

Exhibit CRA-9

Hardbound Catalog, Crane Company
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PLAINTIFF'S
EXHIBIT
CRA-9

CRANE

VALVES - FITTINGS
PIPE AND
FABRICATED PIPING

Founded by R. T. Crane • 1855

CRANE CO.

836 S. Michigan Avenue • Chicago, Illinois

CRANE

Valves • Fittings

Pipe

Fabricated Piping

Catalog No. 41

Founded by R. T. Crane • 1855

CRANE CO.

836 S. Michigan Avenue, Chicago, Illinois

Terms—Conditions

This catalog supersedes all previous issues.

Net Terms—30 days.

Remittances should be made to the office from which our invoice is issued, in funds free of exchange or collection charges.

Prices and Designs: Subject to change without notice.

Contracts: Subject to strikes, accidents, or other causes beyond our control.

No claims allowed unless made within ten days of receipt of goods.

We guarantee Crane goods to the extent that we will replace those having manufacturing defects when used in the service for which we recommend them. No charges for labor or expense required to repair defective goods, or occasioned by them, will be allowed. If the goods are defective, the measure of the damage is the price of the defective goods only.

Goods must not be returned to us unless our consent has first been obtained.

Orders covering special goods are not subject to cancellation, except upon agreement to make payment for the special work which has been performed.

All special goods made to specification, where the buyer is to inspect them, must be inspected and accepted before shipment is made. After shipment is made, our responsibility ceases.

The illustrations in this catalog are an actual representation of a certain size of each line of products, but do not necessarily represent all sizes in all details; we reserve the right to make minor alterations in designs to suit manufacturing convenience.

CRANE CO.

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836 S. Michigan Avenue, Chicago • Cable Address, *Cranecoy—Chicago*

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Keeping Pace with American Industry

Since the middle of the nineteenth century, the development of industrial America is marked by many outstanding achievements. They gave us a standard of living envied by the world. To a great extent, this progress resulted from the ability of men to harness the forces of power.

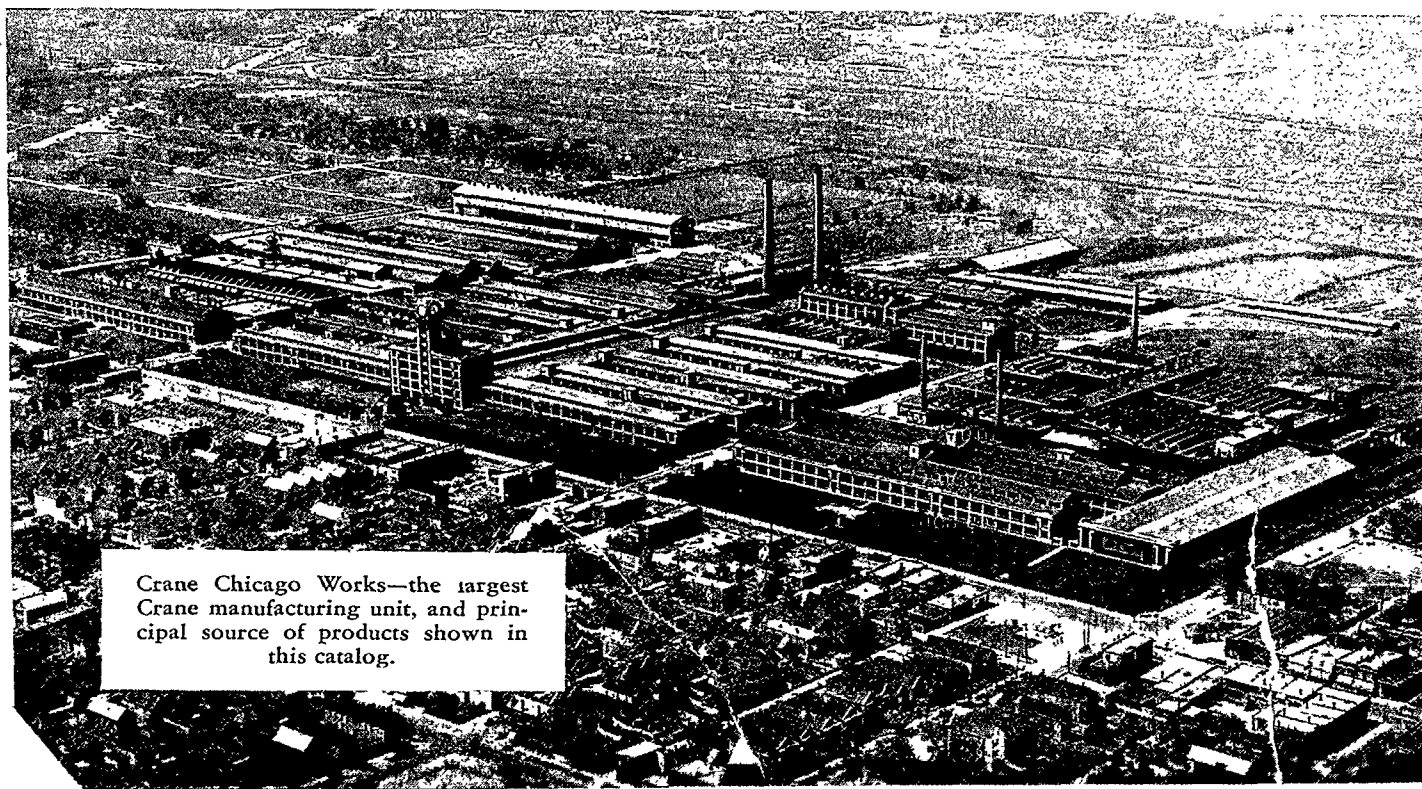
Near the end of this eventful century, the central power station came into being. With it came the knowledge that greater power and economy were obtainable when steam pressures and temperatures were increased. While by comparison with today's steam pressures and temperatures this increase was small, it marked the early commercial use of superheated steam at 250 pounds. This created a demand for new and stronger valves, fittings and piping equipment than were generally available at the time.

Crane Co., by that time, had more than 30 years' experience in the making of piping equipment and thus took an active part in the development of suitable materials for the new requirements. With perhaps the only metallurgist in the industry on its staff, Crane Co. made numerous investigations of the characteristics and behavior of metals in service. Such studies were the basis of improved piping equipment.

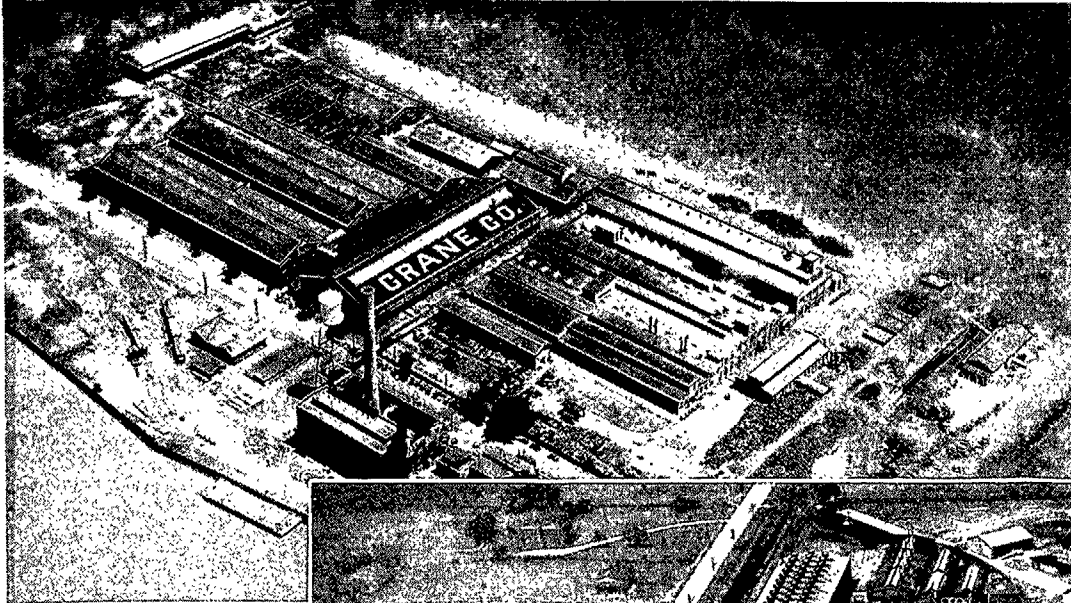
The central station was but one phase of the nation's progress involving piping equipment. With improved power facilities came centralization of population and industry. This created many new problems, among which was that of proper water supply and drainage to provide for the health and comfort of the people. Not only were many new kinds of valves and fittings required, but plumbing fixtures and heating equipment as well. Crane Co. kept steady pace with these needs.

Today the Crane line of valves, fittings, plumbing, heating, and pumps totals more than 40,000 items. Described in this catalog are the piping materials which make up, by far, the greatest part of the complete Crane line. They include equipment of brass, iron, steel, and many alloys for services up to 2500 pounds pressure at 1000°F.

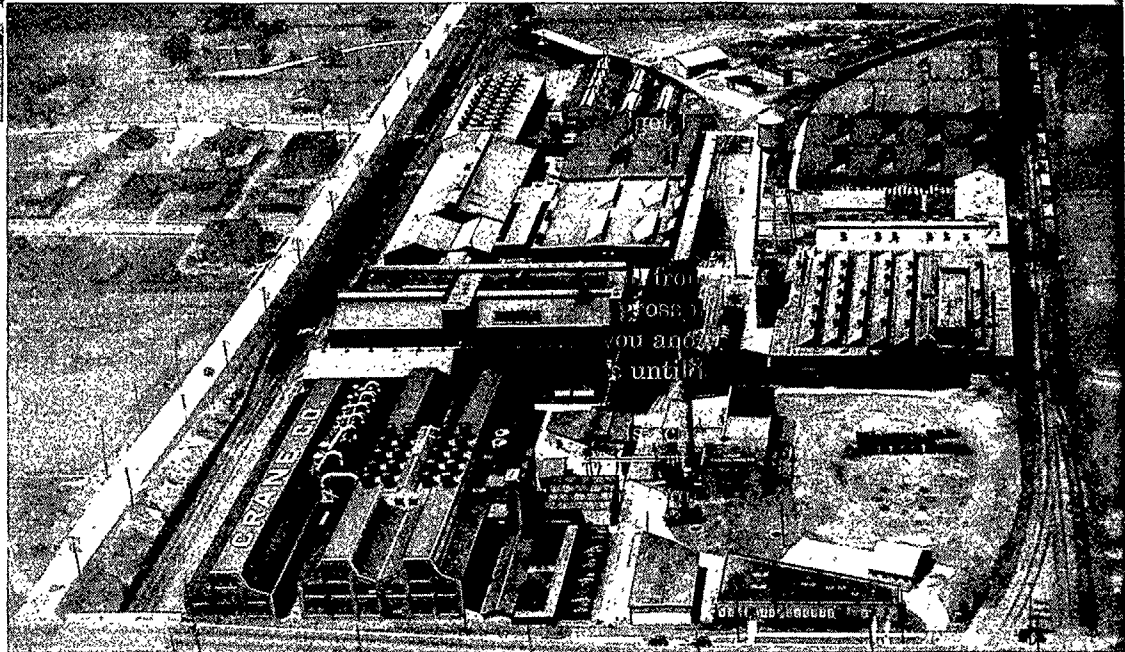
Five big plants in the United States make Crane products—in Chicago, Bridgeport, Chattanooga, Trenton, and North Tonawanda. The largest is the main works in Chicago. On 160 acres of ground, this plant embodies 47 buildings having 3,133,440 sq. ft. of floor space. Here is the greatest array of machinery and equipment especially adapted to the manufacture of valves and fittings in the world. When in Chicago, you are welcome to visit this plant.



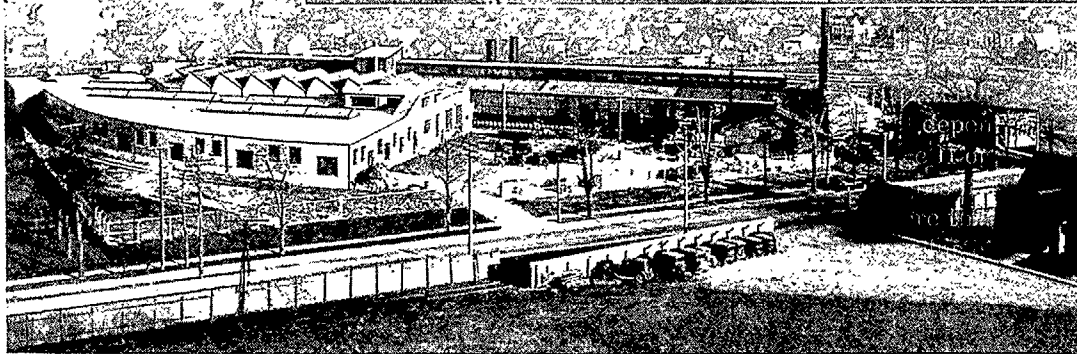
Crane Chicago Works—the largest Crane manufacturing unit, and principal source of products shown in this catalog.



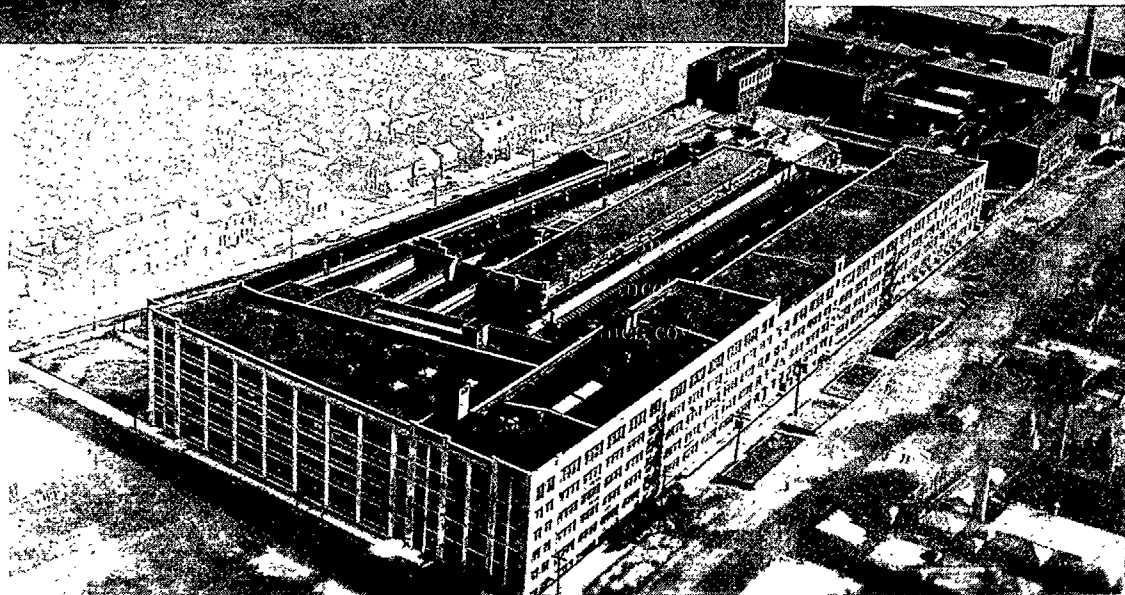
Left—
The Crane plant at
Bridgeport, Conn.



Right—
The Crane plant at
Chattanooga, Tenn.



Left—
The Crane plant at
North Tonawanda, N. Y.



Right—
The Crane plant
at Trenton, N. J.

How Quality is Built into and Maintained in Crane Products

Tests and checks—more tests and checks! At every stage of design and production they safeguard the quality of Crane valves and fittings to assure satisfactory performance in your pipe lines.

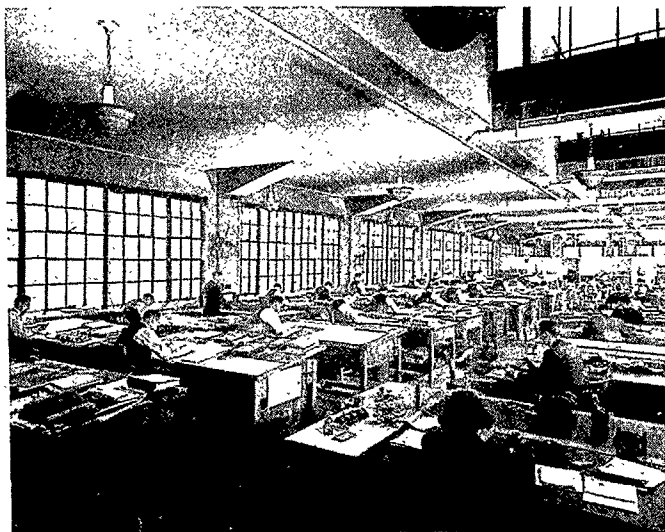
Even before product design is started, Crane Research Laboratories make sure the proposed material is right. By advanced scientific techniques, the chemical composition and physical properties of metals are subjected to grueling investigations. So it is with all raw materials entering Crane plants—none can be used until approved by the laboratory. And again when hot metals are poured, sample bars from each heat are thoroughly analyzed by expert metallurgists.

No valve or fitting becomes a “regular” in the Crane line without the benefit of exhaustive experi-

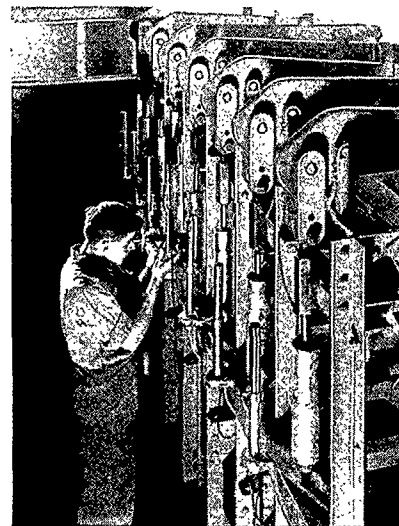
mentation in the laboratory as well as in field applications. Only upon satisfactory completion of such tests is any item approved for production.

No product is ever considered to be beyond improvement. Betterment of design and refinement of materials are constantly being studied.

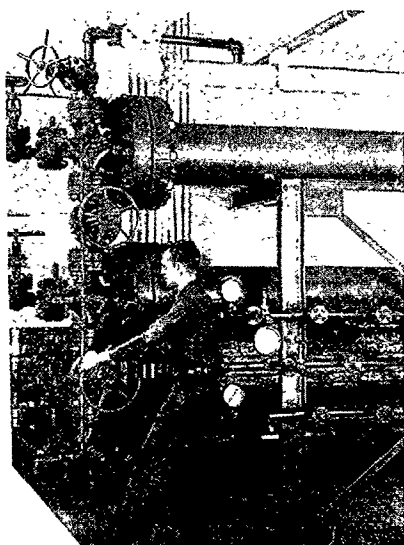
In Crane foundries, machine shops, and assembly departments, no operation is considered completed until careful inspection is made. One is actually amazed at sight of the numerous inspection devices and precision-gauging instruments always in use—over 36,000 of them! Shop tests of finished products are far more exacting than actual service conditions. It is this, the most elaborate and methodical system of checks and tests in the industry, that safeguards Crane Quality—always.



Left—Improvements in Crane products are always in progress in the design engineering division numbering hundreds of men.

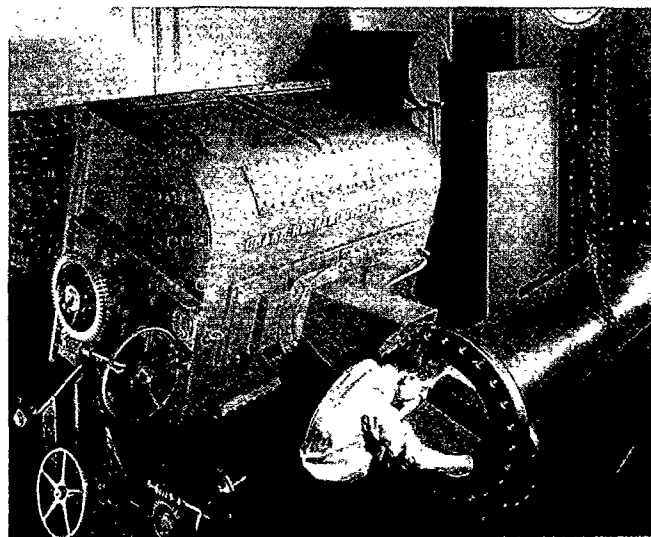


Right—Equipment like this enables thorough study of the actions of metals under stress and elevated temperature.



Left—Safe service recommendations for Crane products are established by thorough pressure testing in the laboratory. Here a relief valve is being tested.

Right—X-Ray examinations are a great help in making better piping materials. This 400,000-volt machine enables Crane engineers to see the inside quality of steel up to 5 inches thick.

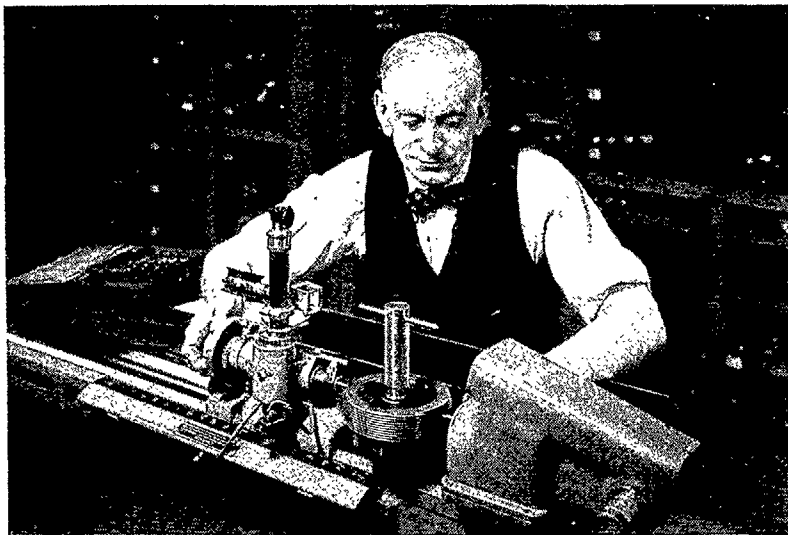




The effects of heat treatment and corrosion on metal structures are clear to the metallurgist when studied under powerful microscopes like this.



Repeated checking of alignment and gauging of threads assure better pipe joints when Crane screwed fittings are used.



Elaborate measuring instruments assure the constant accuracy of over 36,000 gauges regularly used in Crane plants.

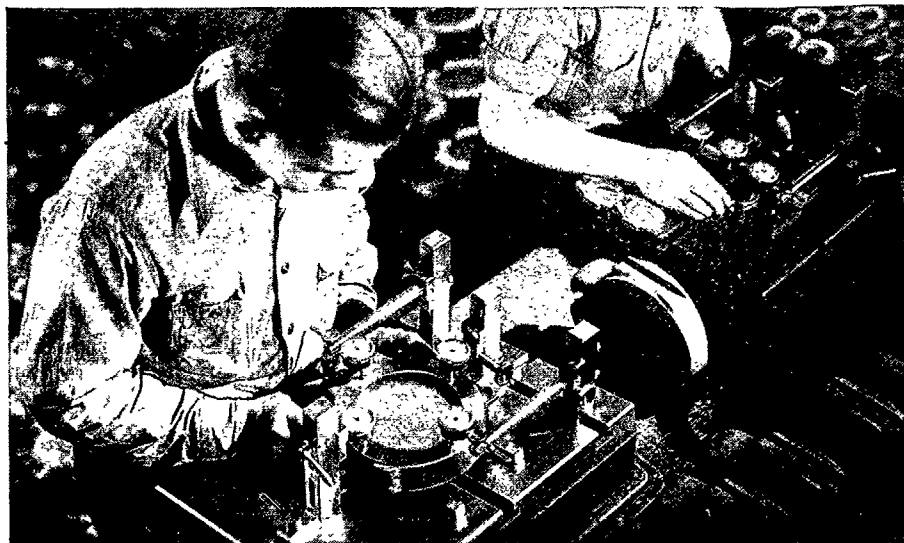


Thickness of their walls must measure up to close limits before castings are machined.

A hydrostatic pressure test is just one of many given all Crane valves before they get a final "O.K."



The exact taper required for positive seating of wedge discs is assured by careful gauging.



Crane Foundries and Shops Are Modern and Completely Equipped

Crane plants are marked by modern facilities, and the attainment of uncommon exactness in the production of so great a variety of products. In equipping Crane plants, the primary objective is always to raise even higher the high standard of Crane craftsmanship.

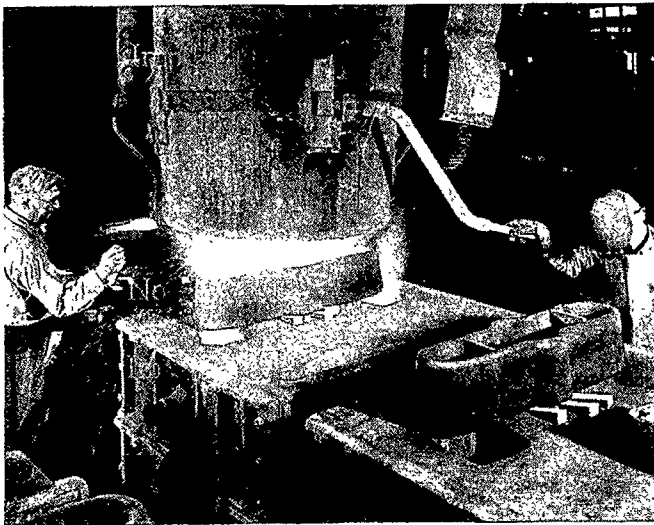
Features aiding uniformity and quality in Crane brass and iron foundries, are the Crane-designed molding machines, automatic mold conveyors and continuous melting furnaces, and the overhead sand tempering and distributing system.

In Crane steel foundries, improved scientific techniques give accurate control of melting and chemical compositions of metals. Here Crane metallurgists produce superior steels, having all the

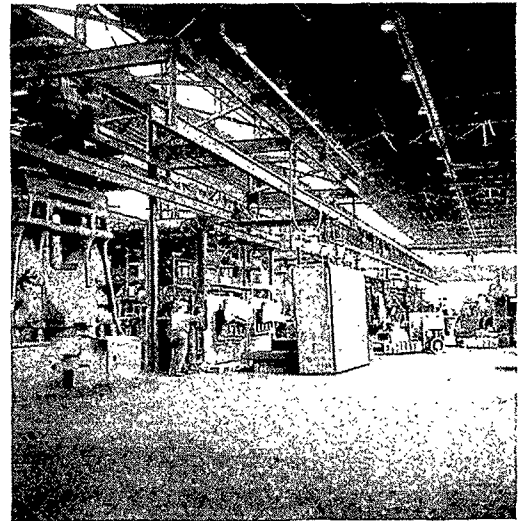
essential properties required for valves and fittings employed in high pressure-temperature power and process lines.

Facing, grinding, boring, threading, tapping, drilling, and lapping of parts are done with every type of automatic and semi-automatic machine. Many are Crane-designed as are the systems by which parts are conveyed to them and on to other processes, or to storage bins and shipping floors.

Equally well equipped are Crane pipe fabricating shops with modern pipe shaping, welding and stress relieving equipment. In the inspection and testing departments, through which all products must pass after each operation, only the most up-to-date and accurate instruments and devices are used.



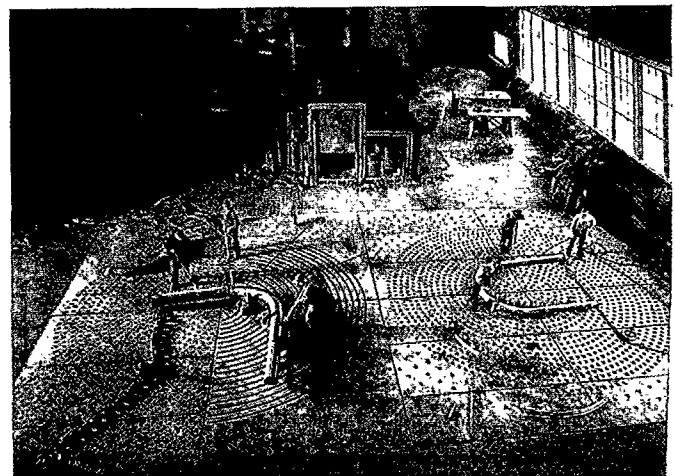
Left—Pouring the molds for large valve parts in the Crane steel foundry at Chicago Works.



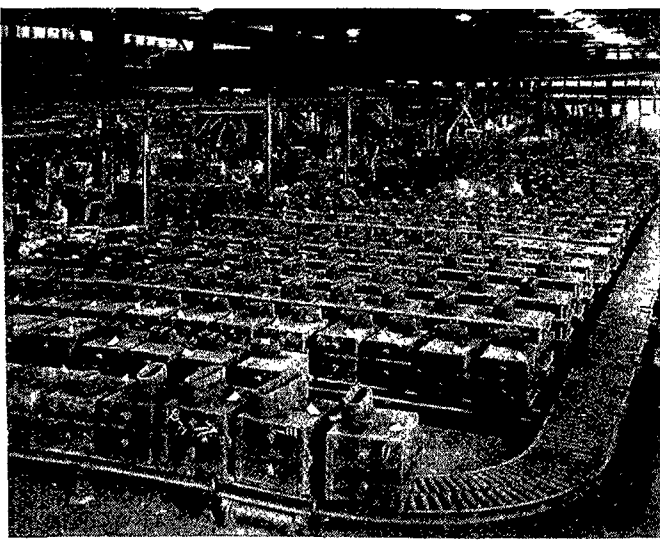
Right—This modern forge shop with numerous hammers along both sides of the aisle produces Crane forged steel materials.



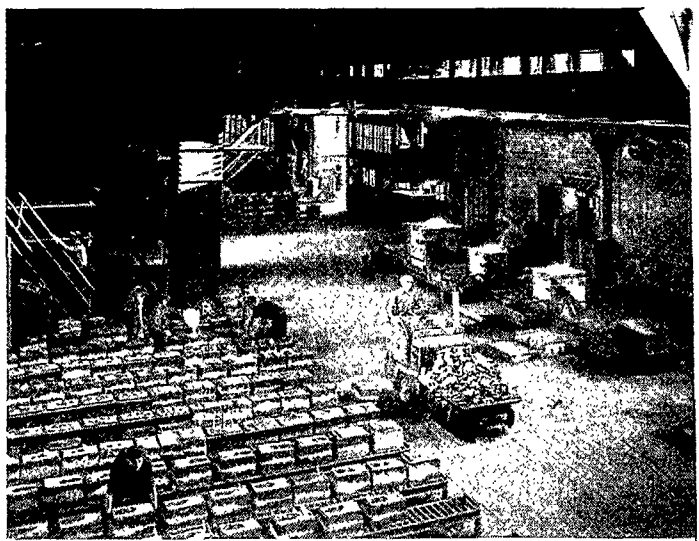
Left—Pouring a heat from one of the electric-arc furnaces in the steel foundry.



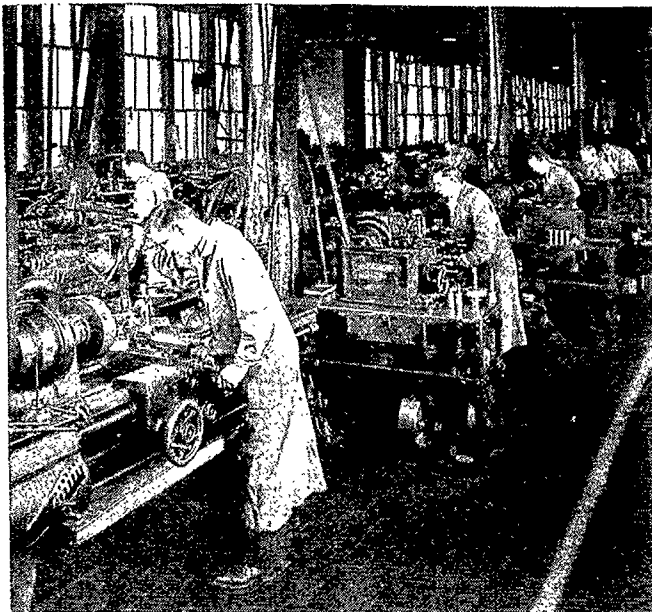
Right—No job is too complex, too large, or too small for Crane pipe fabricating shops.



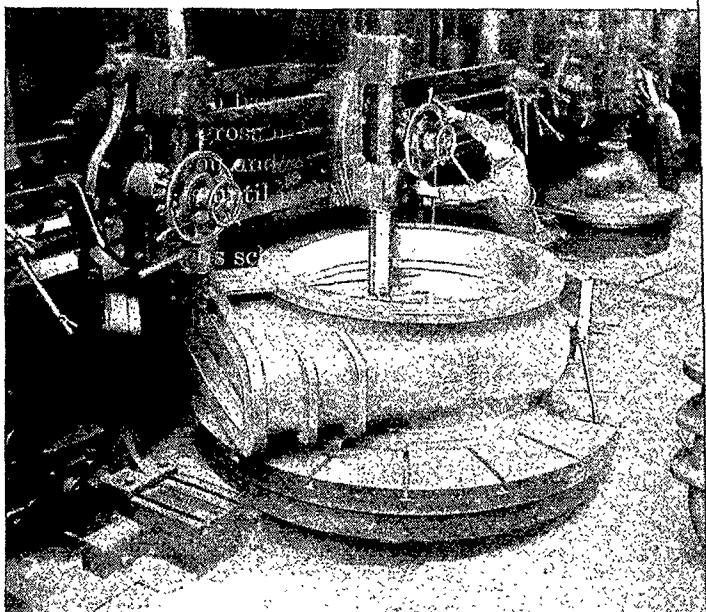
Molding machines and roller conveyors speed production of molds for both small and large castings.



Section of foundry where carbon and alloy steels are melted in high frequency electric induction furnaces.



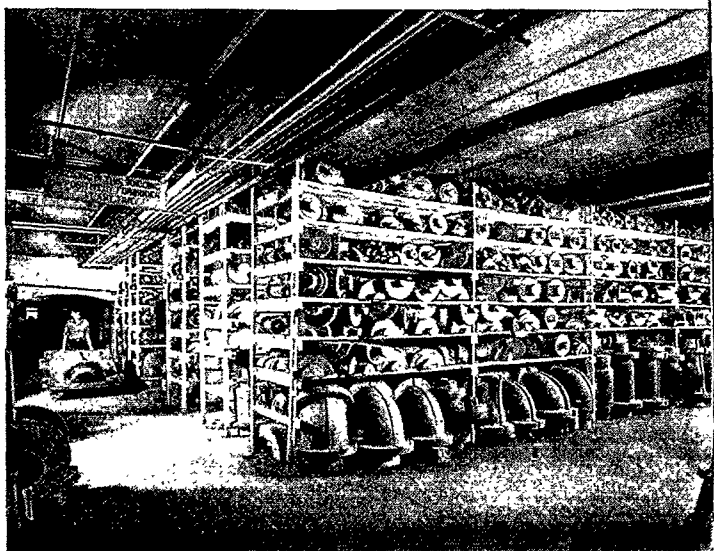
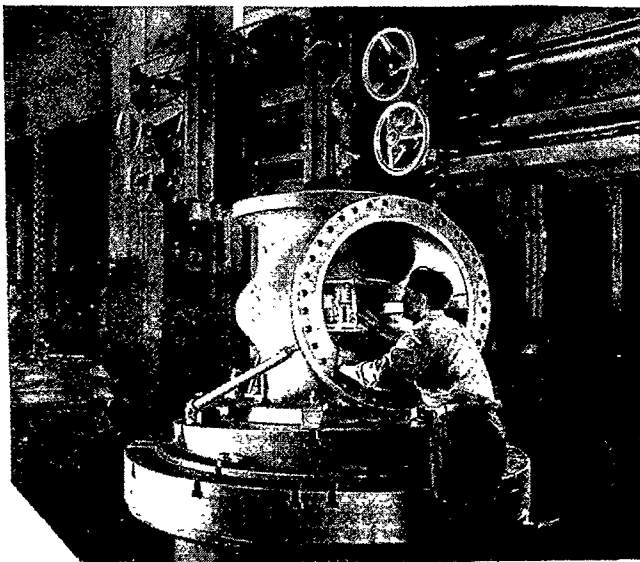
Many thousands of square feet of floor space are required for the multiplicity of machining operations performed.



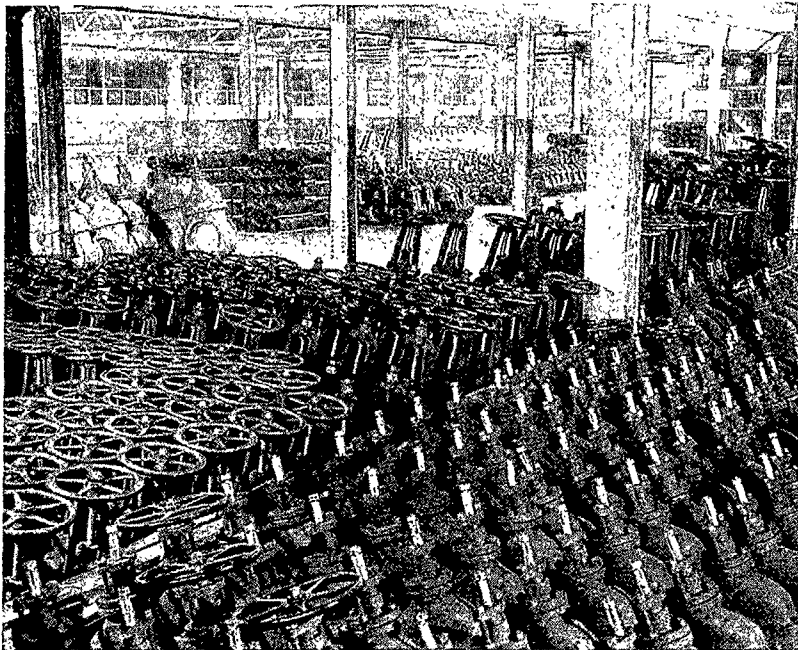
Endless rows of modern machines, big and small, finish the castings and forgings for Crane valves and fittings.

The seating surfaces of all Crane valves are carefully finished with utmost precision.

More amazing than the size of Crane pattern vaults is the "finger-tip" availability of any single pattern.



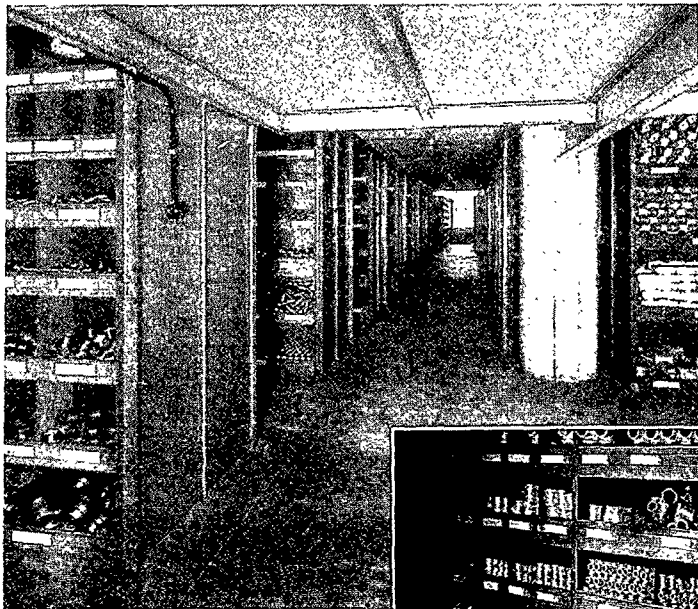
Crane Products Are Available In All Major Industrial Centers



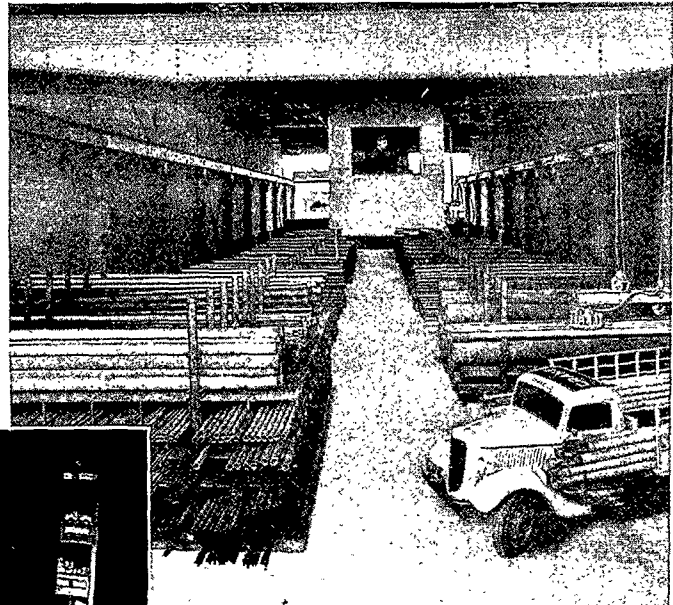
Part of a storage floor in Crane Chicago Works showing wide stock of larger valves ready for shipment.

No matter where you are located, you are near a source of Crane valves and fittings. Patterned to the industrial map of the nation, Crane's extensive distributing and warehousing system of Factory Branches and Wholesalers makes these products conveniently available at the points of their use.

Drawing on the stocks maintained at Crane plants, Branches and Wholesalers carry at all times a substantial assortment of the staple items regularly demanded in the areas they serve. The completeness of the Crane line of piping equipment for every flow-control need, plus the personalized local service offered, gives those who specify "Crane" a two-fold advantage: Crane Quality and Crane Service.



These typical views in a Crane Branch indicate completeness of staple item stocks carried to meet everyday piping demands.



Crane Branches carry adequate pipe stocks for every requirement. Delivery is facilitated by up-to-date storage and loading methods and modern hauling equipment.



Alphabetical Index

All items shown in this catalog are described and cross-indexed alphabetically on this and the following nineteen pages. References under broad classifications to other entries have been replaced by page numbers showing the entire range of products.

For example, under the very general heading of "Brass Valves", group page numbers are shown for each of the various types, but under the specific heading of "Angle Valves, Brass", etc., will be found a detailed listing of the many available types. Similarly, under the general classification of "Fittings", will be found group page numbers, the detailed references being made under specific listings such as, "Elbows", "Tees", "Crosses", "Unions", etc.

A

	Page
A.A.R. Fittings, Screwed, Malleable Iron	193
Union Fittings, Malleable Iron.....	243
Union Fittings, with Steel Tail-Piece.....	244
Unions, Forged Steel.....	244
Unions, Malleable Iron.....	242
Unions, with Steel Tail-Piece.....	244
Valves, Brass, Inside Screw.....	42, 43
Valves, Brass, Outside Screw and Yoke.....	44, 45
Valves, Wrenches for Body Seat Rings.....	45
A.P.I. Line Pipe	580
Ring-Joints.....	562, 563
Thread Data.....	593-595
A.S.A. Standard for Wrought Pipe	584-587
A.W.W.A Iron Body Gate Valves	126, 127
Adapters, Crane-Seal, Brass	495
Solder-Joint.....	505, 508
For Hoffman Venting Valves.....	83
For Sanitary Fittings.....	455
Adjustable Die Stocks	537
Pipe Hangers.....	514-517
Pipe Supports.....	526, 527, 529, 531
Pipe Threaders.....	538-541
Railing Fittings, Malleable Iron.....	271
Adjusters or Turnbuckles	519
Adscos Expansion Joints	428
Air Hoist Three-Way Cocks, Brass	94
Motor Operated Valves.....	172, 173
Pump Unions.....	240, 242, 244
Tested Fittings, Malleable Iron.....	188
Testing of Crane Valves.....	11
Valves, Radiator.....	82, 83
Vent Valves (Traps), Automatic.....	416
All-Iron Ammonia Valves	480-482
Angle Valves.....	144, 145, 150
Check Valves.....	156, 160, 161
Cocks.....	92, 93
Cross Valves.....	150
Expansion Valves.....	482
Flange Unions, Ground Joint.....	251
Gate Valves, Double Disc.....	122-133
Gate Valves, Wedge Disc.....	98-111
Globe Valves.....	144, 145, 150
Liquid Gauges, for Ammonia.....	483
Pulp Stock Valves.....	375
Relief Valves.....	401
Unions, Screwed.....	246
Allowable Stresses for Steel Pipe	636
Alloys, Cast Iron, Properties of	4
Cast Steel, Properties of.....	3, 6, 7
Forged Steel, Properties of.....	8
Non-Ferrous, Properties of.....	2, 3
Used in Fabricated Piping.....	457
Altitude Gauges and Recorders	438, 439
American Standard Taper Pipe Threads	590
Ammonia Combination Elbows	252
Condensers, Atmospheric.....	485
Double Pipe Fittings.....	486, 487
Fittings, Flanged.....	483
Fittings, Screwed.....	190, 191, 483
Flange Unions, Tongue and Groove.....	252
Flange Unions, Boyle.....	484
Flanges.....	484

A

	Page
Ammonia (Cont.)	
Gaskets.....	485
Gauges.....	439
Liquid Gauges.....	483
Return Bends.....	483
Valves, Angle.....	481
Valves, Check.....	482
Valves, Expansion.....	482
Valves, Globe.....	481
Valves, Relief.....	401
Anchor Chair Pipe Supports	529
Anchorage Tees, Flanged	281, 345
Angle Bends	602
Blow-Off Valves.....	376, 377
Check Valves, Brass.....	53-59
Check Valves, Iron Body.....	156, 157
Screw-Down Check Valves, Marine.....	462-473
Stop-Check Valves.....	372-374
Angle Valves, All-Iron	
Ammonia.....	481, 482
Union Bonnet.....	144, 145
Yoke Bonnet.....	150
Angle Valves, Brass	42-45
A.A.R.....	42-45
Bolted Bonnet, 150 and 200-Pound.....	35
Bolted Bonnet, 300-Pound.....	47
Composition Disc, Low Pressure.....	27
Composition Disc, 150-Pound.....	30
Composition Disc, 250-Pound.....	37
Copper Disc, 250-Pound.....	37
Crane-Seal.....	493
Cranoil Disc, for Light Oils and Gases.....	32
Hose.....	71
Lock-Shield, Low Pressure.....	27
Lock-Shield, Radiator Type.....	78-82
Marine.....	462, 463
Names of Parts.....	26
Needle Point.....	29
Outside Screw and Yoke.....	44-47
Plug Type Disc, 150-Pound.....	31
Plug Type Disc, 250-Pound.....	36
Plug Type Disc, 300-Pound.....	40-47
Plug Type Disc, 350-Pound.....	48
Plug Type Disc, 2000-Pound Hydraulic.....	49
Radiator.....	78, 79, 81
Regrinding, 200-Pound.....	34
Regrinding, 300-Pound.....	38, 39
Solder-Joint.....	502, 505
Union End, 300-Pound A.A.R., Inside Screw.....	43
Union End, 300-Pound A.A.R., O. S. & Y.....	45
Union End, 300-Pound Plug Type Disc.....	41
Union End, 300-Pound Regrinding.....	39
With Special Wheels and Finishes.....	27, 28
100-Pound (Low Pressure).....	27
125-Pound (Standard).....	28
150-Pound.....	30, 31, 34, 35
200-Pound.....	34, 35
250-Pound.....	36, 37
300-Pound.....	38-47
350-Pound.....	48
1000-Pound Hydraulic.....	48
2000-Pound Hydraulic.....	49

B

	Page
Bolting On Companion Flanges	557
Bolts, Machine, Data	622, 623
Machine, List Prices	556, 557
Machine, Properties of	9, 622
Bossed Elbows, Sprinkler	207
Boston Casing Threads	594
Boyle Flange Unions	484
Flange Union Gaskets	485
Brackets, Pipe	524, 525
Brass, Properties of	2
Brass Cocks	88, 90, 91, 94
Expansion Joints	426
Faucets, Ground Key	88
Fittings, Crane-Seal	494-497
Fittings, Drainage	215-221
Fittings, Flanged	264
Fittings, Railing	267
Fittings, Screwed	256-263
Fittings, Solder-Joint	506-511
Flange Unions	263
Flanges	264
Floor Flanges	267
Nipples	258
Pipe, Regular and Extra Strong	583
Pipe, Used With Crane-Seal Silbraz Products	498
Stops	88-90
Swing Joints	430
Try Cocks	435
Union Elbows, Screwed	78, 262
Unions, Screwed and Flange	262, 263
Brass Valves	
A.A.R., Globe and Angle	42-45
Angle, Crane-Seal	493
Angle, Hose	71, 467
Angle, Radiator	78, 79, 81
Angle, Screwed and Flanged	25-49
Angle, Solder-Joint	502, 505
Butterfly	69
Check, Crane-Seal	492
Check, Screwed and Flanged	51-63
Check, Solder-Joint	503, 505
Chronometer	476
Crane-Seal	492, 493
Cross, Standard	28
Cross, 200-Pound	34, 35
Cross, 300-Pound	47
Float	380, 381
Foot	53, 54
Gate, Crane-Seal	492
Gate, Hose	70, 467
Gate, Quick Opening	68
Gate, Radiator	80
Gate, Screwed and Flanged	13-24
Gate, Solder-Joint	504, 505
Globe, Crane-Seal	493
Globe, Hose	71, 467
Globe, Quick Opening	33, 66, 67
Globe, Radiator	78, 81
Globe, Screwed and Flanged	25-50
Globe, Solder-Joint	502, 505
Hose	70, 71
Hose, for Marine Service	467
Marine	462-467
Pop Safety	384, 385, 388
Radiator	77-84
Relief	394-400
Safety	384-388, 393
Throttle	69
Whistle	67
Brazing Valves and Fittings, Crane-Seal	489-497
Brine Cocks	88
Coolers, Fittings for	486, 487
British Standard Taper Pipe Threads	591
Bronze, Crane Hard Metal, Properties of	2
Crane Special Brass, Properties of	2
Manganese, Properties of	2
Silicon, Properties of	2
Silicon, Valves, Fittings, Unions, Etc.	446-453
Brushes, Flue	545
Bundling Schedule for Pipe	578

B

	Page
Bushings, Brass	259
Cast Iron	226
Chrome-Nickel-Moly. (18-8 Mo)	452
Crane-Seal	495
Double Tapped, Iron	226
Eccentric, Iron	226
Face, Brass	259
Face, Iron	226
Face, Steel	227
Hose	75
Malleable Iron	226
Monel	452
Nickel	452
Silicon Bronze	452
Solder-Joint	508
Steel	227
Butt Nipples, Wrought Steel	230, 231
Welds	614
Welds, Detail of Bevel	647
Butt-Welding Fittings, Steel	354-356
Fittings, Steel, American Standard for	351
Fittings, Steel, Dimensions of	357
Fittings, Steel, Ratings for	358, 359
Fittings, Wrought Iron	351
Valves, Cast Steel, Angle, 150 to 2500-Pound	322-326
Valves, Cast Steel, Check, 150 to 2500-Pound	333-336
Valves, Cast Steel, Gate, 150 to 2500-Pound	302-307
Valves, Cast Steel, Globe, 150 to 2500-Pound	322-326
Valves, Forged Steel, Angle, 900-Pound	316-318
Valves, Forged Steel, Check, 900-Pound	330
Valves, Forged Steel, Gate, 900-Pound	300
Valves, Forged Steel, Globe, 900-Pound	316-318
Butterfly Valves, Brass	69
Valves, Iron Body	148
By-Passes for Cast Steel Wedge Gate Valves	306
For Iron Body Double Disc Gate Valves	138
For Iron Body Wedge Disc Gate Valves	114
For Valves, Location of	646

C

	Page
"CC" Rubber Gaskets	566, 567, 570, 571
Rubber Sheet Packing	565
Cab Hose Valves	39, 41
California D.B.X. and D.B.8 Casing Threads	594
Canvas Gaskets, Ammonia	485
Gaskets, 25 and 125-Pound Cast Iron	566
Caps, A.A.R.	193
Butt-Welding, Steel	354
Crane-Seal, Brass	495, 496
Hose	70, 71, 75
Screwed, Brass, Standard	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron	201
Screwed, Chrome-Nickel-Moly. (18-8 Mo)	452
Screwed, Forged Steel	339
Screwed, Malleable Iron, Standard	185
Screwed, Malleable Iron, 300-Pound	190, 193
Screwed, Monel	452
Screwed, Nickel	452
Screwed, Silicon Bronze	452
Socket-Welding, Forged Steel	353
Solder-Joint, Brass	508
Thermometer, for Sanitary Fittings	455
Car Heater Wrought Couplings	229
Carbon Cast Steel, Properties of	6
Forged Steel, Properties of	8
Molybdenum Alloy Cast Steel, Properties of	6
Molybdenum Alloy Forged Steel, Properties of	8
Casing, Inserted Joint	582
Merchant	581
Casing Thread Fittings, Cast Iron	203
Fittings, Cast Steel	341
Fittings, Heavy Malleable Iron	192
Fittings, Refinery Oil	189
Fittings, Threading of	596
Wrought Couplings	229

C

C

	Page
Casing Threads, Dimensions and Data	593-596
Cast Iron, Alloy, Properties of	4
High Tensile, Properties of	4
Ni-Resist, Properties of	4
Properties of	4
Cast Iron Blow-Off Crosses	376
Bushings	226
Cocks	92-95
Drainage Fittings	215-224
Drip Pockets	421
Expansion Joints	427, 428
Fittings, Drainage	215-224
Fittings, Flanged, 125-Pound	273-280
Fittings, Flanged, 250-Pound	282-288
Fittings, Flanged, Sprinkler Type	206-209, 274
Fittings, Screwed	195, 213
Fittings, Screwed, Drainage	215-224
Fittings, Screwed, Sprinkler	197, 206-209
Flange Unions	249
Flanges	289-295
Plugs	228
Separators, Sediment	422, 423
Separators, Steam and Oil	420, 421
Sprinkler Fittings	197, 206-209, 274
Steam Traps	415-419
Swing Joints	430
Water Columns	436
Cast Iron Valves	
Angle	143-153
Back Pressure	378, 379
Butterfly	148
Check	155-166
Cross	149-153
Exhaust Relief	378, 379
Float	380, 381
Foot	162, 163
Gate, Double Disc	119-137
Gate, Wedge Disc	97-113
Globe	143-153
Pop Safety	389, 390, 392
Pulp Stock	375
Relief	401, 402, 404, 406
Safety, Lever and Weight Type	393
Swing Check	160, 161, 164
Throttle	148
Cast Manganese Bronze, Properties of	2
Cast Steel Fittings, Flanged	343-350
Fittings, Screwed	341
Steam Traps	416
Valves, Angle	322-326
Valves, Blow-Off	377
Valves, Check	329, 332-336
Valves, Gate	299, 302-307
Valves, Globe	311, 322-326
Valves, Relief	403, 405, 406
Valves, Safety	391, 392
Valves, Stop-Check	373, 374
Cast Steels	
Alloy and Carbon, Properties of	3, 6, 7
Arctic Nickel, Properties of	7
Carbon, Properties of	6
Carbon-Molybdenum, Properties of	6
Chrome-Molybdenum, Properties of	7
Chrome-Nickel-Moly. (18-8 Mo), Properties of	3
Nickel, Properties of	7
Nickel-Chrome, Properties of	7
Ceiling and Floor Plates	532
Centigrade-Fahrenheit Temperature Conversion	663
Chain and Lever Try Cocks	435
Pipe Tongs	544
Pipe Vises	536
Wheels for Valves	176
Chains for Chain Wheels	176
Chairs, Anchor and Pipe	529
Chandelier Hooks and Loops, Malleable Iron	186
Channel Clamps for Pipe Hangers	522
Check Valves, All-Iron	
Ammonia	482
Swing, Bolted Cap	160, 161
Swing, 400-Pound W.O.G.	156

Check Valves, Brass

	Page
Angle, Bolted Cap, 150 and 200-Pound	58
Angle, Composition Disc, 150-Pound	56
Angle, Composition Disc, 250-Pound	59
Angle, Nickel Alloy Disc	59
Angle, Regrinding	57-59
Angle, 100-Pound (Low Pressure)	53
Angle, 125-Pound (Standard)	54
Angle, 150-Pound	56, 58
Angle, 200-Pound	57, 58
Angle, 250-Pound	59
Angle Swing	57
Crane-Seal	492
Gasoline	53
Horizontal, Ball Disc	56
Horizontal, Bolted Cap, 150 and 200-Pound	58
Horizontal, Bolted Cap, 300-Pound	61
Horizontal, Bolted Cap, 2500-Pound Hydraulic	63
Horizontal, Composition Disc, Low Pressure	53
Horizontal, Composition Disc, 150-Pound	56
Horizontal, Composition Disc, 250-Pound	59
Horizontal, Crane-Seal	492
Horizontal, Dashpot Type	60-62
Horizontal, Nickel Alloy Disc	59
Horizontal, Regrinding	57-62
Horizontal, Solder-Joint	503, 505
Horizontal, With Drip Cock	54
Horizontal, 100-Pound (Low Pressure)	53
Horizontal, 125-Pound (Standard)	54
Horizontal, 150-Pound	56, 58
Horizontal, 200-Pound	57, 58
Horizontal, 250-Pound	59
Horizontal, 300-Pound	60, 61
Horizontal, 350-Pound	62
Horizontal, 1000, 2000, and 2500-Pound Hydraulic	63
Marine	464, 465
Names of Parts	52
Solder-Joint	503, 505
Swing, Bolted Cap, 150 and 200-Pound	58
Swing, Bolted Cap, 300-Pound	61
Swing, Crane-Seal	492
Swing, Regrinding, 200-Pound	57
Swing, Regrinding, 200-Pound, with Bolted Cap	58
Swing, Regrinding, 300-Pound	60
Swing, Regrinding, 300-Pound, with Bolted Cap	61
Swing, Regrinding, 350-Pound	62
Swing, Solder-Joint	503, 507
Swing, 125-Pound (Standard)	55
Swing, 150 and 200-Pound	57, 58
Swing, 300-Pound	60, 61
Swing, 350-Pound	62
Vertical, Gasoline	53
Vertical, 125-Pound (Standard)	54
Check Valves, Cast Steel	
Swing, Marine	471-473, 475
Swing, With Lever and Weight	336
Swing, 150 to 2500-Pound	333-336
Swing, 4000-Pound	350
Vertical	329
Check Valves, Corrosion-Resistant Alloy	
Chrome-Nickel-Moly. (18-8 Mo)	449, 451
Monel	449, 451
Nickel	449, 451
Silicon Bronze	449, 451
Check Valves, Ferrosteel	
Ammonia	482
Swing, 250-Pound	165
Swing, 800-Pound Hydraulic	166
Check Valves, Forged Steel	
Horizontal, 600-Pound	328-330
Horizontal, 900-Pound	330
Horizontal, 6000-Pound Hydraulic	331
Marine	475
Check Valves, Iron Body	
All-Iron, Standard	160, 161
All-Iron, 400-Pound W.O.G.	156
Angle, 150-Pound	156
Clearway, Swing	164
Composition, Disc, 150-Pound	156
For Gasoline and Pump Service	157

C

C

1

	Page
Check Valves, Iron Body (Cont.)	
Horizontal, Standard	159
Horizontal, 150-Pound	156
Marine	469
Swing, Clearway, Underwriters'	164
Swing, Hub End	160, 161
Swing, Marine	469
Swing, With By-Pass	160, 161
Swing, With Leather Faced Disc	160, 161
Swing, With Lever and Weight	163
Swing, 125-Pound (Standard)	160, 161
Swing, 250-Pound	165
Swing, 400-Pound W.O.G.	156
Swing, 800-Pound Hydraulic	166
Vertical, Standard	159
Check Valves, Malleable Iron, Swing	156
Check Valves (General)	
Ammonia, All-Iron	482
Butt-Welding	330, 333-336
Crane-Seal, Brass	492
Gasoline	53, 157
Marine	464, 465, 469-475
Socket-Welding	328, 329
Pump Service	157
Solder-Joint, Brass	503, 505
Chicago Hose Valves	71
Unions, Malleable Iron	239
Chiksan Ball Bearing Swing Joints	432
Chime Whistles	437
Chlorine, Globe and Angle Valves for	457
Chrome-Molybdenum Alloy Cast Steel, Properties of	7
Alloy Forged Steel, Properties of	8
Chrome-Nickel-Molybdenum (18-8 Mo) Alloy Steel, Properties of	3
Fittings, Flanges, and Unions	452-455
Valves, Angle, Check, Gate, and Globe	446-449
Valves, Bar Stock	310
Valves, Relief	450
Valves, Sanitary	454
Valves, Special Types	451
Chromometer Valves, Brass	476
Circle Bends	602
Circulating Boiler Fittings	187, 509
Clamp Gate Valves, Iron Body	98, 99
Clamps, Channel	522
Double Strap	233
Hose	74
Hydrant	89
I-Beam	522-524
Pipe, for Pipe Hangers	519
Riser	519
Single Strap	233
Water Pipe	233
Clayton Float Valves	381
Cleanouts, for Iron Body Double Disc Gate Valves	138
For Iron Body Wedge Disc Gate Valves	114
Clearway Swing Check Valves, Iron Body	164
Clevis Pipe Hangers	514
Clip Type Pipe Hangers	514
Clips, Bracket	525
Closet Elbows, Drainage	217
Tees, Drainage	218
Cock Wrenches	95, 96
Cocks, Brass	
Bibb (Faucets)	88
Brine	88
Corporation	89
Cylinder	90
Four-Way, Spring Loaded	94
Four-Way, Standard	91
Gas	90
Gauge	90
Hydrant	89
Pet.	90
Reversible	88
Spring Loaded	94
Three-Way, Spring Loaded	94
Three-Way, Standard	91
Try	435
125-Pound and 250-Pound	91

Cocks, Iron	
All-Iron	92, 93
Asbestos Packed	95
Essex Lock	93
Four-Way, Spring Loaded	94
Gas Line	93
Heavy Duty	93
Lock	93
Mine, Spring Loaded	94
Three-Way	92
125-Pound (Standard)	92, 93
Code For Pressure Piping	
Excerpts from (Pipe Hangers & Supports)	534
Excerpts from (Threaded End Pipe)	634
Pipe Calculations Based on	635-637
Pipe Design Formula	635
Ratings Based on	358, 359
Coils, Pipe	618
Columns, Water	436
Combination Elbows, Forged Steel	252
Pipe Vises	536
Common Flanges, Cast Iron	290
Companion Flanges, Bolting on	557
Brass	264
Chrome-Nickel-Moly. (18-8 Mo)	453
Crane-Seal	495
Forged Steel	361-367
Iron	291-295
Monel	453
Nickel	453
Silicon Bronze	453
Solder-Joint	510
Composition Discs	178
Compound Gauges and Recorders	438, 439
Concentric Reducers, Butt-Welding	355
Condensers, Atmospheric Ammonia	485
Conversion, General	658
Linear	658-662
Pressure	658, 664
Temperature	663
Weight	658, 664
Copper Discs for Valves	37
Expansion Joints	424, 425
Gaskets, Corrugated	567-570
Pipe	498, 583
Straps	511
Tubing Bends	510
Tubing for Crane-Seal Products	498
Tubing for Solder-Joint Products	512
Tubing, Expansion Due to Temperature Changes	510
Tubing, Tools and Straps for	511
Corner Radiator Valves	78, 79
Corporation Stops, Brass	89
Corrosion-Resistant Alloy Fittings and Valves	
Alloy Cast Iron (Valves only)	456
Chlorine (Valves only)	457
Chrome-Nickel-Moly. (18-8 Mo)	443-455
Monel	443-453
Nickel	443-453
Rubber Lined	451
Silicon Bronze	443-453
Sanitary	454, 455
Corrosive Fluids, Metals Recommended for	443-445
Corrugated Expansion Joints	425
Gaskets for Flanged Joints	567-570
Countersunk Plugs, Brass	259
Plugs, Iron	228
Couplings, A.A.R., Malleable Iron	193
Brass, Crane-Seal	495, 496
Brass, Hose	73
Brass, Solder-Joint	508
Brass, Standard	256, 257
Brass, 250-Pound	260
Cast Iron, Drainage	221
Cast Iron, 250-Pound	212
Chrome-Nickel-Moly. (18-8 Mo)	452
Chrome-Nickel-Moly. (18-8 Mo), Sanitary	455
Circulating Boiler, Malleable Iron	187
Circulating Boiler, Solder-Joint	509
Crane-Seal, Brass	495, 496

C
Couplings (Cont.)

	Page
Dayton	433
Drainage	221
Faced	232
Forged Steel, Screwed, 3000-Pound W.O.G.	339
Forged Steel, Screwed, 6000-Pound W.O.G.	340
Forged Steel, Socket-Welding	353
Hose	73
Malleable Iron, Circulating Boiler	187
Malleable Iron, Dayton	433
Malleable Iron, Drainage	221
Malleable Iron, Faced	232
Malleable Iron, Standard	185
Malleable Iron, 300-Pound	190, 193
Monel	452
Nickel	452
Pipe Hanger	518
Sanitary, Stainless Steel	455
Silicon Bronze	452
Socket-Welding	353
Solder-Joint	508
Welded on	614
Wood Rod	89
Wrought Steel, Extra Heavy	229
Wrought Steel, XX Hydraulic	229
Wrought Steel, Car Heater	229
Wrought Steel, Casing Thread	229
Wrought Steel, Half	229
Wrought Steel, for Large O.D. Pipe	229
Wrought Steel, Standard	229
Covering, Pipe	546, 547
Crane-Hulbert Drainage Fittings	224
Crane-Special Brass, Properties of	2
Cranelap Flanges, Forged Steel, 150 to 2500-Lb.	361-367
Joints, Available Sizes and Types	610
Joints, Description	605-609
Joints, Dimensions	608
Joints, Finishes for Faces	613
Welding Nipples, Steel	355
Crane-Seal Brass Valves and Fittings	489-497
Cranetilt Steam Traps, Non-Return	418
Steam Traps, Three-Valve Lifting	419
Cranite Composition Discs for Valves	178
Gaskets	566-571
Gaskets, for Ammonia	485
Sheet Packing, Asbestos Composition	565
Cranoil Discs for Valves	32, 178
Crosby Gauges and Recorders	438, 439
Relief Valves	406, 407
Safety Valves	392
Cross Valves	
Brass, Bolted Bonnet	35, 47
Brass, Regrinding	34
Brass, (Standard)	28
Brass, 150 and 200-Pound	34, 35
Brass, 300-Pound	47
Ferrosteeel, 175 and 250-Pound	152, 153
Iron Body, Composition Disc	151
Iron Body, Yoke Bonnet, 125, 175, & 250-Pound	150-153
Main Injection	476
Marine	462, 463, 469
Crosses	
A.A.R., Malleable Iron	193
Blow-Off, Cast Iron	376
Butt-Welding, Steel	354
Crane-Seal, Brass	494, 496
Flanged, Brass	264
Flanged, Cast Iron, Sprinkler	206, 274
Flanged, Cast Iron, 125-Pound	280
Flanged, Cast Iron, 250-Pound	288
Flanged, Cast Steel, 150 to 2500-Pound	345-347
Sanitary, Stainless Steel	455
Screwed, Brass, 125-Pound	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron, Long Sweep	204, 205
Screwed, Cast Iron, Sprinkler	197, 206
Screwed, Cast Iron, 125-Pound	200
Screwed, Cast Iron, 175-Pound	210, 211
Screwed, Cast Iron, 250-Pound	212
Screwed, Cast Steel	341

Crosses (Cont.)

	Page
Screwed, Chrome-Nickel-Moly. (18-8 Mo)	452, 45
Screwed, Forged Steel, 3000-Pound W.O.G.	33
Screwed, Forged Steel, 6000-Pound W.O.G.	34
Screwed, Forged Steel, 9000-Pound W.O.G.	34
Screwed, Malleable Iron, Heavy	19
Screwed, Malleable Iron, Hydraulic	19
Screwed, Malleable Iron, Refinery Oil	18
Screwed, Malleable Iron, Standard	183, 18
Screwed, Malleable Iron, 300-Pound	190, 19
Screwed, Monel	45
Screwed, Nickel	45
Screwed, Silicon Bronze	45
Solder-Joint, Brass	50
Sprinkler, Cast Iron, Flanged	206, 27
Sprinkler, Cast Iron, Screwed	197, 20
Crossover Bends	60
Tees	18
Crossovers, Screwed, Brass	256, 25
Screwed, Malleable Iron	18
Solder-Joint, Brass	50
Cups, Grease	44
Cutters, Glass Tube	43
Pipe	54
Tubing	54
Cylinder Cocks, Brass	9
Operated Valves	17

D

	Page
Dayton Couplings	43
Dead Weight Testers	43
Deflection of Horizontal Pipe Lines	64
Detroit Lubricators	44
Die Stocks, Armstrong	53
Beaver	54
Nye	53
Toledo	538, 53
Discharge Valves, Overboard	47
Disc Holders	
For Brass Check Valves, Low Pressure	5
For Brass Check Valves, 150-Pound	5
For Brass Check Valves, 250-Pound	5
For Brass Check Valves, Solder-Joint	50
For Brass Globe and Angle Valves, Low Pressure	2
For Brass Globe and Angle Valves, 150-Pound	3
For Brass Globe and Angle Valves, 250-Pound	3
For Brass Globe and Angle Valves, Cranoil Disc	3
For Brass Globe and Angle Valves, Solder-Joint	50
Discs, Composition	17
Copper	37, 17
Cranite	17
Cranoil	32, 17
Gasoline	17
Double Branch Elbows, Cast Iron, Flanged, 125-Lb.	27
Branch Elbows, Cast Iron, Flanged, 250-Pound	28
Branch Elbows, Cast Iron, Long Sweep	204, 20
Extra Strong Pipe	57
Hammer Lug Unions	24
Offset U-Bends	602, 60
Pipe Fittings	486, 48
Pipe Heat Exchangers	61
Strap Clamps	23
Sweep Tees, Cast Iron, Flanged, 125-Pound	278, 27
Sweep Tees, Cast Iron, Flanged, 250-Pound	286, 28
Sweep Tees, Cast Iron, Long Sweep	204, 20
Tapped Bushings, Iron	22
Thickness Cranelap Joints	60
Y-Branched, Drainage	218-22
Drain Tappings on Flanged Fittings, Location of	64
Tees, Sprinkler	20
Drainage	
Fittings, Brass	215-22
Fittings, Cast Iron	215-22
Fittings, Crane-Hulbert, for Wall Closets	22
Fittings, Malleable Iron	215-22
Fittings, Solder-Joint, Brass	51

D

	Page
Drill Pipe Threads, A.P.I.	595
Drilling Templates	
150-Pound Brass	550
250-Pound Brass	550
300-Pound Brass	550
25-Pound Cast Iron	551
125-Pound Cast Iron	551
250-Pound Cast Iron	552
800-Pound Hydraulic Cast Iron	552
150-Pound Steel	553
300-Pound Steel	553
400-Pound Steel	554
600-Pound Steel	554
900-Pound Steel	554
1500-Pound Steel	555
2500-Pound Steel	555
Drip Pan Elbows, Cast Iron	391
Pockets, Cast Iron	421
Tees, Sprinkler	209
Drive Pipe Threads	595
Drop Elbows, Brass	256, 257
Elbows, Malleable Iron	186
Elbows, Solder-Joint	509
Tees, Brass	256, 257
Tees, Malleable Iron	186
Tees, Solder-Joint	509

E

	Page
Eccentric Bushings, Iron	226
Flanges, Cast Iron	293, 295
Reducers, Butt-Welding, Steel	355
Reducers, Flanged, Cast Iron, 125-Pound	277
Reducers, Flanged, Cast Iron, 250-Pound	285
Reducers, Flanged, Cast Steel, 150 to 1500-Pound	345
Reducers, Screwed, Cast Iron	201
Tees, Cast Iron, Screwed	198
Ejectors	441, 442
Elasticity Modulus of Pipe	641
Elbows	
A.A.R.	193
Ammonia	190, 483
Butt-Welding, Steel	354
Circulating Boiler Type	187, 509
Combination	252
Crane-Seal, Brass, 150 and 300-Pound	494, 496
Drip Pan, for Safety Valves	391
Flanged, Brass	264
Flanged, Cast Iron, Sprinkler	206-209, 274
Flanged, Cast Iron, 125-Pound	276, 277
Flanged, Cast Iron, 250-Pound	284, 285
Flanged, Cast Steel, 150 to 2500-Pound	345-349
Flanged, Chrome-Nickel-Moly. (18-8 Mo)	453
Flanged, Monel	453
Flanged, Nickel	453
Flanged, Silicon Bronze	453
Pressure Drop in	629
Screwed, Brass, 125-Pound	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron, Drainage	216, 217
Screwed, Cast Iron, Long Sweep	204
Screwed, Cast Iron, Sprinkler	197, 206-209
Screwed, Cast Iron, 125-Pound (Standard)	198
Screwed, Cast Iron, 175-Pound	210, 211
Screwed, Cast Iron, 250-Pound	212, 213
Screwed, Cast Steel	341
Screwed, Chrome-Nickel-Moly. (18-8 Mo)	452, 455
Screwed, Forged Steel, 2000 to 9000-Pound W.O.G.	338-340
Screwed, Malleable Iron, A.A.R.	193
Screwed, Malleable Iron, Heavy	192
Screwed, Malleable Iron, Hydraulic	194
Screwed, Malleable Iron, Refinery Oil	189
Screwed, Malleable Iron, Standard	181, 186
Screwed, Malleable Iron, 300-Pound	190, 191, 193
Screwed, Monel	452
Screwed, Nickel	452
Screwed, Silicon Bronze	452

E

	Page
Elbows (Cont.)	
Socket-Welding, Forged Steel	353
Solder-Joint, Brass	507, 509, 511
Sprinkler, Cast Iron	197, 206-209, 274
Stainless Steel Sanitary	455
Union, A.A.R.	243, 244
Union, Crane-Seal	497
Union, Radiator, Screwed	78
Union, Screwed, Brass	262
Union, Screwed, Malleable Iron, 150-Pound	238, 239
Union, Screwed, Malleable Iron, 200-Pound	241
Union, Screwed, Malleable Iron, 300-Pound	243, 244
Union, Solder-Joint	505, 509
Electric Motor Operated Valves	172, 173
Enclosure Railing Fittings, Malleable Iron	271
Engineering Data	621-667
Essex Lock Cocks	93
Exelloy, Properties of	3
Exelloy Globe and Angle Valves, Bar Stock	310
Exhaust Heads, Cast Iron	424
Relief Valves, Iron Body	378, 379
Expansion	
Of Copper Tubing	510
Of Liquids, Increase in Pressure Due to	11
Of Pipe, Due to Temperature Changes	426
Of Pipe, Thermal	641
Expansion Hook Plates	532
Joints, Brass	426
Joints, Copper	424, 425
Joints, Iron Body	427, 428
Joints, Rubber	425
Joints, Steel Body	428
U-Bends, Copper Tubing	510
U-Bends, Standard Types	602, 603
Valves, Ammonia	482
Extension Bars, Perforated	519
Eye Bolts, for Pipe Hangers	523
Pieces, Brass	256, 257
Pieces, Malleable Iron	186
Pipe or Riser Clamps	519
Stems for Valves	169
Extra Heavy Wrought Couplings	229
Strong Pipe	576
Eye Bolts, Extension, for Pipe Hangers	523

F

	Page
Fabricated Piping	597-619
Face Bushings, Brass	259
Bushings, Iron	226
Bushings, Steel	227
Faced Couplings, Malleable and Wrought Iron	232
Locknuts, Malleable and Wrought Iron	232
Facings, Male, Female, T. and G., Dimensions	560, 561
Ring Joint, Dimensions	562, 563
Facings and Finishes for Flanges, Description	612, 613
Fahrenheit-Centigrade Temperature Conversion	663
Faucets, Ground Key, Brass	88
Female and Male Facings for Flanged Products	560, 561
Ferrosteel, Properties of	4
Ferrosteel Double Pipe Fittings	486, 487
Flange Unions	252
Flanged Fittings	273-288
Flanged Fittings for Ammonia	483
Flanges	292-295
Steam Separators	420, 421
Steam Traps	415-417
Valves, Ammonia	480-482
Valves, Angle	152, 153
Valves, Blow-Off	376
Valves, Check	165, 166
Valves, Cross	152, 153
Valves, Foot	163
Valves, Gate, Double Disc	130-137
Valves, Gate, Wedge Disc	107-113
Valves, Globe	152, 153
Valves, Stop-Check	372

1

F

F

	Page
Filler Pieces	281
Finishes and Facings for Flanges	612, 613
Fire Hose, Underwriters'	73
Side Fusible Plugs	437
Fittings	
A.A.R.	193
Air Tested, Standard, Malleable Iron	188
Ammonia	483, 487
Brazing, Crane-Seal	494-497
Butt-Welding, Steel	354-356
Casing Thread, Cast Iron, Standard	203
Casing Thread, Cast Steel	341
Casing Thread, Malleable Iron, Heavy	192
Casing Thread, Malleable Iron, Refinery Oil	189
Casing Thread, Threading	596
Circulating Boiler	187, 509
Double Pipe	486, 487
Corrosion-Resistant Alloy	452-455
Crane-Seal, Brass	494-497
Drainage, Brass, Screwed	215
Drainage, Cast Iron	215-224
Drainage, Malleable Iron	215, 221
Drainage, Solder-Joint, Brass	511
Flanged, Ammonia	483
Flanged, Brass	264
Flanged, Cast Iron and Ferrosteeel	273-288
Flanged, Cast Steel	343-350
Flanged, Chrome-Nickel-Moly. (18-8 Mo)	453
Flanged, Galvanizing	572
Flanged, Monel	453
Flanged, Nickel	453
Flanged, Silicon Bronze	453
Flanged, Sprinkler	206-209, 274
Hose	75
Long Sweep, Cast Iron, Screwed	204, 205
Marine, Brass and Iron	461
Marine, Steel	471-473
Railing	265-272
Reducing, How to Read	644
Sanitary, Stainless Steel	454, 455
Screwed, A.A.R.	193
Screwed, Ammonia	190
Screwed, Brass	255-263, 267
Screwed, Cast Iron	195-213, 226, 228
Screwed, Cast Iron, Drainage	215-224
Screwed, Cast Steel	341
Screwed, Chrome-Nickel-Moly. (18-8 Mo)	452, 455
Screwed, Forged Steel	338-340
Screwed, Malleable Iron	179-194, 226, 268-272
Screwed, Monel	452
Screwed, Nickel	452
Screwed, Silicon Bronze	452
Socket-Welding, Forged Steel	351-353
Solder-Joint, Brass	506-511
Sprinkler, Cast Iron	197, 206-209, 274
Stainless Steel Sanitary	454, 455
Union, A.A.R.	243, 244
Union, Brass	78, 262
Union, Cast Iron (Return Bends)	202
Union, Crane-Seal	497
Union, Malleable Iron	238, 239, 241, 243, 244
Union, Solder-Joint	505, 509
Vacuum	215
Welding, Butt-Welding	354-356
Welding, Socket-Welding	351-353
Flange Facings and Finishes, Description	612, 613
Facings, Male, Female, T, & G, Dimensions	560, 561
Facings, Ring Joint, Dimensions	562, 563
Protectors for Valves and Fittings	557
Flange Unions	
All-Iron, Ground Joint	251
Ammonia, Boyle	484
Ammonia, Tongue and Groove	252
Brass, 125-Pound, Gasket Type	263
Brass, 250-Pound, Gasket or Ground Joint Type	263
Cast Iron, "Navy" Pattern	249
Cast Iron, 125-Pound, Gasket Type	249
Cast Iron, 250-Pound, Gasket or Ground Joint Type	249
Cast Iron, 5-Bolt, Oil Country Pattern	249
Ferrosteeel, Tongue and Groove	252

Flange Unions (Cont.)

	Page
Forged Steel, Tongue and Groove	252
Forged Steel, 2000-Pound, Ground Joint	253
Forged Steel, 6000-Pound, Ground Joint	253
Forged Steel, 9000-Pound, Ground Joint	253
Malleable Iron, Standard, Gasket Type	250
Malleable Iron, Standard, Ground Joint	251
Malleable Iron, Three-Part, Ground Joint	251
Malleable Iron, Tongue and Groove	252
Malleable Iron, 400-Pound W.O.G., Gasket Type	250
"Navy" Pattern	249
Oil Country Pattern, 5-Bolt	249
Flanged Fittings	
Ammonia	483
Brass	264
Cast Iron, 25-Pound	274
Cast Iron, 125-Pound	273-280
Cast Iron, 250-Pound	282-288
Cast Steel, 150 to 4000-Pound	343-350
Chrome-Nickel-Moly. (18-8 Mo)	453
Drain Tappings for	645
Ferrosteeel	273-288
Galvanizing	572
Marine	461, 471-473
Monel	453
Nickel	453
Silicon Bronze	453
Sprinkler	206-209, 274
Flanged Joints	
Assembly and Maintenance	624
Cranclap	605-610, 613
Facings for	560-563, 612, 613
Ring, Dimensions	562, 563
Ring, Facings and Finishes	613
Ring, List Prices of Rings	564
Screwed	605
Welded	605-609
Flanges	
Ammonia	484
Blind, Cast Iron	291, 292, 294
Blind, Corrosion-Resistant	453
Blind, Forged Steel	363-367
Blind, Forged Steel, for Ammonia	484
Brass, Floor	267
Brass, 150 and 300-Pound	264
Cast Iron, Common	290
Cast Iron, Floor	290
Cast Iron, 25 to 250-Pound	291-295
Chrome-Nickel-Moly. (18-8 Mo)	453
Common, Cast Iron	290
Companion, Bolting-On	557
Cranclap, Forged Steel	361-367
Crane-Seal	495
Ferrosteeel	292-295
Floor, Brass	267
Floor, Cast Iron	290
Floor, Malleable Iron	268, 270, 290
Forged Steel, Ammonia	484
Forged Steel, 150 to 2500-Pound	361-367
Forged Steel, 4000-Pound	350
Galvanizing	572
Hanger, for Pipe	520
Malleable Iron, Ammonia	484
Malleable Iron, Floor	268, 270, 290
Malleable Iron, 125-Pound	292
Marine	470-473
Monel	453
Nickel	453
Screwed, Ammonia	484
Screwed, Brass	264
Screwed, Cast Iron	291-295
Screwed, Corrosion-Resistant	453
Screwed, Ferrosteeel	292-295
Screwed, Forged Steel	361-367, 484
Screwed, Malleable Iron	292, 484
Silicon Bronze	453
Slip-On Welding, Forged Steel	361-367
Solder-Joint	510
Wall, Malleable Iron	271
Welding Neck, Forged Steel	361-367

F

	Page
Flexible Ball, Swivel, and Revolving Joints	431
Float Valves	380, 381
Floor and Ceiling Plates	532
Flanges, Brass	267
Flanges, Cast Iron	290
Flanges, Malleable Iron, Angle	270
Flanges, Malleable Iron, Ball	268
Flanges, Malleable Iron, Round	290
Stands	168, 169
Flue Brushes and Scrapers	545
Fluid Flow, Valve and Fitting Resistance to	630, 631
Pressure Drop in Elbows and Bends	629
Pressures for Pipe, Internal	589
Fluxes, Soldering	511
Foot Valves	
Brass, Names of Parts	52
Brass, Gasoline	53
Brass, Standard	54
Iron Body, Brass Disc	162
Iron Body, High Pressure	163
Iron Body, Leather Disc	162
Iron Body, Multiple Rubber Disc	163
Forged Carbon-Molybdenum Steel, Properties of	8
Carbon Steel, Properties of	8
Chrome-Molybdenum Steel, Properties of	8
Nickel Steel, Properties of	8
Nickel-Chrome Steel, Properties of	8
Forged Steel A.A.R. Unions	244
Combination Elbows	252
Fittings, Screwed	338-340
Fittings, Socket-Welding	351-353
Flanges, for Ammonia	484
Flanges, 150 to 2500-Pound	361-367
Hammer Lug Unions	248
Unions	244, 247, 248
Valves, Angle	310, 312-319
Valves, Check	328-331
Valves, Gate	300
Valves, Globe	310, 312-319
Valves, Relief	407
Four-Way Cocks, Brass	91, 94
Cocks, Iron	94
Tees, Brass	256, 257
Tees, Malleable Iron	183
Friction of Fluids in Valves and Fittings	630, 631
Fusible Plugs	437

G

	Page
Garden Hose	73
Hose Valves	71
Gas Line Cocks, Iron	93
Stops, Brass	90
Valves, Gate, 500-Pound	134, 135
Gaskets	
All Types, 150 and 300-Pound Brass	567
All Types, 25-Pound Cast Iron	566
All Types, 125-Pound Cast Iron	566
All Types, 175-Pound Cast Iron	567
All Types, 250-Pound Cast Iron	567
All Types, 800-Pound Hydraulic Cast Iron	570
All Types, 150-Pound Steel	564, 568
All Types, 300-Pound Steel	564, 568
All Types, 400-Pound Steel	564, 569
All Types, 600-Pound Steel	564, 569
All Types, 900-Pound Steel	564, 569
All Types, 1500-Pound Steel	564, 569
Ammonia	485
For Large Tongue and Groove Joints	570
Rings for Ring Joints	564
Gasoline Check Valves, Brass	53
Check Valves, Iron Body	157
Discs	178
Foot Valves, Brass	53
Gate Valves, All-Iron	
Double Disc	122-125, 128-133
Wedge Disc	98-111

G

	Page
Gate Valves, Brass	
Crane-Seal	492
Double Disc, 125-Pound	16, 17
Double Wedge Disc, 125-Pound	17
Hose	70, 467
Marine	466, 467
Names of Parts	14
Quick Opening	68
Radiator	80
Solder-Joint	504, 505
Solid Wedge Disc, 125-Pound	17
Underwriters', Cam Action	68
Underwriters', Hose	70
Underwriters', 200-Pound	21
Wedge Disc, Non-Rising Stem, 100-Pound	15
Wedge Disc, Non-Rising Stem, 125-Pound	16
Wedge Disc, Non-Rising Stem, 150-Pound	19
Wedge Disc, Non-Rising Stem, 200-Pound	21
Wedge Disc, Non-Rising Stem, 300-Pound	22
Wedge Disc, Non-Rising Stem, 350-Pound	24
Wedge Disc, Outside Screw and Yoke, 200-Pound	21
Wedge Disc, Rising Stem, 125-Pound	17
Wedge Disc, Rising Stem, 150-Pound	19, 20
Wedge Disc, Rising Stem, 200-Pound	20
Wedge Disc, Rising Stem, 300-Pound	23
With Special Wheels and Finishes	16
Gate Valves, Cast Steel	
By-Passes for	306
Gearing for	307
Marine	471-473, 475
Welded Bonnet	308
150-Pound	302-305
300-Pound	302-305
400-Pound	302-305
600-Pound (Large Sizes)	302-305
600-Pound (New Small Sizes)	298, 299
900-Pound	302-305
1500-Pound	302-305
2500-Pound	307
4000-Pound	350
Gate Valves, Corrosion-Resistant Alloy	
Chrome-Nickel-Moly. (18-8 Mo)	448, 451
Monel	448, 451
Nickel	448, 451
Silicon Bronze	448, 451
Gate Valves, Ferrosteel	
Double Disc, 400-Pound W.O.G.	130, 131
Double Disc, 500-Pound W.O.G.	132, 133
Double Disc, 500-Pound Gas	134, 135
Double Disc, 800-Pound W.O.G.	136, 137
Names of Parts	107, 120
Wedge Disc, 175-Pound	108, 109
Wedge Disc, 250-Pound	110, 111
Wedge Disc, 800-Pound Hydraulic	112, 113
Gate Valves, Forged Steel	
600 and 900-Pound	300
Gate Valves, Iron Body	
A.W.W.A., Double Disc	126, 127
Accessories for Double Disc Type	138, 139
Accessories for Wedge Disc Type	114, 115
Clamp	98, 99
Double Disc, Accessories (By-Passes, Etc.)	138, 139
Double Disc, All-Iron	122-125, 128-133
Double Disc, Brass Trimmed	122-137
Double Disc, Water Works	126, 127
Double Disc, 25-Pound (Low Pressure)	122, 123
Double Disc, 100-Pound W.O.G. (Light Standard)	124, 125
Double Disc, 200-Pound (A.W.W.A.)	126, 127
Double Disc, 200-Pound W.O.G. (Standard)	128, 129
Double Disc, 400-Pound W.O.G.	130, 131
Double Disc, 500-Pound W.O.G.	132, 133
Double Disc, 500-Pound Gas	134, 135
Double Disc, 800-Pound W.O.G.	136, 137
Marine	468
Names of Parts, Double Disc	120
Names of Parts, Wedge Disc	101, 107
Process Industry	456
Quick Opening	99, 104
Split-Wedge Disc, Standard	105
Underwriters'	104

Gate Valves, Iron Body (Cont.)

Wedge Disc, Accessories (By-Passes, Etc.)	114, 115
Wedge Disc, All-Iron	98-111
Wedge Disc, Alloy Trimmed (18-8 Mo)	456
Wedge Disc, Brass Trimmed	98-113
Wedge Disc, Clamp	98, 99
Wedge Disc, Exelloy Trimmed	456
Wedge Disc, Marine	468
Wedge Disc, Process Industry	456
Wedge Disc, Quick Opening	99, 104
Wedge Disc, Underwriters'	104
Wedge Disc, 25-Pound (Low Pressure)	100
Wedge Disc, 125-Pound (Standard)	101-106
Wedge Disc, 125-Pound, Clamp Gate	98, 99
Wedge Disc, 175-Pound	108, 109
Wedge Disc, 250-Pound	110, 111
Wedge Disc, 800-Pound Hydraulic	112, 113

Gate Valves (General)

A.W.W.A., Iron Body	126, 127
Butt-Welding	300, 302-307
Clamp, Iron Body	98, 99
Crane-Seal, Brass	492
Cylinder Operated	171
Gas, 500-Pound	134, 135
Hose, Brass	70, 467
Marine	466-468, 470-473, 475
Motor Operated	172, 173
Process Industry, Alloy Cast Iron Body	456
Radiator	80
Solder-Joint, Brass	504, 505
Socket-Welding	298, 299
Underwriters', Brass	21, 68, 70
Underwriters', Iron Body	104

Gauge Accessories

Cocks	90
Glass Guards	435
Glass Tube Cutters	435
Glasses, "Pyrex"	435

Gauges, Altitude

Ammonia	439
Compound	438, 439
Liquid, for Ammonia	483
Liquid Level, for Corrosive Services	450
Pressure	438, 439
Siphons for	435
Vacuum	438, 439
Water	434

Gear Covers, For Cast Steel Wedge Gate Valves

For Iron Body Double Disc Gate Valves	139
For Iron Body Wedge Gate Valves	115

Gearing, for Cast Steel Angle Valves

For Cast Steel Gate Valves	307
For Cast Steel Globe Valves	326
For Iron Body Double Disc Gate Valves	139
For Iron Body Wedge Gate Valves	115

Genspring Pipe Hangers

Glass Tube Cutters	435
--------------------	-----

Globe Valves, All-Iron

Ammonia	481, 482
Union Bonnet	144, 145
Yoke Bonnet	150

Globe Valves, Brass

A.A.R., Inside Screw	42, 43
A.A.R., Outside Screw and Yoke	44, 45
Bolted Bonnet, 150 and 200-Pound	35
Bolted Bonnet, 300-Pound	47
Bolted Bonnet, 2500-Pound Hydraulic	50
Composition Disc, for Air Lines	33
Composition Disc, Low Pressure	27
Composition Disc, 150-Pound	30
Composition Disc, 250-Pound	37
Copper Disc, 250-Pound	37
Crane-Seal	493
Cranoil Disc, for Light Oils and Gases	32
Lock Shield, Low Pressure	27
Lock Shield, Radiator	78, 81, 82
Marine	462, 463, 467
Names of Parts	26
Needle Point	29
Outside Screw and Yoke	44-47

Globe Valves, Brass (Cont.)

Plug Type Disc, 150-Pound	31
Plug Type Disc, 250-Pound	36
Plug Type Disc, 300-Pound	40-47
Plug Type Disc, 350-Pound	48
Plug Type Disc, 2000-Pound Hydraulic	49
Plug Type Disc, 2500-Pound Hydraulic	50
Quick Opening, for Air Lines	33
Quick Opening, Self Closing, 125-Pound	66, 67
Quick Opening, Self Closing, 200-Pound	66
Radiator	78, 81
Regrinding, 200-Pound	34
Regrinding, 300-Pound	38, 39
Solder-Joint	502, 505
Union End, 300-Pound A.A.R., Inside Screw	43
Union End, 300-Pound A.A.R., O.S. & Y	45
Union End, 300-Pound Plug Type Disc	41
Union End, 300-Pound Regrinding	39
Whistle Type	67
With Special Wheels and Finishes	27, 28
100-Pound (Low Pressure)	27
125-Pound (Standard)	28
150-Pound	30, 31, 34, 35
200-Pound	34, 35
250-Pound	36, 37
300-Pound	38-47
350-Pound	48
1000-Pound Hydraulic	48
2000-Pound Hydraulic	49
2500-Pound Hydraulic	50

Globe Valves, Cast Steel

Gearing for	326
Marine	471-473
Stop-Check, 300-Pound	373
Stop-Check, 400-Pound and Higher	374
Union End	311
150-Pound	322-325
300-Pound	322-325
400-Pound	322-325
600-Pound	311, 322-325
900-Pound	322-325
1500-Pound	322-325
2500-Pound	326
4000-Pound	350

Globe Valves, Corrosion-Resistant Alloy

Chrome-Nickel-Moly. (18-8 Mo)	446, 447
Chrome-Nickel-Moly. (18-8 Mo), Bar Stock	310
Exelloy (Bar Stock)	310
Monel	446, 447
Nickel	446, 447
Silicon Bronze	446, 447

Globe Valves, Ferrosteeel

Ammonia	481, 482
Yoke Bonnet, 175 and 250-Pound	152, 153

Globe Valves, Forged Steel

Bar Stock	310
Chlorine Service	457
Marine	474
600-Pound	312-317
900-Pound	316, 317
1500-Pound	318
6000-Pound Hydraulic	319

Globe Valves, Iron Body

All-Iron, Union Bonnet	144, 145
All-Iron, Yoke Bonnet	150
Brass Mounted, 125-Pound	148
Composition Disc, Union Bonnet, 150-Pound	145
Composition Disc, Yoke Bonnet, 125-Pound	151
Marine	469
Names of Parts	149
Plug Type Disc	146, 147
Union Bonnet	144-147
Yoke Bonnet	150-153
125-Pound (Standard)	148-151
150-Pound	144-146
175-Pound	152
250-Pound	153
400-Pound W.O.G.	147

Globe Valves, Malleable Iron

400-Pound W.O.G.	147
------------------	-----

Iron Body Valves

	Page
Ammonia	480-482
Angle	143-153
Back Pressure	378, 379
Butterfly	148
Blow-Off	376
Check	155-166
Cross	149-153
Exhaust Relief	378, 379
Float	380, 381
Foot	162, 163
Gate, Double Disc	119-141
Gate, Wedge Disc	97-117
Globe	143-153
Marine	468, 469
Pop Safety	389, 390, 392
Pulp Stock	375
Relief	401, 402, 404, 406
Safety	389, 390, 392, 393
Stop-Check	372
Throttle	148

J

Jet Pumps, Steam	441, 442
------------------	----------

Joints

Cranelap	605-610, 613
Expansion	424-428
Flanged, Description of	605-610
Flanged, Facings for	560-563
Flanged, Sizes and Types Available	610
Flexible Ball	431
Revolving	431
Ring, Description	607, 608, 613
Ring, Dimensions	562, 563
Silbraz, Description	489-491
Solder-, Description	499-501
Swing	430, 432
Swivel	431
Threaded, Normal Engagement for	591
Threaded Pipe	592
Welded	605-609

Justrite Garden Hose Nozzles	74
------------------------------	----

K

	Page
Keys, Lock-Shield Valve	177
Street Washer	89
Kilogram-Pound Conversion	664
Klipfel Back Pressure Valves	379
Pressure Reducing Valves	412, 413
Tank Float and Lever Valves	380
Thermostats	414

L

	Page
Large O.D. Pipe, Wrought Steel	579
Laterals, Flanged, Cast Iron, 125-Pound	280
Flanged, Cast Iron, 250-Pound	288
Flanged, Cast Steel, 150 to 2500-Pound	345-349
Lead Gaskets	485, 571
Lever and Chain Try Cocks	435
Lever and Weight Reducing Valves	412, 413
Safety Valves	393
Swing Check Valves, Cast Steel	336
Swing Check Valves, Iron Body	163
Levers for Valves	175
Lifting Steam Traps, Cranetilt Three-Valve	419
Line Pipe, A.P.I.	580
Linear Conversion	659-662
Linen Hose, Unlined	73

	Page
Liquid Gauges, Ammonia	48
Gauges, Brass	43
Gauges, Corrosion-Resistant Alloy	45
Loafer Rails, Cast Iron	27
Lock Cocks, Essex Pattern	9
Cocks, Gas Line	9
Nuts, Brass	256, 25
Nuts, Cast Iron	20
Nuts, Faced, Malleable Iron	23
Nuts, Hexagonal, Malleable Iron	18
Stops, Gas Service	9
Lock Shield Angle Valves	2
Gate Valves	1
Globe Valves	2
Keys	17
Radiator Valves	78-8
Lockup Caps for Iron Body Double Disc Gate Valves	13
Caps for Iron Body Wedge Gate Valves	11
Long Screws	23
Long Radius Elbows, Flanged, Cast Iron, 125-Lb.	276, 27
Flanged, Cast Iron, 250-Pound	284, 28
Flanged, Cast Steel, 150 and 300-Pound	345, 34
Stainless Steel, Sanitary	45
Long Sweep Elbows, Malleable Iron, Hydraulic	19
Fittings, Screwed, Cast Iron	204, 20
Lubricants, Pipe Thread	54
Lubricators	44

M

	Page
Machine Bolts, List Prices	556, 55
Properties of	9, 62
Torque to Produce Stress and Resulting Load	62
Magnesia (85%) Insulations	546, 54
Main Injection Valves	47
Maintenance and Assembly of Flanged Joints	62
Male and Female Facings for Flanged Material	560, 56
Malleable Iron, Properties of	193, 242-24
Malleable Iron A.A.R. Fittings and Unions	190, 48
Ammonia Fittings	22
Bushings	215-22
Drainage Fittings	179-19
Fittings, Banded and Plain	250-25
Flange Unions	29
Flanges	29
Flanges, Floor	29
Flanges, Tongue and Groove	48
Railing Fittings	268-272, 29
Swing Joints	43
Unions and Union Fittings	235-24
Valves, Angle	14
Valves, Check	15
Valves, Globe	14
Manganese Bronze, Properties of	47
Manifold Valves	46
Marine, Fittings, Brass	46
Fittings, Cast Steel, Flanged	471-47
Fittings, Cast Iron	46
Fittings, Malleable Iron	46
Flanges, Forged Steel	470-47
Fusible Plugs	43
Pipe Hangers, Genspring	53
Ratings for Steel Products, Adjusted	47
Requirements and Specifications	460, 46
Marine Valves, Brass	462, 46
Angle	464, 46
Check	46
Chronometer	47
Cross	462, 46
Gate	466, 46
Globe	462, 46
Hose	46
Radiator, Globe and Angle	81, 46
Relief	397, 477, 47
Safety	385, 392, 41
Screw-Down Check	462, 41
Swing Check	464, 41

M

	Page
Marine Valves, Cast Steel	
Adjusted Pressure Ratings	470
Angle	471-473
Gate	471-473, 475
Globe	471-473
Main Injection	476
Safety	392, 477
Swing Check	471-473, 475
Marine Valves, Forged Steel	
Angle	474
Check	475
Globe	474
Marine Valves, Iron Body	
Angle	469
Back Pressure	379
Gate	468
Globe	469
Main Injection	476
Overboard Discharge	476
Relief	478
Swing Check	469
Marine Valves (General)	
Bar Stock (18-8 Mo), Globe and Angle	474
Cargo Oil Wedge Gate	468
Chronometer	476
Hose	467
Main Injection	476
Manifold	476
Overboard Discharge	476
Radiator	81, 467
Markings of Crane Products	10
Marshalltown Gauges	439
Merchant Casing	581
Metallic Gaskets, Corrugated	567-570
Metals Used in Crane Valves and Fittings	1-9
Metric System, Conversion Tables and Chart	658-664
Mill Hose	73
Millimeter-Inch Conversion	659-662
Mine Cocks, Iron, Spring Loaded	94
Mitre Welds	614
Modulus of Elasticity of Pipe	641
Monel Metal, Properties of	3
Fittings	452, 453
Flanges and Unions	452, 453
Valves, Angle, Check, Gate, and Globe	443-449
Valves, Special Type	450, 451
Monkey Wrenches	544
Motor Operated Valves, Air, Gas, and Electric	172, 173
Mueller Water Pressure Regulators	414
Multiple Disc Foot Valves, Iron	163

N

	Page
Navy Pattern Flange Unions, Cast Iron	249
Valves, Angle, Globe, and Cross	34
Valves, Check	57
Needle Point Air Valves, Brass	29
Globe and Angle Valves, Bar Stock	310
Globe and Angle Valves, Brass	29
Nickel, Properties of	3
Nickel Alloy, Properties of	2
Alloy Cast Steel, Properties of	7
Alloy Forged Steel, Properties of	8
Chrome Alloy Cast Steel, Properties of	7
Chrome Alloy Forged Steel, Properties of	8
Fittings	452, 453
Flanges	453
Unions	452
Valves	443-451
Nipples, Brass	258
Butt-Welding, Steel	355, 356
Hexagon, Malleable Iron	186
Hose	75
Seamless Steel	230, 231
Solder-Joint	508
Stainless Steel, Sanitary	455
Wrought Steel	230, 231

N

	Page
Ni-Resist Cast Iron, Properties of	4
Non-Return Steam Traps, Cranetilt	418
Valves	See Stop-Check Valves
Normal Thread Engagement for Pipe Joints	591
Nozzle Welds	614
Nozzles, Hose	74
Nye Die Stocks	537

O

	Page
O.D. Pipe, Large, Wrought Steel	579
Offset Bends, Copper Tubing	510
Standard Type	602
Offsets, Drainage, Cast Iron	221
Malleable Iron	186
Sprinkler, Cast Iron	209
Oil and Steam Separators	420, 421
Country Flange Unions, Cast Iron	249
Country Tubular Goods, Threading of	593-596
Refinery Fittings, Malleable Iron	189
Well Tubing Threads	595
Oilers	440
Open Float Steam Traps	415-417
Ordering Valve Replacement Parts	167
Overboard Discharge Valves	476

P

	Page
P Traps, Drainage	221
P/S Values for Steel Pipe	637
Packing, Sheet	565
Parmelee Pipe Wrenches	544
Partition Crosses, Drainage	219
Parts, Names of, Brass Check and Foot Valves	52
Names of, Brass Gate Valves	14
Names of, Brass Globe and Angle Valves	26
Names of, Iron Body Clamp Gate Valves	98
Names of, Iron Body Double Disc Gate Valves	120
Names of, Iron Body Wedge Gate Valves	101, 107
Names of, Iron Body Globe and Angle Valves	149
Replacement, Ordering	167
Penberthy Injectors and Ejectors	441
Perforated Extension Bars	519
Pet Cocks, Brass	90
Pipe	
A.P.I. Line	580
Brass, Regular and Extra Strong	583
Brass, Used with Crane-Seal Silbraz Products	498
Coils	618
Copper, Regular and Extra Strong	583
Copper, Used with Crane-Seal Silbraz Products	498
Steel, Allowable Stresses and Calculations	635-637
Steel, A.P.I. Line	580
Steel, American Standard for	584-587
Steel, Double Extra Strong	577
Steel, Extra Strong	576
Steel, Hydraulic	577
Steel, Large O.D.	579
Steel, Reamed and Drifted	578
Steel, Standard	575
Steel, Trade Practice	574
Wrought Iron	574
Pipe (Data)	
American Standard	584-587
Bundling Schedule	578
Deflection of Horizontal Lines	643
Design Formula, Code for Pressure Piping	635
Discharge of Water Through	625-627
Expansion Due to Temperature Changes	426
Flow of Water Through	628
General Data	588
Internal Fluid Pressures	589
Modulus of Elasticity	641
Thermal Expansion	641

1

P

P

	Page		Page
Pipe Bends		Pipe Supports, Code for Pressure Piping Excerpts	53
Dimensions and Data	602-604	Standards and Specifications for	53
Fabricating Facilities for	597-601	Spacing of	64
Formulas for Calculating	638, 639	Pipe Supports	
Length of Pipe in	640	Adjustable Chair with Base Plate	52
Minimum Radii and Tangents	602, 603	Adjustable Pipe Roll Stand	52
Notes on	602-604	Adjustable Pipe Roll Stand with Base Plate	52
Pressure Drop in	629	Adjustable Saddles	53
Small Type	232	Anchor Chair	52
Special and Compound Types	604	Base Plates for Pipe Chairs	52
Standard Types	602, 603	Base Plates for Pipe Roll Stands	527, 52
Testing of	619	Brackets for	524, 52
Pipe Hangers, Code for Pressure Piping Excerpts	534	Chair	52
Standards and Specifications for	534	Expansion Type Hook Plates	53
Pipe Hangers		Hook Plates	53
Adjustable Clip	514	Pipe Clamps	51
Adjustable Swivel Pipe Roll	516	Pipe Roll and Plate	52
Adjustable Swivel Ring	515	Pipe Roll Stands	526, 52
Band	514	Pipe Roller	52
Clevis	514	Pipe Rolls for	52
Clip Ring	514	Plates, Hook	53
Genspring, for High-Temperature Installations	533	Pole Type, for Outside Lines	52
Hook, U-Type	518	Riser Clamps	51
Ring Type	515	Saddles	53
Ring and Bolt Type	514	Seats	52
Roll Type	516, 517	Single Wall Hooks	53
Single Pipe Roll with Sockets	517	Stanchion Saddles	53
Single Pipe Roll with Special Sockets	517	Stands, Pipe Roll	526, 52
Split Ring	515	Wall Hooks	53
Spring Cushion Type	516	Wall Type	531, 53
Swivel Pipe Roll, Adjustable	516	Welded Steel Brackets for	524, 52
Swivel Ring	515	Pipe Threads	
U-Hook Type	518	A.P.I. Drill	59
Underwriters'	514, 515, 518	American Standard	59
Pipe Hanger Extensions, Connections, Etc.		British Standard	59
Adjustable Swinging Flanges	520	Casing	593-59
Adjustable Swivel Couplings	518	Drive	59
Bracket Clips	525	Engagement Necessary to Make Tight Joint	591, 59
Brackets, Welded Steel	524, 525	Lubricants for	54
Ceiling Plates	532	Railing	26
Channel Clamps	522	Rotary	59
Clamps, Channel	522	Pipe Threading Tools and Accessories	
Clamps, I-Beam	522-524	Cutters	54
Clamps, Pipe	519	Dies	53
Clamps, Riser	519	Drills and Taps, Combined	54
Clip Bases for Adjustable Clips	514	Power Machines for Threading	54
Clips for Brackets	525	Reamers	542, 54
Couplings, Adjustable Swivel	518	Stocks	53
Couplings, Hanger Rod	518	Taps	54
Couplings, Rod	518	Thread Lubricants	54
Extension Bars, Perforated	519	Threading Devices	537-54
Extension Eye Bolts	523	Tongs	54
Extension Piece	520	Vises	53
Eye Bolts	523	Wrenches	543, 54
Flanges, One-Piece	520	Pipes, Hose	7
Flanges, Swinging, Adjustable	520	Piping, Fabricated, Facilities for Manufacture	597-60
Flanges, Swivel	520	Flange Facings and Finishes	612, 61
Floor Plates	532	Flanged Joints, Description	605-61
Hanger Rods	521	Flanging Processes	605-60
I-Beam Clamps	522-524	Pipe Bends	602-60
Perforated Extension Bars	519	Pipe Coils	61
Pipe Clamps	519	Testing	61
Pipe Covering Protection Saddles	530	Welded Piping	614-61
Plates, Ceiling and Floor	532	Welds Generally Used	61
Riser Clamps	519	Pitched Return Bends, Cast Iron	20
Rod Couplings	518	Plain Pattern Railing Fittings, Malleable Iron	27
Rods, Hanger	521	Plates, Floor and Ceiling	53
Saddles, for Pipe Covering	530	Hook	53
Sockets	515	Plugs	
Sockets for Single Pipe Rolls	517	Brass, Countersunk	25
Steel Brackets	524, 525	Brass, Solid	25
Swinging Flanges	520	Brass, Square Head	25
Swivel Couplings	518	Chrome-Nickel-Moly. (18-8 Mo)	452, 45
Swivel Flanges	520	Crane-Seal	49
Toggle Bolts	518	Fusible	431
Turnbuckles	519	Iron, Bar	22
Underwriters' Eye Bolts	523	Iron, Barrel	22
Underwriters' Hanger Flanges	520	Iron, Countersunk	22
Underwriters' I-Beam and Channel Clamps	522-524	Iron, Square Head	22
Underwriters' Riser and Pipe Clamps	519	Iron, Solid	22

P

	Page
Plugs (Cont.)	
Monel	452
Nickel	452
Silicon Bronze	452
Solder-Joint	508
Stainless Steel, Sanitary	454, 455
Steel, Hexagon Head	228
Steel, Square Head	228
Tapped for Air Cocks, Iron	228
Pop Safety Valves	
Brass, for Low Pressure Kettles, Cookers, Etc.	388
Brass, for Saturated and Superheated Steam	384, 385
Brass, for Steam Heating Boilers	388
Brass, Marine	384, 385, 477
Brass, Outside Spring	385
Cast Steel, for High Temperatures	391, 392
Cast Steel, Marine	391, 392, 477
Iron Body, for Air and Gas	390
Iron Body, for Steam Heating Boilers	389
Posts, Indicator	170
Pound-Kilogram Conversion	664
Power Pipe Machines	540
Pressure Conversion	664
Drop in Elbows and Bends	629
Gauges	438, 439
Reducing Valves	412, 413
Regulators	410, 411, 414
Properties of Crane Metals	2-9
Saturated Steam	650-653
Superheated Steam	654-657
Protection Saddles for Pipe Covering	530
Protectors, Flange	557
Pulp Stock Valves, Iron Body	375
Pumps	
Condensation	85
Sump, Electric	442
Underground Vertical	85
Vacuum	85
Pyrex Glasses for Gauges	435

Q

	Page
Quarter Bends, Copper Tubing	510
Small, Wrought Steel	232
Standard Type	602
Quick-Acting Throttle Valves, Brass	69
Throttle Valves, Iron	148
Quick-Opening Gate Valves, Alloy Metal	451
Gate Valves, Brass	68
Gate Valves, Iron Body	104
Gate Valves, Iron Body, Clamp Type	99
Globe Valves, Brass, 125-Pound	66, 67
Globe Valves, Brass, 150-Pound, for Air	33
Globe Valves, Brass, 200-Pound	66

R

	Page
Radial Back Cramelap Joints	607
Radiator Tail-Pieces, Extra Length	82
Thermostatic Traps	84
Union Elbows	78
Union Elbows, Solder-Joint	505
Valves, Air	82
Valves, All Types, Brass	77-84
Valves, Bellows	84
Valves, Gate	80
Valves, Government Pattern	81
Valves, Hot Water	78, 79
Valves, Lock-Shield	82
Valves, Lock-Shield, Keys for	177
Valves, Marine	81, 467
Valves, Solder-Joint	505
Valves, Venting	82, 83
Railing Pipe Threads	266

R

	Page
Railing Fittings	
Brass	267
Cast Iron, Floor Flanges	290
Cast Iron, Loafer Rails	272
Malleable Iron, Adjustable	271
Malleable Iron, Ball Pattern	268, 269
Malleable Iron, Enclosure	271
Malleable Iron, Plain Pattern	272
Malleable Iron, Stair Rail	270, 271
Railroad Union Fittings, Malleable Iron	241
Unions, Malleable Iron	240
Range Boiler Fittings, Brass, Solder-Joint	509
Malleable Iron	187
Ratchet Die Stocks	537, 538, 541
Reamers, Self-Feeding	542
Ratings, Pipe, Method of Calculating	635-637
Reamed and Drifted Pipe	578
Reamers, Pipe	542, 545
Recessed Couplings, Wrought	229
Recorders, Pressure, Vacuum, Compound, or Altitude	438, 439
Reducers	
A.A.R., Malleable Iron	193
Ammonia	190
Butt-Welding, Steel	355
Crane-Seal, Brass	495, 496
Flanged, Cast Iron, 125-Pound (Standard)	277
Flanged, Cast Iron, 250-Pound	285
Flanged, Cast Steel, 150 to 2500-Pound	345-349
Hose, Brass	75
Screwed, Brass, 125-Pound (Standard)	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron, 125-Pound (Standard)	201
Screwed, Cast Iron, 175-Pound	210, 211
Screwed, Forged Steel, 3000-Pound W.O.G.	339
Screwed, Forged Steel, 6000-Pound W.O.G.	340
Screwed, Forged Steel, 9000-Pound W.O.G.	340
Screwed, Malleable Iron, Standard	184
Screwed, Malleable Iron, 300-Pound	190-193
Screwed, Malleable Iron, Heavy	192
Solder-Joint, Brass	508
Reducing Fittings, How to Read	644
Reed Pipe Vises	536
Refinery Oil Malleable Iron Fittings, Standard	189
Regulators, Pressure	410, 411, 414
Reinforcing Welding Saddles	356
Relief Valves	
All-Iron, for Ammonia	401
Brass, for Air	394, 398, 399
Brass, for Cold Water	394, 396, 397, 400
Brass, for Gas	398, 399
Brass, for Hot Water	394-397
Brass, for Oil	396, 397, 400
Brass, for Steam	394, 396, 397
Brass, for Water Heaters	395
Brass, Hydraulic	400
Brass, Marine	397, 477, 478
Brass, Vacuum	395
Cast Steel, Crosby Nozzle Type	406
Cast Steel, Inside Spring	403
Cast Steel, Outside Spring	405
Chrome-Nickel-Moly. (18-8 Mo)	450
Forged Steel Base and Disc	407
Iron Body, Crosby Nozzle Type	406
Iron Body, Inside Spring	402
Iron Body, Marine	478
Iron Body, Outside Spring	379, 404
Marine	397, 477, 478
Monel	450
Nickel	450
Silicon Bronze	450
Vacuum	395
Renewable Discs for Valves, Composition	178
Replacement Parts for Valves, Ordering	167
Return Bends	
Ammonia	190, 483, 487
Back Outlet	190, 202
Butt-Welding, Steel	355
Copper Tubing	510
Crane-Seal, Brass	495

R

	Page
Return Bends (Cont.)	
Double Pipe	486, 487
Flanged, Cast Iron	281
Flanged, Cast Steel, 150 and 300-Pound	345, 346
Flanged, Ferrosteeel	281
Screwed, Brass, Standard	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron, Standard	202
Screwed, Cast Iron, 175-Pound	210
Screwed, Cast Iron, 250-Pound	212
Screwed, Malleable Iron, Standard	185
Screwed, Malleable Iron, 300-Pound	190
Screwed, Wrought Steel	232
Solder-Joint, Brass	510
Union End, Cast Iron	202, 487
Reversible Stops, Brass	88
Revolving Joints, Barco	431
Rigid Pipe and Tubing Cutters	542
Pipe Wrenches	543
Ring Joint Facings and Rings, Dimensions	562, 563
Joints, Description	607, 608, 613
Joints, Rings for, List Prices	564
Gaskets	566-571
Type Pipe Hangers	514, 515
Riser Clamps for Pipe Hangers	519
Rivet Data for Railing Fittings	266
Rod Couplings for Pipe Hangers	518
Rods, Hanger	521
Roll and Plate, Pipe	528
Stands, Pipe	526, 527
Roller Supports, Pipe	526
Rolls, Pipe	517, 526
Roof Connections, Drainage	220
Rotary Pipe Threads	595
Rough Stops, Brass	88
Rubber Gaskets, "CC"	566, 567, 570, 571
Gaskets, Ammonia	485
Gaskets, Cloth Inserted	566, 567, 571
Lined Gate Valves	451
Sheet Packing, "CC"	565
Spool Type Expansion Joints	425
Running Traps, Drainage	221

S

	Page
S Traps, Drainage	221
Saddle Supports for Pipe	531
Saddles, Pipe Covering Protection	530
Safety Valves	
Brass, Crosby Nozzle Type, for Steam	392
Brass, Inside Spring, for Air and Gas	386, 387
Brass, Lever and Weight	393
Cast Steel, Crosby Nozzle Type, for Steam	392
Iron, Lever and Weight	393
Marine	477
Pop, Brass	384, 385, 388
Pop, Cast Steel	391, 392
Pop, Iron Body	389
Pop, Marine	384, 385, 477
Sampling or Vent Valves for Transformer Oil	33
Sanitary Valves and Fittings, Stainless Steel	454, 455
Saturated Steam, Properties of	650-653
Saunders Pipe Cutters	542
Sawing Vises	511
Scrapers, Flue	545
Screw-Down Check Valves, Marine	462, 463, 471-473
Screwed Flanged Joints	605
Screwed Fittings	
A.A.R.	193
Ammonia	190
Brass, Railing	267
Brass, 125 and 250-Pound	256-260
Cast Iron	195-224
Cast Steel, 1000 and 2000-Pound W.O.G.	341
Chrome-Nickel-Moly. (18-8 Mo)	452
Chrome-Nickel-Moly. (18-8 Mo), Sanitary	455
Circulating Boiler	187, 509

S

	Page
Screwed Fittings (Cont.)	
Drainage	215-223
Forged Steel, 2000 to 9000-Pound W.O.G.	338-340
Long Sweep, Cast Iron	204, 205
Malleable Iron	179-194
Monel	452
Nickel	452
Sanitary, Stainless Steel	454, 455
Silicon Bronze	452
Sprinkler	197, 206-209
Screwed Flanges	
Ammonia	484
Brass, 150 and 300-Pound	264
Cast Iron, 25-Pound	291
Cast Iron, 125-Pound	292, 293
Cast Iron, 250-Pound	294, 295
Chrome-Nickel-Moly. (18-8 Mo)	453
Common, Cast Iron	290
Ferrosteeel, 125 and 250-Pound	292-295
Floor, Brass	267
Floor, Cast Iron	290
Floor, Malleable Iron	268, 270, 290
Forged Steel, Ammonia	484
Forged Steel, 150 to 2500-Pound	361-367
Forged Steel, 4000-Pound	350
Malleable Iron, Ammonia	484
Malleable Iron, 125-Pound	292
Marine	460, 471-473
Monel	453
Nickel	453
Silicon Bronze	453
Seamless Steel Pipe	574-577, 579, 580, 584-586
Steel Nipples and Couplings	229-231
Sediment Separators	422, 423
Self-Adjusting Packed Radiator Valves	75
Self-Feeding Ratchet Reamers	542
Separators, Oil and Steam	420, 421
Sediment	422, 423
Service Tees, Brass, Standard	256, 257
Malleable Iron, Standard	185
Shaped Welding Nipples, Steel	356
Sheet Packing, "CC" Rubber	565
Packing, Cranite Asbestos Composition	565
Shock Effect on Valves and Fittings	11
Side Outlet Elbows, Flanged, Cast Iron, 125-Pound	270
Elbows, Flanged, Cast Iron, 250-Pound	284
Elbows, Screwed, Brass, Standard	256, 257
Elbows, Screwed, Cast Iron, Standard	190
Elbows, Screwed, Malleable Iron, Standard	187
Tees, Flanged, Cast Iron, 125-Pound	270
Tees, Flanged, Cast Iron, 250-Pound	280
Silbraz Joints, Description and Products Used with	489-490
Silicon Bronze, Properties of	
Bronze Fittings, Flanges, Unions, and Valves	446-450
Impact Self-Contained Pipe Threaders	53
Single Hammer Lug Unions	24
Offset Quarter Bends	60
Offset U-Bends	60
Strap Clamps, Malleable Iron	23
Sweep Tees, Flanged, Cast Iron, 125-Pound	278, 27
Sweep Tees, Flanged, Cast Iron, 250-Pound	286, 28
Sweep Tees, Screwed, Cast Iron (Long Sweep)	204, 20
Sink Elbows and Tees, Solder-Joint, Brass	508, 50
Siphons for Steam Gauges	43
Sizing Tools for Soft Copper Tubing	51
Sleeve Welds	61
Sleeves, Welding	35
Slip-On Welding Flanges, 150 to 2500-Pound	363-36
Socket Wrenches, Tee Handle	17
Sockets for Pipe Rolls, Malleable Iron	51
Socket-Welding Fittings, Forged Steel	351-35
Flanges, Marine	47
Valves, Cast Steel, Angle, 150 to 1500-Pound	30
Valves, Cast Steel, Check, 150 to 1500-Pound	30
Valves, Cast Steel, Gate, 150 to 1500-Pound	299, 30
Valves, Cast Steel, Globe, 150 to 1500-Pound	30
Valves, Forged Steel, Angle, 600-Pound	314, 30
Valves, Forged Steel, Check, 600-Pound	328, 30
Valves, Forged Steel, Globe, 600-Pound	314, 30
Soft Iron Gaskets, Corrugated	568-5

S

	Page
Solder-Joint Adapters	505, 508
Bends.....	510
Companion Flanges.....	510
Fittings.....	506-511
Union Elbows.....	505, 509
Unions.....	509
Valves, Angle.....	502
Valves, Check.....	503
Valves, Gate.....	504
Valves, Globe.....	502
Valves, Radiator.....	505
Valves, Swing Check.....	503
Valves, with Adaptors.....	505
Solder-Joints, Description and Instructions	500, 501
Ratings and Recommendations for Products.....	506
Tubing (Copper) Used With.....	512
Soldering Fluxes	511
Solders and Fluxes	511
Solid Ring Pipe Hangers	514, 515
South Penn Casing Threads	594
Spanners, Hose	75
Special Brass, Crane, Properties of	2
Spool Type Rubber Expansion Joints	425
Spring Cushion Pipe Hangers	516
Loaded Cocks.....	94
Sprinkler Fittings, Cast Iron	197, 206-209, 274
Square Head Plugs, Brass	259
Head Plugs, Iron.....	228
Head Plugs, Iron, Tapped for Cock.....	228
Head Plugs, Steel.....	228
Stainless Steel Sanitary Valves and Fittings	454, 455
Stair Rail Brackets, Malleable Iron	272
Rail Fittings, Malleable Iron.....	270, 271
Stanchion Saddle-Type Pipe Supports	531
Standard Pipe, Wrought Steel	575
Stands, Floor	168, 169
Steam, Data Pertaining to	649
Definitions of Terms Used With.....	648
Pressure Drop in Elbows and Bends.....	629
Resistance of Valves and Fittings to Flow of.....	630, 631
Saturated, Properties of.....	650-653
Superheated, Properties of.....	654-657
Steam Brass, Properties of	2
Coils, Heating Water With.....	632, 633
Hose and Hose Couplings.....	73
Jet Pumps.....	441, 442
Separators.....	420, 421
Traps.....	415-419
Steel Bushings	227
Pipe Data.....	588
Plugs.....	228
Stellite ("U") Trim	3
Stem Protectors for Iron Body Double Disc Gate Valves	139
Protectors for Iron Body Wedge Gate Valves.....	115
Stems, Extension, for Valves	169
Stillson Pipe Wrenches	543
Stocks and Dies	537
Stop-Check Valves, General Data	370, 371
Cast Steel, 300-Pound.....	373
Cast Steel, 400-Pound.....	374
Cast Steel, 600-Pound.....	374
Cast Steel, 900, 1500, and 2500-Pound.....	374
Ferrosteel, 250-Pound.....	372
Stops, Brass	88-90
Strainers (Sediment Separators)	422, 423
Strap Wrenches	544
Straps for Copper Tubing	511
Street Washer Tees	89
Street Elbows	
A.A.R.....	193
Ammonia.....	190
Crane-Seal, Brass.....	494, 496
Screwed, Brass, Standard.....	256, 257
Screwed, Cast Iron, Drainage.....	216
Screwed, Forged Steel, 3000-Pound W.O.G.....	339
Screwed, Malleable Iron, Heavy.....	192
Screwed, Malleable Iron, Refinery Oil.....	189
Screwed, Malleable Iron, Standard.....	181
Screwed, Malleable Iron, 300-Pound.....	190, 193
Solder-Joint, Brass.....	507

S

	Page
Studs, Bolt-, Data	622, 623
Bolt-, List Prices.....	558, 559
Suction Hose	73
Sump Pumps, Electric	442
Superheated Steam, Properties of	654-657
Supports, Pipe, List Prices and Description	525-532
Pipe, Spacing of.....	642
Swartwout Exhaust Heads	424
Swing Joints, Ball Bearing	432
Joints, Brass or Iron Body.....	430
Swing Check Valves	
Angle, Brass, 200-Pound.....	57
Brass, Crane-Seal.....	492
Brass, Solder-Joint.....	503, 505
Brass, Standard.....	55
Brass, 150-Pound.....	57, 58
Brass, 200-Pound.....	57, 58
Brass, 300-Pound.....	60, 61
Brass, 350-Pound.....	62
Cast Steel, 150 to 4000-Pound.....	333-336, 350, 475
Chrome-Nickel-Molybdenum (18-8 Mo).....	451
Clearway, Iron Body.....	164
Crane-Seal, Brass.....	492
Ferrosteel, 250-Pound.....	165
Ferrosteel, 800-Pound Hydraulic.....	166
Iron Body, Lever and Weight.....	163
Iron Body, Standard.....	161, 164
Iron Body, 250-Pound.....	165
Iron Body, 400-Pound W.O.G.....	156
Iron Body, 800-Pound Hydraulic.....	166
Malleable Iron, 400-Pound W.O.G.....	156
Marine.....	464, 465, 469-473, 475
Monel.....	451
Nickel.....	451
Silicon Bronze.....	451
Solder-Joint, Brass.....	503, 505
Underwriters', Iron Body.....	164
Swinging Hanger Flanges, for Pipe	520
Swivel Joints, Barco	431
Syphons for Steam Gauges	435

T

	Page
Tail-Pieces for Radiator Valves, Extra Length	82
For Sanitary Valves and Fittings.....	454, 455
Tank Float Valves	380, 381
Nipples, Wrought Steel.....	230, 231
Thermostats, Klipfel.....	414
Taper Reducers	
Flanged, Cast Iron, 125-Pound.....	277
Flanged, Cast Iron, 250-Pound.....	285
Flanged, Cast Steel, 150 to 2500-Pound.....	345-349
Taps, Pipe	545
Taps and Drains for Flanged Fittings, Location of	645
Tee Wrenches for Hub End Gate Valves	177
Tees	
A.A.R.....	193
Ammonia, Flanged.....	483
Ammonia, Screwed.....	190
Butt-Welding, Steel.....	354
Crane-Seal, Brass.....	494, 496
Double Pipe.....	486, 487
Drainage, Cast Iron.....	217
Flanged, Ammonia.....	483
Flanged, Brass, 150 and 300-Pound.....	264
Flanged, Cast Iron, Sprinkler.....	206, 207, 274
Flanged, Cast Iron, 125-Pound.....	278, 279
Flanged, Cast Iron, 250-Pound.....	286, 287
Flanged, Cast Steel, 150 to 2500-Pound.....	345-349
Flanged, Chrome-Nickel-Moly. (18-8 Mo).....	453
Flanged, Monel.....	453
Flanged, Nickel.....	453
Flanged, Silicon Bronze.....	453
Four-Way, Brass.....	256, 257
Four-Way, Malleable Iron.....	183
Refinery Oil, Malleable Iron.....	189
Sanitary, Stainless Steel.....	455

T

	Page
Tees (Cont.)	
Screwed, Ammonia	190
Screwed, Brass, Standard	256, 257
Screwed, Brass, 250-Pound	260
Screwed, Cast Iron, Drainage	217
Screwed, Cast Iron, Long Sweep	204, 205
Screwed, Cast Iron, Sprinkler	197, 206-208
Screwed, Cast Iron, Standard	198, 199
Screwed, Cast Iron, 175-Pound	210, 211
Screwed, Cast Iron, 250-Pound	212, 213
Screwed, Cast Steel, 1000 and 2000-Pound W.O.G.	341
Screwed, Chrome-Nickel-Moly. (18-8 Mo.)	452, 455
Screwed, Forged Steel, 2000-Pound W.O.G.	338
Screwed, Forged Steel, 3000-Pound W.O.G.	339
Screwed, Forged Steel, 6000-Pound W.O.G.	340
Screwed, Forged Steel, 9000-Pound W.O.G.	340
Screwed, Malleable Iron, Heavy	192
Screwed, Malleable Iron, Hydraulic	194
Screwed, Malleable Iron, Refinery Oil	189
Screwed, Malleable Iron, Standard	182, 183, 186
Screwed, Malleable Iron, 300-Pound	190-193
Screwed, Monel	452
Screwed, Nickel	452
Screwed, Silicon Bronze	452
Socket-Welding, Forged Steel	353
Solder-Joint, Brass	507, 509
Stainless Steel, Sanitary	454, 455
Union, Brass, Crane-Seal	497
Union, Malleable Iron	238, 239, 241, 243, 244
Temperature Conversion	663
Templates for Drilling	
150-Pound Brass	550
250-Pound Brass	550
300-Pound Brass	550
25-Pound Cast Iron	551
125-Pound Cast Iron	551
250-Pound Cast Iron	552
800-Pound Hydraulic Cast Iron	552
150-Pound Steel	553
300-Pound Steel	553
400-Pound Steel	554
600-Pound Steel	554
900-Pound Steel	554
1500-Pound Steel	555
2500-Pound Steel	555
Templex Steel, Properties of	9, 622
Templex Steel Bolt-Studs	
List Prices	558, 559
Properties of	9, 622
Torque Required to Produce Stress and Resulting Load	623
Test Gauges	438, 439
Testers, Dead Weight	438
Thermal Expansion of Pipe	641
Thermometer Caps, Stainless Steel, Sanitary	455
Thermostatic Traps	84
Thermostats, Tank	414
Thickness, Calculation of, for Steel Pipe	635-637
Thread Engagement in Made-Up Joints	591
Lubricants, Pipe	548
Threaded Pipe Joints	592
Threading Devices for Pipe	537-541
Threads, Hose	72
Pipe, A.P.I. Casing	593, 594
Pipe, American Standard Taper	590
Pipe, British Standard Taper	591
Pipe, Casing	593-596
Pipe, Normal Engagement for Pipe Joints	591
Pipe, Oil Country Tubular Goods	593-596
Pipe, Oil Well Tubing	595
Pipe, Railing	266
Three-Valve Lifting Steam Traps, Cranetilt	419
Three-Way Cocks, Brass	91, 94
Cocks, Iron	92
Elbows, Drainage	217
Valves, Sanitary	454
Throttle Valves, Brass	69
Valves, Iron Body	148
Toggle Bolts for Pipe Hangers	518
Toledo Pipe Cutters	542
Pipe Threading Devices	538-540

T

	Page
Tongs, Pipe	544
Tongue and Groove Facings for Flanged Material	560, 561
And Groove Flange Unions	252
And Groove Valves and Fittings, Ammonia	481-487
Tools, Sizing, for Soft Copper Tubing	511
Traps, Drainage	221
Steam, Cranetilt, Non-Return	418
Steam, Cranetilt, 3-Valve Lifting	419
Steam, Open Float	415-417
Thermostatic	84
Trim Pipe Cutters and Wrenches	542-544
Triplex Steel, Properties of	9, 622
Triplex Steel Bolt-Studs	
List Prices	558, 559
Properties of	9, 622
Torque Required to Produce Stress and Resulting Load	623
Try Cocks, Brass	435
Tubes, Boiler	583
Tubing, Copper, Expansion Due to Temperature Changes	510
Copper, for Crane-Seal Products	498
Copper, Hard and Soft Types	512
Tubing Bends, Copper	510
Cutters, Glass	435
Cutters, Pipe	542
Threads, Oil Country	595
Tucker Connections, Drainage	221
Turnbuckles	519
Two-Third Unions, Malleable Iron	239

U

	Page
U-Bends, Copper Tubing	510
Standard Type	602
U-Hook Pipe Hangers	518
Underwriters' Extension Eye Bolts	523
Fire Hose	73
Hangers	514, 515, 518
Hose Gate Valves	70
Indicator Posts	170
Pipe Clamps	519, 522, 524
Unions and Union Fittings	238, 240-244
Valves, Gate, Brass	21
Valves, Gate, Brass, Hose	70
Valves, Gate, Iron Body	104
Valves, Swing Check	164
Union Elbows, A.A.R., Malleable Iron	243, 244
Elbows, Circulating Boiler	187
Elbows, Combination, Forged Steel	252
Elbows, Crane-Seal, Brass	497
Elbows, Brass, Ground Joint	262
Elbows, Brass, Radiator	78
Elbows, Malleable Iron, 150-Pound	238
Elbows, Malleable Iron, 150-Pound, Gasket Type	239
Elbows, Malleable Iron, 200-Pound	241
Elbows, Malleable Iron, 300-Pound	243, 244
Elbows, Solder-Joint	505, 509
Fittings, A.A.R., Malleable Iron	243, 244
Fittings, Application on Air Brake Piping	245
Fittings, Malleable Iron, 150-Pound	238
Fittings, Malleable Iron, 150-Pound, Gasket Type	239
Fittings, Malleable Iron, 200-Pound	241
Fittings, Malleable Iron, 300-Pound	243, 244
Fittings, Railroad	241
Fittings, Saving Joints with	236, 237, 245
Return Bends, Cast Iron	202, 487
Tees, A.A.R., Malleable Iron	243, 244
Tees, Brass, Crane-Seal	497
Tees, Malleable Iron, 150-Pound	238
Tees, Malleable Iron, 150-Pound, Gasket Type	239
Tees, Malleable Iron, 200-Pound	241
Tees, Malleable Iron, 300-Pound	243, 244
Valves, Brass, A.A.R.	43, 45
Valves, Brass, for Air Lines	33
Valves, Brass, Needle Point	29
Valves, Brass, Radiator	78-81
Valves, Brass, 100-Pound (Low Pressure)	27
Valves, Brass, 300-Pound	39, 41, 43, 45

U

	Page
Unions	
A.A.R.	242, 244
Air Pump, A.A.R.	242, 244
Air Pump, Railroad, 250-Pound	240
All-Iron, Ground Joint Flange, Standard	251
All-Iron, Ground Joint Screwed, 300-Pound	246
Ammonia, Flange	252, 484
Application to Air Brake Piping	245
Boyle Flange	484
Brass, Crane-Seal	497
Brass, Flange	263
Brass, Government Pattern	262
Brass, 150 and 200-Pound	262
Brass, 250-Pound	263
Cadmium Plated	247, 248
Cast Iron, Flange	249
Chicago	239
Chrome-Nickel-Moly. (18-8 Mo)	452
Chrome-Nickel-Moly. (18-8 Mo), Sanitary	455
Crane-Seal	497
Ferrosteel, Flange	252
Forged, Steel to Exelloy Seat	247
Forged Steel, A.A.R.	244
Forged Steel, Cadmium Plated	247, 248
Forged Steel, Flange	252, 253
Forged Steel, Hammer Lug	248
Forged Steel, 600-Pound	247, 248
Gaskets for	571
Gasket Type, Flange	249, 250, 252
Gasket Type, Screwed	239
Hammer Lug	248
Malleable Iron, A.A.R.	242, 244
Malleable Iron, Flange	250-252
Malleable Iron, Three-Part	251
Malleable Iron, Two-Third	239
Malleable Iron, 150-Pound	238, 239
Malleable Iron, 200-Pound	239
Malleable Iron, 250-Pound	240
Malleable Iron, 300-Pound	242, 244, 246
Monel	452
"Navy" Pattern, Flange	249
Nickel	452
Railroad	240
Silicon Bronze	452
Solder-Joint	509
Tongue and Groove, Flange	252
Upright Y-Branches, Drainage	220

V

	Page
Vacuum Cleaning Fittings	215
Gauges	438, 439
Radiator Valves	79
Relief Valves	395
Venting Valves	83
Valve By-Pass Locations	646
Chain-Wheels	176
Discs	178
Drain Tappings	646
Handles	175
Parts, Ordering	167
Resistance to Flow of Fluids	630, 631
Wheels	174
Valves	
A.A.R., Brass	42-45
A.W.W.A. Double Disc Gate, Iron Body	126, 127
Air, Radiator	82
Air Vent, Automatic	416
Ammonia	401, 481, 482
Angle, Brass (Also Globe and Cross)	25-50
Angle, Cast and Forged Steel	309-326
Angle, Corrosion-Resistant	446, 447
Angle, Iron Body, Ferrosteel, and Mall. Iron	143-153
Back Pressure	378, 379
Bar Stock, Globe and Angle	310
Blow-Off	376, 377
Butterfly	69, 148

V

	Page
Valves (Cont.)	
Cab Hose, Brass	39, 41
Cargo Oil	468
Check, All Types, Brass	51-63
Check, All Types, Cast and Forged Steel	327-336
Check, All Types, Corrosion-Resistant	449, 451
Check, All Types, Iron Body, Ferrosteel & M. I.	155-166
Chlorine	457
Chronometer	476
Clamp Gate, Iron Body	98, 99
Corrosion-Resistant	443-458
Crane-Seal, Brass	492, 493
Cross, Brass	28, 34, 35, 47
Cross, Iron Body and Ferrosteel	150-153
Cylinder Operated	171
Exhaust Relief	378, 379
Expansion, for Ammonia	482
Float	380, 381
Foot, Brass	53, 54
Foot, Iron Body	162, 163
Gas, 500-Pound Double Disc Gate	134, 135
Gasoline, Check	53, 157
Gate, Brass	13-24, 68
Gate, Cast and Forged Steel	297-308
Gate, Corrosion-Resistant	448, 451, 456
Gate, Iron Body and Ferrosteel, Double Disc	119-141
Gate, Iron Body and Ferrosteel, Wedge Disc	97-117
Globe, Brass	25-50
Globe, Brass, Quick Opening, Self-Closing	66, 67
Globe, Cast and Forged Steel	309-326
Globe, Corrosion-Resistant	446, 447
Globe, Iron Body, Ferrosteel, and Mall. Iron	143-153
Hose	70, 71, 467
Lock-Shield, Gate	16
Lock-Shield, Globe and Angle	27
Lock-Shield, Radiator	78-82
Main Injection	476
Manifold	476
Marine	459-478
Motor Operated	172, 173
Needle Air	29
Needle Point Globe and Angle, Brass	29
Overboard Discharge	476
Pop Safety	383-393
Pressure Reducing	412, 413
Pressure Regulating	410, 411, 414
Pulp Stock	375
Quick Opening, Brass	33, 66-69
Quick Opening, Corrosion-Resistant	451
Quick Opening, Iron Body	99, 104
Radiator	77-84
Relief	394-407, 450
Safety	386-393
Sampling or Vent, for Transformer Oil	33
Sanitary, Stainless Steel	454
Screw-Down Check	462, 463, 471-473
Solder-Joint	502-505
Stop-Check	370-374
Tank Float	380, 381
Throttle	69, 148
Transformer Oil	32, 33
Underwriters' Gate, Brass	21
Underwriters' Gate, Brass, Hose	70
Underwriters' Gate, Iron Body	104
Underwriters' Swing Check	164
Vacuum, Radiator	79
Vacuum, Relief	395
Venting, Radiator	83
Water Works Double Disc Gate	126, 127
Whistle	67
Vent or Sampling Valves for Transformer Oil	33
Venting Valves, Radiator	83
Vertical Check Valves, Brass	54
Check Valves, Brass, for Gasoline	53
Check Valves, Cast Steel	329
Steam and Oil Separators	420, 421
Vises, Pipe	536
Sawing, for Copper Tubing	511
Vulcan Chain Pipe Tongs	544
Chain Pipe Vises	536

1

W

	Page
Walco Pipe Wrenches.....	543
Wall Closet Fittings, Crane-Hulbert.....	224
Flanges, Malleable Iron, for Railings.....	270, 271
Pipe Supports.....	531
Plates, Malleable Iron.....	186
Thickness of Steel Pipe, Calculation of.....	635-637
Warnock Strap Wrenches.....	544
Wash Tray Tees, Malleable Iron.....	186
Tray Sink Tees, Solder-Joint.....	509
Waste Nuts, Malleable Iron.....	186
Water, Discharge Through Pipes, Orifices, and Valves.....	625-627
Flow Through Standard Wrought Pipe.....	628
Heating, With Steam Coils.....	632, 633
Pressure Drop, In Elbows and Bends.....	629
Resistance of Valves and Fittings to Flow of.....	630, 631
Water Columns, Cast Iron.....	436
Coolers, Fittings for.....	486, 487
Gauges.....	434
Gauges, Accessories.....	435
Gauges, Expansion Tank.....	434
Hose.....	73
Hose Couplings.....	73
Hose Fittings.....	75
Hose Nozzles.....	74
Meter Elbows, Solder-Joint.....	508
Pressure Regulators.....	414
Water Side Fusible Plugs.....	437
Water Works Gate Valves (A.W.W.A.).....	126, 127
Weight and Lever Reducing Valves.....	412, 413
And Lever Safety Valves.....	393
Conversion Table.....	664
Testers for Gauges.....	438
Welded Bonnet Wedge Gate Valves, Cast Steel.....	308
Brackets, Steel, for Pipe.....	524, 525
Flanged Joints.....	609
Piping, Description.....	614, 615
Piping, Facilities.....	600
Piping, Headers.....	616, 617
Piping, Heat Exchangers, Double Pipe.....	619
Piping, Types of Welds.....	614
Welding Bevels, Details.....	647
Fittings, Butt Type.....	354-359
Fittings, Socket Type.....	351-353
Flanges, Forged Steel, 150 to 2500-Pound.....	363-367
Valves, Angle, Cast and Forged Steel.....	314-326
Valves, Check, Cast and Forged Steel.....	328-336
Valves, Gate, Cast and Forged Steel.....	297-307
Valves, Globe, Cast and Forged Steel.....	314-326
Welds, Types Generally Used.....	614

W

	Page
Wheels, Chain, for Valves.....	176
Valve.....	174
Whistle Valves, Brass.....	67
Whistles, Brass.....	437
Williams Chain Pipe Vises.....	536
Wood Rod Couplings.....	89
Wooden Flange Protectors.....	557
Wool Felt Pre-Shrunk Pipe Insulation.....	546
Wrenches	
Monkey.....	544
Pipe.....	543, 544
Strap.....	544
Tee, for Hub End Gate Valves.....	177
For Body Seat Rings of A.A.R. Valves.....	45
For Brass Cocks.....	96
For Iron Cocks.....	95, 96
Wrought Couplings.....	229
Iron and Steel Pipe.....	573-580, 584-588
Steel Nipples.....	230, 231

Y

	Page
Y-Bends	
Ammonia.....	190
Brass, Crane-Seal.....	494
Brass, 125-Pound (Standard).....	256, 257
Brass, 250-Pound.....	260
Cast Iron, Sprinkler.....	209
Cast Iron, 125-Pound (Standard).....	201
Cast Iron, 175-Pound.....	210
Cast Iron, 250-Pound.....	212
Malleable Iron, 150-Pound (Standard).....	184
Malleable Iron, 300-Pound.....	190
Y-Branches, Drainage.....	218-220
Y-Pattern Blow-Off Valves.....	376
Sediment Separators.....	423
Stop-Check Valves.....	372, 373

Z

	Page
Zero Pipe Insulation.....	546

A colored paper insert near the center of the book is the key to an improved sectional index. Regular valve and fitting catalog users will find this feature unusually convenient.

Numerical Index

1

No.	Page	No.	Page	No.	Page	No.	Page
07	420	4 1/2, Br. Railing	267	8 A	84	21 H	84
09	420	S. O. Tee		8 E	111	22	270
011	420	4 1/2, M. I. Railing	268	8 1/2, Br. Ball	267	22 E	153
013	420	S.O. Tee		Ornament		23	270
1, Globe Valve	28	5, Disc	178	8 1/2, M. I. Ball	268	23 A	455
1, Vent Valve	83	5, C.I. Tee	204	Ornament		23 E	153
1, Disc	178	5, Br. Railing	267	9, Globe Valve	30	24, Check Valve	54
1, C. I. Elbow	204	5, Cross		9, Angle Valve	30	24, Railing Elbow	270
1, Br. Railing	267	5, M. I. Railing	268	9, Trap	84	24 E	153
Elbow		5, Cross		9, 18-8 Cross	455	25, Check Valve	157
1, M. I. Railing	268	5, 18-8 Tee	455	9, Pipe Bend	603	25, Railing Elbow	270
Elbow		5, Ceiling or	532	9 A	84	25 E	153
1, Red. Valve	413	Floor Plate		9-A	75	25 1/2	157
1, Coupling	433	5, Pipe Bend	602	10, Railing	268	26, Check Valve	54
1, Pipe Bend	602	5 K	442	Flange		26, Railing Tee	270
1 A	83	5 1/2, Br. Railing	267	10, Ball Joint	432	26, 18-8 Elbow	455
1 B	27	5 1/2, Cross		10, Ceiling or	532	26 A	455
1-C	519	5 1/2, M. I. Railing	268	Floor Plate		26 B	455
1 K	442	5 1/2, Cross		10, Pipe Bend	603	26 C	455
1 1/2	602	6, Disc	178	10 A	84	26-C	531
2, Angle Valve	28	6, Br. Railing	267	10 C	454	27, Check Valve	56
2, Vent Valve	83	6, S.O. Cross		10 E	111	27, Railing Elbow	270
2, Disc	178	6, M. I. Railing	268	11, Railing Elbow	268	27, Float Valve	380
2, C. I. Elbow	204	6, S. O. Cross		11, Pipe Bend	603	27 CS	492
2, Br. Railing	267	6, 18-8 Tee	455	11 C	454	28, Check Valve	54
Elbow		6, Pipe Bend	603	12, Railing Tee	268	28, Railing Elbow	270
2, M. I. Railing	268	6 E	111	12, 18-8 Union	455	28 E	372
Elbow		6 1/2, Br. Railing	267	12 H	455	28 XU	373
2, Pipe Bend	602	6 1/2, S.O. Cross		12 1/2, Globe Valve	66	29	270
2 A	83	6 1/2, M. I. Railing	268	Railing Tee	268	30, Floor Flange	270
2 B	27	6 1/2, S.O. Cross		13, Br. Ball	267	30, Ball Joint	432
2 C,	455	6 1/2 E	111	Ornament		30 E	372
2-C,	514	7, Globe Valve	30	13, M.I. Ball	268	30 XU	373
2 E	111	7, Angle Valve	30	Ornament		31, Check Valve	56
2 K	442	7, Disc	178	13, 18-8	455	31, 18-8 Tail-Piece	455
3, Vent Valve	83	7, Br. Railing	267	Union Ring		32	418
3, Disc	178	7, Flange		13 H	455	32 X	304
3, C. I. Tee	204	7, M. I. Railing	268	14	455	32 XR	304
3, Br. Railing	267	7, Flange		14 A	455	33	418
Tee		7, Float Valve	380	14 E	111	33 U	304
3, M. I. Railing	268	7, 18-8 Tee	455	14 1/2 P	31	33 X	304
Tee		7, Pipe Bend	602	15, Railing Tee	270	33 XR	304
3, Red. Valve	413	7-8	431	15, 18-8	455	33 1/2	54
3, 18-8 Tee	455	7-8 B	431	Thrd. Piece		33 1/2 U	304
3, Ceiling or	532	7 A-8	431	16	270	33 1/2 X	304
Floor Plate		7 A-8 B	431	16 A, Vac. Vent	83	34, Check Valve	55
3, Pipe Bend	602	7 A-8 BS	431	16 A, 18-8 Plug	455	34, Trap	418
3 E	111	7 A-8 C	431	16 1/2 P	31	34 1/2	55
3 K	442	7 AS-8 CS	431	17, Railing Cross	270	35, Check Valve	57
3 1/2, Br. Railing	267	7 CS	493	17, 18-8 Coupling	455	35, Trap	418
Tee		7 E	111	17 A	84	35 CS	492
3 1/2, M. I. Railing	268	7 F	431	17-C	526	35 1/2	57
Tee		7 KS-8 BS	431	17 C-A	73	36	442
3 1/2, Pipe Bend	602	7 KS-8 CS	431	17 D	84	37, Check Valve	57
4, Globe Valve	37	7 R-8 CR	431	18, Cross Valve	28	37, Rad. Valve	84
4, Angle Valve	37	7 S-8 BS	431	18, Railing Tee	270	38	413
4, Disc	178	7 S-8 CS	431	18, 18-8 Adapter	455	38 E	165
4, C. I. Cross	204	7 1/2, Globe Valve	66	19 A	455	39 E	165
4, Br. Railing	267	7 1/2, Pipe Bend	603	20, Check Valve	54	40, Vent Valve	83
S. O. Tee		7 1/2 E	111	20, Railing Tee	270	40, Safety Valve	393
4, M. I. Railing	268	8, Trap	84	20, Ball Joint	432	40, Ball Joint	432
S. O. Tee		8, Disc	178	20, Ceiling or	532	40-C	524
4, 18-8 Elbow	455	8, Br. Ball	267	Floor Plate		41-C	524
4, Ceiling or	532	Ornament		20 B	53	41 E	541
Floor Plate		8, M. I. Ball	268	20 E	153	42	393
4, Pipe Bend	602	Ornament		20 H	84		
4 A	83	8, 18-8 Cross	455	21, Railing Tee	270		
4 E	111	8, Pipe Bend	603	21, 18-8 Nipple	455		
4 K	442			21 E	153		

No.	Page	No.	Page	No.	Page	No.	Page	No.	Page	No.	Page
225 H	319	274 P-G	527	331 D	253	362 E	38	407 D	345	467 1/2	104
226	79	275-G	527	333 D	340	363	150	410	412	470	104
226-G	522	276	90	334	93	364 E	38	411, Red. Valve	412	471	104
226 H	319	276 E	190	335	92	366	159	411, Exp. Joint	424	472	103
227	79	276-G	527	336	93	366 E	60	412 D	345	473	103
227 H	331	277-G	528	337	93	366 1/2	156	413 D	345	475	103
230-G	519	277 P-G	528	339	94	366 1/2 C	156	415 D	345	475 1/2	103
230 H	24	278	90	340	152	367	159	415 H	378	476	104
232 H	49	278 E	190-3	340 D	253	367 1/2	156	415 V	378	477	104
233 H	49	279 E	190-3	340 E	133	367 1/2 C	156	416	379	480	129
234 H	63	284	90	340 1/2 E	133	368	159	417	379	480 1/2	126
236 H	50	286-G	533	341	152	369 E	60	417 D	345	481	129
237	33	288-G	533	341 D	340	372	161	417 1/2	379	482	129
238 H	63	289	90	341 E	133	372 P	46	419 D	345	483	129
246 X	247	290 E	364	341 1/2 E	133	372 1/2	161	420	421	484 1/2	99
248-G	521	291 E	364	342	152	373	161	421 D	345	485 1/2	99
250	91	292 E	364	342 E	133	373 P	46	422	20	486 1/2	99
250 H	247	294 E	364	342 1/2 E	133	373 1/2	161	422 CS	492	487 1/2	99
252	91	295	430	343	152	374 P	46	422 E	421	488	99
252 H	247	296 E	364	343 E	133	374 1/4	161	422 1/2	20	488 1/2	99
253 H	247	297	430	343 1/2 E	133	374 1/2	164	423	20	490	99
254	91	297 E	364	344	152	375	164	423 D	345	490 1/2	99
254 H	247	298	90	345	152	375 P	46	423 1/2 D	345	491	100
254 P	147	299	430	346 1/2	156	375 1/2	164	425 1/2 D	345	491 1/2	100
255-G	516			347 D	227	376	393	427 D	345	492	99
255 P	147	300		348 E	135	376 E	42	428	17	492 1/2	99
256	91	300	430	349 E	135	376 P	42	429	19	493	100
256-G	516	300 D	339	350	150	377 E	42	429 D	345	493 1/2	100
256 P	147	300 E	264	350 E	356	377 P	42	430	17	494	99
257-G	528	302 D	339	350 H	248	380	148	431, Gate Valve	19	494 1/2	99
257 H	48	303 D	339	350 1/4	150	381	148	431, Red. Valve	412	496	100
257 P	147	304 D	339	350 1/2	144	382	148	431 CS	492	496 E	364
258	91	305	94	350 1/2 C	145	382 P	40	432, Gate Valve	68	496 P	311
258-G	531	305 D	339	350 1/2 H	248	382 P-CS	493	432, Red. Valve	412	497 E	355
258 H	48	306	94	351	150	383 P	40	437	19		
259-G	531	307	94	351 E	356	384	378	437 1/2	19	500	
259 H	63	307 D	339	351 1/4	150	384 P	40	438	16	500	109
260 D	341	308	94	352	150	384 P-CS	493	438 CS	492	501	109
260 E	190-3	310 D	340	352 E	354	385	378	440	16	504 1/2	109
260-G	514	312 D	340	352 H	248	385 P	40	442	68	505	109
260 H	194	313 D	339	352 1/4	150	390	376	448	414	505 1/2	109
261-G	519	314 D	340	352 1/2	144	391	376	449	414		
262 D	341	314 1/2 P	146	352 1/2 C	145	391 U	377	449 1/2	15	506	109
262 E	190-3	316 1/2 P	146	353	150	393	376	450 E	356	508	109
262 1/2 E	190-3	317 D	340	353 E	354	393 1/2	376	451	70	510	170
263 H	194	318	94	353 1/4	150	393 E	45	451 E	356	515	239
264 D	341	319	94	354	148	393 P	45	452 E	354	517	240
264 E	190-3	320	92	354 E	354	394	162	453	70	517 1/2	240
264-G	531	320 D	228	354 1/2	144	394 1/2	162	453 E	354	519	240
264 H	194	320 1/2	92	355 E	355	395	162	454 E	354	519 1/2	240
265	91	321	93	355 1/2	144	395 1/2	162	455	80	520	170
266	91	321 D	228	355 1/2 C	145	396 E	44	455 E	355	521	290
266 D	341	322	92	356	148	396 P	44	457 E	354	521 1/2	262
266 E	190-3	322 1/2	92	356 1/2	144	397	163	458	21	522	262
266 H	194	323	93	357 E	354	397 E	44	458 E	354	523	262
267 E	190-3	323 D	339	357 1/2	144	397 P	44	459	21	523 1/2	262
268	91	324	92	357 1/2 C	145	398	427	459 E	355	524 1/2	262
268 E	190-3	324 1/2	92	358	151	400		460	103	525	276
269	91	325	92	358 E	356	400, Red. Valve	412	460 E	355	525 D	345
269-G	514	326	92	358 1/2	151	400, Exp. Joint	427	461	103	526	276
270	90	326 D	227	359	151	401	427	461 1/2	103	527	276
271	542	327 D	227	359 E	355	401 D	345	462	103	527 D	345
271-G	526	328 D	253	359 1/2	151	403	427	462 1/2	104	528	276
272	90	329	92	360 E	355	403	427	464	103	529	278
272 E	190	329 D	253	360 1/2	151	403 D	345	464 1/2	103	530	278
272-G	526	330	92	361 E	356	404	426	465	103	531	278
273-G	526	330 D	253	361 1/2	151	406	426	465 1/2	103	531 D	345
274-G	527	331	92	362	150			467	104	532	278

No.	Page	No.	Page	No.	Page	No.	Page	No.	Page	No.	Page	No.	Page				
533	278	605 D	345	756½	31	854 E	364	1009	216	1200		1345	50				
534	278	607 D	345	757	31	855 D	345	1010	217			1350	50				
534 D	345	608	67	757½	31	855 E	364	1012	217			1351	50				
535	278	608½	67	760	189	856	89	1013	217			1352	50				
536	278	610	434	760 D	341	856 E	364	1017	217			1353	50				
								1018	217								
537	280	613	434	762	189	857 E	364					1354	50				
537 D	345	613 D	345	762 D	341	858 E	364	1019	219			1355	50				
538	276	615	434	764	189	859 E	605	1020	218			1356	50				
539	280	615 D	345	764 D	341	860	89	1022	219			1357	50				
539 D	345	616	434	766	189	862 E	364	1024	218			1358	50				
								1026	219								
540	276	617 D	345	766 D	341	869 E	607			1204	27	1359	50				
541	280	619 D	345	768	189	890 E	243	1028	220	1205	27	1360	50				
541 D	345	621 D	345	773	251	890 E-CS	497	1030	220	1210	27	1361	50				
543	280	622 E	23	775	251	891	123	1032	220	1211	27	1362	50				
543 D	345	623	434	776	125	891½ E	243	1033	221	1212	53	1363	50				
								1034	220	1213	78						
545	277	623 D	345	777	125	891½ E-CS	497			1218	239	1364	50				
545 D	345	623 E	23	778	125	892 E	243	1036	221	1219½	239	1365	50				
546	277	623½ E	23	779	125	893	123	1037	221	1228	93	1366	50				
547	277	624	434	780	125	893 E	243	1038	221	1232	93	1367	50				
547 D	345	624 D	345	781	125	894 E	243	1039	221	1234	93	1368	50				
								1046	219	1236	93						
548	277	624 E	22	791	123	894 E-CS	497			1241 D	345	1369	50				
548 D	345	624 E-CS	492	793½	123	895 E	243	1047	217	1241 XR	403	1370	51				
549	276	625	434	798	123	896 E	243	1048	221	1245 D	345	1371	51				
550	276	625 D	345			897 E	243	1049	220	1246 D	345	1372	50				
550 D	345	625 E	22	800		898	123	1050	218	1247 D	345	1373	50				
								898 E	243	1051	218	1248 D	345				
551	276	640	436			898 E-CS	497			1250 D	345	1249 D	345	1370	51		
551 D	345	642	157			898½ E	243	1052	218	1251 D	345			1371	51		
553	292	644	157					1053	218	1252 D	345			1372	50		
553 D	345	648	414			900		1054	218	1253 D	345	1380	50				
554	364	649	414					1055	218	1254 D	345	1381	50				
								1056	217	1255 D	345	1383	51				
554½	364	651 E	364							1262 E	364	1384	51				
555	292	656 E	364					800	88	1263 E	364	1385	51				
556	364	657 E	364					801	88	1265 E	364						
556½	364	658 E	364					804	88	1266 E	364	1400		1425	3		
557	293	660 E	605					804½	88	1057	216			1427	3		
								804½ H	113	1058	216			1429	3		
558½	364	664 E	364					805½ H	113	1059	221			1431	3		
559	292	670 E	607					806	88	1059½	221						
561½	364	673	209					806½	88	1070	221						
568	364	674	209					812	88					1500		1501	4
572	364	675	209					812½	88	1080	129					1503	4
								814	88	1081	129					1504	4
574	355	677	209					816	89	1082	129					1504½	4
583	291	679	209					817 E	242	1083	129					1505	4
583½	291	679 E	209					819 E	242							1505½	4
584	291	681	209					819 E-CS	497	981	416	1507	4				
585	187	681 E	209					819½ E	242	981 A	416	1507½	4				
								819½ E-CS	497	981½	416	1511	4				
586	187	693 E	364							982	416	1513	4				
586½	187	694 E	364					820 H	166	983 D	416						
587	187	700						821	88	984	416	1100				1282	238	1515	4
587½	187							821 H	166	986	422			1283	238	1517	4
588	187							823	88	988	422			1284	238	1519	4
								824	88	988½	423			1285	238	1519¼	4
589	187							830	89	989	422			1290	239	1519½	4
589½	187							831	89	989½	423			1292	239	1521	4
590	241							833	89	990½	423			1294	239	1523	4
591	241							834	89	991½	423			1294 E	364	1529	4
592	241									992 E	244			1295 E	364	1541 D	4
										993 E	244			1296	239		
593	241	714	90					1000	216	1100	391	1300		1515	4		
594	241	724	90					1001	217	1102	390			1517	4		
595	241	730	435					1001½	217	1113	404			1519	4		
596	241	731	435					1002	216	1113 LX	405			1519¼	4		
597	241	734	435					1002½	216	1113½ LX	405			1521	4		
								1003	216	1114	404			1523	4		
598	241	741	435					1004	217	1118	401			1529	4		
598½	241	744	90					1005	216	1118½	401			1541 D	4		
		750	437					1006	216	1123	402			1545	4		
		751	437					1007	216	1124	402			1545 D	4		
		754	131					1008	216	1124 XR	403	1546 D	4				
600		754½	131					1008½ E	244	1128	400	1547	4				
		755	131					1000		1128½	400	1548 D	4				
		755½	131							1130	400	1549	4				
		756	131							A 1131	394	1549 D	4				
						1131	394			1550 D	4						
		600	437	1133	394												
		601 D	345	1133½	394												
		602	437	1155 V	395												
		603 D	345	1160	388												
				1164	388												
		1165	389														
		1166	389														
		1168	389														

No.	Page	No.	Page	No.	Page	No.	Page	No.	Page	No.	Page
1551 D	345	1900	74	2531	391	3640 X	315	4700	437	16689	453
1552 D	345			2534	391	3640 XR	315			16690	452
1553 D	345			2550	387	3641 X	315			16691	453
1554 D	345			2551	387	3641 XR	315			17700	446
1555	484			2552	387	3644 X	315				
1555 D	345	2100	264	2553	387	3644 XR	315	17702	446		
1556 E	364			2560	387	3645 X	315	17703	446-7		
1557	484			2561	387	3645 XR	315	17705	446-7		
1557 E	364			2562	387	3648 X	315	17720	449		
1558 E	364			2563	387	3648 XR	315	17721	449		
1559	483	2105	264	2565	388	3649 X	315	8000	74	17740	448
1559 E	605			2570	387	3649 XR	315			17741	448
1562 E	364			2571	387	3652 X	315			17760	452
1564	190			2580	387	3652 XR	315			17761	453
1565	487			2581	387	3653 X	315			17762	452
1565 E	364	2108	264	2590	387	3653 XR	315	9000	414	17763	453
1569	487			2591	387	3656 X	315			17768	452
1569 E	607			2600	397	3656 XR	315			17769	453
1570	483					3657 X	315			17772	452
1571	487					3657 XR	315			15500	446
1574	487	3670 X	328			15501	446				
1574 1/2	487	3674 X	329	15502	446						
1575	487	3678 X	328	15503	446-7						
1575 1/2	487	3682 X	329	15505	446-7						
1575 3/4	487	2605	397	3686 X	329	15520	449	18800	446		
1581	487	2606	395	3692 XS	329	15521	449			18801	446
1582 1/2	484	2607	395	3900	74	15540	448			18802	446
1583 1/2	484	2621	478			15541	448			18803	446-7
1585	484	2624	478			15560	452			18805	446-7
1586 1/2	483	2628	478			15561	453	18820	449		
1589	252	2650	399	4000	58	15562	452	18821	449		
1591 1/2	252	2651	399			4032	58	15563	453	18840	448
1594 E	364	2653	399			4033	58	15566	452	18841	448
1595 E	364	2654	399			4062	58	15568	452	18859	450
1600	457	2664	399			4063	58	15569	453	18860	452
1600	457	2668	399	4064 E	61	15572	452	18861	453		
		2669	399	4065 E	61	15578	452			18862	452
		2674	399	4100	35	15582	452			18863	453
		2684	399			15584	452			18868	452
		2684	399			15586	452			18869	453
2684	399	15589	453			16600	446				
2684	399	15590	452					16601	446		
2684	399	15591	453	16602	446						
2684	399	4200	61	16603	446-7						
2684	399			16605	446-7						
2684	399			16620	449						
2684	399			16621	449						
2684	399			16640	448						
2684	399	2684	399	4234 E	61	16660	452	16641	448		
2684	399	2684	399	4235 E	61	16666	452	16660	452		
2684	399	2684	399	4270	81	16669	453	16666	452		
2684	399	2684	399	4300	476	16672	452	16678	452		
2684	399	2684	399			4347	476	16682	452	16684	452
2684	399	2684	399			4377	476	16686	452	16686	452
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2684	399	2684	399	4467	468	16686	452	16686	452		
2684	399	2684	399	4467	468	16					

Metals and Materials

Steam Brass.....	page 2
Special Brass.....	page 2
Hard Metal.....	page 2
Cast Manganese Bronze.....	page 2
No. 44 Nickel Alloy.....	page 2
No. 48 Nickel Alloy.....	page 2
No. 49 Nickel Alloy.....	page 2
Exelloy.....	page 3
Stellite.....	page 3
18-8 Mo Alloy Cast Steel.....	page 3
Silicon Bronze.....	page 2
Monel Metal.....	page 3
Nickel.....	page 3
Cast Iron, Ferrosteel, and High Tensile Iron.....	page 4
Alloy Cast Iron.....	page 4
Ni-Resist Cast Iron.....	page 4
Malleable Iron.....	page 4
Carbon Cast Steel.....	page 6
No. 2 Nickel-Chrome Alloy Cast Steel.....	page 7
No. 3 Nickel Alloy Cast Steel.....	page 7
No. 4 Carbon-Molybdenum Alloy Cast Steel.....	page 6
No. 5 Chrome-Molybdenum Alloy Cast Steel.....	page 7
"Arctic" Nickel Alloy Cast Steel.....	page 7
Carbon Forged Steel.....	page 8
No. 2 Nickel-Chrome Alloy Forged Steel.....	page 8
No. 3 Nickel Alloy Forged Steel.....	page 8
No. 4 Carbon-Molybdenum Alloy Forged Steel.....	page 8
No. 5 Chrome-Molybdenum Alloy Forged Steel.....	page 8
Machine Bolts.....	page 9
Triplex Steel Bolt-Studs.....	page 9
Templex Steel Bolt-Studs.....	page 9
C.C. Rubber Sheet Packing.....	page 5
Cranite Sheet Packing.....	page 5
Metallic Gaskets.....	page 5
Rings for Ring Joints.....	page 5
Composition Discs.....	page 5
Marking of Crane Products.....	page 10
Air Testing.....	page 11
Hydrostatic and Shock Working Pressures.....	page 11
Increase in Pressure by Expansion of Liquids.....	page 11

The thousands upon thousands of items manufactured by Crane — valves, fittings, and allied products for all pressures, temperatures, and services — necessitates the use of an unusually wide variety of metals and materials. The most common of these are briefly described and discussed in this section. Additional information and data on other Crane metals and materials will be furnished on request.

Brasses, Bronzes, and Nickel Alloys

Crane Steam Brass

Crane Steam Brass, widely used for valves, fittings, and other products not recommended for superheated steam temperatures, is an alloy of copper, tin, lead, and zinc. It conforms to A.S.T.M. Specification B 62 (Composition Brass or Ounce Metal Castings, 85-5-5-5) and is classified as "Leaded Red Brass" in A.S.T.M. B 119 (Tentative Classification of Cast Copper-Base Alloys).

Physical properties at 70° F.		Average
Tensile strength.....	lbs. per sq. in.	34,000
Yield point.....	lbs. per sq. in.	16,000
Elongation in 2 inches.....	per cent	22

Crane Special Brass

Crane Special Brass, commercially termed "bronze", is a high grade alloy used in valves, fittings, and other products recommended for the higher pressures and temperatures.

It conforms to A.S.T.M. Specification B 61 (Steam or Valve Bronze Castings) and is classified as "Leaded Tin Bronze" in A.S.T.M. B 119 (Tentative Classification of Cast Copper-Base Alloys).

Physical properties at 70° F.		Average
Tensile strength.....	lbs. per sq. in.	36,000
Yield point.....	lbs. per sq. in.	17,000
Elongation in 2 inches.....	per cent	25

Crane Hard Metal

Crane Hard Metal is a pure copper-tin bronze of high strength and hardness. Years of satisfactory service have shown it to be thoroughly reliable for valves and fittings used under high pressures and extremely severe operating conditions. Its hardness and average tensile strength of 40,000 pounds per square inch make it an exceptionally desirable material for valve bodies and seating surfaces.

This material conforms to A.S.T.M. Specification B 60 and is classified as "Tin Bronze" in A.S.T.M. B 119 (Tentative Classification of Cast Copper-Base Alloys).

Crane Cast Manganese Bronze

Crane Co. developed "Cast Manganese Bronze" in order to procure a stem metal that would withstand the great torsional and tensile strains to which this valve part is subjected. Its unusually good bearing qualities offer excellent resistance to wear, and this, combined with strength and the good corrosion resistance typical of copper-base alloys, has extended its use to yoke sleeves, yoke bushings, and glands of valves for steam, water, and general service.

Crane Cast Manganese Bronze has an average tensile strength of 67,000 pounds per square inch and conforms to the requirements of A.S.T.M. Specification B 54 (Manganese-Bronze Sand Castings).

Crane No. 44 Nickel Alloy

Crane No. 44 Nickel Alloy is a copper-base nickel alloy, having a hardness superior to that of ordinary bronze. Its particular application is as a seating material in valves which are to be subjected to services requiring the use of non-ferrous trim where brass or bronze are inadequate. Strong, tough, and hard, it offers good resistance to wear.

Crane No. 48 Nickel Alloy

Crane No. 48 Nickel Alloy is used for the yoke sleeves, yoke bushings, and glands of steel valves recommended for oil or oil vapor service. It possesses a combination of excellent bearing qualities, high strength, corrosion resistance, and an unusually high melting point, being from 500 to 600° F. higher than that of ordinary brass or bronze.

It resists wear and breakage exceptionally well, and its high melting point is an important safety factor in oil refinery service where valves are sometimes exposed to accidental fire.

Crane No. 49 Nickel Alloy

Crane No. 49 Nickel Alloy is a nickel-base copper alloy, having excellent bearing qualities and corrosion resistance. With Brinell number up to 200 it withstands wear and erosion at temperatures up to 750° F. unusually well.

The combination of Crane No. 49 Nickel Alloy and Crane Exelloy is used in most plug type disc seat constructions in brass and iron valves, and resists severe services exceptionally well. This combination used in steel valves (known as "XR" trim) has been found particularly satisfactory for steam, water, air, or gas lines.

Cast Silicon Bronze

Cast Silicon Bronze is a high copper bronze alloy having approximately 4% silicon as its most distinguishing element. This metal is similar to many commercially trade-marked alloys, such as "Endur", "Herculoy", "Olympic Bronze", "P-M Metal", "Duronze No. 2", "Cramp No. 99", etc. It is characterized both by excellent physical properties and by better than average resistance to corrosion by a large number of fluids for which brasses are not suitable.

Cast Silicon Bronze Valves and Fittings are shown on pages 443 to 453. The average physical properties of this alloy are:

Physical properties at 70° F.		Average
Tensile strength.....	lbs. per sq. in.	48,000
Yield point.....	lbs. per sq. in.	25,000
Elongation in 2 inches.....	per cent	25

18-8 Mo, Monel, Nickel, Exelloy, and Stellite

Crane 18-8 Mo Alloy Cast Steel

Crane 18-8 Mo Alloy (18-8 chromium-nickel molybdenum) is an exceptionally high grade stainless steel that is highly resistant to corrosion and finds wide application in many industries. The addition of molybdenum to regular 18-8 chromium-nickel steel has been found to increase materially the corrosion resistance of this alloy, and, in recognition of this fact, Crane Co. has adopted 18-8 Mo in preference to other types of 18-8 chromium-nickel steels.

Valves and fittings made of this material, shown on pages 443 to 455, may be recommended for use in services handling food products as well as a large number of industrial chemicals.

Crane 18-8 Mo Alloy Steel conforms to and substantially exceeds the minimum requirements of A.S.T.M. Specification A 198, Grade B, as shown below, and is heat-treated to obtain maximum corrosion resistance.

Physical properties at 70° F.	A.S.T.M. Minimum	Crane Average
Tensile strength.....lbs. per sq. in.	70,000	75,000
Yield point.....lbs. per sq. in.	30,000	38,000
Elongation in 2 inches.....per cent	35	40
Reduction of area.....per cent	40	45

Crane Co. is licensed under Patent No. 1,587,614 to manufacture valves and fittings made from 18-8 chromium-nickel alloy with 2 to 4% molybdenum.

Cast Monel Metal

Monel metal is a high strength nickel-copper alloy containing approximately two-thirds nickel and one-third copper. It has excellent resistance to corrosion by many acids, alkalis, salt solutions, food products, organic substances, and many other miscellaneous fluids. Among non-ferrous alloys, Monel is an outstanding material for handling solutions of the alkalis and is widely used wherever avoidance of copper contamination is not imperative.

Monel Metal Valves and Fittings are shown on pages 443 to 453. The average physical properties of this alloy are:

Physical properties at 70° F.	Average
Tensile strength.....lbs. per sq. in.	67,000
Yield point.....lbs. per sq. in.	35,000
Elongation in 2 inches.....per cent	30

Cast Nickel

Crane Cast Nickel (commercially pure) contains a minimum of 97% nickel, the remainder consisting of copper (0.25% maximum), silicon, carbon, manganese, and iron. It is highly resistant to corrosion and finds many applications in the food, textile, glue, paint, sugar, bottling, canning, tanning, and other industries where the copper content of high nickel alloys is considered undesirable.

Crane Cast Nickel Valves and Fittings are shown on pages 443 to 453. The material has the following average physical properties:

Physical properties at 70° F.	Average
Tensile strength.....lbs. per sq. in.	55,000
Yield point.....lbs. per sq. in.	25,000
Elongation in 2 inches.....per cent	20

Crane Exelloy for Stems

Crane Exelloy is a specially processed chromium iron, having a chromium content of about 12 per cent and a carbon content of about 0.10 per cent.

For valve stems, it is carefully heat-treated to provide superior strength and excellent resistance to tension, compression, shear, and other strains attending stem service. It withstands wear unusually well and offers liberal resistance to corrosion by atmosphere; by mildly alkaline water; and by steam, gas, air, oil, and hot oil vapors.

The remarkable properties of Crane Exelloy as a stem material have resulted in its adoption for regular use in all Crane Steel Valves.

Physical properties at 70° F.	Minimum	Crane Average
Tensile strength.....lbs. per sq. in.	100,000	115,000
Yield point.....lbs. per sq. in.	80,000	90,000
Elongation in 2 inches.....per cent	20	22
Reduction of area.....per cent	60	65
Brinell hardness number (range).....		225-250
Charpy impact strength.....ft. lbs.		40

Crane Exelloy for Seating Surfaces

Crane Exelloy for seating surfaces is the same as Crane Exelloy for stems, but is heat-treated to secure greater hardness — minimum Brinell hardness number ranging up to 350, depending upon the valve part. With this high hardness — resisting scratching, scoring, or indentation by hard particles — is combined adequate strength and ductility; excellent resistance to wear, seizure, galling, and erosion; and high resistance to oxidation and to the corrosive action of hot sulfur-bearing oils.

Crane Exelloy seating surfaces, used in steel valves and known as "X" trim, are especially recommended for oil and oil vapor. Exelloy combined with Crane No. 49 Nickel Alloy makes an ideal combination for steam, water, gas, and similar services.

Crane Exelloy has been more universally suitable for valve seats in oil service than any other single material. With its remarkable properties, it is not surprising that thousands of tons of it are in valve service.

Crane Stellite Trim

Crane Stellite trim, used in high pressure-temperature steel valves and known as "U" trim, is a cobalt-chromium-tungsten alloy. Facings of this material are deposited on steel discs or body seat rings by the welding process.

Stellite is recommended where service conditions are especially severe, particularly in modern steam power plants operating at elevated temperatures. Its extreme hardness when cold (Brinell number 375 minimum) is maintained almost unimpaired at red heat. Stellite withstands corrosion and erosion unusually well, and it displays excellent resistance to wear, seizure, galling, and abrasion.

Cast, Malleable, Alloy, and Ni-Resist Irons

2

Crane Cast Irons

Crane Cast Iron is regularly produced in three grades—Cast Iron, Ferrosteel, and High Tensile Iron. All of these grades conform to and exceed the minimum requirements of the A.S.T.M. Specification A 126 for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

Each grade is particularly suited to provide uniform density, soundness, and close grain within a specific range of thicknesses of sections employed in the making of Crane cast iron valves and fittings.

Cast Iron, used for small valves and fittings having light metal sections, conforms to the requirements of A.S.T.M. Specification A 126 for Class A Cast Iron.

Ferrosteel, used for sections of medium metal thicknesses, conforms to the requirements of A.S.T.M. Specification A 126 for Class B higher strength Iron Castings.

High Tensile Iron, used for the heavier metal sections, conforms to the requirements of A.S.T.M. Specification A 126 for Class C High-Test Cast Iron.

	Crane Cast Iron Average	ASTM A 126 Class A	Crane Ferrosteel Average	ASTM A 126 Class B	Crane High Tensile Iron Average	ASTM A 126 Class C
Tensile Strength, pounds per square inch.....	26,000	21,000	35,000	31,000	50,000	40,000
Transverse Test, load at center, pounds.....	3,000	2,200	3,600	3,300	4,200	3,000
Transverse Test, deflection at center, inches.....	0.12	0.10	0.14	0.12	0.14	0.10

Crane Malleable Iron

Crane Malleable Iron is particularly suited for use in screwed pipe fittings, valves, and flanges. It is characterized by pressure tightness, stiffness, and toughness, the latter property being an especially valuable one for pipe line materials subjected to expansion and contraction stresses and shock.

This iron has a tensile strength of from 40,000 to 50,000 pounds per square inch. Through improved practices in casting and annealing, a superior line of malleable iron products is assured.



Malleable Iron Torsional Test Bar

As part of routine control in casting and annealing malleable iron products, a torsional test is made half-hourly during each day's run.

Crane Malleable Iron conforms to the requirements of the Tentative A.S.T.M. Specification A 19 Cupola Malleable Iron.

The comparable ability of malleable iron to resist shock or impact as well as bending stresses during piping weight, expansion, etc., is shown in the following table. Note that because of their excellent ductility, the malleable iron and cast steel were reversed after each blow.

Tests for Shock and Impact (Bars 1"x1"x13")		
Material	Blows of a 25-pound Drop Hammer to Break	Shock Test Foot Pounds
Cast Iron	7	10
Ferrosteel	11	20
*Malleable Iron	22	158
*Cast Steel	92	10,11

*Reversed after each blow because of bending.

Crane Alloy Cast Iron

Crane Alloy Cast Iron, a development of the Crane Research Laboratory, is offered to meet the need for an iron having better physical properties and resistance to corrosion when subjected to services where ordinary gray iron is not adequate.

This material, having a nickel low alloy composition, is suited for valves or fittings in specialized services of pulp or paper or petroleum industries.

Crane Ni-Resist Cast Iron

Ni-Resist Cast Iron (sometimes called Monel Cast Iron) is used as material where the physical properties of cast iron suffice but where greater resistance to corrosion is required.

Ni-Resist is an alloy cast iron containing 14% nickel, 6% copper, and 2½% chromium; it has an average tensile strength of approximately 25,000 pounds per square inch.



View in the Laboratories, Chicago Works

Packing Materials

C.C. Rubber Sheet Packing

C.C. Rubber Sheet Packing is a superior grade of rubber composition packing, which is manufactured solely for Crane Co. This material is exceptionally tough, durable, and resilient. It is compounded according to a special formula, and it is subjected to frequent and careful tests to assure that the high quality is strictly maintained.

C.C. Rubber is available in rolled sheets or finished cut gasket shapes. It is recommended for all pressures in services such as saturated steam, hot and cold water, air, and gas.

C.C. Rubber Sheet Packing.....page 565
C.C. Rubber Ring Gaskets.....pages 566 and 567

Cranite Sheet Packing

Cranite is a superior gasket material prepared from selected long fiber asbestos, cross-laminated to secure exceptional strength and durability. It has a high and uniform compressive strength, does not deteriorate with age, and is ideally suited for use with water, air, gas, gasoline, ammonia, steam, and other fluids at temperatures up to 750° F. Cranite has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

Cranite Sheet Packing.....page 565
Cranite Ring Gaskets.....pages 566 to 570
Cranite Union Gaskets.....page 571

Corrugated Metallic Gaskets

Corrugated metallic gaskets are recommended for service where temperatures exceed 750° F. Listed in copper, of 27-gauge, and in soft iron, of 22-gauge, they should be used with smooth faced flanges only. Crane Corrugated Metallic Gaskets are of good quality, having proper strength, ductility, and toughness.

To secure a smaller bearing surface with the resulting increase in unit compressive load, the inside diameter of these gaskets is made larger than the port diameter of the joint, providing assurance of tightness.

Corrugated Metallic Gaskets.....pages 567 to 570

Rings for Ring Joints

Ring Joints can be utilized as connections for all pressure classes of Crane Steel Valves, Fittings, and Flanges. They require the use of a metal ring, which seats in an especially prepared groove in each flange face, to seal the joint.

Crane rings for ring joints are the result of extensive research and field and laboratory testing. They are of unusually high quality, being purchased under exceptionally rigid specifications; each shipment is carefully inspected and tested before being admitted to stock.

Crane rings are furnished in three types: Type A, of Armco Iron with a maximum Brinell hardness number of 90; Type B, of 4 to 6% chrome $\frac{1}{2}\%$ molybdenum with a maximum Brinell hardness number of 130; and Type C, of soft steel with a maximum Brinell hardness number of 130.

Crane rings and ring joints are particularly recommended for high pressure hydraulic installations and for high pressure-temperature steam and hot oil lines. The merits of the joint are well known; both the American Standard (ASA B16e-1939) and the American Petroleum Institute (API No. 5-G-3 and No. 600A-39) recognized its greater efficiency by assigning higher ratings to products with this facing than to those with other types.

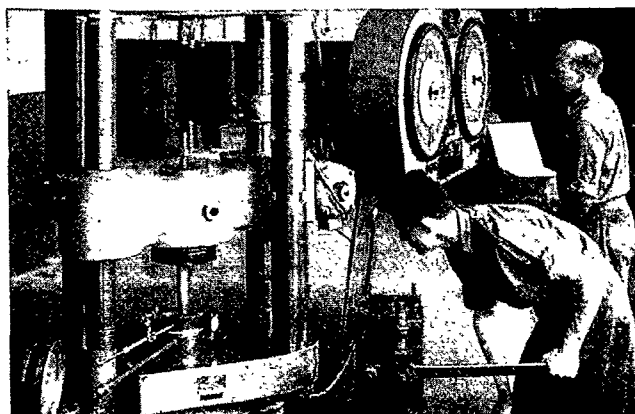
Rings for Ring Joints.....page 564

Composition Discs

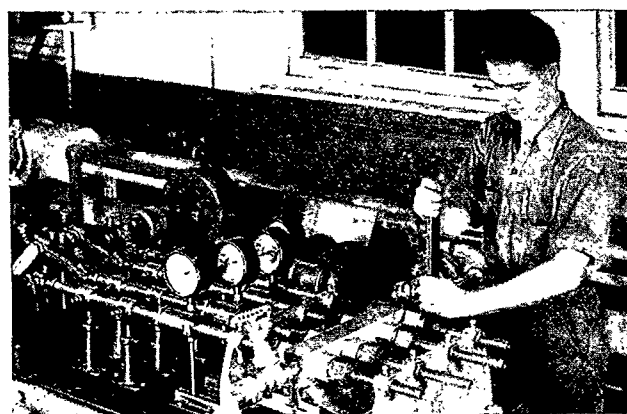
Crane Composition Discs are furnished in a wide variety of materials, sizes, and styles. Through years of constant study, research, and testing, this line of Composition Discs was developed to fill the need for suitable renewable type discs in globe and angle valves.

These materials are made for use in steam, hot and cold water, oil, air, gas, and gasoline services. Users are urged to choose the type and material recommended on page 178, in order to obtain the best results.

Composition Discs.....page 178



Studying Pressure Holding Properties of Gasket Material



Testing Stuffing Box Packing Under Operating Conditions

Crane Cast Steels

To provide adequately for the widely varied services to which steel valves and fittings are subjected, Crane Co. regularly produces several different types of cast steel. The individual characteristics and recommendations for each are described below and on the opposite page.

The Crane steel foundry today is the largest and best equipped in the valve and fitting industry. It includes the latest type of swinging-roof top-charge electric arc furnaces, modern high frequency electric induction furnaces, efficient molding and conveying equipment, and exacting laboratory control. These facilities and foundry procedure produce sound, pressure tight, and high quality castings in small sizes as well as large sizes. It is a complete and unexcelled service to the buyers of steel valves and fittings.

The careful and thorough heat treatment given Crane steel castings completely refines the grain, relieves internal stresses, and imparts superior physical properties. Regular heat treatments consist of annealing or normalizing and drawing.

In annealing, the castings, having cooled after pouring to a temperature below the critical range, are heated to and held at, the annealing temperature for the proper length of time; they are then allowed to cool slowly. For normalizing and drawing, the castings, having cooled below the critical range after pouring, are heated to and held at, the normalizing temperature, after which they are allowed to cool in still air at room temperature. They are then reheated to and held at, the drawing temperature, finally being allowed to cool in the furnace.

Crane Carbon Cast Steel

Crane Carbon Cast Steel is ideally suited for a multitude of services that are beyond the scope of bronze or iron. Its superior strength and toughness, and its resistance to piping strains, vibration, shock, freezing, and damage by fire, afford reliable protection when safety and utility are desired.

It is suitable for use on saturated or superheated steam, cold or hot water, cold or hot non-corrosive oil, gas, air, or other fluids. Under appropriate pressures, it may be used with safety on temperatures as high as 1000° F.

When Crane Carbon Cast Steel Valves and Fittings are required for fusion welding into the piping, steel with a carbon content not exceeding 0.35% is supplied, which assures excellent welding qualities.

Crane Carbon Steel castings are carefully heat treated by annealing.

Crane Carbon Cast Steel conforms to and sub-

stantially exceeds the minimum requirements A.S.T.M. Specification A 95, covering carbon steel castings for valves, flanges, and fittings for high temperature service.

Chemical Composition	Minimum	Maximum	Crane average
Carbon.....per cent	0.15	0.45	0.30
Manganese.....per cent	0.50	0.85	0.60
Silicon.....per cent	0.20	0.45	0.30
Phosphorus.....per cent	....	0.05	0.03
Sulfur.....per cent	....	0.06	0.03

Physical Properties at 70° F.	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	70,000	74,000
Yield point.....lbs. per sq. in.	36,000	42,000
Elongation in 2 inches.....per cent	22	25
Reduction of area.....per cent	30	35
Brinell hardness number.....	....	....
Bend test.....degrees	90	....
Charpy impact strength.....ft. lbs.	....	....

NOTE: In addition, Crane Co. will furnish Carbon Cast Steel complying with the A.S.T.M. Specification A 216, fusion welding grade, when so ordered

Crane No. 4 Carbon-Molybdenum Alloy Cast Steel

Crane No. 4 Carbon-Molybdenum Cast Steel, containing approximately 1/2% of molybdenum, has many unusually desirable characteristics. At room temperature, its strength is slightly greater than that of Crane Carbon Steel, and this strength is retained to a marked degree at elevated temperatures. At temperatures to 1000° F., its resistance to creep is equal to that of more highly alloyed steels. Unlike most alloy steels, its weldability compares favorably with that of carbon steel.

It is admirably suited for use on steam, water, oil, gas, air, or other services when superior strength and toughness are essential. It is especially recommended for high-pressure, high-temperature service when valves and fittings are welded into the piping. It is the logical choice for superheated steam lines at temperatures up to 1000° F.

Crane No. 4 Carbon-Molybdenum Steel castings are carefully heat treated, by normalizing and drawing.

Crane No. 4 Carbon-Molybdenum Cast Steel con-

forms to and substantially exceeds the minimum requirements of A.S.T.M. Specification A 181, Grade C 1, covering alloy steel castings for valves, flanges, and fittings for service at temperatures from 750 to 1100° F.

Chemical Composition	Minimum	Maximum	Crane average
Carbon.....per cent	0.15	0.30	0.20
Molybdenum.....per cent	0.40	0.60	0.50
Manganese.....per cent	0.50	0.70	0.60
Silicon.....per cent	0.20	0.45	0.30
Phosphorus.....per cent	....	0.05	0.03
Sulfur.....per cent	....	0.06	0.03

Physical Properties at 70° F.	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	70,000	75,000
Yield point.....lbs. per sq. in.	45,000	50,000
Elongation in 2 inches.....per cent	22	25
Reduction of area.....per cent	35	40
Brinell hardness number.....	....	....
Bend test.....degrees	90	....
Charpy impact strength.....ft. lbs.	....	....

NOTE: In addition, Crane Co. will furnish Carbon-Molybdenum Alloy Cast Steel complying with the A.S.T.M. Specification A 217, fusion welding grade, when so ordered.

Crane No. 2 Nickel-Chrome Alloy Cast Steel

Crane No. 2 Nickel-Chrome Cast Steel possesses exceptional strength at both normal and elevated temperatures. The molybdenum content enhances its toughness and eliminates the danger of embrittlement. No. 2 Steel offers greater resistance to erosion, to oxidation or scaling, and to corrosion than do Carbon Steel and Carbon-Molybdenum Steel.

It is unusually suited for severe service on oil, gas, water, or steam lines. It is especially recommended for high-pressure oil refinery service at temperatures up to 1100° F., for flow lines in oil and gas fields, and for oil or gas pipe lines. As heat treatment after welding is essential, it is best adapted to products having flanged or threaded ends. All castings are carefully heat treated, by normalizing and drawing.

Crane No. 2 Nickel-Chrome Cast Steel conforms to and substantially exceeds the minimum requirements of A.S.T.M. Specification A 157, Grade C 11, cover-

ing alloy steel castings for valves, flanges, and fittings for service at temperatures from 750 to 1100° F.

Chemical Composition	Min- imum	Max- imum	Crane average
Carbon.....per cent	0.25	0.35	0.30
Nickel.....per cent	1.75	2.25	2.00
Chromium.....per cent	0.65	0.95	0.75
Molybdenum.....per cent	0.20	0.30	0.25
Manganese.....per cent	0.45	0.75	0.60
Silicon.....per cent	0.20	0.45	0.30
Phosphorus.....per cent	....	0.05	0.03
Sulfur.....per cent	....	0.06	0.02

Physical Properties at 70° F.	Min- imum	Crane average
Tensile strength.....lbs. per sq. in.	100,000	112,000
Yield point.....lbs. per sq. in.	65,000	85,000
Elongation in 2 inches.....per cent	18	20
Reduction of area.....per cent	30	45
Brinell hardness number.....	.....	235
Bend test.....degrees	90	180
Charpy impact strength.....ft. lbs.	.....	20

Crane No. 5 Chrome-Molybdenum Alloy Cast Steel

Crane No. 5 Chrome-Molybdenum Cast Steel is unusually strong at normal temperatures and possesses exceptional strength and creep resistance at high temperatures. It offers excellent resistance to erosion and to scaling at temperatures up to 1100° F. It is relatively economical in cost when compared with more highly alloyed steels.

Crane No. 5 Steel is ideal for severe service on steam, water, oil, or gas lines, particularly when corrosion resistance is essential as in oil refinery service. Since heat treatment after welding is necessary, it is best adapted to products having flanged or threaded ends. All castings are carefully heat treated by normalizing and drawing. Crane No. 5 Cast Steel conforms to and substantially exceeds the minimum requirements of A.S.T.M. Specification A 157, Grade C 5, covering

alloy steel castings for valves, flanges, and fittings for service at temperatures from 750 to 1100° F.

Chemical Composition	Min- imum	Max- imum	Crane average
Carbon.....per cent	0.15	0.30	0.25
Chromium.....per cent	4.00	6.50	5.00
Molybdenum.....per cent	0.40	0.65	0.50
Manganese.....per cent	0.45	0.75	0.60
Silicon.....per cent	0.20	1.25	0.65
Phosphorus.....per cent	....	0.05	0.03
Sulfur.....per cent	....	0.06	0.02

Physical Properties at 70° F.	Min- imum	Crane average
Tensile strength.....lbs. per sq. in.	100,000	112,000
Yield point.....lbs. per sq. in.	65,000	87,000
Elongation in 2 inches.....per cent	18	20
Reduction of area.....per cent	30	45
Brinell hardness number.....	.....	235
Bend test.....degrees	90	180
Charpy impact strength.....ft. lbs.	.....	15

Crane No. 3 Nickel Alloy Cast Steel

Crane No. 3 Nickel Cast Steel provides adequate tensile and impact strength at sub-zero temperatures.

It is especially recommended for use at extremely low atmospheric temperatures, or for refrigerating processes down to -100° F., such as in the dewaxing of lubricating oil. All castings are carefully heat treated, by normalizing and drawing.

Physical Properties at 70° F.	Min- imum	Crane average
Tensile strength.....lbs. per sq. in.	67,500	75,000
Yield point.....lbs. per sq. in.	45,000	55,000
Elongation in 2 inches.....per cent	25	32
Reduction of area.....per cent	45	55
Charpy impact strength		
At 70° F. ....ft. lbs.	25	35
At -100° F. ....ft. lbs.	15	20

Crane "Arctic" Nickel Alloy Cast Steel
(Patented)

For sub-zero temperatures substantially lower than those for which Crane No. 3 Nickel Cast Steel is recommended, Crane Metallurgists developed Crane "Arctic" Nickel Cast Steel. All castings are heat treated to develop the required physical properties. Inquiries for Crane "Arctic" Nickel Cast Steel should include specifications of the contemplated service.

Physical Properties at 70° F.	Minimum
Tensile strength.....lbs. per sq. in.	60,000
Yield point.....lbs. per sq. in.	40,000
Elongation in 2 inches.....per cent	35
Reduction of area.....per cent	60
Charpy impact strength	
At 70° F. ....ft. lbs.	40
At -175° F. ....ft. lbs.	15

Crane Forged Steels

2

Paralleling the assortment of Cast Steels produced by Crane Co. to provide for widely varied services, is an identical group of Crane Forged Steels. While the chemical composition and physical properties of the forged steels are not exactly the same as those of the cast steels, in general characteristics and ultimate utility the forged material is the full equivalent of the cast.

The recommendations for Crane Cast Steels and comparisons thereof, are, therefore, equally applicable to Crane Forged Steels; see pages 6 and 7. From the standpoint of life and service there is no difference; both are component parts of a complete line. Forgings have a highly refined grain, with physical properties well in excess of recognized minimum requirements.

Crane Carbon Forged Steel

For a greater diversity of service, Crane Carbon Forged Steel is furnished in two Classes, Class I and Class II. Class I, with a maximum carbon content of 0.30 per cent, has unusually good welding properties and is used for Welding Neck Flanges and for Socket-Welding Fittings. Class II, with slightly higher carbon content (0.35 per cent maximum) is used for all other types of steel flanges and for flange unions, yokes on steel valves, etc.

Crane Carbon Steel forgings possess such a highly mechanically refined grain structure and such generally excellent physical properties that heat treatment is confined to flanges in the 400-Pound and higher steel pressure classes.

Crane Carbon Forged Steel conforms to A.S.T.M. Specification A 105 when heat treated and to A.S.T.M. Specification A 181 when not heat treated. The Crane average physical properties, substantially exceeding A.S.T.M. minimums, are shown below.

Physical Properties at 70° F.

	Crane Average		Crane Average	
	Class I	Class II	Class I	Class II
	Heat treated	As forged	Heat treated	As forged
Tensile strength, psi.....	75,000	77,000	80,000	80,000
Yield point, psi.....	45,000	46,000	47,000	48,000
Elongation in 2 inches, %....	32	25	30	25
Reduction of area, %.....	60	50	55	45
Brinell hardness number.....	155	160	160	160
Charpy impact strength, ft. lbs.	25	20	25	20

Crane No. 4 Carbon-Molybdenum Alloy Forged Steel

Crane No. 4 Carbon-Molybdenum Forged Steel has the same good welding properties, high strength retention at elevated temperatures, and excellent resistance to creep as Crane No. 4 Carbon-Molybdenum Cast Steel. Its mechanically refined grain structure is further refined by a careful heat treatment, consisting of normalizing and drawing.

This steel exceeds the minimum requirements of A.S.T.M. Specification A 182, Grade F 1.

Physical Properties at 70° F.

	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	70,000	78,000
Yield point.....lbs. per sq. in.	45,000	50,000
Elongation in 2 inches.....per cent	25	30
Reduction of area.....per cent	35	60
Brinell hardness number.....	155	155
Charpy impact strength.....ft. lbs.	.....	30

Crane No. 2 Nickel-Chrome Alloy Forged Steel

Crane No. 2 Nickel-Chrome Forged Steel has the same superior high temperature properties and resistance to corrosion, erosion, and scaling as the cast material. The mechanical refinement of grain structure by the forging process is supplemented by heat treatment consisting of a quench and draw.

Physical Properties at 70° F.

	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	100,000	115,000
Yield point.....lbs. per sq. in.	70,000	85,000
Elongation in 2 inches.....per cent	18	25
Reduction of area.....per cent	50	50
Brinell hardness number.....	.....	.....
Charpy impact strength.....ft. lbs.	.....	.....

Crane No. 5 Chrome-Molybdenum Alloy Forged Steel

Crane No. 5 Chrome-Molybdenum Forged Steel, the cast material, offers unusually high retention of strength on elevated temperature service, superior corrosion resistance, and excellent resistance to erosion and scaling. All forgings are carefully heat treated, by normalizing and drawing.

This steel exceeds the minimum requirements of A.S.T.M. Specification A 182, Grade F 5.

Physical Properties at 70° F.

	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	90,000	100,000
Yield point.....lbs. per sq. in.	65,000	75,000
Elongation in 2 inches.....per cent	22	25
Reduction of area.....per cent	50	50
Brinell hardness number.....	.....	.....
Charpy impact strength.....ft. lbs.	.....	.....

Crane No. 3 Nickel Alloy Forged Steel

Crane No. 3 Nickel Forged Steel is characterized by its outstanding suitability for service on sub-zero temperatures. All forgings of this steel are carefully heat treated, by normalizing and drawing.

Physical Properties at 70° F.

	Minimum	Crane average
Tensile strength.....lbs. per sq. in.	62,500	65,000
Yield point.....lbs. per sq. in.	36,000	40,000
Elongation in 2 inches.....per cent	25	25
Reduction of area.....per cent	40	40
Charpy impact strength		
At 70° F. ....ft. lbs.	25	25
At -100° F. ....ft. lbs.	15	15

Bolting Materials

In the manufacture of Crane Valves and in bolting flanged valves, fittings, and flanges together to form a complete piping system, four classes of bolting materials are regularly used. These materials, open hearth steel, cold rolled steel, chrome-molybdenum steel, and chrome-molybdenum-vanadium steel, are described as follows:

Machine Bolts and Bolt-Studs

Bolts and studs for temperatures up to 500° F. are made from steel complying with A.S.T.M. Specification A 107, Open Hearth free-cutting grade, having the following physical properties:

Physical Properties at 70° F.	Minimum
Tensile strength.....lbs. per sq. in.	60,000
Yield point.....lbs. per sq. in.	35,000
Elongation in 2 inches.....per cent	25
Reduction of area.....per cent	50

Nuts regularly used with machine bolts or studs are made from free-cutting or resulfurized nut stock which conforms to A.S.T.M. Specification A 107.

Studs and bolt-studs for temperatures up to 500° F., primarily for high pressure hydraulic service, are made from cold rolled steel complying with A.S.T.M. Specification A 108, Open Hearth free-cutting grade, having the following physical properties:

Physical Properties at 70° F.	Minimum
Tensile strength.....lbs. per sq. in.	70,000
Yield point.....lbs. per sq. in.	60,000
Elongation in 2 inches.....per cent	18
Reduction of area.....per cent	45

Nuts regularly used on cold rolled steel studs and bolt-studs are cold made of material in accordance with A.S.T.M. Specification A 107.

Alloy Steel Bolt-Studs

Crane Co. pioneered in the development of alloy steel bolting. For years, Crane Triplex Steel was recognized as the highest quality bolting material available, and today, still ranks well with the best steels obtainable. With the introduction of Crane Templex Steel, the culmination of a long, patient, exhaustive, and comprehensive study, Crane Co. again offers an outstanding bolting material, unsurpassed for high-pressure high-temperature services.

Crane Triplex Steel

Crane Triplex Steel, a chrome-molybdenum steel having marked stability, retains its strength unusually well at elevated temperatures. It offers better resistance to creep than most high grade alloy steel bolting materials. Responding readily to heat treatment, it is carefully processed to secure liberal strength, hardness, and other desirable properties.

The uniformly satisfactory results secured with Triplex Steel Bolt-Studs in thousands of steel valve and fitting installations, many of which — particularly in oil refineries — have been operating under extreme pressures and temperatures, is a fitting testimonial of their excellence. Crane Triplex Steel is regularly used for the bonnet bolting of Crane "XR" and "X" trimmed steel valves.

The steel is specially heat treated by quenching and drawing, producing a dense, uniform, and fine grain with superior physical properties.

Crane Triplex Steel substantially exceeds the minimum requirements of A.S.T.M. Specifications A 96, for Class C Bolting, and A 193, Grade B 7.

Physical Properties at 70° F.

	Min- imum	Crane Triplex average	Crane Templex average
Tensile strength...lbs. per sq. in.	125,000	134,000	145,000
Yield point.....lbs. per sq. in.	105,000	116,000	118,000
Elongation in 2 inches...per cent	16	20.5	20
Reduction of area.....per cent	50	57	57
Brinell hardness number (range).	260-320	270-300	285-320

Crane Templex Steel

Crane Templex Steel is a chrome-molybdenum-vanadium alloy, recently developed by Crane Co. Its unusual strength and remarkable stability at elevated temperatures is the result of the molybdenum and vanadium combined with special heat treatment. Crane Templex Steel has greater resistance to creep than any other bolting steel offered on the market today.

For exceptionally high temperature service, this steel is ideal. It is regularly used in the bonnet bolting of Crane "U" trimmed steel valves.

The secret of the superiority of Crane Templex Steel lies in the exacting heat treatment developed by Crane laboratories. In addition to uniform grain and excellent physical properties, it produces a definite carbide size in the microstructure of the material, resulting in maximum creep resistance.

Crane Templex Steel substantially exceeds the minimum requirements of A.S.T.M. Specifications A 96, for Class C Bolting, and A 193, Grade B 14.

Nuts for Alloy Steel Bolt-Studs

Crane Triplex and Templex Steel Bolt-Studs are regularly fitted with hot forged, medium carbon, oil-quenched nuts, made to American Standard Semi-Finished Heavy Hexagon dimension, ASA B18.2. Having a Brinell hardness number of 250 minimum, they are capable of developing the full strength of the stud. They conform to A.S.T.M. Specifications A 96, Class 1, and A 194, Class 2 H.

Marking of Crane Products

2

The marking and identification of Crane Products conforms to the Manufacturers Standardization Society Standard Marking System for Valves, Fittings, Flanges, and Unions (MSS SP-25).

Distinguishing Marks

All product is marked for identification with either the name "CRANE", the letter "C", or the letters "CC", depending on the size and type of the article as well as the method of manufacture. In addition, certain unions and union fittings have specific marking, such as "RAILROAD", etc. Unions, fittings, and valves made in accordance with the specifications adopted by the American Association of Railroads are marked with either the letters "ARA" or "AAR".

Designation of Material

Cast iron product has no marking indicating the material.

Malleable iron product is marked with either the letters "MI" or "MALL", except for Standard Malleable Iron Screwed Fittings which can be distinguished from the Standard Cast Iron by the open crotch between the bands in place of joining bands, and unions or union fittings which are not made in cast iron and cannot be confused.

Brass product can be readily distinguished from cast iron by its color, and therefore has no material

marking, except special bronze alloys which have special markings.

Steel product is all marked with the word "STEEL" which definitely distinguishes it from cast iron. In addition, alloy steels are marked with a symbol to identify the alloy. Steel castings of pressure containing parts have the heat number stamped on raised pad.

Cast stainless steels and other corrosion resistant alloys have special markings.

Designation of Service Pressure Ratings

The recommended pressure ratings for each line of goods illustrated in this catalog are specified on the page where listed. Nearly all of the product, with the exception of Gas Stops, Low Pressure Brass Valves, and Standard Screwed Fittings, are marked with the recommended basic working pressure.

Where the numerals are not followed by any suffix symbols, they represent the basic steam service pressure rating at the maximum temperature which is given for the line on the corresponding page of this catalog, or, where the maximum temperature is not specified, at the temperature of saturated steam.

Ammonia Valves and Fittings are an exception to the foregoing in that they are marked "300" without

any suffix symbol to indicate ammonia service pressure. Valves with leather or rubber faced discs are another exception in that they use bodies regularly marked with a basic steam rating, yet should only be used on the service for which this type of disc face is recommended.

Where the numerals are followed by the letters "WOG", they represent the water, oil, or gas service pressure rating at or near atmospheric temperature. Where two sets of numerals are shown, the steam service pressure is followed by the letter "S" and the water, oil, or gas service pressure, by the letters "WOG". Test pressure marking, when used, is followed by the word "TEST".

Air Testing

The fact that many of our products are recommended for water, oil, and gas does not necessarily indicate that all of those products are air tested. It has been found commercially that our regular stock valves have proven quite generally satisfactory for gas service without an air test, and therefore when an air test is required, it must be definitely specified.

Any valves that are to be used for air, gas, or very volatile fluids and where absolute tightness is of essential importance, should be ordered air tested unless the catalog definitely states that they are regularly air tested.

All valves which are air tested are provided with protectors placed over the openings.

Hydrostatic and Shock Working Pressures

All valves, fittings, and flanges in this catalog are suitable for the liquid working pressures given, only when used in hydraulic installations in which shock is absent or negligible.

The sudden closure of a valve in a hydraulic system causes the body of liquid, which may be moving at a rate generally in excess of 1 foot per second, to stop instantaneously. As a liquid is relatively incompressible, the effect of the sudden cessation of flow is to raise the pressure considerably above the static working pressure. This increase in pressure is called "SHOCK" and may, in some cases, be sufficient to cause valves or piping to fail.

The increase in pressure due to shock is not dependent upon the working pressure of the system but upon the velocity with which the liquid is flowing. For example: An installation having a working pressure of 100 pounds per square inch with a velocity of 3 feet per second will be subject to the same increase in pressure due to *instantaneous closure* of a valve as one

having a working pressure of 1000 pounds per square inch and the same velocity.

Shock is generally prevalent in lines which are equipped with check valves, quick closing valves, or in lines supplied by reciprocating pumps. Shock, however, may also be produced in any line to a lesser degree by the rapid closure of regular globe or gate valves, and it is therefore recommended that care must always be used in closing valves in lines transporting liquids.

It is recommended that, where shock is likely to occur, the maximum shock pressure be added to the working pressure of the line to determine the working pressure of the valves, fittings, or flanges which should be used.

It is also recommended that all hydraulic installations be equipped with air chambers or other types of shock absorbers to eliminate, as much as possible, the increase in pressure due to shock.

Increase in Pressure Due to Expansion of Liquids

If a vessel is completely filled with a liquid so that there is no space available for volumetric expansion, any rise in temperature of the liquid will cause an increase in internal pressure. This increase in pressure is due to the tendency of the liquid to change in volume, and as liquids are relatively incompressible, the pressure builds up rapidly with only a slight change in temperature. The rise in temperature may be due to the sun's rays or to an increase in atmospheric temperature.

Crane Co. has conducted tests which indicate that when vessels are completely filled with fuel oil of 33° A.P.I., a temperature rise of one degree Fahrenheit causes the internal pressure to increase approximately 75 pounds per square inch.

It is recommended, therefore, where valves are installed in lines carrying liquids (particularly oil), that some means be employed to prevent entrapping the liquid in the valve bonnet, to eliminate the possibility of pressure building up due to a rise in the temperature.

The knowledge and facilities of Crane engineering and research extend far beyond the abbreviated treatise on metals and materials shown on the preceding pages. Through years of untiring research and critical study of new developments, a wealth of data has been accumulated which forms an integral part of Crane service. Users confronted with unusual problems pertinent to the control of fluids are invited to avail themselves of this source of information and to refer to the many Crane technical publications on specialized subjects. Inquiries concerning the users' needs are rendered careful consideration.

Brass Gate Valves

Names of parts.....	page 14
Low Pressure Valves.....	page 15
Standard Valves, Rising Stem.....	pages 16 and 17
Standard Valves, Non-Rising Stem.....	page 16
150-Pound Valves, Rising Stem.....	page 19
150-Pound Valves, Non-Rising Stem.....	page 19
200-Pound Valves, Rising Stem.....	page 20
200-Pound Valves, Non-Rising Stem.....	page 21
200-Pound Valves, Outside Screw and Yoke.....	page 21
300-Pound Valves, Rising Stem.....	page 23
300-Pound Valves, Non-Rising Stem.....	page 22
350-Pound Valves.....	page 24
Valves with Lock Shield.....	page 16

The Crane line of Brass Gate Valves includes a valve for every commercial requirement. The uniformly superior quality that distinguishes all Crane products has been maintained in this line. Excellence of design, high grade materials, and workmanship of the highest order assure dependability in service.

Other types of brass valves, supplementing the gate valves indexed above, are shown on the following pages:

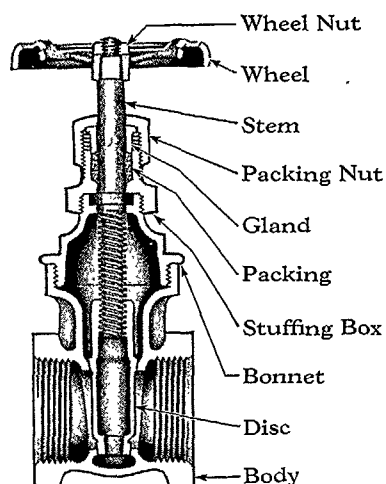
Brass Globe and Angle Valves.....	pages 25 to 50
Brass Check and Foot Valves.....	pages 51 to 63
Brass Hose Valves.....	pages 70 and 71
Brass Lever-Operated Quick-Opening Valves....	pages 66 to 69
Brass Radiator Valves.....	pages 77 to 81

* * * * *

The lists shown above do not include all Crane Brass Valves. Brass Valves that perform a special duty or those made for special services such as Float Valves, Pop Safety Valves, Relief Valves, Pressure Regulators, Pressure Reducing Valves, Solder-Joint Valves, and Valves for Marine Service are described in other sections of this catalog. Refer to the index.

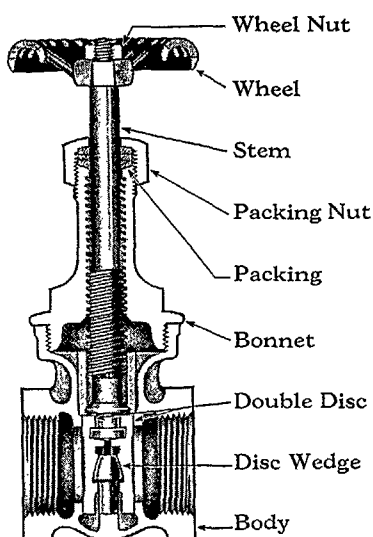
Names of Parts Brass Gate Valves

3



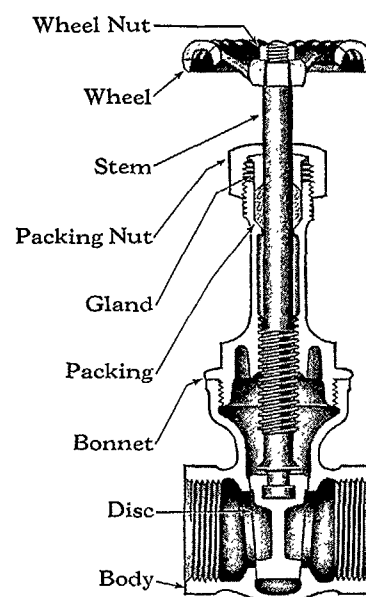
Non-Rising Stem
Wedge Disc Gate Valve

(No. 449½, p. 15)



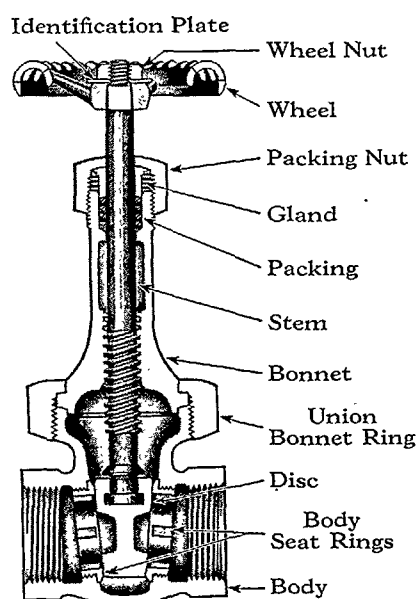
Rising Stem
Double Disc Gate Valve

(No. 440, p. 16)



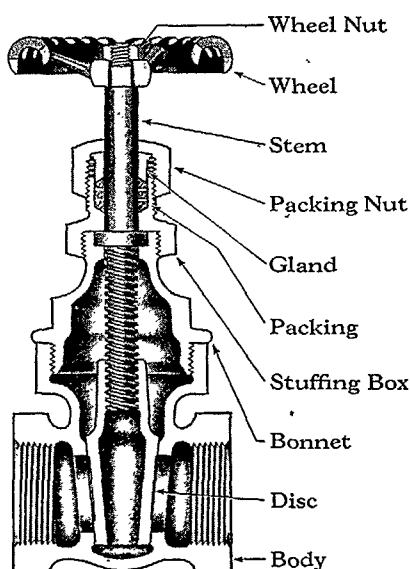
Rising Stem
Wedge Disc Gate Valve

(No. 431, p. 19)



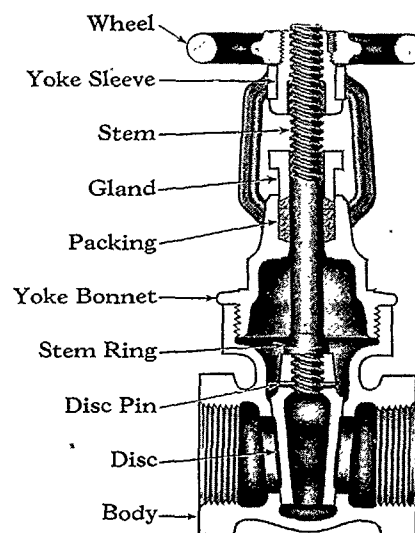
Rising Stem, Union Bonnet
Wedge Disc Gate Valve
With Renewable Seats

(No. 423, p. 20)



Non-Rising Stem
Wedge Disc
Gate Valve

(No. 458, p. 21)

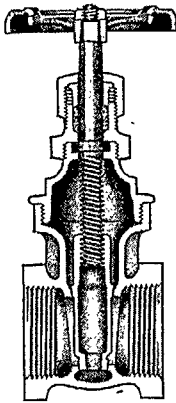


Outside Screw and Yoke
Wedge Disc
Gate Valve

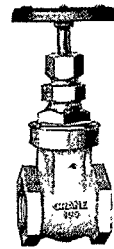
(No. 459, p. 21)

Low Pressure Brass Gate Valves

Wedge Disc—Non-Rising Stem



Cross Section
No. 449 1/2



No. 449 1/2
Screwed

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F.
125 pounds cold oil or gas

No. 449 1/2 Valves: The No. 449 1/2 are well-constructed valves. They will give good results where working conditions are not severe, and are recommended for general shut-off valve service on low pressure steam and water lines. They are well suited for heating systems, city

water, low pressure condensation return lines, and similar service.

Their body, bonnet, wedge disc, and stem are made of brass.

Repacking: The stuffing box is equipped with a brass gland. The valves, when wide open, can be repacked while under pressure.

List Prices, Each, and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 449 1/2, Screwed		1.20	1.20	1.30	1.50	2.00	2.65	3.55	5.00
Dimensions in Inches	End to end	1 3/4	1 13/16	1 13/16	2	2 3/16	2 7/16	2 5/8	3
	Center to top of wheel	3 3/4	3 3/4	3 3/4	4 1/2	5 1/4	5 3/4	6 1/2	7 5/8
	Diameter of wheel	2 1/4	2 1/4	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4

Low Pressure Valves with Bolted Bonnet

WORKING PRESSURES

100 pounds steam
125 pounds cold water, oil, or gas, non-shock

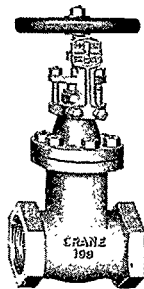
Nos. 4436 and 4437 Valves: The No. 4436 and No. 4437 Valves are of liberal proportions throughout. They are recommended for the same service as the valves shown above.

The valves have a body, bolted bonnet, non-rising stem, wedge disc, and renewable body seat rings made of brass. The stuffing box is deep, is filled with a high grade packing, and on sizes 2 1/2 to 10-inch is equipped with a bolted gland (the 2-inch size has a screwed type stuffing box and a gland).

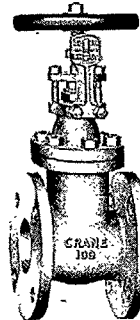
The valves are regularly furnished with an indicator to show whether the valve is open or closed. When so ordered, valves without indicator will be furnished.

Repacking: These valves, when wide open, can be repacked while under pressure.

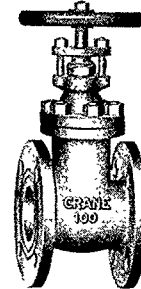
Flanged valves: End flanges and drilling conform



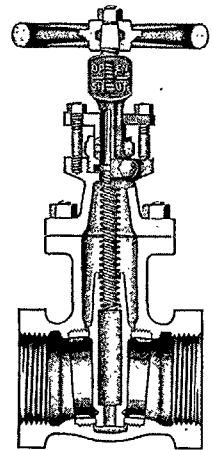
No. 4436, Screwed
With Indicator
(Also furnished
without Indicator)



No. 4437, Flanged
With Indicator



No. 4437, Flanged
Without Indicator



Cross Section
No. 4436
With Indicator

Unless otherwise ordered, the No. 4436 and No. 4437 Valves are always furnished with indicator.

to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only. Full face gaskets should be used; see page 567.

List Prices, Each, and Dimensions

Size	Inches	2	2 1/2	3	3 1/2	4	5	6	8	10
No. 4436, Screwed	With Indicator	40.00	50.00	65.00	80.00	100.00				
	Without Indicator	38.00	48.00	63.00	78.00	98.00				
No. 4437, Flanged F. D. & S. F.	With Indicator	50.00	60.00	75.00	90.00	110.00	160.00	210.00	325.00	425.00
	Without Indicator	48.00	58.00	73.00	88.00	108.00	155.00	205.00	320.00	420.00
Dimensions in Inches	End to end	4 5/16	5 1/2	6	6 1/4	6 1/2				
	Face to face	4 5/8	5	5 1/2	6	6 1/2	7	7 1/2	8 1/2	9 1/2
	Center to top of stem	With Indicator	9 3/4	11 1/2	13 3/4	14 1/2	16	18 1/4	20	25
		Without Indicator	8 5/8	10 1/4	12 1/8	12 7/8	14 3/8	16 1/2	18 1/8	23 1/8
	Diameter of wheel	4 1/2	6	7	7	8	9	9	10	12
	Diameter of flanges	6	7	7 1/2	8 1/2	9	10	11	13 1/2	16
	Thickness of flanges	1/2	9/16	5/8	11/16	11/16	3/4	13/16	15/16	1

*Other types of
Low Pressure
Brass Gate
Valves:*

*Marine, p. 466
Radiator, p. 80
Solder-Joint...
.....p. 504*

*Templates
for drilling,
see page 550.*

Standard Brass Gate Valves

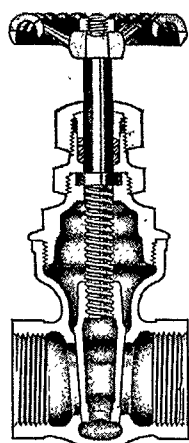
Wedge Disc
Non-Rising Stem

Double Disc
Rising Stem

WORKING PRESSURES

125 pounds steam

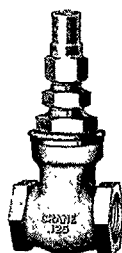
200 pounds cold water, oil, or gas, non-shock



Cross Section
No. 438

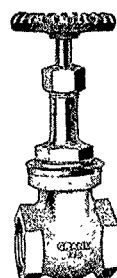


No. 438
Screwed
with Wheel



No. 438
Screwed
with Lock Shield

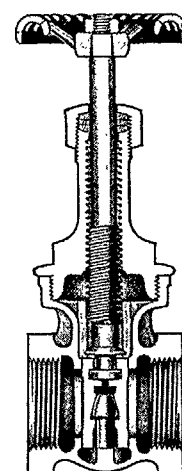
Unless
otherwise
ordered,
valves with
wheels are
always
furnished.



No. 440
Screwed
with Wheel



No. 440
Screwed
with Lock Shield



Cross Section
No. 440

List Prices and Dimensions

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	
No. 438 or No. 440		With Wheel	Each	2.40	2.40	2.60	3.30	4.40	6.00	8.00	11.00	19.00	28.00
		With Lock Shield	Each			3.25	4.10	5.50	7.50	10.00	13.75		
Dimensions in Inches	No. 438	End to end		1 3/4	1 13/16	2	2 1/4	2 11/16	3	3 1/4	3 11/16	4 1/4	4 11/16
		Center to top of wheel		3 3/4	3 3/4	4 1/16	4 3/4	5 5/8	6 1/2	7 1/4	8 5/8	10	11 1/8
		Center to top of lock shield				3 3/4	4 3/8	5 1/4	6 1/4	7 3/8	8 3/4		
		Diameter of wheel		1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
	No. 440	End to end		1 5/8	1 3/4	1 7/8	2 1/8	2 1/2	2 3/4	3	3 1/2	4 1/16	4 9/16
		Center to top of wheel, open		4 1/4	4 1/4	4 3/4	5 7/8	7	8 3/8	9 1/2	11 7/8	14 1/4	16 1/2
		Center to top of lock shield				4 1/2	5 1/8	6 1/8	7 1/2	8 7/8	11 1/8		
		Diameter of wheel		1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8

For list prices of keys for Lock Shield Valves, see page 177.

Service recommendations: These valves are more rugged than is usual with "Standard" valves. All parts are liberally proportioned to assure a high factor of safety against pressure, operating strains, and expansion and contraction of piping.

The valves are recommended for general service on steam, water, oil, or gas lines.

Both the No. 438 and the No. 440 Valves are regularly furnished with wheels. When orders so specify, they will be furnished with lock shield.

Materials: All parts are made of brass, except the wheel which is made of malleable iron.

No. 438 Valves: The No. 438 Valves have a wedge disc and a non-rising stem. The stuffing box is equipped with a gland.

No. 440 Valves: The No. 440 Valves have a rising stem, a double disc, and parallel seats. The double disc is guided in the body. When closing, the last turn of the wheel forces the discs against the seats; when opening, the first turn of the wheel releases the discs from the seats.

Repacking: The No. 438 and No. 440 Valves, when wide open, can be repacked while under pressure.

Flanged valves: For flanged valves, see page 19.

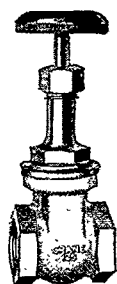
Rising Stem Valves With Special Wheels and Special Finish

Except for the special wheels and the style of finish, the valves illustrated at the bottom of this page are the same as the No. 440 Valves shown above.

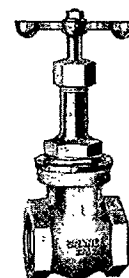
The valves have a composition or a brass wheel and are made to order only. They are available in a variety of special finishes such as rough body; rough body, nickel-plated; polished; polished and nickel-plated; and polished and chromium-plated.

Orders should specify the style of wheel and finish desired.

Prices and dimensions will be furnished on application.



Gate, Screwed
with
Composition Wheel

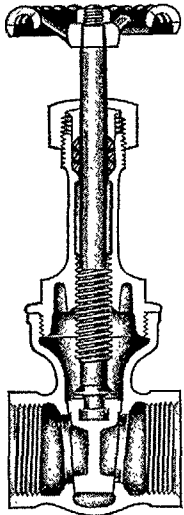


Gate, Screwed
with
Brass Wheel

Standard Brass Gate Valves

Rising Stem

Solid Wedge Disc



Cross Section
No. 428



No. 428
Screwed

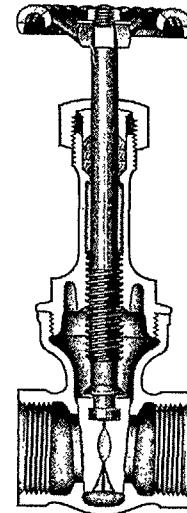
WORKING PRESSURES

125 pounds steam
200 pounds cold water, oil, or gas, non-shock

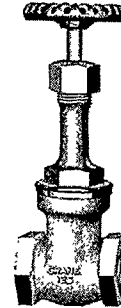
FEATURES

Solid or Double Wedge Disc
Slip-On Disc-Stem Connection
Rising Stem

Double Wedge Disc



Cross Section
No. 430



No. 430
Screwed

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 428, with Solid Wedge Disc		2.40	2.40	2.60	3.30	4.40	6.00	8.00	11.00	19.00	28.00
No. 430, with Double Wedge Disc		2.40	2.40	2.60	3.30	4.40	6.00	8.00	11.00	19.00	28.00

These are new Standard Brass Gate Valves. Ruggedly constructed and accurately designed throughout, they offer the user of brass valves dependable service over a long period of time.

Made with either a solid or a double disc, which is tapered to provide tight, easy seating in the body, the valves are ideal for general service on steam, water, oil, or gas lines.

In addition to the No. 428 and No. 430, the Crane line of Standard Brass Gate Valves with rising stem includes the No. 440 Double Disc Valves shown on page 16. The completeness of the Crane line allows the user to choose a valve best suited for his particular requirements.

Construction: The valves are of the inside screw rising stem type. They are liberally proportioned to assure a high factor of safety against pressure, operating strains, and expansion and contraction of piping.

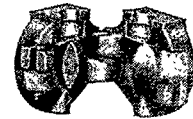
With the exception of the discs, the No. 428 and No. 430 Valves use the same parts.

No. 428 Valves: The No. 428 Valves have a solid wedge disc. The disc slips onto a strong head on the stem end. It is accurately guided in the body to

prevent contact between the seating surfaces until the valve is practically closed. The disc is reversible in the body.

The stuffing box is deep and is equipped with a gland. It is filled with high grade packing.

No. 430 Valves: The No. 430 Valves have a double wedge disc which is reversible in the body. The disc, illustrated at the right, is carefully designed and machined to assure positive, easy operation. The disc-stem connection is the same as in the No. 428 Valves.



When closing, the last turn of the wheel forces the discs against the seats; when opening, the first turn of the wheel releases the discs from the seats. Long disc guides provide accurate seating.

The stuffing box is deep and is equipped with a gland. It is filled with high grade packing.

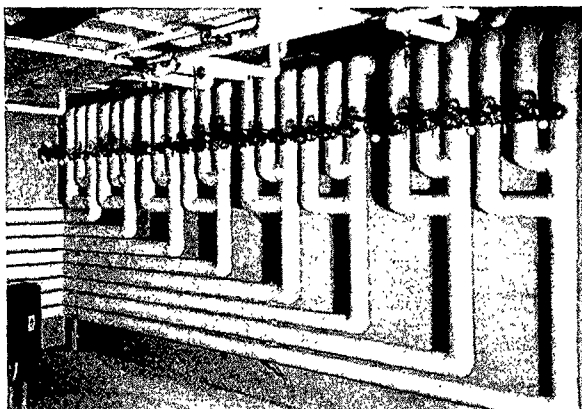
Materials: All parts are made of brass with the exception of the wheel. The wheel is made of malleable iron.

Repacking: The valves, when wide open, can be repacked while under pressure.

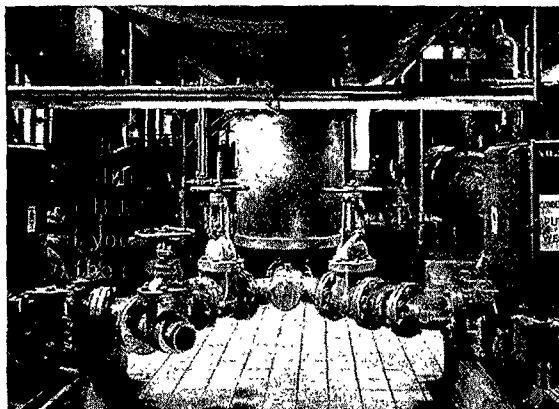
Dimensions, in Inches

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 428 or No. 430	End to end	1 3/4	1 13/16	2	2 1/4	2 11/16	3	3 3/4	3 11/16	4 1/4	4 11/16
	Center to top of valve, open	5 1/8	5 1/8	5 1/2	6 5/8	7 7/8	9 1/2	10 7/8	13 1/8	15 3/8	17 7/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8

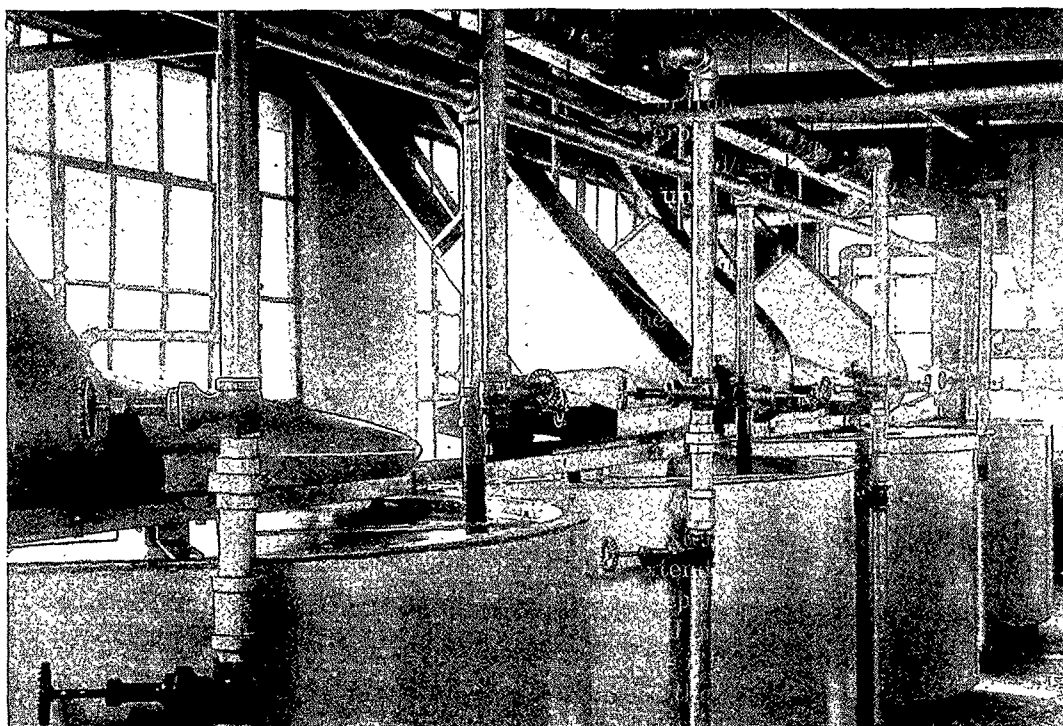
3



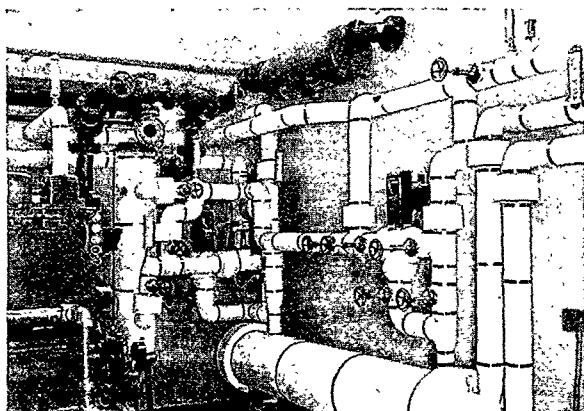
Commercial buildings of all types choose Crane equipment for dependable control of service lines



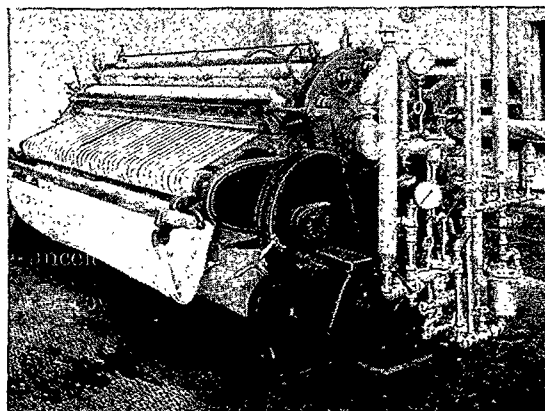
Crane valves and fittings are standard in the piping systems of many automotive plants.



Crane brass gate valves serve many uses in food packing plants.



Sewage disposal plants find that Crane products help them operate at maximum efficiency.



Machinery builders are important users of Crane valves and fittings.

150-Pound Brass Gate Valves

Wedge Disc

Non-Rising Stem

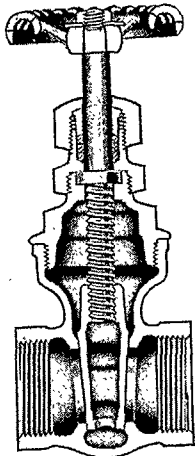
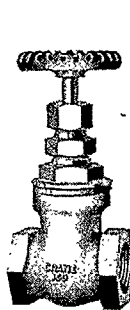
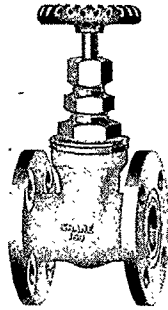
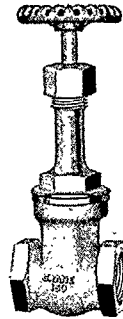
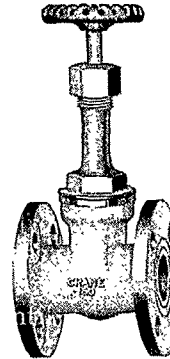
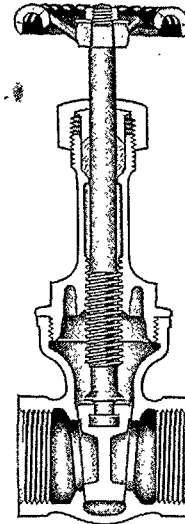
Rising Stem

WORKING PRESSURES

150 pounds steam

Screwed valves—300 pounds cold water, oil, or gas, non-shock

Flanged valves—225 pounds cold water, oil, or gas, non-shock

Cross Section
Non-Rising Stem
No. 437Non-Rising Stem
No. 437
ScrewedNon-Rising Stem
No. 437 1/2
FlangedRising Stem
No. 431
ScrewedRising Stem
No. 429
FlangedCross Section
Rising Stem
No. 431

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 437, Screwed		3.20	3.20	3.60	4.20	5.80	8.00	10.00	16.00	26.00	38.00
No. 437 1/2, Flanged, F.D. & S.F.					20.00	23.00	27.00	33.00	56.00	72.00	90.00
No. 431, Screwed		3.20	3.20	3.60	4.20	5.80	8.00	10.00	16.00	26.00	38.00
No. 429, Flanged, F.D. & S.F.					20.00	23.00	27.00	33.00	56.00	72.00	90.00

Service recommendations: These valves are recommended for steam, water, oil, or gas where the service requires a heavier construction than found in Standard valves.

No. 437 and No. 437 1/2 Gate Valves: The No. 437 and No. 437 1/2 are non-rising stem valves. They are more massive and are heavier in construction than the No. 438 Standard Wedge Disc Gate Valves, shown on page 16.

They have a gland in the stuffing box, and when wide open can be repacked while under pressure.

No. 431 and No. 429 Gate Valves: The No. 431 and

No. 429 are rising stem valves. Their solid wedge disc slips onto the stem, and is accurately guided in the body.

The valves have a gland in the stuffing box, and when wide open can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

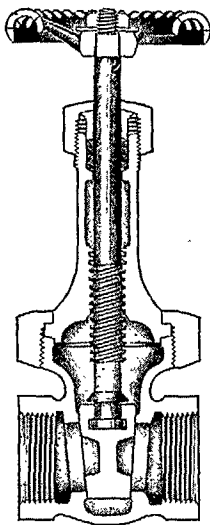
Dimensions, in Inches

Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 437 and No. 437 1/2	End to end, No. 437	1 7/8	1 15/16	2 1/8	2 3/8	2 7/8	3 3/16	3 7/16	3 7/8	4 1/2	4 15/16
	Face to face, No. 437 1/2				3	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	7 1/2
	Center to top of wheel	3 3/4	3 3/4	4 1/16	4 3/4	5 5/8	6 1/2	7 1/4	8 5/8	10	11 1/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
No. 431 and No. 429	End to end, No. 431	1 7/8	1 15/16	2 1/8	2 3/8	2 7/8	3 3/16	3 7/16	3 7/8	4 1/2	4 15/16
	Face to face, No. 429				3	3 3/8	3 7/8	4 3/8	5 1/2	6 1/2	7 1/2
	Center to top of wheel, open	5 1/8	5 1/8	5 1/2	6 5/8	7 7/8	9 1/2	10 7/8	13 1/8	15 3/8	17 7/8
	Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
Flange dimensions	Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
	Thickness of flanges				1 1/32	3/8	13/32	7/16	1/2	9/16	5/8

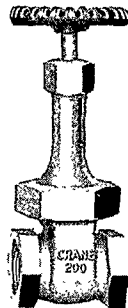
Templates for drilling . . . page 550

200-Pound Brass Gate Valves

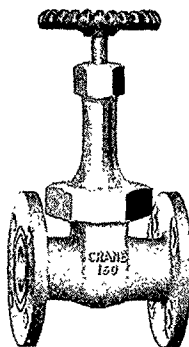
Wedge Disc — Rising Stem



Cross Section
*No. 422



*No. 422
Screwed



*No. 422 1/2
Flanged

Crane Nickel Alloy Disc — Rising Stem
Integral Seats

Air Tested

FEATURES

Union or Bolted Bonnet

Nickel Alloy
Solid Wedge Disc

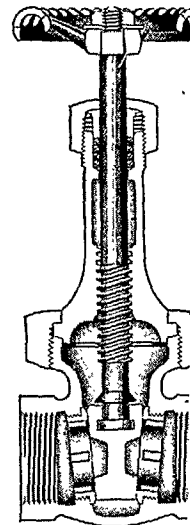
Nickel Alloy
Renewable Seats
In No. 423 Valves

Slip-On
Disc-Stem Connection

Interchangeable Parts



*No. 423
Screwed



Cross Section
*No. 423

Crane Nickel Alloy Disc — Rising Stem
Crane Nickel Alloy Renewable Seat

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 422, Screwed, Integral Seats		3.90	3.90	4.60	5.60	8.00	10.00	13.20	21.50	31.00	50
No. 422 1/2, Flanged, F.D. & S.F., Integral Seats					23.00	28.00	33.00	43.00	62.00	85.00	110
No. 423, Screwed, Renewable Seats		3.90	3.90	4.60	5.60	8.00	10.00	13.20	21.50	31.00	50

No. 422 and No. 422 1/2 Valves: The No. 422 and No. 422 1/2 are high quality brass gate valves. Exceptionally sturdy and dependable, they will give excellent service on ordinary steam, water, oil, or gas lines. The valves have a Crane Nickel Alloy Disc; the body seat rings are integral with the body.

No. 423 Valves: The No. 423 have renewable seats, and otherwise are similar to the No. 422. The renewable seats and the disc are Crane Nickel Alloy. The valves are particularly recommended for severe service on steam, water, oil, or gas lines.

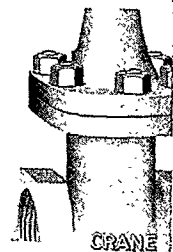
Construction: These are inside screw, rising stem valves. Their solid wedge disc slips onto a strong head on the stem end. The disc is accurately guided in the body to prevent contact between the seating surfaces until the valve is practically closed.

All parts are interchangeable. The bodies, however, are not interchangeable in a line, the No. 423 having slightly longer end to end dimensions than the No. 422.

Materials: Bodies and bonnets are made of Crane Special Brass, a high grade steam composition. The stems are also made of brass. Crane Nickel Alloy, used for the seats and discs, is especially resistant to wear.

Stuffing box: The stuffing box is large and deep, and is filled with high grade packing; sizes 1/2-inch and larger are equipped with a gland.

***Bonnet construction:** Sizes 2-inch and smaller have a union bonnet as shown above. 2 1/2 and 3-inch sizes have a compact, inside screw bolted bonnet, equipped with steel studs, brass nuts, and a Crane gasket, as shown at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injuring the valve.



Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to MSS 150-Pound SP Bronze Flange Standard (SP-2-1937). They are plain faced, with two shaped concentric grooves between the port and bolt holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end	No. 422	1 3/4	2	2 1/4	2 9/16	2 7/8	3 3/16	3 1/2	4	4 11/16
	No. 423	1 15/16	2 1/16	2 3/8	2 3/4	3	3 3/8	3 3/4	4 5/16	5
Face to face, No. 422 1/2				3 3/4	4 1/4	4 3/4	5	6	6	
Center to top of wheel, open		3 7/8	4 1/4	5 5/8	6 7/8	8	9 3/8	10 5/8	12 7/8	15 1/2
Diameter of wheel		1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	
Thickness of flanges				11/32	3/8	13/32	7/16	1/2	9/16	

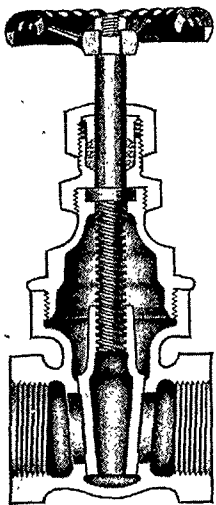
Valves for Marine Service....page 466

Templates for drilling....pag

200-Pound Brass Gate Valves

Wedge Disc

Non-Rising Stem



Cross Section
Non-Rising
Stem
No. 458



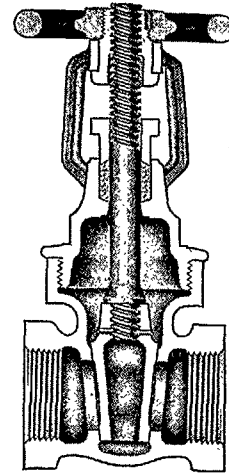
Non-Rising
Stem
No. 458
Screwed

WORKING PRESSURES
200 pounds steam, 500° F.
400 pounds cold water, oil, or gas, non-shock

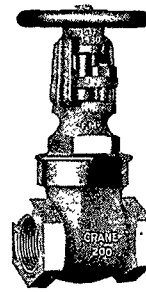
TEST PRESSURE
550 pounds hydrostatic

SERVICE RECOMMENDATIONS
No. 458 and No. 459 Valves are recommended for severe service on steam, water, oil, or gas lines.

Outside Screw and Yoke



Cross Section
Outside Screw
and Yoke
No. 459



Outside Screw
and Yoke
No. 459
Screwed

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 458, Non-Rising Stem		3.90	3.90	4.60	5.60	8.00	10.00	13.20	21.50	31.00	50.00
No. 459, Outside Screw and Yoke				15.00	17.00	19.00	22.00	27.00	40.00	56.00	88.00

These are sturdy, ruggedly constructed brass gate valves. They have been carefully designed to give long service under severe operating conditions. All parts are liberally proportioned to assure a high factor of safety against pressure, operating strains, and expansion and contraction of piping.

No. 458 Non-Rising Stem Gate Valves: The No. 458 Gate Valves have a non-rising stem and a wedge disc. The body and disc are made of Crane Special Brass, a high grade steam composition.

The stuffing box is equipped with a gland and is filled with a high quality packing.

The valves, when wide open, can be repacked while under pressure.

No. 459 Outside Screw and Yoke Gate Valves: The No. 459 Gate Valves are of the outside screw and yoke type. Their body, bonnet, and wedge disc are made of Crane Special Brass.

The valves are especially suitable on services where the action of the fluid might affect inside stem threads. In addition, the stem threads can be easily lubricated when necessary, thereby minimizing wear.

The stuffing box is equipped with a bolted gland and is filled with high grade packing.

The valves, when wide open, can be repacked while under pressure.

Underwriter's Specifications: The No. 459 Gate Valves, in sizes 1/2 to 2-inch inclusive, conform to the Underwriters' Specification known as "The National Standard". They are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies of Boston, and the Underwriters' Laboratories of Chicago.

Flanged valves: No. 459 Gate Valves with flanged ends can be made to order; prices and dimensions will be furnished on application.

Dimensions, in Inches

Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 458	End to end	2	2	2 3/8	2 5/8	3	3 1/2	4	4 3/4	5 3/8	6
	Center to top of wheel	4 1/8	4 1/8	4 7/8	5 1/2	6 1/4	7 1/4	8 1/8	9 5/8	11 1/4	12 3/4
	Diameter of wheel	2 1/16	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7
No. 459	End to end			2 5/8	2 5/8	3	3 1/2	4	4 3/4	5 3/8	6
	Center to top of stem, open			6 3/8	6 3/8	7 3/8	8 3/4	9 3/4	11 5/8	13 7/8	16 1/8
	Diameter of wheel			3 5/16	3 5/16	3 5/8	3 7/8	4 3/8	4 13/16	5 3/4	6 11/16

300-Pound Brass Gate Valves

Wedge Disc—Non-Rising Stem

WORKING PRESSURES

300 pounds steam, 550° F.
600 pounds cold water, oil, and gas, non-shock

Air Tested

FEATURES

Union or Bolted Bonnet
Nickel Alloy Wedge Disc

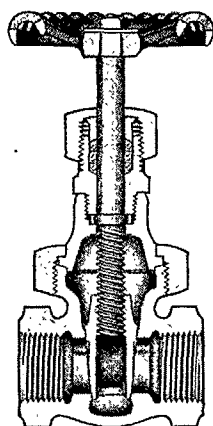
Copper Silicon Alloy Stem
Interchangeable Parts

Nickel Alloy Renewable Seats
in the No. 625 E Valve

SERVICE RECOMMENDATIONS

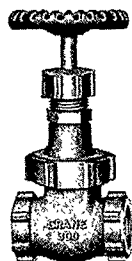
These newly designed, ruggedly constructed non-rising stem brass gate valves are ideal for high-pressure service. No. 625 E Valves, having nickel alloy renewable seats, are particularly suitable where operating conditions are unusually severe.

The valves are a companion line to the new 300-Pound Rising Stem Gate Valves shown on page 23.

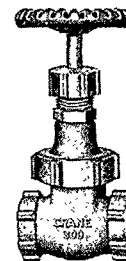


Cross Section
*No. 624 E

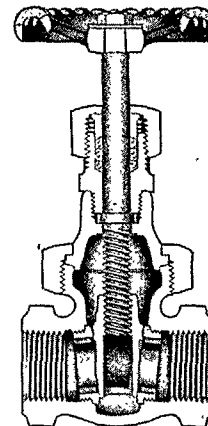
Crane Nickel Alloy Disc
Integral Seats



*No. 624 E
Screwed



*No. 625 E
Screwed



Cross Section
*No. 625 E

Crane Nickel Alloy Disc
Crane Nickel Alloy Renewable Seats

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 624 E, Screwed, Integral Seats		10.00	10.00	12.00	14.40	16.00	22.50	33.00	46.00	80.00	123.00
No. 625 E, Screwed, Renewable Seats		10.00	10.00	12.00	14.40	16.00	22.50	33.00	46.00	80.00	123.00

No. 624 E Valves: The No. 624 E Valves have a Crane Nickel Alloy disc. The body seat rings are integral with the body.

No. 625 E Valves: The No. 625 E Valves have renewable seats, and otherwise are similar to the No. 624 E Valves. The renewable seats and the disc are made of Crane Nickel Alloy.

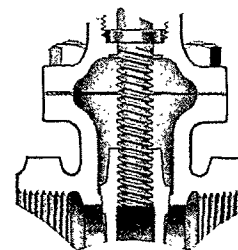
Construction: These valves are inside screw, non-rising stem type. They have unusually heavy metal sections and are ruggedly constructed. The packing nut, union bonnet ring, and body ends are made with lugs, permitting a secure wrench grip and presenting a neat, compact appearance.

Long, clean-cut threads engage the disc and stem, assuring accurate and easy operation. The disc is thoroughly guided throughout its travel; the seating surfaces do not come into contact until the valve is practically closed.

All parts are interchangeable. The bodies, however, are not interchangeable in a line, the No. 625 E having slightly longer end to end dimensions than the No. 624 E.

Materials: Bodies and bonnets are made of Crane Special Brass, a high grade steam composition. The stems are made of bronze, assuring long life. Crane Nickel Alloy, used for the seats and discs, is especially resistant to wear, being hard and tough.

***Bonnet construction:** Sizes 1-inch and smaller have a union bonnet as shown in the illustration above. Sizes 1 1/4-inch and larger have a compact inside screw bolted bonnet, equipped with steel studs, brass nuts, and a Cranite gasket, as shown in the illustration at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injuring the valve.



Stuffing box: The stuffing box is large and deep, and is filled with high grade packing. Sizes 3/8-inch and larger are equipped with a gland.

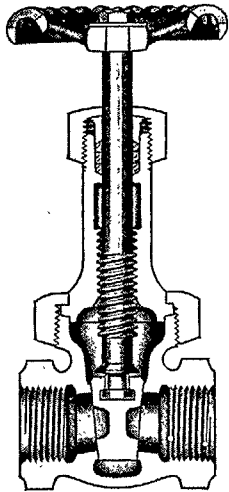
Repacking: These valves, when wide open, can be repacked while under pressure.

Dimensions, in Inches

Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end	No. 624 E	1 15/16	2 1/16	2 3/8	2 3/4	3 1/4	3 1/2	3 3/4	4 5/16	5 3/16	5 5/8
	No. 625 E	2 1/8	2 3/16	2 1/2	2 15/16	3 5/16	3 11/16	4	4 5/8	5 1/2	6
Center to top of wheel		3 5/8	4 3/8	4 13/16	5 3/8	6 3/8	7 3/16	8	9 5/16	10 3/8	11 7/8
Diameter of wheel		2 1/16	2 9/16	2 3/4	3 1/16	3 3/8	4 1/16	4 3/4	5 3/8	5 3/8	6

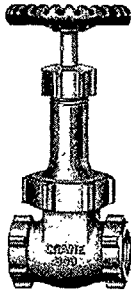
300-Pound Brass Gate Valves

Wedge Disc—Rising Stem



Cross Section
*No. 622 E

Crane Nickel Alloy Disc
Integral Seats



*No. 622 E
Screwed

WORKING PRESSURES

300 pounds steam, 550° F.

Screwed valves — 600 pounds cold water, oil, or gas, non-shock

Flanged valves — 500 pounds cold water, oil, or gas, non-shock

Air Tested

FEATURES

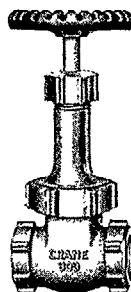
Union or Bolted Bonnet

Nickel Alloy
Solid Wedge Disc

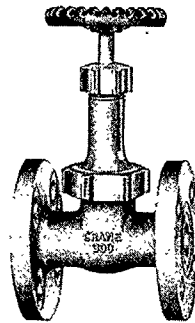
Nickel Alloy
Renewable Seats on
Nos. 623 E and 623½ E

Slip-On
Disc-Stem Connection

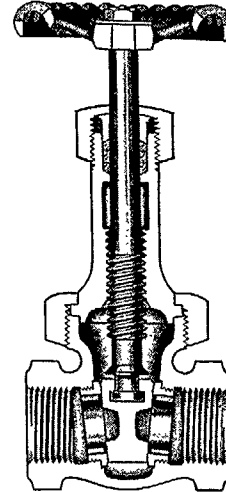
Interchangeable
Parts



*No. 623 E
Screwed



*No. 623½ E
Flanged



Cross Section
*No. 623 E

Crane Nickel Alloy Disc
Crane Nickel Alloy Renewable Seats

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 622 E, Screwed, Integral Seats		10.00	10.00	12.00	14.40	16.00	22.50	33.00	46.00	80.00	123.00
No. 623 E, Screwed, Renewable Seats		10.00	10.00	12.00	14.40	16.00	22.50	33.00	46.00	80.00	123.00
No. 623½ E, Flanged, F.D. & S.F., Renewable Seats					26.00	32.00	43.00	60.00	82.00	130.00	190.00

This is a new line of valves. In addition to the features enumerated above, the packing nut, union bonnet ring, and body ends are made with lugs, permitting a better wrench grip and presenting a distinctive appearance. Exceptionally durable and rugged, the valves are ideal for high pressure service.

The No. 623 E and the No. 623½ E, having nickel alloy renewable seats, are particularly suitable where operating conditions are unusually severe.

Construction: Except for their seats, the valves are similar. No. 622 E Valves have the seats integral with the body; No. 623 E and No. 623½ E Valves have Crane Nickel Alloy renewable seats.

Of the inside screw, rising stem type, the valves have a solid wedge disc that slips onto a strong head on the stem end. The disc, made of Crane Nickel Alloy, is accurately guided in the body to prevent contact between the seating surfaces until the valve is practically closed.

All parts are interchangeable. The bodies, however, are not interchangeable in a line.

Materials: Bodies and bonnets are made of Crane

Special Brass, a high grade steam composition. The stems are bronze. Crane Nickel Alloy, used for seats and discs, is especially resistant to wear.

***Bonnets:** Sizes 1-inch and smaller have a union bonnet as shown above; larger sizes have a compact inside screw bolted bonnet, equipped with steel studs, brass nuts, and a Cranite gasket, as shown at the right.

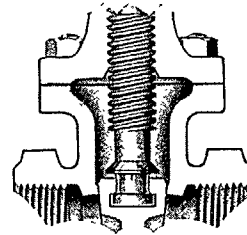
Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injuring the valve.

Stuffing box: The stuffing box is large and deep and is filled with high grade packing. Sizes 3/8-inch and larger are equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.



Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end	No. 622 E	11 5/16	21 1/16	2 3/8	2 3/4	3 1/4	3 1/2	3 3/4	4 5/16	5 3/8
	No. 623 E	2 1/8	2 3/16	2 1/2	2 5/16	3 5/16	3 11/16	4	4 5/8	5 1/2
Face to face, No. 623½ E				4 3/8	4 7/8	5 1/4	5 3/4	6 1/2	7 1/2	8
Center to top of wheel, open		4 1/8	5 1/4	6	7 1/8	8 3/8	9 3/4	11	13 1/4	15 1/2
Diameter of wheel		2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	5 3/8
Diameter of flanges				4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4
Thickness of flanges				1 7/32	1 9/32	5/8	1 1/16	3/4	1 3/16	2 9/32

Templates for drilling . . . page 550

Valves for Marine Service . . . page 466

350-Pound Brass Gate Valves

Wedge Disc — Non-Rising Stem

WORKING PRESSURES

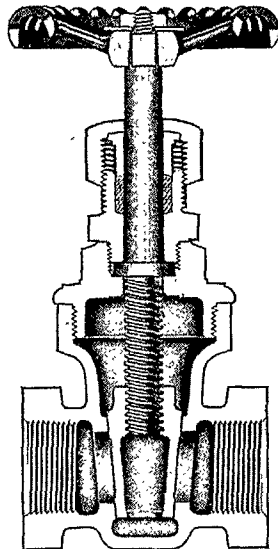
350 pounds steam, 550° F.
1000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE

1200 pounds hydrostatic

SERVICE RECOMMENDATIONS

These valves are recommended for high pressure steam lines such as are used on oil and gas field boilers for deep well drilling, for severe high-pressure hydraulic service on lines not subjected to shock, and for high-pressure gas lines.



Cross Section
No. 230 H



No. 230 H
Screwed

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	
No. 230 H	Each	13.50	15.50	18.00	21.60	24.00	31.00	45.00	69
End to end	Inches	2 3/16	2 3/16	2 13/16	3 1/4	3 3/4	4 1/4	4 11/16	5 9/16
Center to top of wheel	Inches	4 1/2	4 1/2	5 1/2	6 1/4	7	8	9	10
Diameter of wheel	Inches	2 9/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	

Construction: The No. 230 H Gate Valves are exceptionally massive, rugged, and heavy. They are well proportioned and will easily withstand strains resulting from installation and operation on high-pressure service.

The valves have a non-rising stem and a solid wedge disc.

Materials: The body, and disc of these valves are

made of Crane Hard Metal, an unusually hard strong, copper-tin bronze which resists wear exceptionally well. It is ideal for severe service.

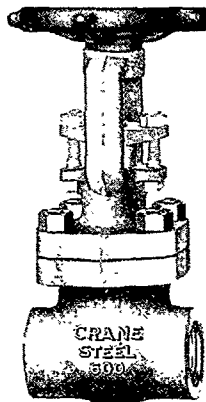
Stuffing box: The stuffing box is deep and equipped with a gland. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

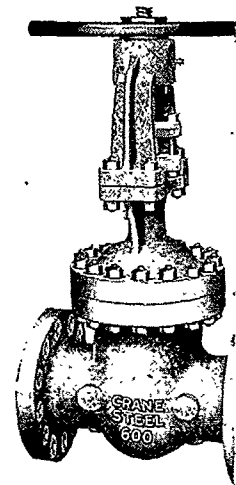
For Higher Pressures Use Crane Steel Valves

When gate valves are required for steam pressures higher than 350 pounds or for other high pressure-temperature or hydraulic lines, Crane Steel Gate Valves are recommended. They are made in a wide range of sizes and types for all service conditions.

Crane Steel Gate Valves are described in detail on pages 297 to 308.



No. 3607 X
Cast Steel
Wedge Gate Valve
Screwed
See page 299.



No. 76 X
Cast Steel
Wedge Gate Valve
Flanged
See page 304.

Brass Globe, Angle, and Cross Valves

Names of parts.....	page 26
Low Pressure Globe and Angle.....	page 27
Standard Globe, Angle, and Cross.....	page 28
150-Pound Globe and Angle, Composition Disc.....	page 30
150-Pound Globe and Angle, Plug Type Disc.....	page 31
200-Pound Globe, Angle, and Cross, Union Bonnet.....	page 34
200-Pound Globe and Angle, Bolted Bonnet.....	page 35
250-Pound Globe and Angle, Plug Type Disc.....	page 36
250-Pound Globe and Angle, Composition or Copper Disc.....	page 37
250-Pound Globe and Angle, Brass Disc.....	page 37
300-Pound Globe and Angle, Regrinding Type.....	pages 38 and 39
300-Pound Globe and Angle, Plug Type Disc.....	pages 40 and 41
300-Pound Globe and Angle, Outside Screw and Yoke.....	pages 46 and 47
350-Pound Globe.....	page 48
1000-Pound Hydraulic Globe and Angle.....	page 48
2000-Pound Hydraulic Globe and Angle.....	page 49
2500-Pound Hydraulic Globe.....	page 50
Globe and Angle, Needle Point.....	page 29
Globe and Angle, for Light Oils and Gases.....	page 32
Globe Valves, Quick Opening.....	page 33
Vent Valves for Transformer Oil Service.....	page 33
A.A.R. Globe and Angle, Inside Screw.....	pages 42 and 43
A.A.R. Globe and Angle, Outside Screw and Yoke.....	pages 44 and 45

The Crane line of Brass Globe, Angle, and Cross Valves offers a size, style, and weight for every commercial requirement, and in addition, includes in most pressure classifications, a variety of designs that covers all service conditions.

Distinct advantages accrue to the user who standardizes on Crane: a complete assortment, making it possible to select a valve exactly suited for each particular operating requirement; traditionally high quality — quality that results in more efficient service over a longer period of use; uniformity — in design, appearance, and performance.

Other types of brass valves, supplementing the globe, angle, and cross valves indexed above, are shown on the following pages:

Brass Gate Valves.....	pages 13 to 24
Brass Check and Foot Valves.....	pages 51 to 64
Brass Lever Operated Quick-Opening Valves.....	pages 65 to 69
Brass Hose Valves.....	pages 70 and 71
Brass Radiator Valves.....	pages 78 to 81

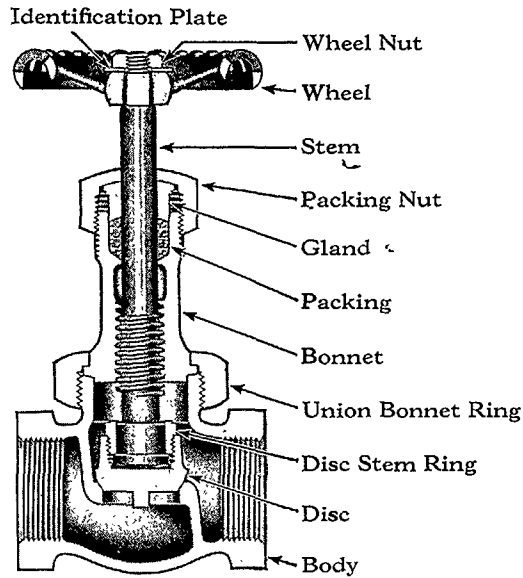
* * * * *

The lists shown above do not include all Crane Brass Valves. Brass Valves that perform a special duty or those made for special services such as Float Valves, Pop Safety Valves, Relief Valves, Pressure Regulators, Pressure Reducing Valves, Solder-Joint Valves, Crane-Seal Valves, and Valves for Marine Service are described in other sections of this catalog. Refer to the index.

Names of Parts

Brass Globe, Angle, and Cross Valves

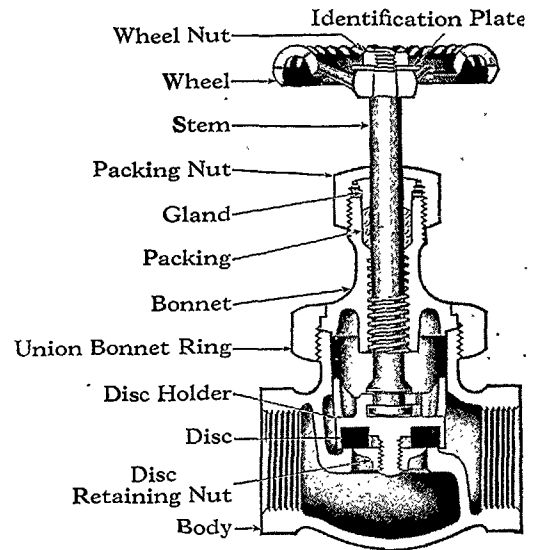
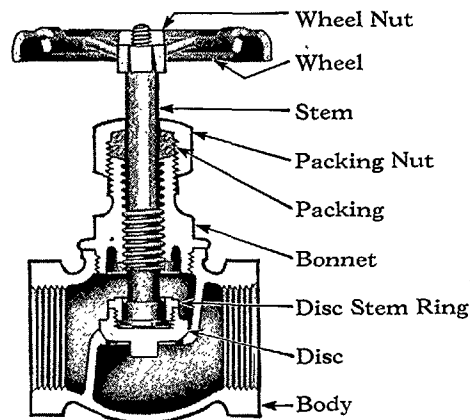
4



Above
Union Bonnet Globe Valve
with Metal Disc
(No. 362 E, p. 38)

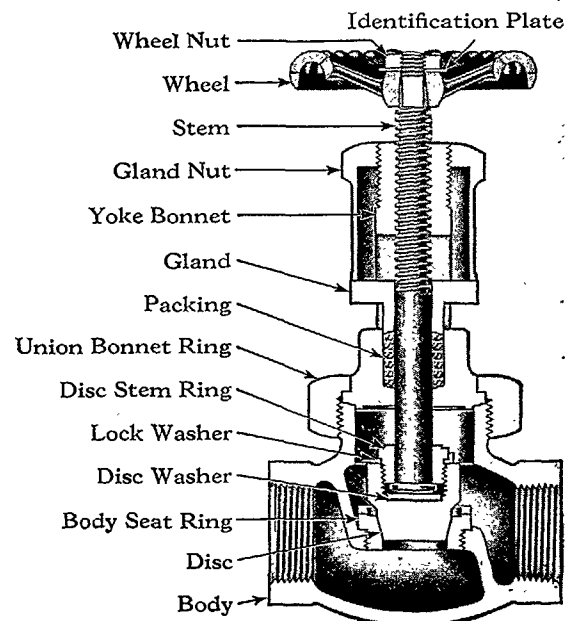
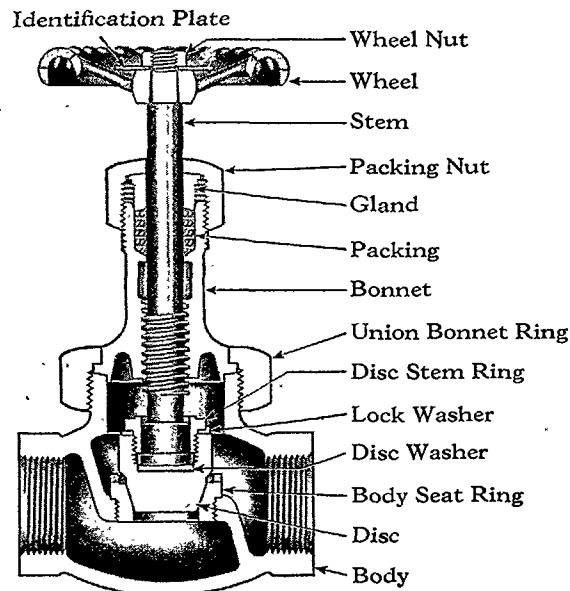
Below
Union Bonnet Globe Valve
with
Metal Disc and Renewable Seat
(No. 382 P, p. 40)

Below
Screwed Bonnet
Globe Valve
(No. 1, p. 28)



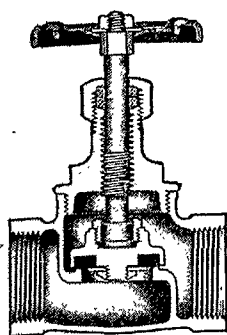
Above
Union Bonnet Globe Valve
with Composition Disc
(No. 7, p. 30)

Below
Union Bonnet Globe Valve
Outside Screw and Yoke
with
Metal Disc and Renewable Seat
(No. 372 P, p. 46)



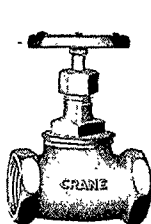
Low Pressure Brass Globe and Angle Valves

Composition Disc Valves

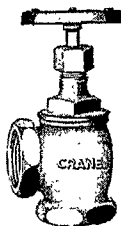


Cross Section
No. 1204
Globe, Screwed

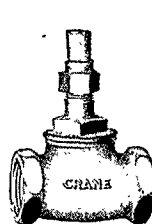
WORKING PRESSURES
100 pounds steam — 125 pounds water, 200° F.



No. 1204
Globe
Screwed



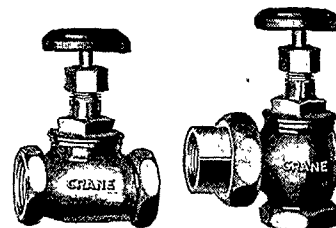
No. 1205
Angle
Screwed



No. 1210
Globe
With Lock Shield



No. 1211
Angle
With Lock Shield



These Low Pressure Valves can be made to order with a composition wheel, a female or male union end, and in a variety of special finishes. Prices and dimensions on application.

List Prices, Each, and Dimensions, in Inches

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1204 or No. 1205, with Wheel		1.10	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75
No. 1210 or No. 1211, with Lock Shield			1.40	1.60	2.00	2.65	3.35	4.75		
Extra disc holder, disc, nut, and disc stem ring, complete	Spun on stem	.50	.60	.70	.85	1.10	1.50	2.00		
A		1 13/16	1 13/16	2	2 3/8	2 3/4	3 5/16	3 3/4	4 1/4	4 7/8
B		1 3/16	1 3/16	1 5/16	1 11/16	1 5/16	1 1/2	1 13/16	2	2 7/16
C — Open		2 7/8	2 7/8	3 1/8	3 5/8	4 1/8	4 5/8	5 1/8	5 7/8	6 1/4
D — Open		2 1/2	2 1/2	2 7/8	3 3/8	3 3/4	4 3/8	4 7/8	5 5/8	6 1/8
E			2 1/2	2 5/8	3 1/4	3 3/8	4 1/8	4 5/8		
F			2 1/4	2 3/8	3	3 1/4	3 7/8	4 1/2		
G		1 3/4	1 3/4	1 3/4	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4

For list prices of Composition Discs, see page 178.

Service recommendations: These valves combine a wide range of utility with moderate cost. Equipped with a composition disc, they are suitable for almost any low pressure installation, being especially recommended for domestic water or gas lines, steam heating systems, and similar services.

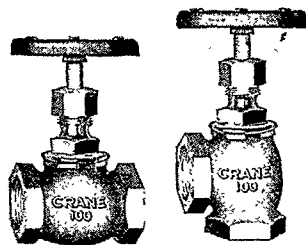
cold water, or domestic gas service. When ordered for steam, the valves will be furnished with a No. 7 Steam Disc. For discs, see page 178.

Construction: The swivel disc holder in sizes 1/8 and 1/4-inch is spun onto the stem. In larger sizes, it is attached to the stem with a threaded nut.

Discs: Unless otherwise ordered, the valves are furnished with a No. 8 Disc suitable for hot water,

Repacking: These valves, when wide open, can be repacked while under pressure.

Brass Disc Valves



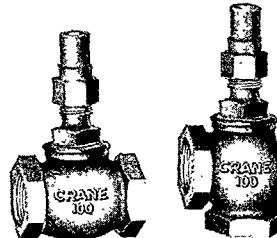
No. 1 B
Globe
Screwed

No. 2 B
Angle
Screwed

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F.
125 pounds cold oil or gas

These sturdy brass valves are recommended for general low pressure service.

Unless otherwise ordered, valves with wheel are always furnished.

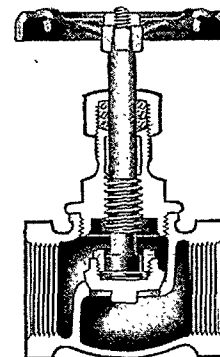


No. 1 B
Globe
With Lock Shield

No. 2 B
Angle
With Lock Shield

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1 B, Globe, with Wheel	Each	.70	.85	1.05	1.30	1.85	2.40	3.50
No. 2 B, Angle, with Wheel	Each	.75	.85	1.05	1.50	2.00	2.70	4.10
Add for Valve with Lock Shield	Per valve	.25	.30	.35	.40	.55		
Dimensions, in Inches	End to end, Globe	1 11/16	2	2 1/2	2 7/8	3 7/16	3 7/8	4 3/4
	Center to end, Angle	7/8	1	1 1/4	1 7/16	1 3/4	1 15/16	2 3/8
	Center to top of wheel, open	3 1/4	3 3/8	4 3/8	4 3/4	5 1/2	5 3/4	6 7/8
	Center to top of lock shield	2 3/4	2 7/8	3 3/8	4	4 11/16		
	Diameter of wheel	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4	4 3/4



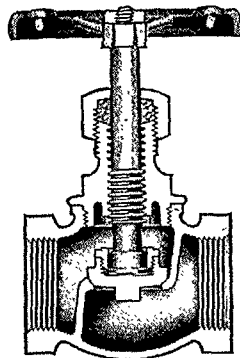
Cross Section, Globe
3/8 and 1/2-inch sizes have an integral disc and stem.

Solder-Joint Valves, pages 502 to 505.

Keys for Lock Shield Valves, page 177.

Standard Brass Globe, Angle, and Cross Valves Brass Disc

4



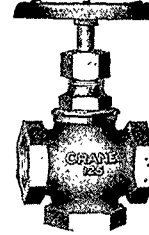
Cross Section
No. 1, Globe



No. 1, Globe
Screwed



No. 2, Angle
Screwed



No. 18, Cross
Screwed

WORKING PRESSURES

125 pounds steam

200 pounds cold water, oil, or gas, non-shock

List Prices, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	
No. 1, Globe or No. 2, Angle		1.80	1.80	1.90	2.40	3.00	3.60	5.00	7.00	10.60	20.00	27
No. 18, Cross			3.10	3.10	3.60	4.50	5.00	7.00	10.00	16.00	32.00	45

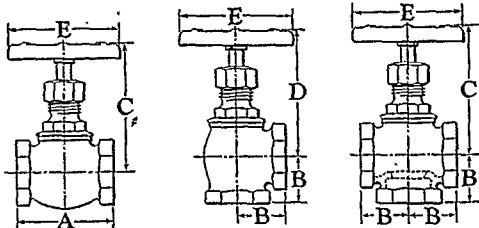
Service recommendations: Crane Standard Brass Globe, Angle, and Cross Valves are recommended for general service on steam, water, oil, or gas lines.

Construction: The valves are sturdy and unusually well constructed. They are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned to assure a high factor of safety against pressure, operating strains, and expansion and contraction of the piping.

The disc in sizes 1/8 to 1/2-inch is integral with stem. In the larger sizes, the disc swivels on the stem as shown in the cross section above.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: When flanged valves are desired the No. 71 Globe and Angle Valves are recommended. See page 34.



Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	
A	1 7/16	1 5/8	1 7/8	2 3/16	2 11/16	3 3/16	3 11/16	4 3/16	5 1/8	6 1/16	7
B	3/4	1 3/16	1 5/16	1 1/8	1 3/8	1 5/8	1 13/16	2 1/16	2 1/2	3 1/16	3
C—Open	2 7/8	3 1/8	3 3/8	3 7/8	4 1/2	5 1/8	5 5/8	6 1/2	7 1/2	8	
D—Open	2 3/4	3	3 1/4	3 3/4	4 1/2	5	5 5/8	6 3/8	7 1/2	8	
E	1 3/4	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4	4 3/4	5 3/4	5 3/4	

Valves with Special Wheels and Special Finish



Globe
With
Composition
Wheel

The globe and angle valves shown above can be made to order with composition or brass wheels; they are available in a variety of special finishes such as rough body; rough body, nickel-plated; polished; polished and nickel-plated; and polished and chromium-plated.

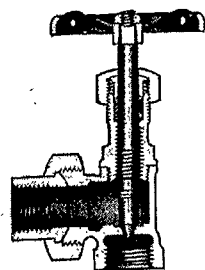
When ordering, specify the style of wheel and finish desired, also whether globe or angle valves are wanted.

Prices and dimensions will be furnished on application.



Angle
With
Brass
Wheel

Needle Point Brass Globe and Angle Valves



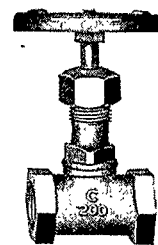
Cross Section
No. 85
Angle, Screwed
With Female Union Outlet

WORKING PRESSURES

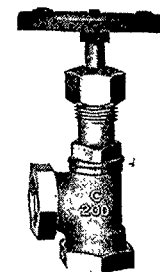
200 pounds steam
400 pounds cold water, oil, or gas, non-shock

List Prices, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4
No. 85, Angle, with union		3.50	3.80	4.50	6.00	7.00
No. 88, Globe		2.30	2.60	2.90	3.70	4.70
No. 89, Angle		2.40	2.70	3.00	3.80	5.00



No. 88
Globe
Screwed



No. 89
Angle
Screwed

Service recommendations: These valves are especially suitable where very close and delicate regulation of flow is desired. They are recommended for steam, water, oil, gas, for light liquid lines, for fuel oil, and for similar service.

Construction: The valves are compact and unusually rugged. They have a brass stem. The stuffing box is large and is equipped with a gland.

The valves, when wide open, can be repacked while under pressure.

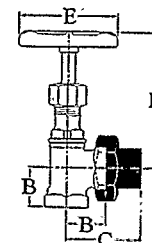
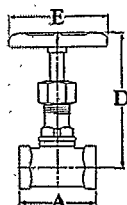
Valves with indicators: These valves can be made to order with indicators; prices will be furnished on application.

Seat opening: The diameter of the seat opening in these valves is given in the dimension table shown below. Valves with other size seat opening are special and are made to order; prices on application.

Higher pressure valves: Needle point valves for higher pressures are made of steel, Exelloy, or 18-8 Mo; see page 310.

Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4
A	1 3/16	1 9/16	1 13/16	2 1/16	2 5/16
B	5/8	13/16	7/8	1 1/16	1 1/4
C	1 5/16	1 9/16	1 3/4	2	2 3/16
D — Open	2 7/8	2 7/8	3 1/8	3 5/8	4 1/4
E	1 3/4	1 3/4	2 1/4	2 5/8	3
Diameter of seat opening	1/8	3/16	1/4	5/16	7/16



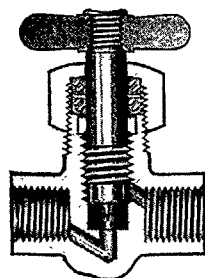
Brass Needle Air Valve

WORKING PRESSURE

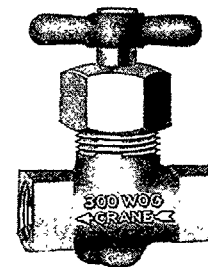
300 pounds cold water, oil, or gas, non-shock

List Price and Dimensions

Size	Inches	3/8
Price	Each	5.00
Diameter of seat opening	Inches	1/8
End to end	Inches	2 5/16
Center to top of stem, open	Inches	2 1/2



Cross Section
No. 57



No. 57
Needle Air Valve

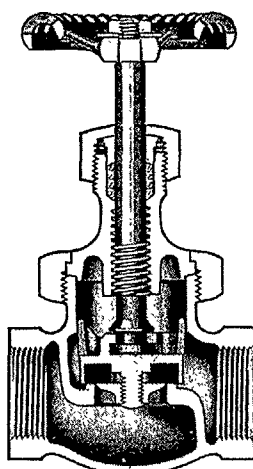
Service recommendations: The No. 57 Valve is ideal for service on water lines to air drills, on air or water lines in garages, filling stations, and industrial plants, and for similar service.

The valve should always be installed with the pressure above the seat.

Construction: This valve is heavy and rugged. The body, packing nut, and stem are brass. The tee handle is malleable iron; valves with malleable iron wheel are made to order at a special price.

The valve has an extra thick fibre seat that can be easily renewed should it become worn.

150-Pound Brass Globe and Angle Valves Cranite Composition Disc



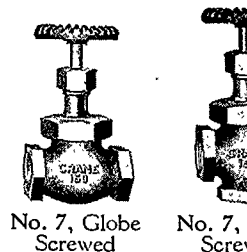
Cross Section
No. 7, Globe

WORKING PRESSURES
Screwed valves—150 pounds steam
300 pounds cold water, oil, or gas, non-shock
Flanged valves—150 pounds steam
225 pounds cold water, oil, or gas, non-shock

FEATURES
Union or Bolted Bonnet
Cranite Disc

SERVICE RECOMMENDATIONS
These valves are recommended for a wide range of service when equipped with the proper disc. They will give excellent results on steam, hot water, cold water, oil, air, or gas lines. They are especially suited for use in installations where the discs must be renewed quickly. All parts are unusually rugged, to withstand severe operating strains.

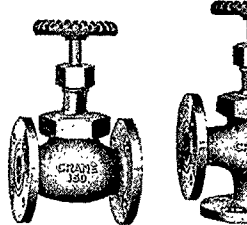
Specify whether globe or angle valves are wanted.



No. 7, Globe
Screwed



No. 7, Angle
Screwed



No. 9, Globe
Flanged



No. 9, Angle
Flanged

List Prices, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 7, Globe or Angle, Screwed		2.40	2.60	3.00	3.60	4.70	6.60	8.60	12.00	19.00	34.00
No. 9, Globe or Angle, Flanged, F. D. & S. F.						13.00	15.00	23.00	28.00	42.00	63.00
*Extra disc holder, disc, and nut, complete	With No. 4 Cranite Disc	.65	.70	.75	.80	.95	1.15	1.55	2.15	3.30	*6.50
	With No. 2 or No. 3 Disc	.50	.55	.65	.75	.85	1.00	1.25	1.75	2.80	*5.50

*2 1/2 and 3-inch sizes include a disc stem ring.

For list prices of Composition Discs, see page 178.

Quick repairs: A leak can be quickly repaired by replacing the disc holder with an extra complete disc holder and disc. A new disc can be placed in the original holder, at the convenience of the engineer. Users should keep on hand a supply of extra disc holders and discs for this purpose.

Sizes 2-inch and smaller have a slip-on disc holder (see cross-section above). Larger sizes have the disc and stem fastened with a disc stem ring (see illustration at right).

Bonnet construction: Sizes 2-inch and smaller have a union bonnet as shown in the illustrations at the top of the page.

Larger sizes have a bolted bonnet, inside screw, as shown at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and

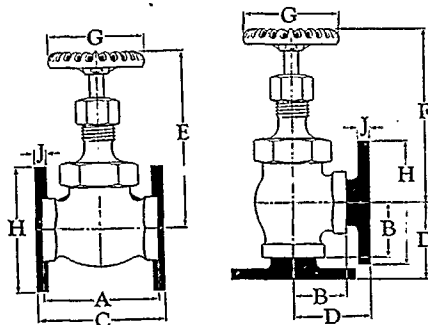
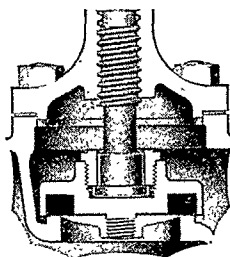
reassembled without danger of injuring the

Discs: Unless otherwise ordered, these valve furnished with a No. 4 Cranite Disc, suitable for pressure steam. When ordered for hot water oil, or gasoline they are furnished with a No. 2 and when ordered for cold water or air, with a Disc. For discs, see page 178.

Stuffing box; repacking: The stuffing box is and is equipped with a gland. The valves, wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.



Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
A	2	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4
B	1 5/16	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4
C					3 3/4	4 3/8	4 13/16	5 1/2	6 1/2	7 1/2
D					2 7/16	2 9/16	2 7/8	3 3/16	3 3/4	4 5/16
E—Open	4	4	4 1/2	5	5 5/8	6 3/8	7 1/8	7 7/8	9 1/8	11
F—Open	3 7/8	3 7/8	4 3/8	4 7/8	5 1/2	6 1/4	7	7 5/8	8 7/8	10 7/8
G	1 3/4	1 3/4	2 1/16	2 3/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	7
H					3 7/8	4 1/4	4 5/8	5	6	7
J					1 11/32	3/8	1 13/32	7/16	1/2	9/16

Templates for drilling... page 550

150-Pound Brass Globe and Angle Valves Plug Type Disc

WORKING PRESSURES

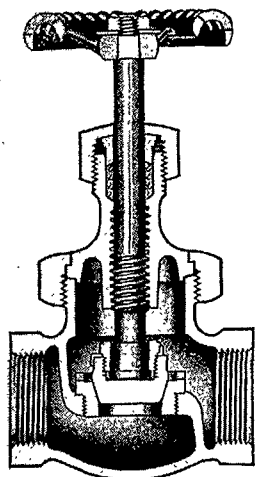
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

FEATURES

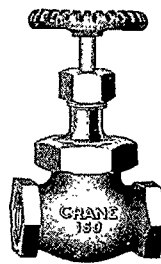
Crane Nickel Alloy Plug Type Disc
Renewable Exelloy Body Seat Ring
Union or Bolted Bonnet

SERVICE RECOMMENDATIONS

These valves are recommended for throttling; for soot blower, blow-off, boiler feed, drip, and drain lines; and for other hard services. Having a Crane Nickel Alloy disc and an Exelloy seat, the valves are well suited for installations where operating conditions are severe.



*Cross Section
No. 14 1/2 P. Globe



*No. 14 1/2 P. Globe
Screwed



*No. 16 1/2 P. Angle
Screwed

*2 1/2 and 3-inch sizes
have a bolted bonnet.

List Prices, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 14 1/2 P or No. 16 1/2 P		5.00	5.00	5.40	6.60	8.00	10.00	14.00	20.00	30.00	55.00	80.00

Plug type disc valves for moderate pressures: The valves shown on this page, while intended for moderate pressures, are made with a plug type disc and seat, a refinement formerly found only in valves designed for high pressures.

The plug type disc and seat are ideal for severe service. The wide seating surface is unusually resistant to foreign matter and to wiredrawing, and the tapered disc permits easy regulation of flow when throttling.

Sturdy construction: The valves are sturdily constructed. All parts are liberally proportioned to withstand severe operating strains.

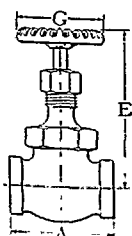
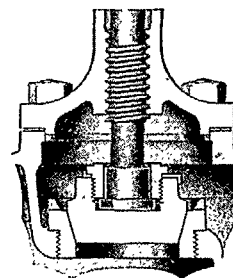
Seat metals: The valves have a Crane Nickel Alloy Disc and an Exelloy body seat ring. These metals offer excellent resistance to wear, temperature, galling, and scoring; they are harder, tougher, and

stronger than metals ordinarily used in brass valves.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet as shown on the illustrations above; 2 1/2 and 3-inch sizes have a low-type, compact bolted bonnet, inside screw, as illustrated at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injuring the valve.

Stuffing box: The stuffing box is large and deep and is equipped with a gland. It is filled with high grade packing.

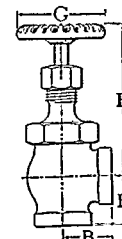
Repacking: These valves, when wide open, can be repacked while under pressure.



Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
B	1 5/16	1 5/16	1 11/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 13/16
E—Open	4 1/8	4 1/8	4 5/8	5 1/4	6	6 7/8	7 1/4	8 1/4	9 1/2	11	12 1/4
F—Open	4	4	4 1/2	5 1/8	5 7/8	6 3/4	7 1/8	8	9 1/4	10 7/8	12
G	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	7	8

Valves for Marine Service... page 462



Brass Globe and Angle Valves For Light Oils and Gases

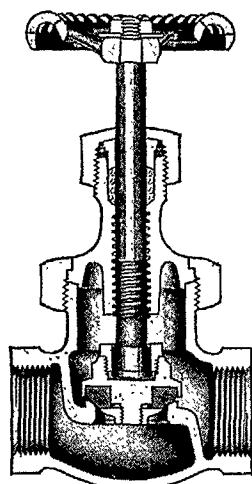
300 pounds oil, air, or gas working pressure, 250° F.

Air Tested

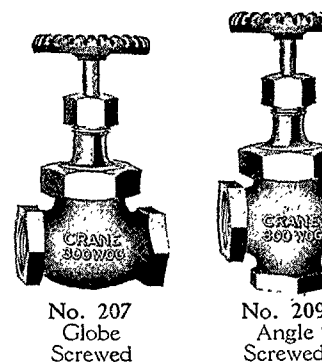
SERVICE RECOMMENDATIONS

These are definitely superior to valves ordinarily used on light oils and gases. They seat perfectly tight, they close easily, and they withstand wear exceptionally well.

They are especially recommended for refined oils, such as transformer oil, for gases, and for solvents which, in many cases, attack rubber composition discs but do not corrode brass, and which are difficult to hold with metal to metal seat valves.



Cross Section
No. 207
Globe
Screwed
Union or Bolted Bonnet
With Cranoil Disc



No. 207
Globe
Screwed

No. 209
Angle
Screwed

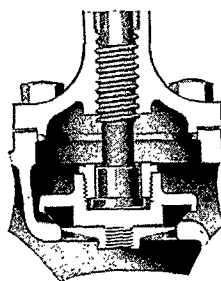
These valves have the tight, easy seating No. 5 Cranoil Disc.

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 207, Globe, or No. 209, Angle		3.50	4.20	4.80	6.00	8.00	10.00	14.00	22.00	40.00
Extra disc holder, complete	Slip-on disc holder	.95	1.10							
	With disc stem ring			1.30	1.50	2.00	2.60	3.75	5.30	9.60

Construction: These valves are ruggedly constructed. Sizes 1/4 and 3/8-inch have a slip-on disc holder; larger sizes have the disc and stem fastened with a disc stem ring as shown in the cross sections.

Union or bolted bonnet: Sizes 2-inch and smaller have a union bonnet as shown on the illustrations above; 2 1/2 and 3-inch sizes have a low-type, compact bolted bonnet, inside screw, as illustrated at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injuring the valve.



Disc and seat: The No. 5 Cranoil Disc is a specially fabricated material that will not swell, harden, or otherwise break down. It is permanently cemented into the disc holder; there can be no seepage around it. For description of disc, see page 178.

The seat and disc form a line to line contact. The

narrow bearing and the disc material are an ic combination for light oils and gases, provic absolute tightness and easy seating.

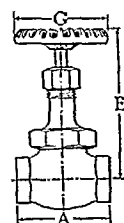
Stuffing box: Stuffing boxes are equipped wit gland and are filled with high grade packing.

Valves used in hazardous locations should have a sealed stuffing box to prevent the leakage of dan, ous fumes or fluids. Valves so equipped are nished only when specified; prices on applicat

Boss on body of globe valve: Globe valve bo sizes 1 1/4-inch and larger have a boss cast on one s When ordered tapped or when ordered equipped v a No. 211 Valve (shown on page 33) for transfor oil service, the boss is drilled and tapped wit 1/4-inch pipe thread, without extra charge.

Installation: Wherever possible, these va should be installed with the pressure under the c

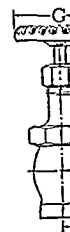
Tamper-proof valves: Valves with lock shield with lock shield and slip cover are made to or prices are furnished on application.



Boss on body of globe valve, sizes 1 1/4-inch and larger only.

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
B	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 13/16
C						1 5/16	1 1/8	1 1/2	1 15/16	2 3/8
D						1 7/16	1 1/2	1 3/4	1 7/8	2 1/16
E—Open	4	4 1/2	5 1/4	6	6 7/8	7 3/4	8 5/8	9 3/4	11	12 1/4
F—Open	3 7/8	4 3/8	5 1/8	5 7/8	6 3/4	7 5/8	8 3/8	9 1/2	10 7/8	12
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7



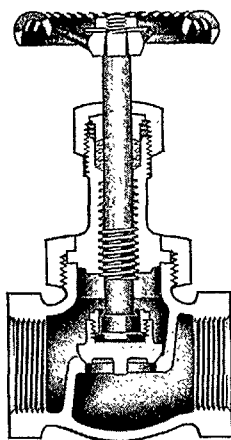
200-Pound Brass Globe, Angle, and Cross Valves Regrinding

WORKING PRESSURES

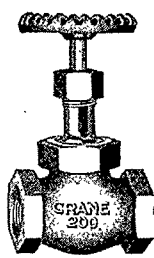
Screwed valves — 200 pounds steam, 500° F.
 — 400 pounds cold water, oil, or gas, non-shock
 Flanged valves — 150 pounds steam, 500° F.
 — 225 pounds cold water, oil, or gas, non-shock

TEST PRESSURES

Screwed valves — 600 pounds hydrostatic
 Flanged valves — 450 pounds hydrostatic



Cross Section
No. 70, Globe



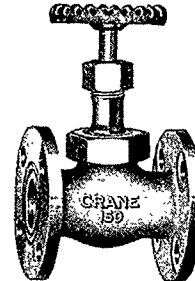
No. 70, Globe
Screwed



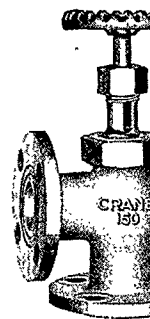
No. 70, Angle
Screwed



No. 74, Cross
Screwed



No. 71, Globe
Flanged



No. 71, Ang
Flanged

When ordering No. 70 or No. 71 Valves, specify whether globe or angle valves are wanted.

List Prices, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 70, Globe or Angle, Screwed		2.30	2.40	2.60	3.00	4.80	6.00	8.40	11.00	18.00	33.00
No. 74, Cross, Screwed					6.00	7.00	8.60	11.00	15.00	24.00	
No. 71, Globe or Angle, Flanged, F. D. & S. F.						13.00	16.00	20.00	28.00	37.00	60.00

Service recommendations: These valves are recommended for severe service on steam, water, oil, or gas lines. They were formerly known as "Navy" pattern.

Material: The body is made of Crane Special Brass, a high grade steam metal.

Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet: The union bonnet ring reinforces the bonnet joint and facilitates dismantling and reassembling. When a valve is being reground, the ring centers and guides the valve trimmings.

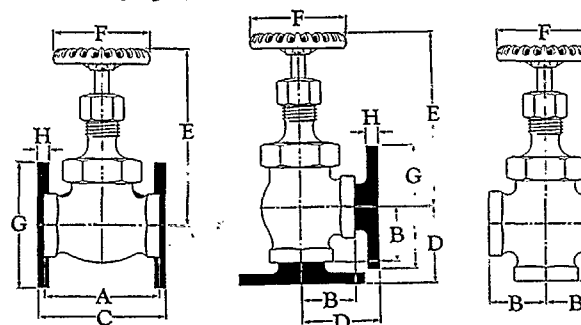
Disc connection: The disc in sizes 1/8 to 1/2-inch is integral with the stem. In larger sizes, the disc swivels on the stem, as shown in the cross section.

Stuffing box: Stuffing boxes are deep, are equipped with a gland, and are filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric

grooves between the port and the bolt holes. Pr include drilling to the MSS 150-Pound Standard. spot-facing; no deduction is made if valves ordered faced only. Full face gaskets should used; see page 567.



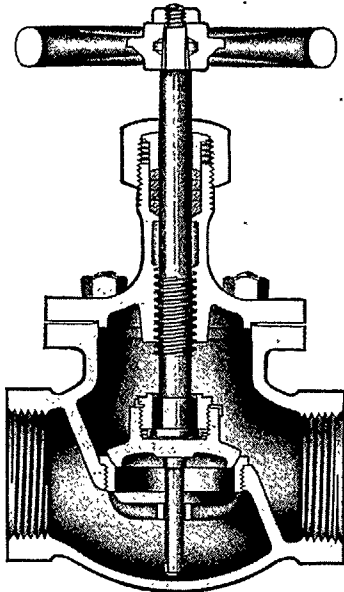
Dimensions, in. Inches

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
A	1 11/16	1 11/16	1 15/16	2 1/4	2 3/4	3 5/16	3 7/8	4 1/2	5 1/4	6 5/16
B	1 3/16	1 3/16	1	1 3/16	1 3/8	1 11/16	1 15/16	2 1/4	2 5/8	3 3/16
C					3 11/16	4 3/16	4 9/16	5 5/16	6	6 3/4
D					2 7/16	2 5/8	2 7/8	3 3/16	3 3/4	4 5/16
E — Open	3 1/2	3 1/2	3 7/8	4 3/8	5 3/8	6	6 7/8	7 7/8	8 5/8	9 1/2
F	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6
G					3 7/8	4 1/4	4 5/8	5	6	7
H					1 1/32	3/8	1 3/32	7/16	1/2	9/16

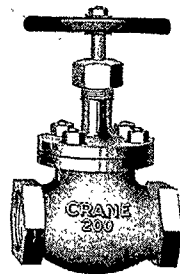
Templates for drilling..page 550

Valves for Marine Service..page

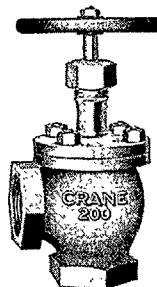
200-Pound Brass Globe and Angle Valves Bolted Bonnet



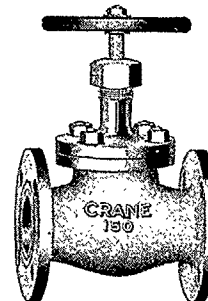
Cross Section
No. 4196, Globe



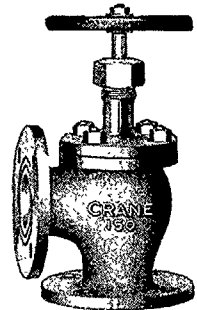
No. 4196, Globe
Screwed



No. 4198, Angle
Screwed



No. 4197, Globe
Flanged



No. 4199, Angle
Flanged

Sizes 3 1/2-inch and larger have outside stem threads and a bolted gland (not illustrated).

List Prices

Size	Inches	1 1/2	2	2 1/2	3	3 1/2	4	5	6
No. 4196 or No. 4198, Screwed	Each	19.00	25.00	35.00	50.00	80.00	100.00		
No. 4197 or No. 4199, Flanged, F., D., & S.F.	Each	27.00	35.00	50.00	70.00	110.00	140.00	200.00	275.00

Service recommendations: These are high quality valves, especially intended for use in large size pipe lines. They are recommended for general service on steam, water, oil, or gas.

Construction: The valves are strong, rugged, and durable. The bolted bonnet makes a tight joint and assures liberal strength. The disc is accurately guided by a guide stem which operates in a bridge cast integral with the body seat ring; the body seat ring is renewable.

Sizes 3-inch and smaller have inside stem threads, a screwed packing nut, and a gland, as illustrated. Sizes 3 1/2-inch and larger have outside stem threads with a crosshead type yoke and a one-piece bolted gland and flange (not illustrated).

Materials: The body and bonnet are made of Crane

Special Brass, a high grade steam metal. The disc is also made of Crane Special Brass. The body seat ring is made of Crane Hard Metal.

Stuffing box; repacking: The stuffing box is unusually deep and is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Lb. SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 150-Lb. Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Cross valves: Cross valves can be made to order.

Dimensions, in Inches

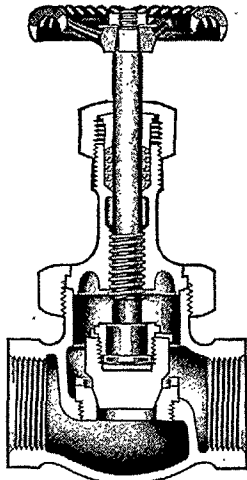
Size	1 1/2	2	2 1/2	3	3 1/2	4	5	6
End to end, Globe, Screwed	5 5/16	6	7 1/4	8 1/4	10 3/8	11 3/8		
Center to end, Angle, Screwed	2 11/16	3	3 5/8	4 1/8	5 3/16	5 11/16		
Face to face, Globe, Flanged	5 7/8	6 7/8	8	9 1/8	10 3/8	11	12 1/4	14
Center to face, Angle, Flanged	3 1/8	3 3/4	4 1/4	4 5/8	5 1/4	5 1/2	6 1/4	7
Center to top of wheel, open, Globe	8 1/4	9 3/4	11 1/2	12 3/4	12 1/4	13 3/4	16 1/2	18 1/8
Center to top of wheel, open, Angle	7 1/2	8 5/16	10 1/2	11 3/4	11 1/4	12 1/2	15	16 1/4
Diameter of wheel	4 1/16	5 3/8	7	8	9	10	10	12
Diameter of flange	5	6	7	7 1/2	8 1/2	9	10	11
Thickness of flange	7/16	1/2	9/16	5/8	1 1/16	1 1/16	3/4	13/16

Templates for drilling... page 550

Valves for Marine Service... page 462

250-Pound Brass Globe and Angle Valves Plug Type Disc

4



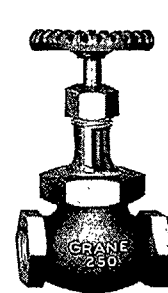
Cross Section
*No. 212 P, Globe

WORKING PRESSURES
250 pounds steam, 500° F.
500 pounds cold water, oil, or gas,
non-shock

TEST PRESSURE
750 pounds hydrostatic

FEATURES
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union or Bolted Bonnet

SERVICE RECOMMENDATIONS
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines.



*No. 212 P, Globe
Screwed



*No. 214 P, Angle
Screwed

*2½ and 3-inch sizes
have a bolted bonnet.

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 212 P or No. 214 P	Each	5.00	5.40	6.60	8.00	10.00	14.00	20.00	30.00	55.00	80.00

Body: The body is Crane Special Brass, a high grade steam metal.

Plug type disc and seat: The plug type disc and seat are ideal for severe service. The wide seating surface is unusually resistant to foreign matter and to wire drawing. The tapered disc permits easy regulation of flow when throttling.

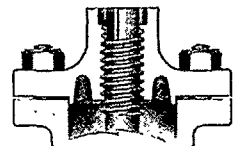
A metal plate, secured to the valve by the wheel nut, identifies the plug type disc.

Seat metals: The disc is Crane Nickel Alloy. The seat ring is Exelloy, a specially heat-treated chromium iron. These metals offer excellent resistance to wear, temperature, galling, and scoring; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Stem threads: The stem threads are accurately

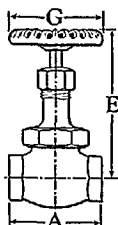
machined and are unusually long, assuring long life.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet as shown in the illustrations at the top of the page; 2½ and 3-inch sizes have a bolted bonnet. Inside screw as illustrated at the right. Both types provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injury to the valve.



Stuffing box: The stuffing box is equipped with a gland and is unusually deep. It is filled with high grade packing.

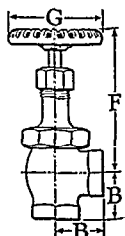
Repacking: These valves, when wide open, can be repacked while under pressure.



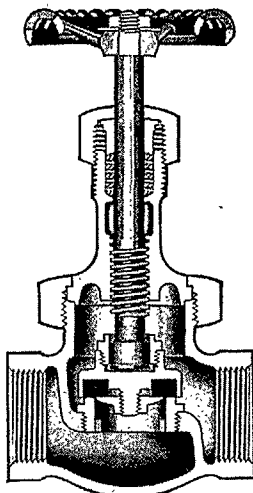
Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	7 1/4	8 1/4
B	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 5/8	4 1/8
E—Open	4 1/8	4 3/4	5 3/8	6	6 3/4	7 5/8	8 5/8	10	11 1/4	12 3/4
F—Open	4 1/8	4 5/8	5 1/4	5 7/8	6 5/8	7 1/2	8 1/2	9 3/4	10 1/4	11 3/4
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	5 3/8	7	8

Valves for Marine Service . . . page 463



250-Pound Brass Globe and Angle Valves



Cross Section
No. 212 C or No. 213

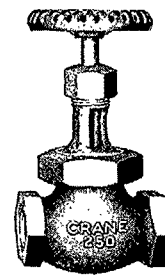
Cranite Composition Disc or Copper Disc Valves

WORKING PRESSURES
250 pounds steam, 500° F.
*500 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

FEATURES
Nickel Alloy Renewable Seat
Union Bonnet

*When No. 212 C or No. 214 C Valves are used on gas, oil, or gasoline, they are recommended for only 400 pounds working pressure.



Globe, Screwed
No. 212 C, Cranite Disc
No. 213, Copper Disc



Angle, Screwed
No. 214 C, Cranite Disc
No. 215, Copper Disc

Except for the disc and seat, these valves are similar to the Nos. 212 P and 214 P, shown on page 36. A metal plate, secured to the valve stem under the wheel nut, identifies the type of disc.

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 212 C, No. 214 C, No. 213, or No. 215		5.00	5.40	6.60	8.00	10.00	14.00	20.00	30.00
Extra disc holder, disc, nut, and disc stem ring, complete, for No. 212 C or No. 214 C	With No. 4 Cranite Disc	.75	.85	.90	1.30	1.70	2.40	3.00	4.30
	With No. 2 or No. 3 Disc	.70	.75	.85	1.10	1.50	2.10	2.60	3.70
Extra copper discs for No. 213 or No. 215		.20	.25	.30	.35	.40	.50	.75	1.10

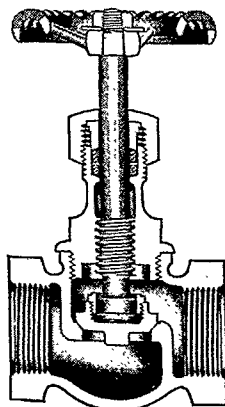
Dimensions are the same as for the Nos. 212 P and 214 P; see page 36.

For list prices of Composition Discs, see page 178.

Nos. 212 C and 214 C: The No. 212 C and No. 214 C Valves are recommended where discs must be frequently renewed. Unless otherwise ordered, they are furnished with a No. 4 Cranite Disc for high-pressure steam. When ordered for hot water, gas, oil, or gasoline, they are furnished with a No. 2 Hot Water Disc; and when ordered for cold water or air,

with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 178.

Nos. 213 and 215: The No. 213 and No. 215 Valves are recommended for services where discs must be frequently renewed and where a metallic disc is preferred. They have a Crane Renewable Copper Disc.



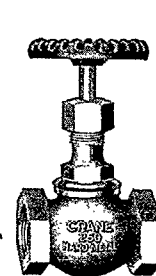
Cross Section
No. 4, Globe

Brass Disc Valves

WORKING PRESSURES
250 pounds steam
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

No. 4 Valves have Crane Hard Metal body and disc. In sizes 1/2-inch and smaller, the disc is integral with the stem; in larger sizes, the disc swivels on the stem, as shown in the cross section. The stuffing box on sizes 3/4-inch and larger has a gland. The valves, when wide open, can be repacked while under pressure.



No. 4, Globe
Screwed



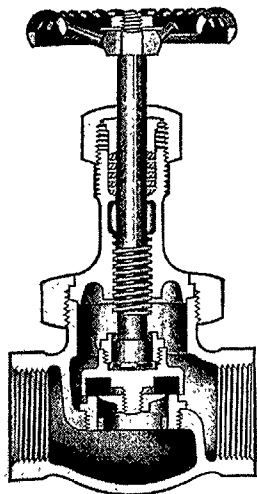
No. 4, Angle
Screwed

When ordering, specify whether globe or angle valves are wanted.

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 4, Globe or Angle	Each	3.25	3.25	3.75	4.50	6.00	7.00	10.00	14.00	22.00	40.00	55.00
End to end, Globe	Inches	1 9/16	1 9/16	1 7/8	2 3/16	2 11/16	3 1/4	3 7/8	4 5/16	5 1/4	6 1/16	7 1/4
Center to end, Angle	Inches	1 3/16	1 3/16	1 5/16	1 1/8	1 5/8	1 9/16	1 15/16	2	2 5/8	3 1/4	3 11/16
Center to top of wheel, open, Globe	Inches	3 1/8	3 1/8	3 3/8	3 7/8	4 5/8	5 3/8	6 1/4	7	7 7/8	8 3/4	11
Center to top of wheel, open, Angle	Inches	3 1/8	3 1/8	3 3/8	4	4 1/2	5 3/8	6 1/2	7 1/4	8 3/8	9 1/4	11 1/8
Diameter of wheel	Inches	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7

250-Pound Brass Globe and Angle Valves



Cross Section
No. 212 C or No. 213

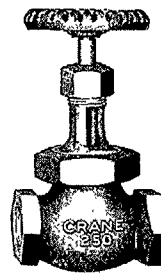
Cranite Composition Disc or Copper Disc Valves

WORKING PRESSURES
250 pounds steam, 500° F.
*500 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

FEATURES
Nickel Alloy Renewable Seat
Union Bonnet

*When No. 212 C or No. 214 C Valves are used on gas, oil, or gasoline, they are recommended for only 400 pounds working pressure.



Globe, Screwed
No. 212 C, Crane Disc
No. 213, Copper Disc



Angle, Screwed
No. 214 C, Crane Disc
No. 215, Copper Disc

Except for the disc and seat, these valves are similar to the Nos. 212 P and 214 P, shown on page 36. A metal plate, secured to the valve stem under the wheel nut, identifies the type of disc.

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 212 C, No. 214 C, No. 213, or No. 215		5.00	5.40	6.60	8.00	10.00	14.00	20.00	30.00
Extra disc holder, disc, nut, and disc stem ring, complete, for No. 212 C or No. 214 C	With No. 4 Crane Disc	.75	.85	.90	1.30	1.70	2.40	3.00	4.30
	With No. 2 or No. 3 Disc	.70	.75	.85	1.10	1.50	2.10	2.60	3.70
Extra copper discs for No. 213 or No. 215		.20	.25	.30	.35	.40	.50	.75	1.10

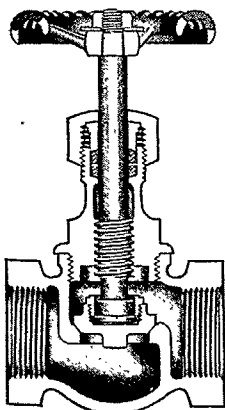
Dimensions are the same as for the Nos. 212 P and 214 P; see page 36.

For list prices of Composition Discs, see page 178.

Nos. 212 C and 214 C: The No. 212 C and No. 214 C Valves are recommended where discs must be frequently renewed. Unless otherwise ordered, they are furnished with a No. 4 Crane Disc for high-pressure steam. When ordered for hot water, gas, oil, or gasoline, they are furnished with a No. 2 Hot Water Disc; and when ordered for cold water or air,

with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 178.

Nos. 213 and 215: The No. 213 and No. 215 Valves are recommended for services where discs must be frequently renewed and where a metallic disc is preferred. They have a Crane Renewable Copper Disc.



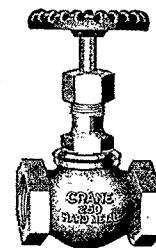
Cross Section
No. 4, Globe

Brass Disc Valves

WORKING PRESSURES
250 pounds steam
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
650 pounds hydrostatic

No. 4 Valves have Crane Hard Metal body and disc. In sizes 1/2-inch and smaller, the disc is integral with the stem; in larger sizes, the disc swivels on the stem, as shown in the cross section. The stuffing box on sizes 3/4-inch and larger has a gland. The valves, when wide open, can be repacked while under pressure.



No. 4, Globe
Screwed



No. 4, Angle
Screwed

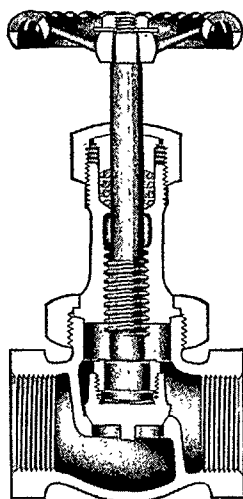
*When ordering, specify
whether globe or
angle valves are wanted.*

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 4, Globe or Angle	Each	3.25	3.25	3.75	4.50	6.00	7.00	10.00	14.00	22.00	40.00	55.00
End to end, Globe	Inches	1 9/16	1 9/16	1 7/8	2 3/16	2 11/16	3 1/4	3 7/8	4 5/16	5 1/4	6 1/16	7 1/4
Center to end, Angle	Inches	1 3/16	1 3/16	1 5/16	1 7/8	1 3/8	1 9/16	1 15/16	2	2 5/8	3 1/4	3 11/16
Center to top of wheel, open, Globe	Inches	3 1/8	3 1/8	3 3/8	3 7/8	4 5/8	5 3/8	6 1/4	7	7 7/8	8 3/4	11
Center to top of wheel, open, Angle	Inches	3 1/8	3 1/8	3 3/8	4	4 1/2	5 3/8	6 1/2	7 1/4	8 1/8	9 1/4	11 1/8
Diameter of wheel	Inches	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7

300-Pound Brass Globe and Angle Valves Regrinding

4



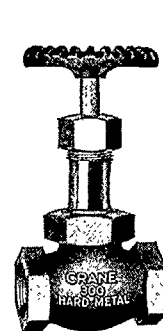
Cross Section
No. 362 E, Globe

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE
900 pounds hydrostatic

FEATURES
Hard Metal Body and Disc
Union Bonnet

SERVICE RECOMMENDATIONS
These valves are recommended for severe operating conditions at high pressures. They combine serviceability with moderate cost.



No. 362 E, Globe
Screwed



No. 364 E, Angle
Screwed

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 362 E or No. 364 E	Each	3.30	3.70	4.70	6.00	8.00	11.00	15.00	24.00	42.00	62.00

Body and disc: These parts are made of Crane Hard Metal, a strong, hard, copper-tin bronze that resists cutting and wiredrawing exceptionally well.

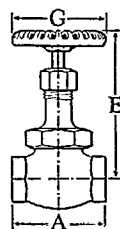
Bonnet: The bonnet is made of a new special bronze. Its unusually good wear-resisting properties combined with the long and accurately machined stem threads materially lengthens the life of both the stem and bonnet.

Regrinding: These valves can be reground without removing the body from the line. Instructions for regrinding are furnished with each valve.

Union bonnet construction: The union bonnet construction, in addition to making a sturdy, tight joint, facilitates dismantling and reassembling the valve. The union ring reinforces the bonnet joint and when the valve is being reground, it centers and guides the valve trimmings.

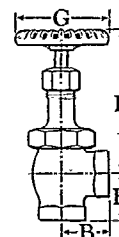
Stuffing box: The stuffing box is unusually deep and is filled with high grade packing. It is equipped with a gland.

Repacking: These valves, when wide open, can be repacked while under pressure.

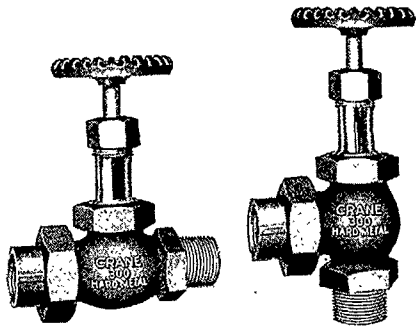


Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2	2 5/16	2 11/16	2 15/16	3 1/2	4 1/16	4 5/8	5 3/4	6 7/8	8
B	1 5/16	1 1/16	1 1/4	1 1/2	1 3/4	2 1/16	2 5/16	2 7/8	3 7/16	4
E—Open	4 1/8	4 5/8	5 1/4	6 3/8	6 7/8	7 7/8	8 3/4	10 3/8	12 1/8	13 1/4
F—Open	4	4 1/2	5 1/8	6 1/4	7	7 7/8	9	10 1/2	12	13 1/4
G	1 3/4	2 1/16	2 9/16	3 1/16	3 5/8	4 1/16	4 3/4	6	7	8



300-Pound Brass Globe and Angle Valves Regrinding



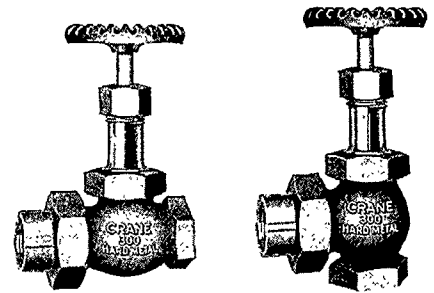
No. 1834, Globe No. 1835, Angle
Male Inlet
Female Union Outlet

*Male end is one pipe size
larger than female union end.*

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE
900 pounds hydrostatic

INTERCHANGEABILITY
All parts of these valves except
the bodies are interchangeable
with the corresponding parts of
the No. 362 E Globe and No.
364 E Angle Valves shown on
the preceding page.



No. 1836, Globe No. 1837, Angle
Female Inlet
Female Union Outlet

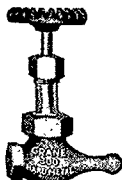
Both ends are the same size.

List Prices

Size	Inches	$\frac{3}{8} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{4} \times \frac{1}{2}$	$1 \times \frac{3}{4}$	$1\frac{1}{4} \times 1$	$1\frac{1}{2} \times 1\frac{1}{4}$	$2 \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2$	$3 \times 2\frac{1}{2}$
No. 1834 or No. 1835	Each	10.10	10.30	12.30	15.20	21.40	28.40	36.60	66.80	115.00
Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	
No. 1836 or No. 1837	Each	9.50	9.70	10.80	12.90	17.30	23.80	31.10	53.50	

Cab Hose Valves

Female Inlet — Hose End Outlet



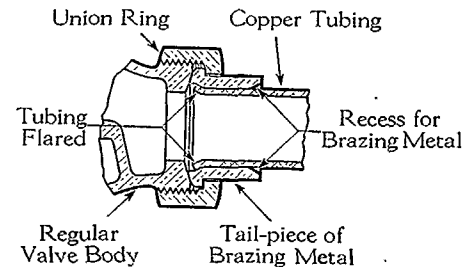
No. 1833

The No. 1833 Valves except for
their hose end bodies are made
like the No. 362 E Valves shown
on the preceding page.

List Prices

Size	Inches	$\frac{3}{8}$ female $\frac{1}{2}$ hose	$\frac{1}{2}$ female $\frac{1}{2}$ hose	$\frac{1}{2}$ female $\frac{3}{4}$ hose
No. 1833	Each	6.50	7.00	10.00

Union End Valves for use with Copper Tubing



Union end valves can be made to order
with brazing tail-pieces for use with copper
tubing. Prices on application.

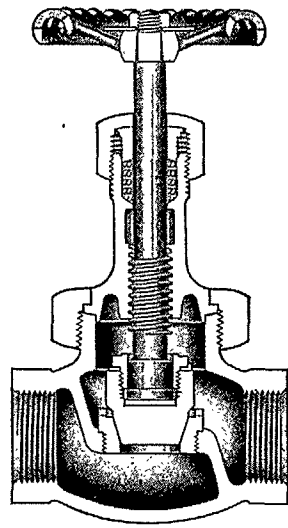
Dimensions, in Inches

Size, No. 1834, No. 1835	$\frac{3}{8} \times \frac{1}{4}$	$\frac{1}{2} \times \frac{3}{8}$	$\frac{3}{4} \times \frac{1}{2}$	$1 \times \frac{3}{4}$	$1\frac{1}{4} \times 1$	$1\frac{1}{2} \times 1\frac{1}{4}$	$2 \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2$	$3 \times 2\frac{1}{2}$
Size, No. 1836, No. 1837	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	
Size, No. 1833	$\frac{3}{8} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{1}{2}$	$\frac{1}{2} \times \frac{3}{4}$						
End to end, No. 1834	$3\frac{11}{16}$	$4\frac{1}{4}$	$4\frac{13}{16}$	$5\frac{1}{2}$	$6\frac{1}{8}$	$6\frac{7}{8}$	$7\frac{13}{16}$	$9\frac{1}{16}$	$10\frac{3}{8}$
Center to male end, No. 1835	$1\frac{3}{4}$	$2\frac{1}{16}$	$2\frac{3}{8}$	$2\frac{3}{4}$	3	$3\frac{5}{16}$	$3\frac{13}{16}$	$4\frac{3}{8}$	$4\frac{15}{16}$
Center to union end, No. 1835	$1\frac{15}{16}$	$2\frac{3}{16}$	$2\frac{7}{16}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{9}{16}$	$4\frac{1}{4}$	$4\frac{11}{16}$	$5\frac{7}{16}$
End to end, No. 1836	$2\frac{15}{16}$	$3\frac{3}{8}$	$3\frac{13}{16}$	$4\frac{1}{4}$	$4\frac{7}{8}$	$5\frac{5}{8}$	$6\frac{5}{16}$	$7\frac{9}{16}$	
Center to female end, No. 1837	1	$1\frac{3}{16}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{16}$	$2\frac{5}{16}$	$2\frac{7}{8}$	
Center to union end, No. 1837	$1\frac{15}{16}$	$2\frac{3}{16}$	$2\frac{7}{16}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{9}{16}$	4	$4\frac{11}{16}$	
End to end, No. 1833	$3\frac{3}{8}$	$3\frac{1}{2}$	$3\frac{15}{16}$						
Center to top, open, Globe	$4\frac{5}{8}$	$4\frac{5}{8}$	$5\frac{1}{4}$	$4\frac{1}{8}$	$4\frac{5}{8}$	$5\frac{1}{4}$	$6\frac{3}{8}$	$6\frac{7}{8}$	$7\frac{7}{8}$
Center to top, open, Angle			4	$4\frac{1}{2}$	$5\frac{1}{8}$	$6\frac{1}{4}$	7	$7\frac{7}{8}$	9
Diameter of wheel	$2\frac{1}{16}$	$2\frac{1}{16}$	$2\frac{9}{16}$	$1\frac{3}{4}$	$2\frac{1}{16}$	$2\frac{9}{16}$	$3\frac{1}{16}$	$3\frac{5}{8}$	$4\frac{1}{16}$

All valves shown on this page are made to order only.

Description....page 38

300-Pound Brass Globe and Angle Valves Plug Type Disc



Cross Section
No. 382 P, Globe

WORKING PRESSURES

300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil,
or gas, non-shock
Flanged valves — 500 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE

900 pounds hydrostatic

FEATURES

Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union or Bolted Bonnet

SERVICE RECOMMENDATIONS

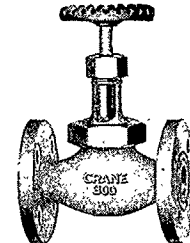
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines.



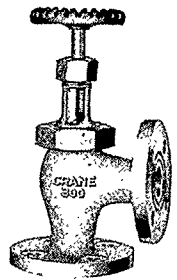
No. 382 P, Globe
Screwed



No. 384 P, Angle
Screwed



No. 383 P, Globe
Flanged



No. 385 P, Angle
Flanged

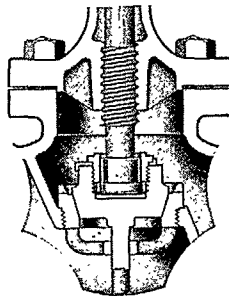
List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 382 P or No. 384 P, Screwed		5.40	5.70	7.40	9.70	12.00	16.00	22.00	36.50	60.00	91.00
No. 383 P or No. 385 P, Flanged, F. D. & S. F.					24.00	31.00	40.00	52.00	75.00	114.00	180.00

Body: The body is strong and durable; it is made of Crane Special Brass, a high grade steam metal.

Plug type disc and seat: The wide seat resists wire drawing and foreign matter exceptionally well. The disc taper assists in maintaining tightness and permits easy flow regulation when throttling.

Construction: Sizes 2-inch and smaller have a union bonnet as illustrated above; 2 1/2 and 3-inch sizes have a bolted bonnet, inside screw, and a bottom pin guide on the disc as illustrated at the right. Both bonnet types provide a strong, tight joint, yet they can be easily dismantled and reassembled without injuring the valve.



Seat metals: The disc is Crane Nickel Alloy; the

seat ring is Exelloy. These metals are an ideal combination, offering unusual resistance to wear, temperature, and galling; they are harder, tougher, and stronger than metals ordinarily used in brass valves.

Stuffing box: The stuffing box is unusually deep; it is equipped with a gland, and is filled with high grade packing.

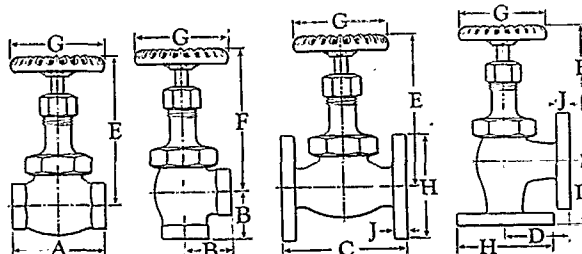
Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Dimensions, in Inches

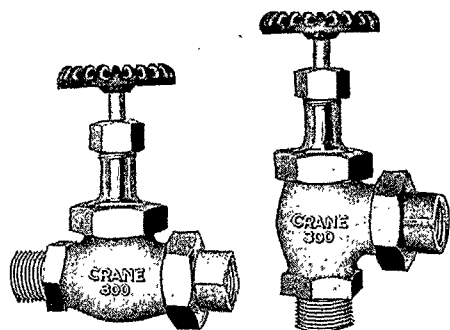
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2 1/4	2 1/2	2 5/16	3 1/2	4 1/8	4 3/4	5 1/4	6 3/8	7 1/2	8 1/2
B	1 1/8	1 1/4	1 1/2	1 3/4	2 1/16	2 3/8	2 5/8	3 3/16	3 3/4	4 1/4
C				4 3/4	5 3/8	6 1/4	7 1/4	8	9	10 5/16
D				3	3 1/4	3 1/2	4	4 5/16	4 3/4	5 7/16
E-Open	4 3/8	5 1/8	5 5/8	6 5/8	7 1/4	8 1/4	9 3/8	10 5/8	12	13 3/8
F-Open	4 1/4	4 7/8	5 3/8	6 3/8	7	8	9	10 1/4	11	12 3/8
G	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7	8
H				4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4
J				1 7/32	1 9/32	5/8	1 1/16	3/4	1 3/16	2 9/32



Templates for drilling....page 550

Valves for Marine Service....page 463

300-Pound Brass Globe and Angle Valves Plug Type Disc



No. 1824 P, Globe No. 1825 P, Angle

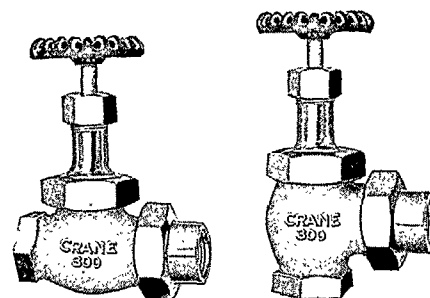
Male Inlet
Female Union Outlet

*Male end is one pipe size
larger than female union end.*

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE
900 pounds hydrostatic

INTERCHANGEABILITY
All parts of these valves
except the bodies are
interchangeable with the cor-
responding parts of the
No. 382 P Globe and No. 384 P
Angle Valves shown on the
preceding page.



No. 1826 P, Globe No. 1827 P, Angle

Female Inlet
Female Union Outlet

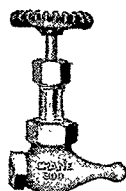
Both ends are the same size.

List Prices

Size	Inches	1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2
No. 1824 P or No. 1825 P	Each	10.30	12.30	15.20	21.40	28.40	36.60	66.80
Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	
No. 1826 P or No. 1827 P	Each	10.80	12.90	17.30	23.80	31.10	53.50	

Cab Hose Valves

Female Inlet — Hose End Outlet



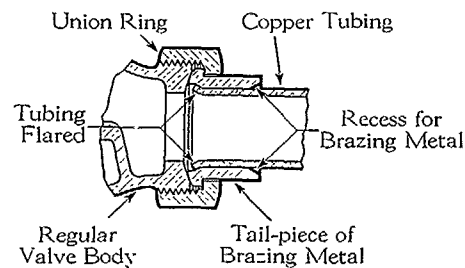
No. 1823 P

The No. 1823 P Valves except
for their hose end bodies are
made like the No. 382 P Valves
shown on the preceding page.

List Prices

Size	Inches	3/8 female 1/2 hose	1/2 female 1/2 hose
No. 1823 P	Each	6.50	7.00

Union End Valves for use with Copper Tubing



Union end valves can be made to order
with brazing tail-pieces for use with
copper tubing. Prices on application.

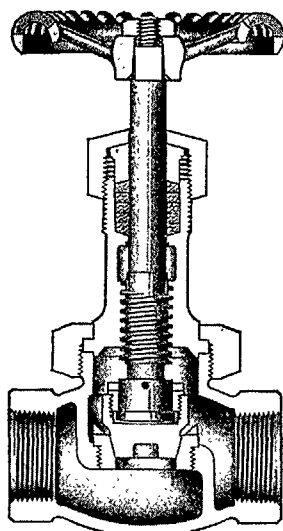
Dimensions, in Inches

Size, No. 1824 P, No. 1825 P			1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2
Size, No. 1826 P, No. 1827 P				1/2	3/4	1	1 1/4	1 1/2	2
Size, No. 1823 P		3/8 x 1/2	1/2 x 1/2						
End to end, No. 1824 P			4 5/16	5	5 7/8	6 5/8	7 7/16	8 5/16	9 11/16
Center to male end, No. 1825 P			2 1/8	2 1/2	3	3 5/16	3 5/8	4 1/8	4 11/16
Center to union end, No. 1825 P			2 3/16	2 1/2	2 7/8	3 5/16	3 13/16	4 3/16	5
End to end, No. 1826 P				4	4 5/8	5 3/8	6 3/16	6 13/16	8 3/16
Center to female end, No. 1827 P				1 1/2	1 3/4	2 1/16	2 3/8	2 5/8	3 3/16
Center to union end, No. 1827 P				2 1/2	2 7/8	3 5/16	3 13/16	4 3/16	5
End to end, No. 1823 P	3 1/2	3 5/8							
Center to top, open, Globe	5 1/8	5 1/8	5 1/8	5 5/8	6 5/8	7 1/4	8 1/4	9 3/8	10 5/8
Center to top, open, Angle			4 7/8	5 3/8	6 3/8	7	8	9 1/4	10 1/4
Diameter of wheel	2 9/16	2 9/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6

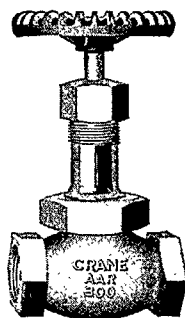
All valves shown on this page are made to order only.

Description . . . page 40

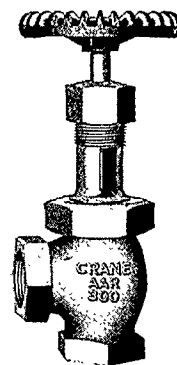
300-Pound A. A. R. Brass Globe and Angle Valves Inside Screw Type



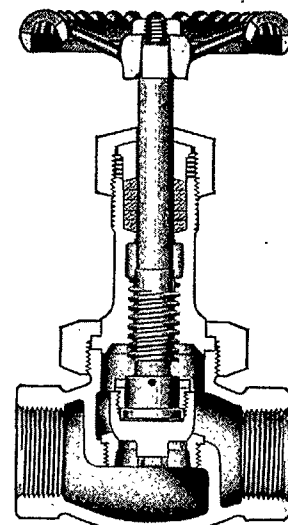
Cross Section
No. 376 P, Globe
Plug Type Disc



Globe, Screwed
No. 376 P, Plug Type Disc
No. 376 E, Ball Type Disc



Angle, Screwed
No. 377 P, Plug Type Disc
No. 377 E, Ball Type Disc



Cross Section
No. 376 E, Globe
Ball Type Disc

WORKING PRESSURE
300 pounds steam
TEST PRESSURE
800 pounds hydrostatic

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 376 P or No. 377 P, Plug Type Disc	Each	5.90	6.30	8.30	10.70	13.30	17.50	24.00	40.00		
No. 376 E or No. 377 E, Ball Type Disc	Each	5.40	5.70	7.40	9.70	12.00	16.00	22.00	36.50	60.00	91.00

For wrenches for removing seat rings, see page 45.

Association of American Railroads: These valves conform to the recommended practice of the Association of American Railroads (A.A.R.) for 300-Pound Globe and Angle Valves for Steam Locomotives, adopted 1932, effective August 1, 1933, revised 1935, 1937.

Body and bonnet: The body is made of Crane Special Brass. The bonnet is made of a special wear-resisting bronze.

Union bonnet ring: Sizes 1 1/2-inch and smaller have a hexagon bonnet ring; larger sizes have a round spanner-type ring (not illustrated).

Plug Type Disc Valves: The disc in 1/4, 3/8, and 1/2-inch Plug Type Disc Valves is made of monel metal and is spun onto the stem (not illustrated). In sizes 3/4-inch and larger, the disc is made of Crane Nickel Alloy and is fastened to the stem with a disc stem ring, as illustrated in the cross section. All sizes have an Exelloy body seat ring.

Ball Type Disc Valves: 1/4, 3/8, and 1/2-inch Ball

Type Disc Valves have a monel metal disc spun onto the stem (not illustrated), and an Exelloy body seat ring. Sizes 3/4-inch and larger have a Crane Nickel Alloy disc and body seat ring, the former being fastened to the stem by a disc stem ring, as illustrated in the cross section.

In 2, 2 1/2, and 3-inch Ball Type Disc Valves, the disc has a bottom pin guide which operates through a bridge in the body seat ring (not illustrated).

Stem end for Universal Joint: When so ordered, these valves can be furnished with the stem end machined for a Universal Joint connection, following the dimensions specified in the A.A.R. recommended practice. Such valves are sold at the same price as valves with wheel and wheel nut.

Universal Joints can be supplied when ordered; prices will be furnished on application.



Dimensions, in Inches

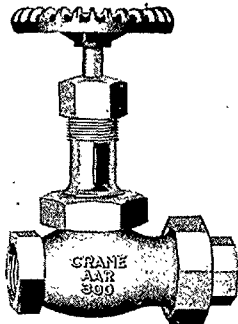
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
End to end, Globe	2 5/16	2 1/2	2 7/8	3 9/16	4 1/8	4 3/4	5 1/4	6 3/8	7 3/8	8 3/8
Center to end, Angle	1 5/32	1 1/4	1 7/16	1 25/32	2 1/16	2 3/8	2 5/8	3 3/16	3 11/16	4 3/16
Center to top of wheel, open	4 7/8	4 7/8	5 9/16	6 7/16	7 9/16	8 3/8	9 1/4	10 5/8	12 1/16	14 3/16
Diameter of wheel	2 3/4	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6	7	8

*Dimensions on 2 1/2 and 3-inch sizes apply to Ball Type Disc Valves only; Plug Type Disc Valves in these sizes are not included in the A. A. R. recommended practice.

300-Pound A. A. R. Brass Globe and Angle Valves Inside Screw Type

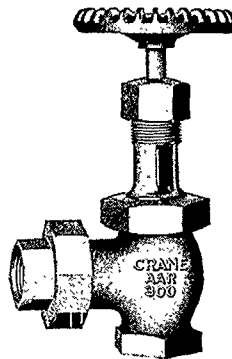
WORKING PRESSURE
300 pounds steam

TEST PRESSURE
800 pounds hydrostatic



Globe, Screwed
No. 1870 P, Plug Type Disc No. 1871 P, Plug Type Disc
No. 1870 E, Ball Type Disc No. 1871 E, Ball Type Disc

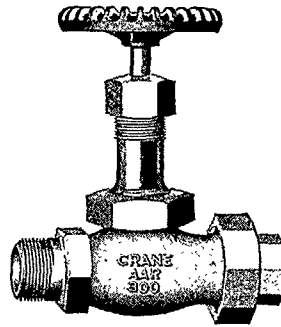
Female Inlet, Female Union Outlet



Angle, Screwed
No. 1871 P, Plug Type Disc No. 1871 E, Ball Type Disc

Female Inlet, Female Union Outlet

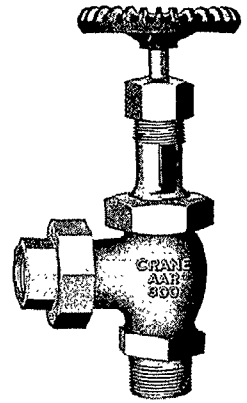
Both ends are the same pipe size.



Globe, Screwed
No. 1874 P, Plug Type Disc No. 1875 P, Plug Type Disc
No. 1874 E, Ball Type Disc No. 1875 E, Ball Type Disc

Male Inlet, Female Union Outlet

*The male end is one pipe size
larger than the female union end.*



Angle, Screwed
No. 1875 P, Plug Type Disc No. 1875 E, Ball Type Disc

Male Inlet, Female Union Outlet

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 1870 P or No. 1871 P, Plug Type Disc		10.00	10.30	11.70	13.90	18.60	25.30	33.10	57.00	
No. 1870 E or No. 1871 E, Ball Type Disc		9.50	9.70	10.80	12.90	17.30	23.80	31.10	53.50	91.00
Size	Inches	3/8 x 1/4	1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	3 x 2 1/2
No. 1874 P or No. 1875 P, Plug Type Disc		10.60	10.90	13.20	16.20	22.70	29.90	38.60	70.30	
No. 1874 E or No. 1875 E, Ball Type Disc		10.10	10.30	12.30	15.20	21.40	28.40	36.60	66.80	115.00

For wrenches for removing seat rings, see page 45.

Association of American Railroads: These valves conform to the recommended practice of the Association of American Railroads (A.A.R.) for 300-Pound Globe and Angle Valves for Steam Locomotives, adopted 1932, effective August 1, 1933, revised 1935, 1937.

Interchangeability: Except for the body, the valves shown on this page and those shown on the preceding page are identical.

Body, union ring, and tail-piece: The body,

union ring, and tail-piece are made of Crane Special Brass.

Stem end for Universal Joint: When so ordered, these valves can be furnished with the stem end machined for a Universal Joint connection, following the dimensions specified in the A.A.R. recommended practice. Such valves are sold at the same price as valves with wheel and wheel nut.

Universal Joints can be supplied when ordered; prices will be furnished on application.

Dimensions, in Inches

Size	Female Inlet Valves	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	*2 1/2
	Male Inlet Valves	3/8 x 1/4	1/2 x 3/8	3/4 x 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	*3 x 2 1/2
Center to female end		15/32	1 1/4	1 7/16	1 25/32	2 1/16	2 3/8	2 5/8	3 3/16	3 11/16
Center to male end		1 31/32	2 1/16	2 9/16	3 1/32	3 5/16	3 5/8	4 1/8	4 11/16	5 3/16
Center to union end		2 1/8	2 5/16	2 1/2	3 1/8	3 9/16	4 3/8	4 11/16	5 5/16	5 15/16
Center to top of wheel, open		4 7/8	4 7/8	5 9/16	6 7/16	7 9/16	8 3/8	9 1/4	10 5/8	12 1/16
Diameter of wheel		2 3/4	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6	7

*Dimensions on the 2 1/2 and 3 x 2 1/2-inch sizes apply to Ball Type Disc Valves only; Plug Type Disc Valves in these sizes are not included in the A. A. R. recommended practice.

The valves shown on this page are made to order only.

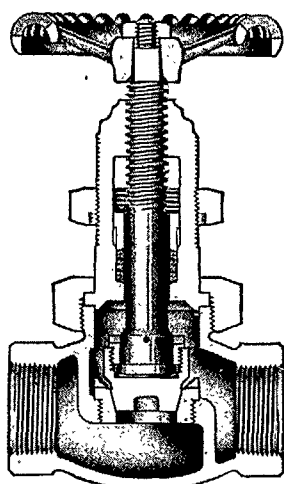
300-Pound A. A. R. Brass Globe and Angle Valves Outside Screw and Yoke

WORKING PRESSURE

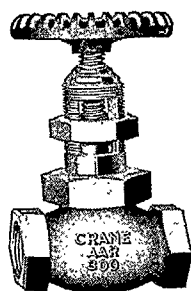
300 pounds steam

TEST PRESSURE

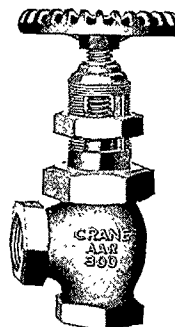
800 pounds hydrostatic



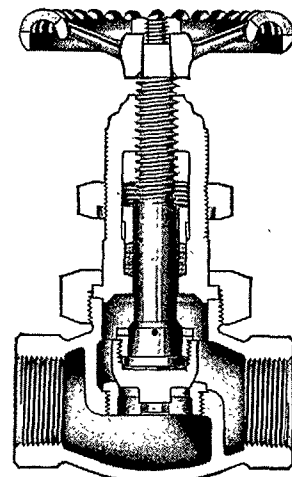
Cross Section
No. 396 P, Globe
Plug Type Disc



Globe, Screwed
No. 396 P, Plug Type Disc
No. 396 E, Ball Type Disc



Angle, Screwed
No. 397 P, Plug Type Disc
No. 397 E, Ball Type Disc



Cross Section
No. 396 E, Globe
Ball Type Disc

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 396 P or No. 397 P, Plug Type Disc	Each	15.00	17.20	18.30	26.10	33.40	66.50
No. 396 E or No. 397 E, Ball Type Disc	Each	14.10	16.20	17.00	24.60	31.40	63.00

For wrenches for removing seat rings, see page 45.

Association of American Railroads: These valves conform to the recommended practice of the Association of American Railroads (A.A.R.) for 300-Pound Globe and Angle Valves for Steam Locomotives, adopted 1932, effective August 1, 1933, revised 1935, 1937.

Interchangeability: The valves shown on this page use the same wheel, wheel nut, disc stem ring, disc, body seat ring, union bonnet ring, and body as the A.A.R. 300-Pound Inside Screw Type Valves shown on page 42; only the stem, bonnet, gland, and gland nut are different.

Body: The body is made of Crane Special Brass.

Bonnet: The bonnet is made of Crane Cast Manganese Bronze.

Stem: The stem is made of *Crane 18-8 Mo Chrome-Nickel Alloy Steel.

Plug Type Disc Valves: In the Plug Type Disc

Valves, the disc is made of Crane Nickel Alloy, and the body seat ring is made of Exelloy.

Ball Type Disc Valves: In the Ball Type Disc Valves, both the disc and the body seat ring are made of Crane Nickel Alloy.

Stem end for Universal Joint: When so ordered, these valves can be furnished with the stem end machined for a Universal Joint connection, following the dimensions specified in the A.A.R. recommended practice. Such valves are sold at the same price as valves with wheel and wheel nut.

Universal Joints can be supplied when orders so specify; prices will be furnished on application.

*Crane Co. is licensed under patent No. 1,587,614 to manufacture valves and fittings made from 18-8 chromium-nickel alloy with 2 to 4% molybdenum.



Dimensions, in Inches

Size	1/2	3/4	1	1 1/4	1 1/2	2
End to end, Globe	2 7/8	3 9/16	4 1/8	4 3/4	5 1/4	6 3/8
Center to end, Angle	1 7/16	1 25/32	2 1/16	2 3/8	2 5/8	3 3/16
Center to top of wheel, open	5 5/16	5 11/16	6 9/16	7 1/2	8 7/16	10
Diameter of wheel	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6

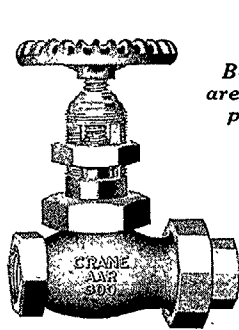
600-Pound Cast Steel Valves for Locomotive Service ... page 311

A.A.R. Screwed Fittings... page 193

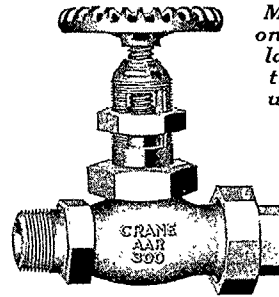
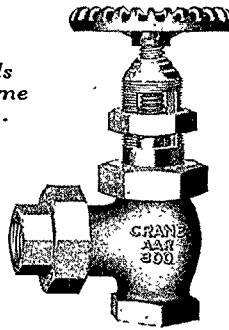
A.A.R. Unions and Union Fittings... pages 242 to 244

300-Pound A. A. R. Brass Globe and Angle Valves Outside Screw and Yoke

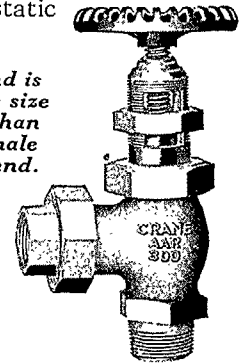
WORKING PRESSURE — 300 pounds steam TEST PRESSURE — 800 pounds hydrostatic



*Both ends
are the same
pipe size.*



*Male end is
one pipe size
larger than
the female
union end.*



Globe, Screwed
No. 1890 P, Plug Type Disc No. 1891 P, Plug Type Disc
No. 1890 E, Ball Type Disc No. 1891 E, Ball Type Disc
Female Inlet, Female Union Outlet

Globe, Screwed
No. 1894 P, Plug Type Disc No. 1895 P, Plug Type Disc
No. 1894 E, Ball Type Disc No. 1895 E, Ball Type Disc
Male Inlet, Female Union Outlet

List Prices, Each

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 1890 P or No. 1891 P, Plug Type Disc		18.40	20.40	23.50	33.90	42.60	83.50
No. 1890 E or No. 1891 E, Ball Type Disc		17.50	19.40	22.20	32.40	40.60	80.00
Size	Inches	3/4 x 1 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2
No. 1894 P or No. 1895 P, Plug Type Disc		19.90	22.70	27.60	38.50	48.10	96.80
No. 1894 E or No. 1895 E, Ball Type Disc		19.00	21.70	26.30	37.00	46.10	93.30

Association of American Railroads: These valves conform to the recommended practice of the Association of American Railroads (A.A.R.) for 300-Pound Globe and Angle Valves for Steam Locomotives, adopted 1932, effective August 1, 1933, revised 1935, 1937.

Interchangeability: Except for the body, these valves are the same as those shown on the preceding page. Except for the stem, bonnet, gland, and gland nut, the valves use the same parts as the A.A.R. 300-Pound Inside Screw Type Valves shown on page 43.

Body, union ring, and tailpiece: The body, union ring, and tailpiece are Crane Special Brass.

Universal Joint: When desired, valves can be furnished with the stem end machined for a Universal Joint connection, following dimensions specified in the A.A.R. recommended practice; prices are the same as for valves with wheel and wheel nut.

Universal Joints can be supplied when ordered; prices will be furnished on application.

Dimensions, in Inches

Size	Female Inlet Valves						
	1/2	3/4	1	1 1/4	1 1/2	2 1/2	
Male Inlet Valves							
	3/4 x 1 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2	
Center to female end	17/16	125/32	21/16	23/8	25/8	33/16	
Center to male end	29/16	31/32	35/16	35/8	41/8	411/16	
Center to union end	2 1/2	3 1/8	3 9/16	4 7/8	4 11/16	5 5/16	
Center to top of wheel, open	55/16	5 11/16	6 9/16	7 1/2	8 7/16	10	
Diameter of wheel	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8	6	

The valves shown on this page are made to order only.

Wrenches for Body Seat Rings

For A.A.R. Brass Globe and Angle Valves

These are steel wrenches. A brass guide ring (included in the price of each wrench) slips over the shank of the wrench and fits into the top of the valve body, centering and guiding the wrench.

The No. 393 P Wrench can be used to hold the disc when removing or inserting the disc stem ring. The square end fits the recess in the disc.



Guide Ring
(Furnished
with each
wrench)



No. 393 E, Wrench
for
Ball Type Disc
Valves



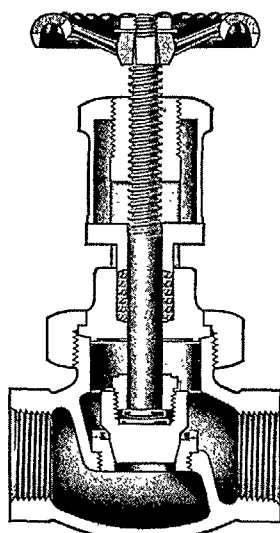
No. 393 P, Wrench
for
Plug Type Disc
Valves

List Prices, Each

Size of Valve	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
		3/8 x 1 1/2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1 1/2	2 1/2 x 2		
No. 393 P Wrench		4.00	4.00	4.25	4.90	5.90	7.00	8.35	10.50
No. 393 E Wrench		2.90	2.90	3.10	3.50	4.25	4.90	6.00	7.25

300-Pound Brass Globe and Angle Valves Outside Screw and Yoke

4



Cross Section
No. 372 P, Globe

WORKING PRESSURES

300 pounds steam, 550° F.

Screwed valves — 600 pounds cold water, oil,
or gas, non-shock

Flanged valves — 500 pounds cold water, oil,
or gas, non-shock

TEST PRESSURE

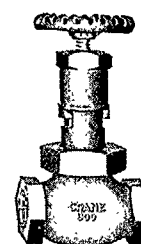
800 pounds hydrostatic

FEATURES

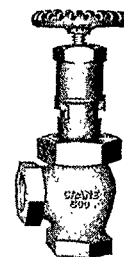
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union Bonnet

SERVICE RECOMMENDATIONS

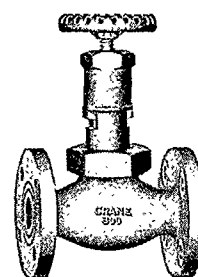
These valves are recommended for exceptionally severe service, such as for throttling, and for soot blower, blow-off, boiler feed, drip, and drain lines. They are especially suitable for superheated steam or for service where valves are operated frequently.



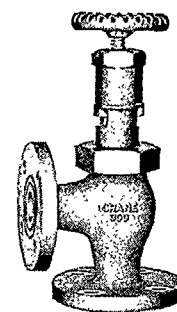
No. 372 P, Globe
Screwed



No. 374 P, Angle
Screwed



No. 373 P, Globe
Flanged



No. 375 P, Angle
Flanged

List Prices, Each

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 372 P or No. 374 P, Screwed		11.00	14.50	18.00	22.00	30.00	46.00
No. 373 P or No. 375 P, Flanged, F. D. & S. F.			30.00	37.00	47.00	60.00	86.00

Body: The body is strong and rugged. It is made of Crane Special Brass, a high grade steam composition.

Yoke-bonnet: The yoke is compact without sacrificing accessibility for repacking. Full threads at the yoke top for the packing nut prevent crossing or stripping of threads. The serviceable and practical union bonnet holds a tight joint and makes dismantling for cleaning or repairing easy.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and foreign matter. The tapered disc permits easy flow regulation when throttling.

Seat metals: The seat ring is Exelloy; the disc, Crane Nickel Alloy. These metals have excellent resistance to wear, temperature, galling, and scoring.

Stem: The stem is made of Crane 18-8 Mo, assuring liberal strength and long life.

Stuffing box: The stuffing box is exceptionally deep and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

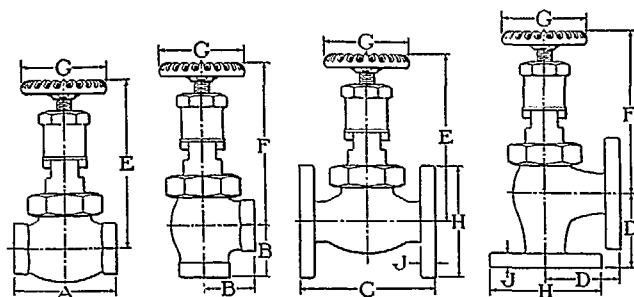
Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

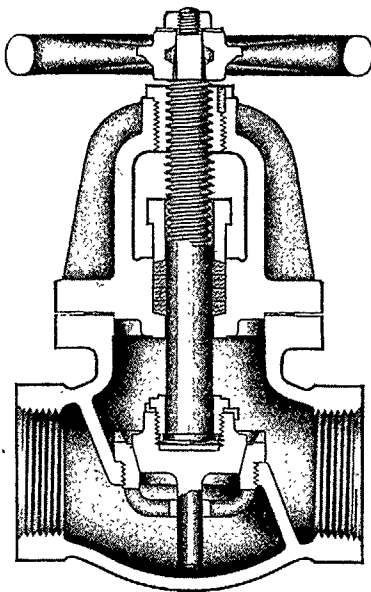
Dimensions, in Inches

Size	1/2	3/4	1	1 1/4	1 1/2	2
A	2 15/16	3 1/2	4 1/8	4 3/4	5 1/4	6 3/8
B	1 1/2	1 3/4	2 1/16	2 3/8	2 5/8	3 3/16
C		4 3/4	5 3/8	6 1/4	7 1/4	8
D		3	3 1/4	3 1/2	4	4 5/16
E—Open	5 3/4	6 1/8	7 5/8	8 5/8	10 1/8	12 1/8
F—Open	5 5/8	5 7/8	7 3/8	8 3/8	9 3/4	11 7/8
G	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	5 3/8
H		4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
J		1 7/32	1 9/32	5/8	1 1/16	3/4

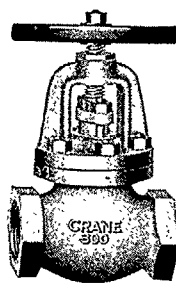
Templates for drilling . . . page 550



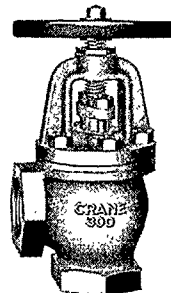
300-Pound Brass Globe and Angle Valves Outside Screw and Yoke—Bolted Bonnet



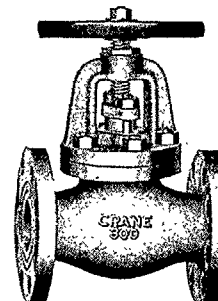
Cross Section
No. 85 P, Globe



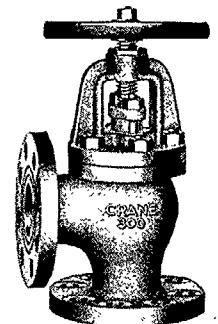
No. 85 P
Globe, Screwed



No. 85 1/2 P
Angle, Screwed



No. 87 P
Globe, Flanged



No. 87 1/2 P
Angle, Flanged

WORKING PRESSURES

300 pounds steam, 550° F.

Screwed valves — 600 pounds cold water, oil, or gas, non-shock
Flanged valves — 500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE

900 pounds hydrostatic

FEATURES

Exelloy Renewable Seat — Nickel Alloy Plug Type Disc

List Prices, Each

Size	Inches	1 1/2	2	2 1/2	3
No. 85 P or No. 85 1/2 P, Screwed		60.00	75.00	110.00	170.00
No. 87 P or No. 87 1/2 P, Flanged, F.D. & S.F.		80.00	100.00	140.00	200.00

Service recommendations: These valves are recommended for throttling, for soot blower lines, and for other exceptionally severe services.

The valves have a plug type disc and seat, permitting easy flow regulation when throttling and offering excellent resistance to foreign matter and to wire-drawing. The outside stem threads are particularly well suited for services where the action of the fluid might affect inside threads.

Construction: The valves are unusually heavy and rugged. The bolted bonnet provides liberal strength at the bonnet joint.

Sizes 2 1/2 and 3-inch have the disc guided through a bridge cast integral with the body seat ring, as shown in the cross section; smaller sizes do not have the guide.

Materials: The valves have a body and bonnet made of Crane Special Brass, a high grade steam metal. The plug type disc is made of Crane Nickel Alloy, and the renewable body seat ring is made of Exelloy; these metals are an ideal combination, being stronger, harder, and tougher than metals ordinarily used in brass valves.

Stuffing box; repacking: The stuffing box is deep and is filled with high grade packing. It is equipped

with a bolted gland. The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

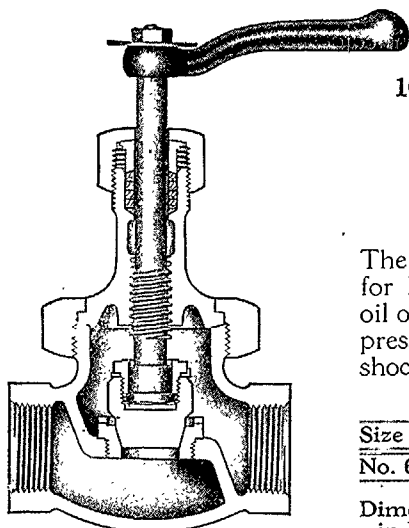
Larger sizes: Sizes 3 1/2-inch and larger are made to order; they have a 45° flat seat and are recommended for general stop valve service. Prices will be furnished on application.

Cross valves: Cross valves can be made to order.

Dimensions, in Inches

Size	1 1/2	2	2 1/2	3
End to end, No. 85 P	5 1/2	6 1/4	7 1/2	8 1/2
Center to end, No. 85 1/2 P	2 3/4	3 1/8	3 3/4	4 1/4
Face to face, No. 87 P	7	8	9	10 5/16
Center to face, No. 87 1/2 P	3 7/8	4 1/4	4 3/4	5 7/16
Center to top of stem, open	Globe	9 1/8	10 1/4	11 5/8
	Angle	8 3/8	9 1/2	10 5/8
Diameter of wheel	6	7	8	9
Diameter of flanges	6 1/8	6 1/2	7 1/2	8 1/4
Thickness of flanges	1 1/16	3/4	1 3/16	2 9/32

350-Pound Brass Globe Valves Plug Type Disc



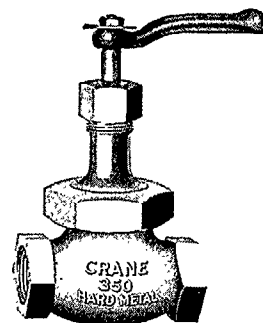
*Cross Section, No. 62 P

WORKING PRESSURES
350 pounds steam, 550° F.
1000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
1200 pounds hydrostatic

SERVICE RECOMMENDATIONS

The No. 62 P Brass Globe Valves are recommended for high-pressure steam lines such as are used on oil or gas field boilers for deep well drilling, for high-pressure water or oil service on lines not subject to shock, and for high-pressure gas lines.

*No. 62 P, Globe
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 62 P, Globe, Screwed	Each	8.30	10.70	13.30	17.50	24.00	40.00
Dimensions, in Inches	End to end	3 1/8	3 5/8	4 1/4	5	5 5/8	6 3/4
	Center to top of lever, open	6 1/8	7	7 3/4	8 3/4	9 5/8	11 1/2
	Center to end of lever handle	3 1/2	3 7/8	4 1/4	4 5/8	5	5 3/4

Body: The body is made of Crane Hard Metal, a strong, hard, copper-tin bronze.

Plug type disc and seat: The plug type disc and seat are ideal for severe service, as on soot blower, blow-off, boiler feed, drip, drain lines, etc. The wide seating surface is unusually resistant to foreign matter and to wiredrawing. The tapered disc permits easy regulation of flow when throttling.

The disc is Crane Nickel Alloy; the body seat ring, Exelloy. These metals are harder, stronger, and tougher than metals ordinarily used in brass valves.

Stem threads: Stem threads are long and accurately machined, assuring long life. They have liberal engagement with the bonnet threads at all times.

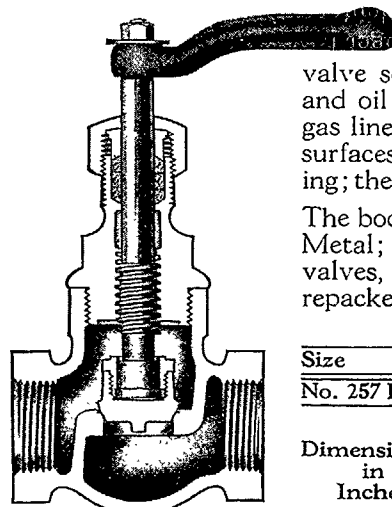
***Bonnet construction:** Sizes 1 1/2-inch and smaller have a union bonnet as illustrated. The 2-inch size has a bolted bonnet, inside screw (not illustrated). Both types provide a strong, tight joint.

Stuffing box: The stuffing box is deep, is filled with high grade packing, and is equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

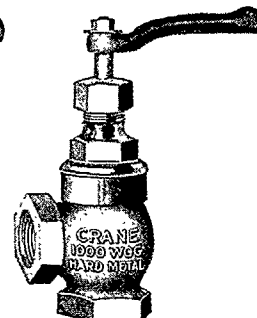
1000-Pound Hydraulic Brass Globe and Angle Valves

WORKING PRESSURE — 1000 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 1200 pounds hydrostatic



Cross Section, No. 257 H

These valves are recommended for general stop valve service on non-shock water and oil lines and on high-pressure gas lines. Angular shaped seating surfaces provide a wide seat bearing; the seats and body are integral. The body and disc are Crane Hard Metal; the stem is Exelloy. The valves, when wide open, can be repacked while under pressure.

No. 257 H, Globe
ScrewedNo. 258 H, Angle
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 257 H, Globe, or No. 258 H, Angle	Each	9.00	12.00	18.00	25.00	33.00	45.00
Dimensions, in Inches	End to end, Globe	3	3 7/16	3 15/16	4 7/16	5 5/16	6 5/16
	Center to end, Angle	1 3/8	1 5/8	1 5/16	2 3/16	2 9/16	3 1/16
	Center to top of Globe	5 7/8	6 5/8	7 1/4	8 3/8	9 1/8	10 7/8
	Center to end of lever handle	3 1/2	3 7/8	4 1/4	4 5/8	5	5 3/4

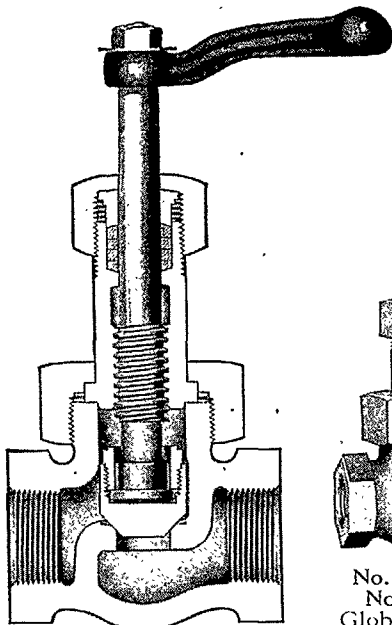
The diameter of the seat opening in the valves is the same as the nominal size of the valve.

2000-Pound Hydraulic Brass Globe and Angle Valves Union Bonnet

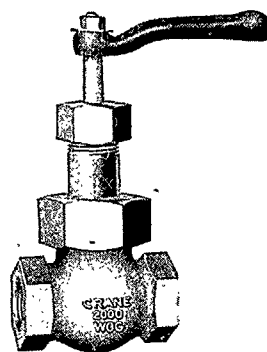
WORKING PRESSURE
2000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE
2200 pounds hydrostatic

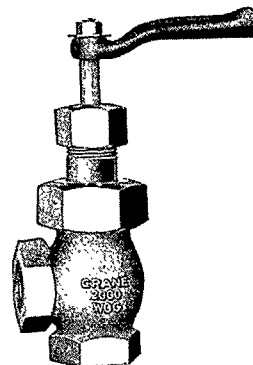
FEATURES
Union Bonnet
Hard Metal Body and Disc



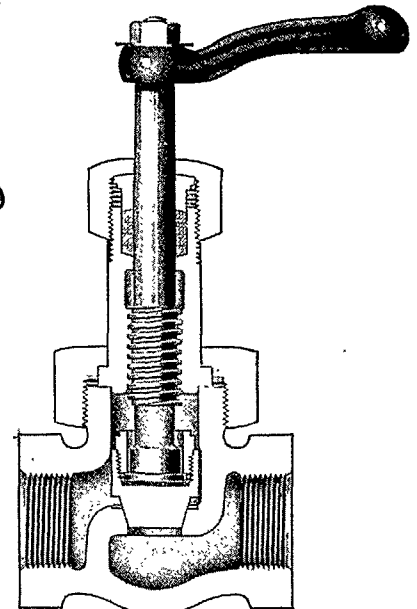
Cross Section
No. 232 H, Globe
45° Seat



No. 232 H or
No. 233 H
Globe, Screwed



No. 232 H or
No. 233 H
Angle, Screwed



Cross Section
No. 233 H, Globe
Plug Type Disc

*When ordering, specify whether globe
or angle valves are wanted.*

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4
No. 232 H or No. 233 H, Globe or Angle	Each	13.00	14.00	17.00	25.00	36.00
End to end, Globe	Inches	2 13/16	2 13/16	3 7/16	4	4 11/16
Center to end, Angle	Inches	1 3/8	1 3/8	1 3/4	2 1/16	2 3/8
Center to top of lever handle, open	No. 232 H, Globe	Inches	6 1/8	6 1/8	6 3/4	8 1/8
	No. 232 H, Angle	Inches	5 3/4	5 3/4	6 3/8	7 1/2
	No. 233 H, Globe	Inches	6 3/8	6 3/8	7	8 3/8
	No. 233 H, Angle	Inches	6 1/8	6 1/8	6 1/2	7 3/4
Center to end of lever handle	Inches	3 7/8	3 7/8	4 1/4	4 5/8	5

No. 232 H Valves; 45° seat: The No. 232 H Globe and Angle Valves are made with a 45° seat. They are suitable for general stop valve service on high-pressure hydraulic lines that are not subject to shock and on high-pressure gas lines.

All sizes of the No. 232 H Globe and Angle Valves have the disc stem ring construction illustrated in the cross section at the left.

No. 233 H Valves; plug type disc: The No. 233 H Globe and Angle Valves have a plug type disc and seat. They are especially recommended for severe service, such as throttling. The wide seating surfaces have excellent resistance to wire drawing and to foreign matter, and the tapered disc permits easy regulation of flow.

The 1 1/4-inch size valves have the disc stem ring construction shown in the cross section at the right;

smaller sizes have the disc cast integral with the stem.

Rugged construction: Both types of valves are well proportioned throughout and are unusually heavy. Bodies and discs are cast of Crane Hard Metal, a copper-tin bronze of high strength and hardness. The union bonnet joint is strong and serviceable; it holds a tight joint readily, and it facilitates regrinding.

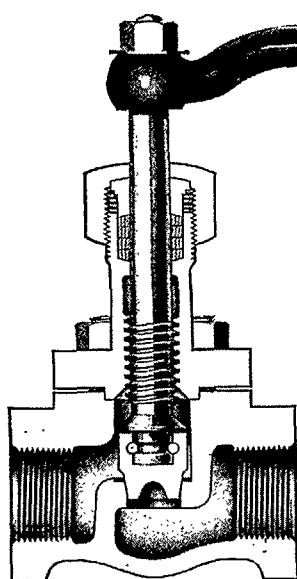
Seat opening: The diameter of the seat opening in the valves is slightly larger than the inside diameter of Double Extra Strong Pipe.

Repacking: These valves, when wide open, can be repacked while under pressure.

Renewable seat valves made to order: Renewable seat valves with either 45° seat or plug type disc can be made on special order; prices on application.

2500-Pound Hydraulic Brass Globe Valves Bolted Bonnet

4



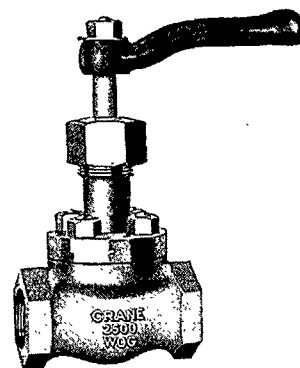
Cross Section

WORKING PRESSURE
2500 pounds cold water,
oil, or gas, non-shock

TEST PRESSURE
3000 pounds
hydrostatic

FEATURES
Bolted Bonnet
Hard Metal Body
Hard Metal Plug Type Disc

SERVICE RECOMMENDATIONS
Recommended for severe and extremely high pressure hydraulic service on lines not subject to shock, and on high-pressure gas lines.



No. 236 H
Globe, Screwed
Plug Type Disc

List Prices and Dimensions

Size	Inches	1	1 1/4	1 1/2	2	2 1/2
No. 236 H	Each	45.00	55.00	70.00	95.00	180.00
End to end	Inches	4 1/2	4 15/16	5 1/2	6 3/8	7 7/8
Center to top, open	Inches	8 1/8	9	10 1/8	11 1/2	12 5/8
Center to end of handle, or wheel diameter	Inches	5	5 3/4	8	9	10

Exceptionally rugged construction: No. 236 H Valves have very heavy metal sections; their bolted bonnet provides a sturdy, rugged construction. Crane Hard Metal, used for the bodies and discs, has great strength and hardness, and offers excellent resistance to wear.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and foreign matter. The wide tapered seating surface permits easy flow regulation when throttling.

Disc-stem connection: The 1-inch No. 236 H Valves have the disc and stem cast integral (not illustrated); 1 1/4 and 1 1/2-inch sizes have the disc and stem cast separately and fastened together with two

disc pins as shown in the cross section; 2 and 2 1/2-inch sizes have the two parts cast separately and fastened together with a disc stem ring (not illustrated).

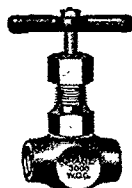
Handle or wheel: 1 and 1 1/4-inch valves have lever handles as illustrated; larger sizes have wheels.

Seat opening: The diameter of the seat opening in these valves is slightly larger than the inside diameter of Double Extra Strong Pipe.

Repacking: These valves, when wide open, can be repacked while under pressure.

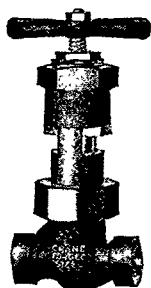
Renewable seat valves: Renewable Seat No. 236 H Valves are made on special order; prices are furnished on application.

For Higher Pressures Use Crane Steel Valves



3000-Pound W.O.G.
No. 222 X, Globe
Exelloy

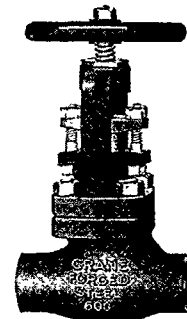
See page 310



600-Pound
No. 216 XR, Globe
Forged Steel

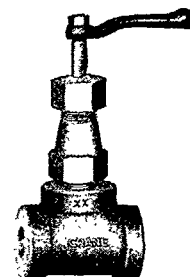
See page 312

When globe and angle valves are required for hydraulic pressures higher than 2500 pounds or for high pressure-temperature lines, use Crane Steel Valves. They are made in an unusually wide range of sizes and types and for all service conditions; see pages 309 to 326.



600-Pound
No. 3644 XR, Globe
Forged Steel

See page 315



6000-Pound Hyd.
No. 225 H, Globe
Forged Steel

See page 319

Brass Check and Foot Valves

Names of parts.....	page 52
Low-Pressure Horizontal Check.....	page 53
Standard Horizontal and Angle Check.....	page 54
Standard Swing Check.....	page 55
Standard Vertical Check.....	page 54
150-Pound Horizontal and Angle Check.....	page 56
200-Pound Horizontal and Angle Check.....	pages 57 and 58
200-Pound Swing Check.....	pages 57 and 58
250-Pound Horizontal and Angle Check.....	page 59
300-Pound Horizontal Check.....	pages 60 and 61
300-Pound Swing Check.....	pages 60 and 61
350-Pound Horizontal Check.....	page 62
350-Pound Swing Check.....	page 62
1000-Pound Hydraulic Horizontal Check.....	page 63
2000-Pound Hydraulic Horizontal Check.....	page 63
2500-Pound Hydraulic Horizontal Check.....	page 63
Standard Foot Valves.....	page 54
Foot Valves for Gasoline Service.....	page 53
Vertical Check Valves for Gasoline Service.....	page 53

Crane Brass Check and Foot Valves, like other Crane products, are characterized by quality. The line is complete and includes a valve for every commercial requirement. Designs are carefully developed based on an accurate knowledge of valve use, and are practical and serviceable.

Other types of brass valves, supplementing the check and foot valves indexed above, are shown on the following pages:

Brass Gate Valves.....	pages 13 to 24
Brass Globe and Angle Valves.....	pages 25 to 50
Brass Hose Valves.....	pages 70 and 71
Brass Lever-Operated Quick-Opening Valves..	pages 66 to 69
Brass Radiator Valves.....	pages 78 to 81

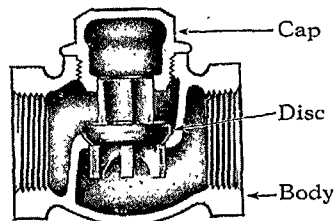
* * * * *

The lists shown above do not include all Crane Brass Valves. Brass Valves that perform a special duty or those made for special services such as Float Valves, Pop Safety Valves, Relief Valves, Pressure Regulators, and Reducing Valves, Solder-Joint Valves, Crane-Seal Valves, and Valves for Marine Service are described in other sections of this catalog. Refer to the index.

Names of Parts

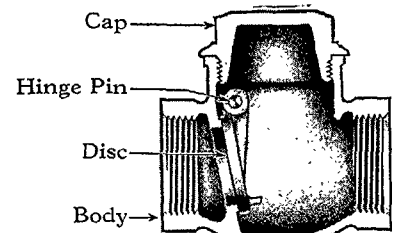
Brass Check and Foot Valves

5



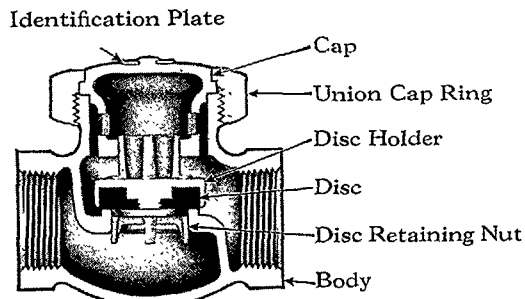
Horizontal Check Valve
With Brass Disc

(No. 20, p. 54)



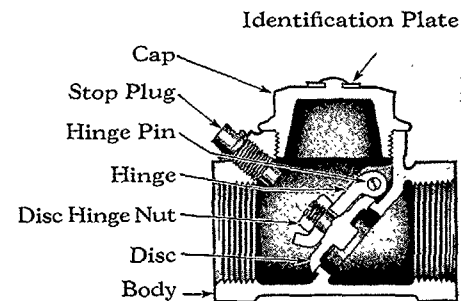
Swing Check Valve
With Brass Disc

(No. 34, p. 55)



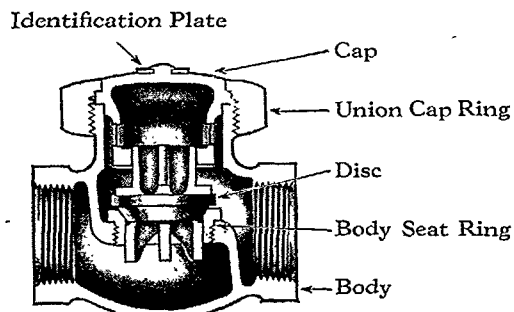
Horizontal Check Valve
With Composition Disc

(No. 27, p. 56)



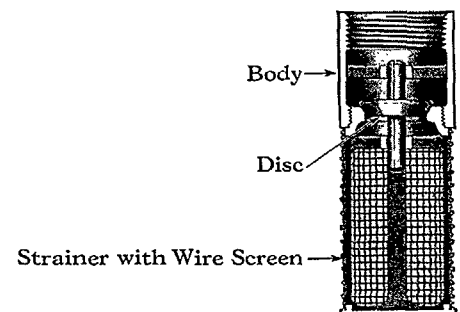
Swing Check Valve
Regrinding Type

(No. 35, p. 57)



Horizontal Check Valve
With Metal Disc and Renewable Seat

(No. 218, p. 59)

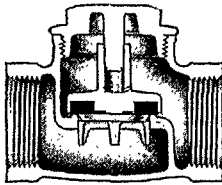


Foot Valve
With Strainer

(No. 33½, p. 54)

Low Pressure Brass Check Valves

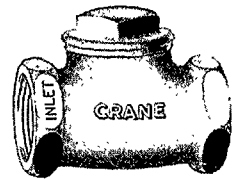
Composition Disc Valves



Cross Section
No. 1212, Horizontal

WORKING PRESSURES
100 pounds steam — 125 pounds water. 200° F.

Especially recommended for domestic hot or cold water lines, domestic gas lines, and similar low pressure service.



No. 1212, Horizontal
Screwed

List Prices and Dimensions

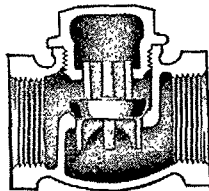
Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1212, Horizontal	Each	1.10	1.10	1.20	1.30	1.90	2.60	3.60	5.00	7.50
Extra disc holder, disc, and nut, complete	Each	.40	.40	.55	.80	1.10	1.40	1.75	2.25	3.00
End to end	Inches	1 13/16	1 13/16	2	2 3/8	2 3/4	3 5/16	3 3/4	4 1/4	4 7/8
Center to top	Inches	1 1/8	1 1/8	1 1/4	1 3/8	1 5/8	1 3/4	2	2 1/4	2 1/2

These valves combine a wide range of utility with moderate cost. Their composition disc makes them suitable for almost any low pressure installation.

furnished with a No. 8 Disc, suitable for hot or cold water, or domestic gas service. When ordered for steam, they will be furnished with a No. 7 Disc.

Discs: Unless otherwise ordered, the valves are

For description and dimensions of discs, see page 178.

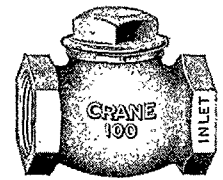


Cross Section
No. 20 B, Horizontal

Brass Disc Valves

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F. — 125 pounds cold oil or gas

The 3/8-inch size is made with a ball disc.



No. 20 B, Horizontal
Screwed

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 20 B, Horizontal	Each	.80	1.00	1.25	1.50	1.90	2.70	4.00
End to end	Inches	1 11/16	2	2 1/2	2 7/8	3 7/16	3 3/8	4 3/4
Center to top	Inches	1 1/8	1 1/4	1 1/2	1 11/16	2	2 1/4	2 5/8

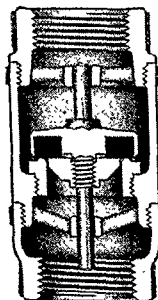
Brass Check and Foot Valves for Gasoline

WORKING PRESSURE — 15 pounds gasoline

Air Tested — Patented

List Prices, Each, and Dimensions, in Inches

Size	1 ¹ / ₄	1 ¹ / ₂	2
No. 43, Vertical Check Valves	7.50	9.75	14.00
No. 47, Foot Valve with Strainer	7.75	10.25	15.00
End to end	No. 43	4 ³ / ₄	5 ¹ / ₄
	No. 47	5 ¹ / ₁₆	5 ¹¹ / ₁₆
Size that valves will pass through	Pipe tap opening	2 ¹ / ₂	3
	Standard pipe	3	3 ¹ / ₂



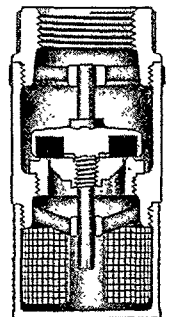
Cross Section
No. 43



No. 43
Vertical
Check
Screwed



No. 47
Foot Valve
With Strainer
Screwed



Cross Section
No. 47

Service recommendations: These are rugged, superior quality valves, ideal for gasoline service. They are recommended for 15 pounds pressure, for use in accessible locations only, as on overhead tanks; they should not be used where inaccessible, as where buried underground.

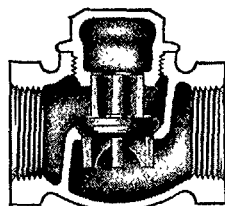
Construction and materials: The body, the disc holder, and the wire screen on the Foot Valves are made of brass. The disc holder is top and bottom

guided, assuring square seating. The renewable body seat ring is made of a special alloy metal, especially suitable for gasoline.

Disc: The valves have a Crane No. 6 Composition Disc. Completely resistant to gasoline, this disc, combined with the special alloy seat, makes an ideal seating surface; see page 178 for description.

Test: Each valve body is tested on 80 pounds air; the seat is tested under one foot head of kerosene.

Standard Brass Check Valves Brass Disc



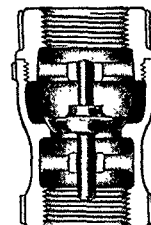
No. 20, Horizontal
Screwed



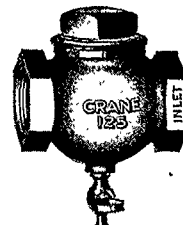
No. 26, Angle
Screwed

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil,
or gas, non-shock

*Sizes 3/8-inch and smaller
have a ball disc.*



No. 24, Vertical
Screwed



No. 28, Horizontal
Screwed
with Drip Cock

List Prices

Size	Inches:	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 20, Horizontal	Each	1.60	1.60	1.75	2.16	2.75	3.20	4.50	6.30	9.50	18.00	25.00
No. 24, Vertical	Each	1.80	1.80	1.90	2.40	3.00	3.60	5.00	7.00	10.60	20.00	27.50
No. 26, Angle	Each	1.80	1.80	1.90	2.40	3.00	3.60	5.00	7.00	10.60	20.00	27.50
No. 28, Horizontal, with Drip Cock	Each				3.60	4.40	5.30	6.60				

Service recommendations: These valves are recommended for general service on steam, water, oil, or gas lines.

Construction: The valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned, to withstand oper-

ating strains and expansion and contraction of the pipe.

Installation: The No. 26 Angle Check Valves and the No. 24 Vertical Check Valves are designed to operate on upward flow only and should always be installed with the inlet end down.

Dimensions, in Inches

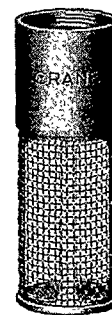
Size		1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 20	End to end	1 7/16	1 5/8	1 7/8	2 1/4	2 11/16	3 3/16	3 11/16	4 1/4	5 1/8	6 1/16	7 1/16
	Center to top	1 5/16	1 1/16	1 3/16	1 3/8	1 5/8	1 7/8	2 3/16	2 3/8	2 13/16	3 5/16	3 3/4
No. 26	Center to end	3/4	1 3/16	1 5/16	1 1/8	1 3/8	1 5/8	1 13/16	2 1/16	2 1/2	3 1/16	3 5/8
	Center to top	1 5/16	1	1 3/16	1 5/16	1 9/16	1 13/16	2 1/16	2 5/16	2 3/4	3 1/4	3 3/4
No. 24	End to end	1 13/16	1 13/16	1 3/4	2 5/16	2 3/4	3 7/16	3 13/16	4 1/8	4 11/16	5 3/4	6 5/16
	Largest diameter	1 1/8	1 1/8	1 3/8	1 1/2	1 3/4	2 1/8	2 9/16	2 7/8	3 5/8	4 7/16	5 1/4
No. 28	End to end				2 5/8	3 1/8	3 9/16	3 7/8				
	Center to top				1 11/16	2	2 1/16	2 1/4				



Cross Section
No. 33 1/2

Standard Brass Foot Valves with Strainer

WORKING PRESSURE
200 pounds cold water, non-shock



No. 33 1/2
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 33 1/2, Screwed	Each	1.40	1.55	1.90	2.50	3.50	5.00	10.00	15.00
End to end	Inches	2 1/16	2 5/8	3 15/16	5	6 1/4	7 1/16	9	10 11/16
Size of pipe that valve will pass through	Inches	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4

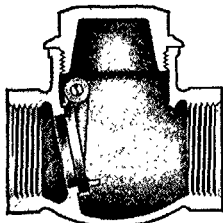
Service recommendations: These valves are recommended for use on water suction lines.

Construction: The valves are designed to slip

through standard wrought pipe, two pipe sizes larger than the nominal valve size.

The strainer is made of brass wire screen.

Standard Brass Swing Check Valves

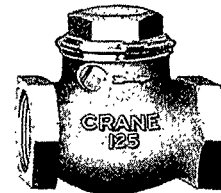


Cross Section
No. 34, Brass Disc

Brass Disc Valves

WORKING PRESSURES
125 pounds steam
200 pounds cold water, non-shock

These valves may be used either in a horizontal position, or in a vertical position for upward flow.



No. 34, Screwed
With Brass Disc

List Prices and Dimensions

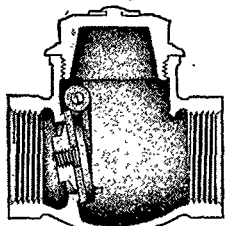
Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 34, Brass Disc	Each	Use No. 35	4.50	4.80	5.40	5.60	7.30	9.50	13.50	30.00	45.50
End to end	Inches	Valves.	1 7/8	2 1/4	2 11/16	3 3/16	3 11/16	4 1/4	5 1/8	6 1/16	7 3/8
Center to top	Inches	See p. 57.	1 3/8	1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4	3 7/8	4 1/8

Service recommendations: These valves are recommended for service on steam and water lines.

Construction: The valves are heavier and more rugged than is usual with "Standard" valves. All parts are liberally proportioned to withstand normal

operating strains. The disc in sizes 3/8 to 2-inch is integral with the hinge as shown in the cross section.

In the larger sizes, the disc swivels on the hinge. All sizes have a disc stop, preventing the disc from sticking in the open position.

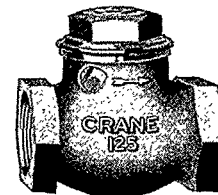


Cross Section
No. 34 1/2, Leather Disc

Leather Disc Valves

WORKING PRESSURE
200 pounds cold water, non-shock

These valves may be used either in a horizontal position, or in a vertical position for upward flow.



No. 34 1/2, Screwed
With Leather Disc

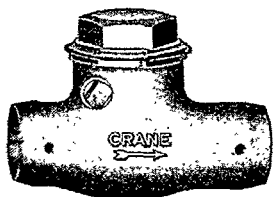
List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 34 1/2, Leather Disc	Each	5.75	6.30	6.90	7.20	9.30	12.00	16.50
End to end	Inches	1 7/8	2 1/4	2 11/16	3 3/16	3 11/16	4 1/4	5 1/8
Center to top	Inches	1 3/8	1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4

Service recommendations: The No. 34 1/2 Leather Disc Valves are especially recommended for service on cold water lines.

Construction: Except for the leather disc construction, the valves are identical with the No. 34 Brass Disc Valves shown above.

Brass Solder-Joint Swing Check Valves



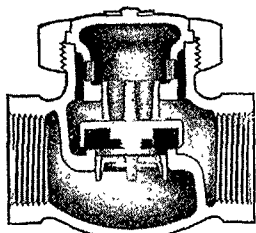
No. 1303, Swing Check

No. 1303 Brass Solder-Joint Swing Check Valves have solder-joint end connections for use with copper tubing.

The complete Crane Solder-Joint line includes valves, fittings, bends, and accessories for domestic and industrial installations; see the Solder-Joint Valve and Fitting section, pages 499 to 512.

150-Pound Brass Check Valves

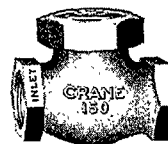
Composition Disc Valves



Cross Section
No. 27
Horizontal

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

FEATURES
Union Cap, 2-inch and smaller
Bolted Cap, 2½ and 3-inch
Composition Disc



No. 27
Horizontal
Screwed



No. 27
Angle
Screwed

When ordering, specify whether horizontal or angle valves are wanted.

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3
No. 27, Horizontal or Angle	Each	2.60	2.90	3.20	4.20	5.80	8.00	11.00	16.00	30.00	46.00
Extra disc holder, disc, and nut, complete	Each	.50	.65	.95	1.20	1.45	1.75	2.40	3.50	6.80	10.75
Dimensions, in Inches	End to end, Horizontal	2	2 ⁵ / ₁₆	2 ¹¹ / ₁₆	3 ³ / ₁₆	3 ³ / ₄	4 ¹ / ₄	4 ³ / ₄	5 ³ / ₄	6 ³ / ₄	8
	Center to end, Angle	1 ⁵ / ₁₆	1 ¹ / ₁₆	1 ¹ / ₄	1 ⁷ / ₁₆	1 ¹¹ / ₁₆	2	2 ³ / ₁₆	2 ¹¹ / ₁₆	3 ¹ / ₄	3 ¹³ / ₁₆
	Center to top	Horizontal		1 ³ / ₈	1 ¹ / ₂	1 ³ / ₄	2	2 ¹ / ₄	2 ⁵ / ₈	3	3 ¹ / ₂
		Angle		1 ¹ / ₄	1 ³ / ₈	1 ⁵ / ₈	1 ⁷ / ₈	2 ¹ / ₈	2 ¹ / ₂	2 ³ / ₄	3 ¹ / ₄

For list prices of Composition Discs, see page 178.

Service recommendations: These valves are recommended for a wide range of service, such as for steam, hot water, cold water, oil, air, or gas. They are especially suited for use where discs must be renewed easily and quickly.

Rugged construction: All parts are strong and rugged, assuring a high factor of safety.

Cap joint: Sizes 2-inch and smaller have a union cap as shown on the illustrations at the top of the page; 2½ and 3-inch valves have a compact bolted cap as illustrated at the right.



Both types provide a strong, tight joint, and can be easily dismantled for cleaning or for replacement of disc.

Discs: Unless otherwise ordered, these valves are furnished with a No. 1 Steam Disc, suitable for steam.

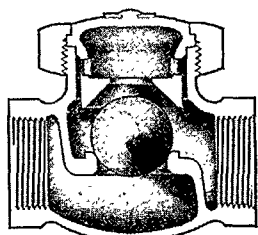
When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water or air, they are furnished with a No. 3 Cold Water disc.

For description and dimensions of discs, see page 178.

A metal plate, secured to the cap, identifies the type of disc.

Metal Ball Disc Valves

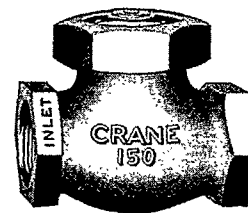


Cross Section
No. 31
Horizontal

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	½	¾	1	1¼
No. 31, Horizontal	Each	3.30	4.50	6.00	9.00
End to end	Inches	2 ¹¹ / ₁₆	3 ³ / ₁₆	3 ³ / ₄	4 ¹ / ₄
Center to top	Inches	1 ¹¹ / ₁₆	1 ¹⁵ / ₁₆	2 ¹ / ₄	2 ⁹ / ₁₆



No. 31
Horizontal
Screwed

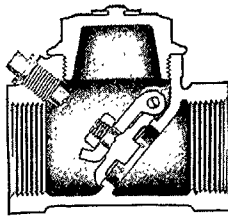
Service recommendations: These valves are recommended for steam, water, oil, or gas lines.

Smaller sizes: When sizes smaller than ½-inch are required, the No. 20 Horizontal Check Valves shown

on page 54 are recommended; they have a ball disc.

Valves with drip cock: These valves can be furnished with a drip cock, similar to that on the No. 28 Check Valve shown on page 54, at an extra price.

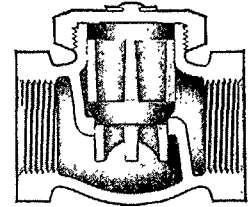
200-Pound Brass Check Valves Regrinding



Cross Section
No. 35, Swing

WORKING PRESSURES
 Screwed valves—200 pounds steam, 500° F.
 400 pounds cold water, oil, or gas, non-shock
 Flanged valves—150 pounds steam, 500° F.
 225 pounds cold water, oil, or gas, non-shock

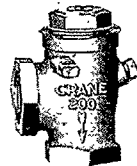
TEST PRESSURES
 Screwed valves—600 pounds hydrostatic
 Flanged valves—450 pounds hydrostatic



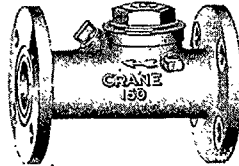
Cross Section
No. 72, Horizontal



No. 35, Swing
Screwed



No. 37, Swing
Angle, Screwed



No. 35 1/2, Swing
Flanged



No. 72, Horizontal
Screwed



No. 72, Angle
Screwed

*Horizontal Swing Check Valves may also be used
in a vertical position for upward flow.*

*When ordering, specify whether horizontal
or angle valves are wanted.*

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 35, Swing, Screwed		6.25	6.25	6.60	7.50	8.00	11.00	14.00	20.00	38.00	51.00
No. 35 1/2, Swing, Flanged, F. D. & S. F.					24.00	25.00	34.00	42.00	70.00	100.00	123.00
No. 37, Swing, Angle, Screwed				6.60	7.50	8.00	11.00	14.00	20.00		
No. 72, Horizontal or Angle, Screwed		2.00	2.30	2.80	4.00	5.50	7.20	10.00	16.00	29.00	41.00

Service recommendations: These valves are recommended for severe service on steam, water, oil, or gas lines. The No. 72 Valves were formerly known as "Navy" Pattern.

Materials: The bodies are made of Crane Special Brass, a high grade steam metal. The hinge pin in Swing Check Valves is made of Exelloy.

Regrinding: All check valves shown on this page may be reground without removing the bodies from the line. By removing the stop plug on the swing check valves, a screw driver can be engaged with the

slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

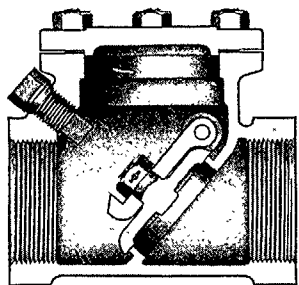
Dimensions, in Inches

Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 35, Swing	End to end	2	2 3/16	2 1/2	2 3/4	3 1/4	3 13/16	4 1/4	5 5/16	6	7
	Center to top	1 5/16	1 5/16	1 7/16	1 11/16	2	2 3/8	2 11/16	3 3/16	3 3/4	4 5/16
No. 35 1/2, Swing	Face to face				4 3/8	5	5 5/8	6 1/8	7 3/8	8 1/2	9 1/8
	Center to top				1 11/16	2	2 3/8	2 11/16	3 3/16	3 3/4	4 5/16
No. 37, Angle, Swing	Center to end			1 1/8	1 3/8	1 5/8	1 7/8	2 1/8	2 5/8		
	Center to top			1 9/16	1 13/16	2 3/16	2 1/2	2 7/8	3 7/16		
No. 72, Horizontal or Angle	End to end, Horizontal	1 11/16	1 15/16	2 1/4	2 3/4	3 5/16	3 7/8	4 1/2	5 1/4	6 5/16	7 1/4
	Center to end, Angle	1 3/16	1	1 3/16	1 3/8	1 11/16	1 5/8	2 1/4	2 5/8	3 3/16	3 13/16
	Center to top, Horizontal	1 5/16	1 1/8	1 3/16	1 7/16	1 3/4	2	2 1/4	3 5/16	3 3/4	4 5/16
	Center to top, Angle	1 5/16	1 1/8	1 3/16	1 7/16	2 1/8	2 1/16	2 3/4	3 5/16	3 3/4	4 3/8
Flange dimensions	Diameter of flanges				3 7/8	4 1/4	4 5/8	5	6	7	7 1/2
	Thickness of flanges				1 1/32	3/8	13/32	7/16	1/2	9/16	5/8

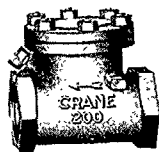
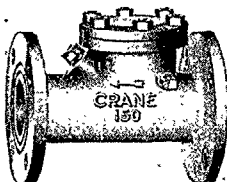
Templates for drilling . . . page 550

Valves for Marine Service . . . page 464

200-Pound Brass Check Valves Bolted Cap



Cross Section, No. 4032, Swing

No. 4032, Screwed
SwingNo. 4033, Flanged
Swing

WORKING PRESSURES

Screwed Valves

200 pounds steam, 500° F.

400 pounds cold water, oil, or gas, non-shock

Flanged Valves

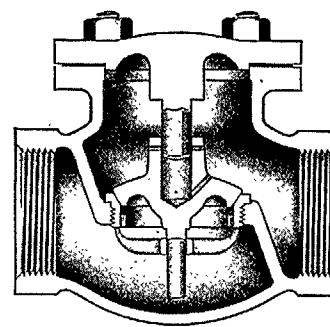
150 pounds steam, 500° F.

225 pounds cold water, oil, or gas, non-shock

TEST PRESSURES

Screwed Valves — 600 pounds hydrostatic

Flanged Valves — 500 pounds hydrostatic



Cross Section

No. 4062, Screwed
Horizontal or Angle
(Horizontal illustrated)No. 4063, Flanged
Horizontal or Angle
(Not illustrated)When ordering, specify
whether horizontal or
angle valves are wanted.

*The No. 4032 and No. 4033
Swing Check Valves may
also be used in a vertical
position for upward flow.*

List Prices, Each

Size	Inches	1½	2	2½	3	3½	4	5	6
No. 4032, Swing, Screwed			54.00	68.00	84.00				
No. 4033, Swing, Flanged, F.D. & S.F.			76.00	94.00	124.00	194.00	234.00	290.00	400.00
No. 4062, Horizontal or Angle, Screwed		Prices on application							
No. 4063, Horizontal or Angle, Flanged, F.D. & S.F.		Prices on application							

Service recommendations: The valves shown on this page are high quality bolted cap check valves. They are recommended for use on large pipe lines where brass valves are wanted.

Strong and rugged, the valves are liberally proportioned to withstand severe operating strains; their bolted cap construction makes an exceptionally tight, strong, and serviceable joint.

No. 4032 and No. 4033: The No. 4032 and No. 4033 Swing Check Valves have a body, cap, and disc made of Crane Special Brass, a high grade steam metal. Sizes 4-inch and smaller have a separate disc and hinge, as illustrated; larger sizes have a one-piece disc and hinge (not illustrated).

Sizes 4-inch and smaller can be reground without removing the body from the line. By removing the

stop plug, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

No. 4062 and No. 4063: The No. 4062 and No. 4063 Horizontal and Angle Check Valves have a Crane Special Brass body, cap, and disc. The body seating ring is Crane Hard Metal, a strong, hard, copper-tin alloy having excellent resistance to wear.

Flanged valves: End flanges conform to the MSS 150-Lb. SP Bronze Flange Standard (No. SP-2-1937). They are plain-faced, with two V-shaped concentric grooves between the port and bolt holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Dimensions, in Inches

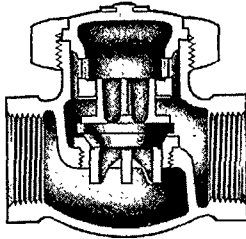
Size		1½	2	2½	3	3½	4	5	6
No. 4032, Screwed or No. 4033, Flanged	End to end, No. 4032		5¾	6¾	7¼				
	Face to face, No. 4033		7¾	8½	9½	10¼	11½	12⅞	14¾
	Center to top		3¾	4¾	5	6	6½	7¼	8¼
No. 4062, Screwed or No. 4063, Flanged	End to end, No. 4062, Horizontal	5⅝	6	7¼	8¼				
	Center to end, No. 4062, Angle	2⅞	3	3⅝	4⅝				
	Face to face, No. 4063, Horizontal	5⅝	6⅝	8	9⅝	10¾	11	12¼	14
	Center to face, No. 4063, Angle	3⅝	3¾	4¼	4⅝	5¼	5½	6¼	7
	Center to top								
	Horizontal	3¾	3⅝	4⅝	5	5⅝	5¾	6¾	7¾
	Angle	2⅝	2⅞	3⅝	4	4⅝	4⅝	5¼	5¾
Flange dimensions	Diameter of flanges	5	6	7	7½	8½	9	10	11
	Thickness of flanges	7/16	1/2	9/16	5/8	11/16	11/16	3/4	13/16

Templates for drilling . . . page 550

Valves for Marine Service . . . page 464

250-Pound Brass Check Valves

Crane Nickel Alloy Disc Valves

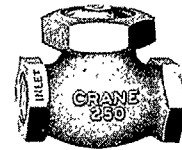


Cross Section
No. 218, Horizontal

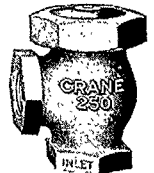
WORKING PRESSURES
250 pounds steam. 500° F.
500 pounds cold water, oil, or gas, non-shock

TEST PRESSURE — 750 pounds hydrostatic

FEATURES
Crane Nickel Alloy Disc and Seat
Union Cap



No. 218
Horizontal
Screwed



No. 219
Angle
Screwed

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 218, Horizontal, or No. 219, Angle	Each	3.80	4.20	4.80	6.50	7.50	11.00	14.00	23.00
End to end, Horizontal	Inches	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4
Center to end, Angle	Inches	1 5/16	1 1/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16
Center to top, Horizontal or Angle	Inches	1 3/8	1 1/2	1 3/4	2	2 1/4	2 5/8	3	3 1/2

Service recommendations: No. 218 and No. 219 Brass Check Valves are recommended where operating conditions require a high quality metal disc and seat. They are suitable for severe service on steam, water, oil, or gas lines.

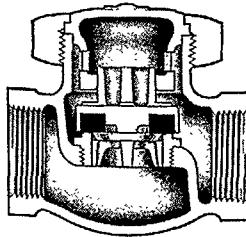
Rugged construction: All parts are unusually strong and rugged. The valves are liberally propor-

tioned and will withstand severe operating strains.

Material: The body is made of Crane Special Brass, a high grade steam composition. The disc and seat are Crane Nickel Alloy, a seating material that resists wear exceptionally well.

Union cap: The valves have a union cap and can be easily dismantled for cleaning and repairing.

Cranite Composition Disc Valves

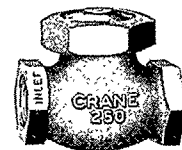


Cross Section
No. 218 C, Horizontal

WORKING PRESSURES
250 pounds steam. 500° F.
500 pounds cold water, non-shock
400 pounds cold oil or gas, non-shock

TEST PRESSURE — 650 pounds hydrostatic

FEATURES
Cranite Disc — Crane Nickel Alloy Seat
Union Cap



No. 218 C
Horizontal
Screwed



No. 219 C
Angle
Screwed

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 218 C, Horizontal, or No. 219 C, Angle	Each	3.80	4.20	4.80	6.50	7.50	11.00	14.00	23.00
Extra disc holder, disc, and nut, complete	With No. 4 Cranite Disc	Each	.65	.70	1.00	1.30	1.60	2.00	2.70
	With No. 2 or No. 3 Disc	Each	.50	.65	.95	1.20	1.45	1.75	2.40
									3.50

For list prices of Composition Discs, see page 178.

Service recommendations: The No. 218 C and No. 219 C Valves are recommended for services where discs must be frequently renewed.

Construction and dimensions: Except for the disc and seat, the valves are the same as the Nos. 218 and 219 shown above. End to end, center to end, and center to top dimensions are alike.

Discs: Unless otherwise ordered, No. 218 C and

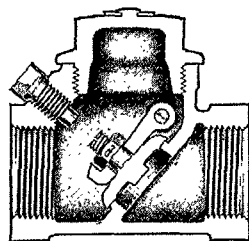
No. 219 C Valves are furnished with a No. 4 Cranite Disc, suitable for high-pressure steam.

When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water or air, they are furnished with a No. 3 Cold Water Disc.

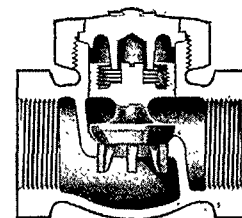
For description and dimensions of discs, see page 178.

300-Pound Brass Check Valves Regrinding



Cross Section
No. 74 E, Swing

WORKING PRESSURES
300 pounds steam, 550° F.
Screwed valves — 600 pounds cold water, oil,
or gas, non-shock
Flanged valves — 500 pounds cold water, oil,
or gas, non-shock



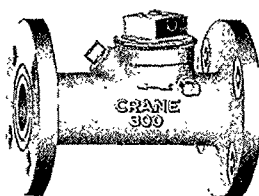
Cross Section
No. 366 E, Horizontal

TEST PRESSURES

No. 74 E and No. 75 E — 900 pounds hydrostatic
No. 366 E and No. 369 E — Air tested



No. 74 E, Swing
Screwed

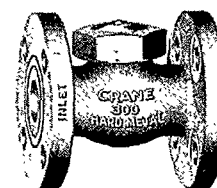


No. 75 E, Swing
Flanged

*The No. 74 E and the
No. 75 E Swing Check
Valves may also be used
in a vertical position
for upward flow.*



No. 366 E, Horizontal
Screwed



No. 369 E, Horizontal
Flanged

List Prices, Each

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 74 E, Swing, Screwed		6.80	7.00	7.70	9.00	10.00	14.00	19.00	27.00	49.00	75.00
No. 75 E, Swing, Flanged, F. D. & S. F.					20.00	26.00	36.00	54.00	75.00	110.00	140.00
No. 366 E, Horizontal, Screwed		3.00	3.40	4.20	5.50	7.20	10.00	13.50	21.00	38.00	57.00
No. 369 E, Horizontal, Flanged, F. D. & S. F.					19.50	23.00	27.00	32.50	43.00	68.00	91.00

No. 74 E and No. 75 E: The No. 74 E and No. 75 E are heavy, ruggedly constructed swing check valves, recommended for severe service on steam, water, oil, or gas lines. The body and disc are Crane Special Brass, a high grade steam metal. The hinge pin is made of Exelloy.

These valves may be reground without removing the body from the line. By removing the stop plug, a screw driver can be engaged with the disc-spud slot, making it easy to rotate the disc when regrinding.

No. 366 E and No. 369 E: These are horizontal check valves, recommended for steam, water, oil, air, or gas, and especially for service where pulsations in the line are apt to cause an ordinary check valve to hammer. The dashpot formed above the piston type disc effectively cushions the disc.

The body and disc are Crane Hard Metal, a copper-tin bronze that resists wear exceptionally well.

These valves can be reground without removing the body from the line.

When so ordered, the valves can be equipped with a spring above the disc to keep the valve normally closed when used on air or gas; prices on application.

Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Dimensions, in Inches

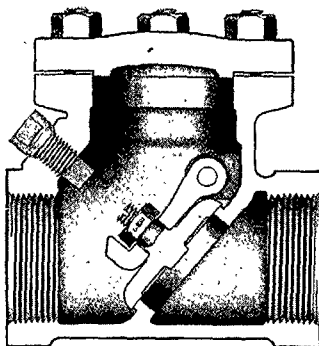
Size		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 74 E or No. 75 E	End to end, No. 74 E	2 1/4	2 1/4	2 3/4	3 1/16	3 3/8	4 1/8	4 13/16	5 13/16	6 13/16	8
	Face to face, No. 75 E				5 1/4	5 13/16	6 7/16	7 7/16	8 3/8	9 3/8	10 1/16
	Center to top	1 5/16	1 5/16	1 13/16	2 1/8	2 7/16	2 13/16	3 5/16	3 13/16	4 9/16	5 1/16
No. 366 E or No. 369 E	End to end, No. 366 E	1 13/16	2	2 1/2	2 15/16	3 1/2	4 1/16	4 5/8	5 3/4	6 7/8	8
	Face to face, No. 369 E				3 15/16	4 9/16	5	5 3/4	6 3/4	7 7/8	8 11/16
	Center to top	1	1 1/8	1 3/8	1 7/8	2	2 3/8	2 5/8	3 1/4	3 7/8	4 1/2
Flange dimensions	Diameter of flanges				4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4
	Thickness of flanges				1 7/32	1 9/32	5/8	1 1/16	3/4	1 3/16	2 9/32

Ferrosteel Piston Type Disc Check Valves . . . page 482

Templates for drilling . . . page 550

Valves for Marine Service . . . page 465

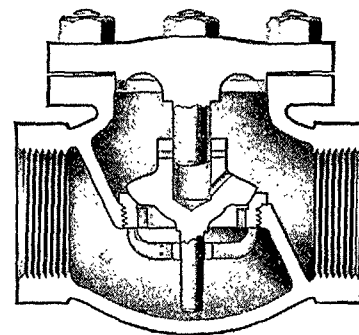
300-Pound Brass Check Valves Bolted Cap



Cross Section
No. 4234 E, Swing

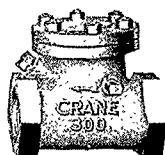
WORKING PRESSURES
 300 pounds steam, 550° F.
 Screwed valves — 600 pounds cold water, oil,
 or gas, non-shock
 Flanged valves — 500 pounds cold water, oil,
 or gas, non-shock

TEST PRESSURE
 900 pounds hydrostatic

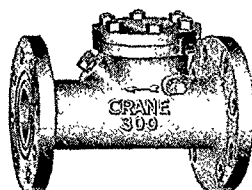


Cross Section
No. 4064 E, Horizontal

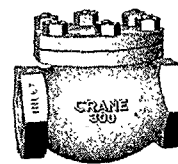
*Swing Check Valves may also be used
 in a vertical position for upward flow.*



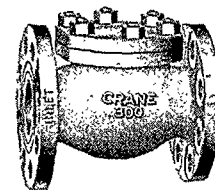
No. 4234 E, Swing
Screwed



No. 4235 E, Swing
Flanged



No. 4064 E, Horizontal
Screwed



No. 4065 E, Horizontal
Flanged

List Prices, Each

Size	Inches	1½	2	2½	3
No. 4234 E, Swing, Screwed			30.00	40.00	55.00
No. 4235 E, Swing, Flanged, F. D. & S. F.			40.00	55.00	75.00
No. 4064 E, Horizontal, Screwed		20.00	30.00	40.00	55.00
No. 4065 E, Horizontal, Flanged, F. D. & S. F.		30.00	40.00	55.00	75.00

Service recommendations: These are exceptionally rugged check valves. They have heavy metal sections and are liberally reinforced to withstand severe operating conditions. Their bolted cap provides an unusually strong and tight joint. The valves are ideal for hard service.

Materials: The No. 4234 E and No. 4235 E Swing Check Valves have a body, disc, and cap made of Crane Special Brass, a high grade steam metal.

The No. 4064 E and No. 4065 E Horizontal Check Valves have a Crane Special Brass body and cap; the disc and body seat ring are Crane Hard Metal, a strong, hard, copper-tin bronze. The body seat ring is renewable.

Regrinding: These valves can be reground without removing the bodies from the line. By removing the stop plug on the swing check valves, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Flanged valves: End flanges conform to the MSS 300-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 300-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Larger sizes: Larger sizes can be made to order.

Dimensions, in Inches

Size		1½	2	2½	3
No. 4234 E and No. 4235 E	End to end, No. 4234 E		5 13/16	6 13/16	8
	Face to face, No. 4235 E		8 9/16	9 7/8	10 7/8
No. 4064 E and No. 4065 E	Center to top, No. 4234 E or No. 4235 E		3 7/8	4 3/4	5 1/2
	End to end, No. 4064 E	5 1/2	6 1/4	7 1/2	8 1/2
No. 4064 E and No. 4065 E	Face to face, No. 4065 E	7	8	9	10 5/16
	Center to top, No. 4064 E or No. 4065 E	3 1/2	3 7/8	4 7/8	5 1/2
Flange dimensions	Diameter of flanges	6 1/8	6 1/2	7 1/2	8 1/4
	Thickness of flanges	1 1/16	3/4	13/16	29/32

Templates for drilling . . . page 550

Valves for Marine Service . . . page 465

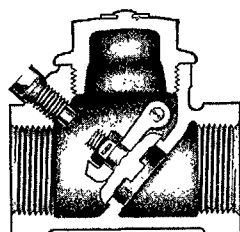
350-Pound Brass Check Valves Regrinding

WORKING PRESSURES

350 pounds steam, 550° F.
1000 pounds cold water, oil, or gas, non-shock

TEST PRESSURE

1200 pounds hydrostatic

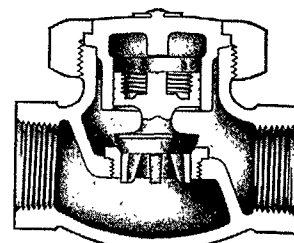


Cross Section
No. 78 E, Swing



No. 78 E, Swing
Screwed

*The No. 78 E Swing Check Valves
may also be used in a
vertical position for upward flow.*



*Cross Section
No. 63 E, Horizontal



*No. 63 E, Horizontal
Screwed

**2-inch No. 63 E Horizontal Check Valves
are made with a bolted cap.
(Not illustrated)*

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 78 E, Swing Check, Screwed	Each	8.00	10.00	13.00	17.00	22.00	33.00
No. 63 E, Horizontal Check, Screwed	Each	9.00	11.00	15.00	20.00	25.00	37.00

Service recommendations: These are unusually rugged check valves, especially designed for high-pressure steam lines such as are used on oil and gas field boilers for deep well drilling operations. They are equally well suited for high-pressure water or oil service on lines not subjected to shock, and for high-pressure gas lines.

No. 78 E: The No. 78 E are Swing Check Valves, having a Crane Hard Metal body and disc. Hard Metal is a strong copper-tin bronze that has exceptional wear resistance. The hinge pin is Exelloy.

No. 63 E: The No. 63 E are Horizontal Check Valves, having a Crane Hard Metal body and disc, and a Crane Nickel Alloy body seat ring.

The upper part of the disc is piston type, fitting snugly into the cap and forming a dashpot which

effectively cushions the movement of the disc.

The union cap construction shown on the illustrations is used on sizes 1 1/2-inch and smaller. The 2-inch size has a bolted cap (not illustrated).

Regrinding: All of the check valves shown on this page may be reground without removing the valve body from the line. By taking out the stop plug on the swing check valves, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

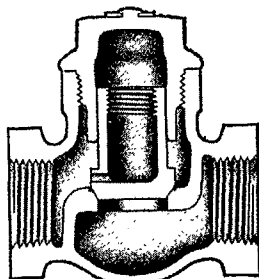
Steel valves: For higher steam pressures and temperatures or for exceptionally severe service on which many engineers prefer a material better than brass or bronze, Crane Steel Valves are recommended. See the section of this catalog devoted to Steel Check Valves, pages 327 to 336.

Dimensions, in Inches

Size		1/2	3/4	1	1 1/4	1 1/2	2
No. 78 E, Swing	End to end	2 3/4	3 1/16	3 5/8	4 1/8	4 13/16	5 13/16
	Center to top	1 13/16	2 1/8	2 7/16	2 13/16	3 5/16	3 13/16
No. 63 E, Horizontal	End to end	3 1/8	3 5/8	4 1/4	5	5 5/8	6 3/4
	Center to top	1 7/8	2 1/8	2 1/2	2 3/4	3 1/8	4 1/2

Hydraulic Brass Check Valves

1000 - Pound

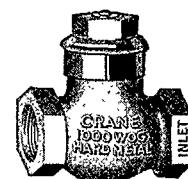


Cross Section

WORKING PRESSURE
1000 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 1200 pounds hydrostatic

List Prices and Dimensions

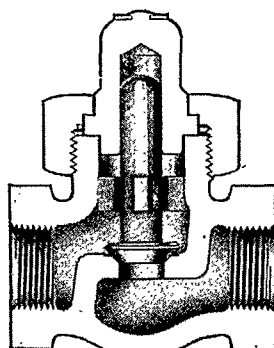
Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 259 H	Each	7.00	10.00	13.00	17.00	23.00	33.00
End to end	Inches	3	3 7/16	3 15/16	4 7/16	5 5/16	6 5/16
Center to top	Inches	2 1/8	2 3/8	2 3/4	3 1/4	3 5/8	4 1/4



No. 259 H
Horizontal
Screwed
1000-Pound

5

2000 - Pound

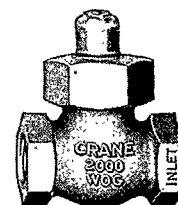


Cross Section

WORKING PRESSURE
2000 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 2200 pounds hydrostatic

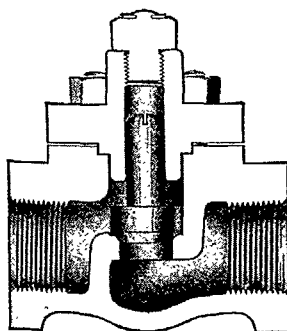
List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4
No. 234 H	Each	11.00	12.00	15.00	21.00	32.00
End to end	Inches	2 13/16	2 13/16	3 7/16	4	4 11/16
Center to top	Inches	2 5/8	2 5/8	3 1/4	3 7/8	4 7/16



No. 234 H
Horizontal
Screwed
2000-Pound

2500 - Pound

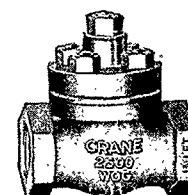


Cross Section

WORKING PRESSURE
2500 pounds cold water, oil, or gas, non-shock
TEST PRESSURE — 3000 pounds hydrostatic

List Prices and Dimensions

Size	Inches	1	1 1/4	1 1/2	2
No. 238 H	Each	36.00	45.00	55.00	80.00
End to end	Inches	4 1/2	4 15/16	5 1/2	6 3/8
Center to top	Inches	3 5/8	4 1/8	4 5/8	5 3/8



No. 238 H
Horizontal
Screwed
2500-Pound

Service recommendations: Crane Hydraulic Brass Check Valves are recommended for severe high-pressure hydraulic service on lines not subjected to shock, and for high-pressure gas lines.

Construction: The valves are exceptionally heavy and rugged. The top of the disc fits snugly in the valve cap, guiding the disc accurately and forming a dashpot that effectively cushions the action of the valve while in service.

The No. 259 H Valves have a screwed cap, the No. 234 H Valves have a union cap, and the No. 238 H have a bolted cap.

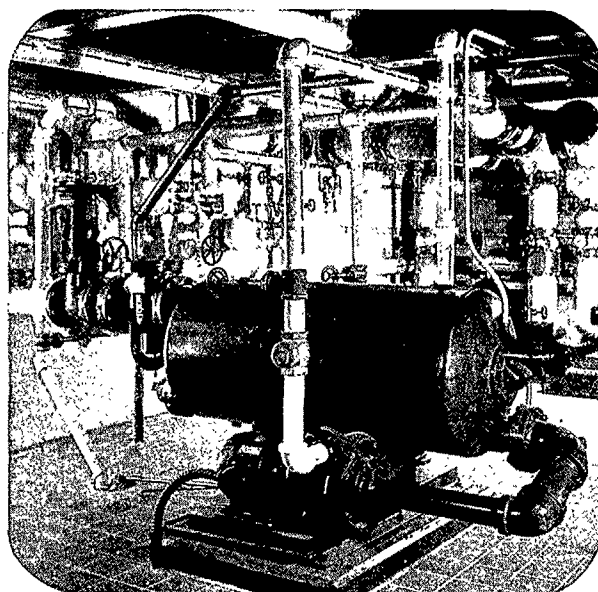
Materials: The bodies and discs of these valves are made of Crane Hard Metal, a strong, hard, copper-tin alloy having excellent resistance to wear.

Seat opening: The diameter of the seat opening in the No. 259 H Valves is the same as the nominal size of the valve. In both the No. 234 H and the No. 238 H Valves, it is slightly larger than the inside diameter of Double Extra Strong Pipe.

Steel valves: When check valves are wanted for higher pressures, for higher temperatures, or for unusually severe services, Crane Steel Valves are recommended. See pages 327 to 336.

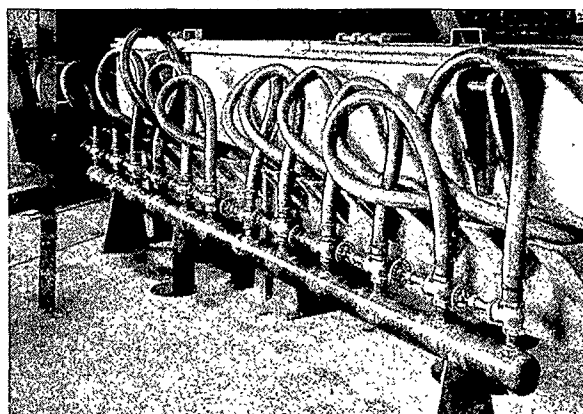
5

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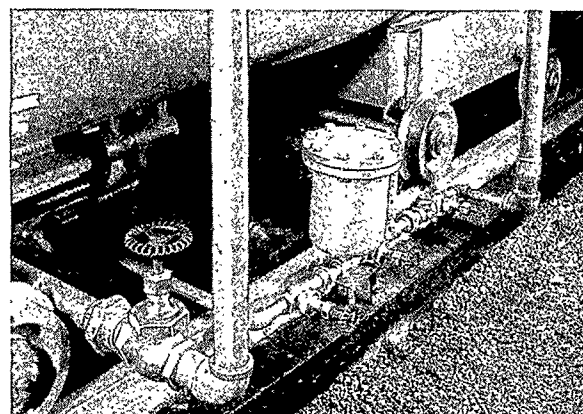


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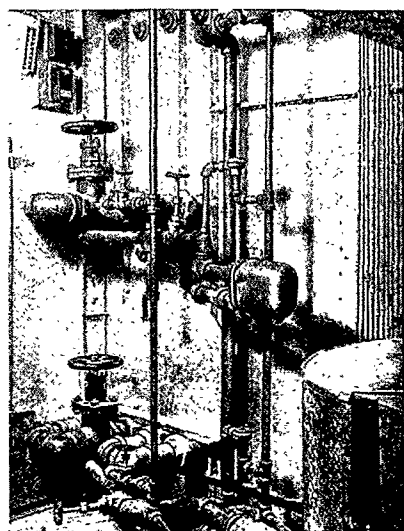
Crane brass check valves, gate and globe valves, and fittings on the service lines of an office building.



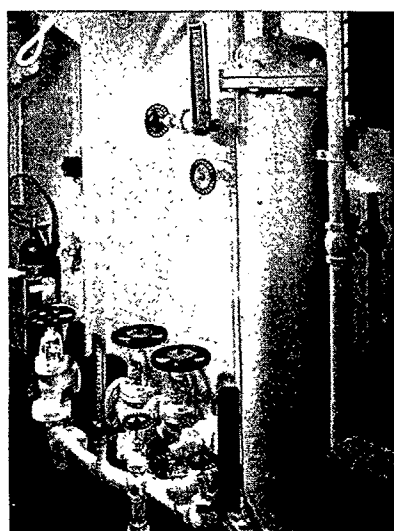
In a steel mill — these Crane brass gate valves control the water lines for descalers.



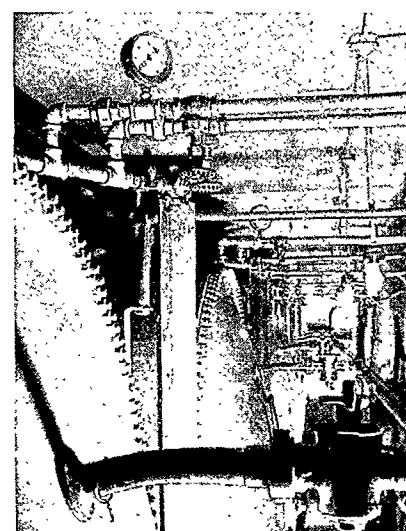
Condensation return from creosoting retorts in a wood-treating plant using Crane equipment.



Crane iron and brass gate valves, unions and fittings in air conditioning system of a glass manufacturing plant.



Typical of many marine services — Crane valves on the lubricating oil lines of a river towboat.



The complete piping requirements of breweries are fully met by dependable Crane equipment.

Brass Quick-Opening and Hose Valves

Hose and Hose Goods

Brass Quick-Opening Self-Closing Globe Valves	
125-Pound, with Composition Disc.....	page 66
200-Pound, with Composition Disc.....	page 66
125-Pound, with Brass Disc, without Stuffing Box.....	page 67
125-Pound, with Brass Disc and Stuffing Box.....	page 67
Brass Quick-Opening Cam-Action Gate Valves.....	page 68
Brass Quick-Opening Sliding-Stem Gate Valves.....	page 68
Brass Butterfly Valves.....	page 69
Brass Quick-Acting Throttle Valves.....	page 69
 Brass Hose Gate Valves, Standard and Underwriters'...	page 70
Chicago Hose Valves.....	page 71
Brass Angle Hose Valves.....	page 71
Garden Hose Valves.....	page 71
Hose Threads for Hose Valves.....	page 72
 Hose.....	page 73
Hose Couplings.....	page 73
Hose Clamps.....	page 74
Hose Nozzles and Pipes.....	page 74
Hose Fittings.....	page 75

* * * * *

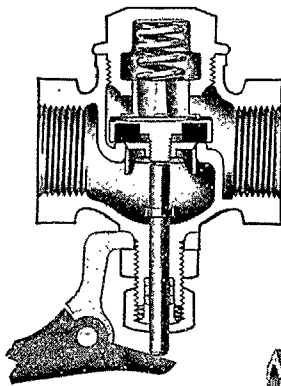
In addition to the Brass Valves indexed above, Crane Co. also manufactures an extensive line of Quick-Opening Valves made of other materials and a line of Brass Hose Valves for Marine service. These are shown in other sections of the catalog; see the pages referred to below:

Quick-Opening Clamp Gate Valves, Iron Body.....	page 99
Quick-Opening Standard Iron Body Wedge Gate Valves.....	page 104
Iron Body Butterfly Valves.....	page 148
Iron Body Quick-Acting Throttle Valves.....	page 148
Corrosion-Resistant Alloy Quick-Opening Gate Valves.....	page 451
 Brass Hose Gate Valves for Marine Service.....	page 467

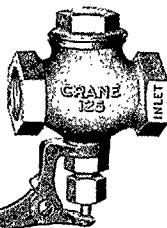
Brass Globe Valves

Quick-Opening—Self-Closing

125-Pound



Cross Section
No. 12 1/2



No. 12 1/2, Globe, Screwed

WORKING PRESSURES

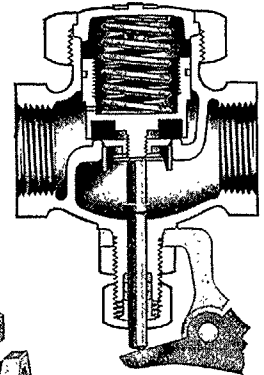
No. 12 1/2 Valves
125 pounds air, gas, or steam
No. 7 1/2 Valves
200 pounds hot water, 200° F.
200 pounds cold water, light oils, or gasoline, 100° F.

SERVICE RECOMMENDATIONS

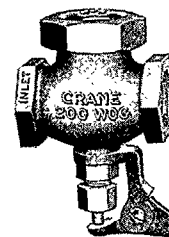
No. 12 1/2 Valves are recommended for air or gas at atmospheric temperature and for saturated steam. They are ideally suited for cooking vats, soot blowers, can and bottle sterilizers, and similar service.

No. 7 1/2 Valves are recommended for hot or cold water, and for light oils or gasoline at atmospheric temperature. They are widely used on gasoline and oil loading racks, public showers, etc. Valves for heavy oil service can be furnished when desired; prices on application.

200-Pound



Cross Section
No. 7 1/2



No. 7 1/2, Globe, Screwed

List Prices, Each

Orders for Nos. 12 1/2 or 7 1/2 Valves should specify service conditions.

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 12 1/2		6.00	7.00	8.00	10.00	13.00	16.00	24.00			
No. 7 1/2				8.00	10.00	13.00	16.00	24.00	34.00	50.00	90.00

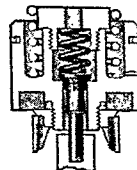
List prices of composition discs are shown on page 178.

Operation: The valves are easily operated. A short pull on the lever lifts the disc off its seat, opening the valve. When the lever is released, the spring above the disc automatically closes the valve.

Materials and construction: The body, stem, and disc holder of these valves are brass. The lever is malleable iron, and can be turned to any desired position by loosening the locknut which holds the bracket to the valve body. The spring is stainless steel.

The valves have a stuffing box filled with high grade packing. It is equipped with a gland.

No. 7 1/2 Valves: On No. 7 1/2 Valves the top of the disc holder is a piston fitting into the upper part of the body. It forms a dashpot that effectively cushions the disc when closing, and prevents destructive shock. Sizes 1 1/2-inch and larger have a pilot valve in the main disc, as illustrated at the right.



When the valve is operated, the pilot valve opens first, equalizing the pressure around the main disc, thereby facilitating easy operation.

Sizes 2-inch and smaller have a union cap, as shown above; larger sizes have a bolted cap (not illustrated).

Discs: Unless otherwise ordered, No. 12 1/2 Valves are furnished with a No. 3 Disc suitable for air or gas service. Valves for steam service will be furnished with a No. 1 Disc.

No. 7 1/2 Valves are regularly furnished with a No. 2 Disc suitable for hot water, oil, or gasoline. When ordered for cold water service, they will be furnished with a No. 3 Disc.

For description and dimensions of discs, see page 178.

Installation: These valves always should be installed with the pressure above the disc.

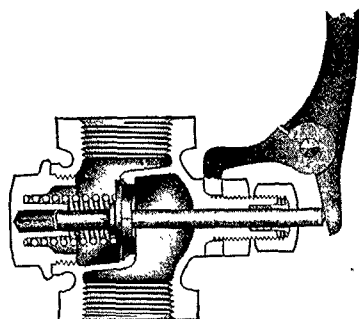
Flanged valves: No. 7 1/2 Valves can be made to order with flanged end bodies; prices on application.

Dimensions, in Inches

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 12 1/2	End to end of body	2 1/8	2 3/8	2 3/4	3 1/4	3 3/4	4 1/4	5			
	Center to top of cap	1 7/16	1 5/8	1 11/16	2	2 3/16	2 1/2	2 15/16			
	Center of port to bottom of lever, open	3 1/2	3 1/2	5	5 1/2	6 3/4	7 1/4	8			
	Center of stem to end of lever, closed	3 1/2	3 1/2	4 1/4	5 1/2	6 3/4	8 1/2	8 3/4			
No. 7 1/2	End to end of body			2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
	Center to top of cap			1 3/4	2	2 1/4	2 5/8	3	3 1/2	4 1/2	4 7/8
	Center of port to bottom of lever, open			5 3/4	7	8 1/4	9 3/4	10 3/4	14 1/2	16 3/4	18
	Center of stem to end of lever, closed			4 1/4	5 1/2	6 3/4	8 1/2	8 3/4	10	12 1/2	13

125-Pound Brass Globe Valves

Quick-Opening — Self-Closing

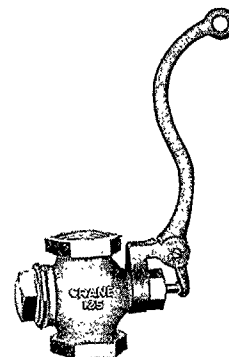


Cross Section
No. 608 1/2, Globe
Screwed
With Stuffing Box

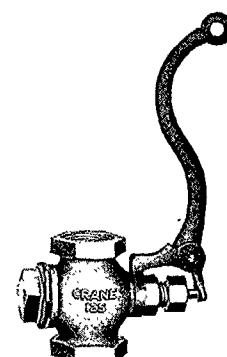
WORKING PRESSURE
125 pounds steam

INSTALLATION
These valves always
should be installed
with the pressure
above the disc.

The valve bodies are
marked to indicate
the inlet end.



No. 608, Globe
Screwed
Without Stuffing Box



No. 608 1/2, Globe
Screwed
With Stuffing Box

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 608, Globe (without stuffing box)	Each	3.60	4.40	5.30	6.20	9.00	10.50	16.00	32.00
No. 608 1/2, Globe (with stuffing box)	Each	3.60	4.40	5.30	6.20	9.00	10.50	16.00	32.00
Dimensions, in Inches	End to end of body	1 7/8	2 3/16	2 5/8	3 1/8	3 5/8	4 1/16	4 5/16	6
	Center of port to cap	1 1/4	1 3/8	1 11/16	2	2 1/8	2 5/8	2 7/8	3 3/8
	Center of port to end of lever, open	No. 608 3 1/4	4 1/2	4 1/2	5 3/4	7 1/4	7 3/4	9 1/2	11 3/4
		No. 608 1/2 3 3/4	4 3/4	6	7	7 1/2	8 1/4	12	13
	Center of stem to end of lever, closed	No. 608 3 1/2	4 1/4	5 3/4	6 3/4	8 3/4	8 3/4	10 3/4	12 1/2
		No. 608 1/2 3 1/2	4	5 1/4	6 1/2	8 3/4	8 3/4	10 1/2	12 1/2

Service recommendations: The No. 608 and No. 608 1/2 Brass Globe Valves are recommended for general industrial service on steam lines only. They are used to control the flow of steam to small apparatus such as steam presses, laundry machinery, can and bottle sterilizers, etc.

The No. 608 1/2 valve is provided with a stuffing box around the stem, assuring ample protection against the leakage of steam. This feature makes the valve particularly suitable for use in confined spaces and on installations requiring valves that will not leak at the stem under constant service.

Both valves are frequently used in conjunction with whistles.

Materials and construction: Except for the stuffing box on the No. 608 1/2, the valves are similar in design, materials, and construction. They have a body, disc, and cap made of brass, a steel spring,

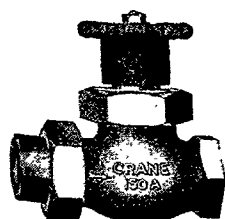
and a malleable iron lever. The lever can be turned to any desired position by loosening the locknut which holds the bracket to the valve body.

The stuffing box on the No. 608 1/2 is filled with high grade packing and is equipped with a brass gland.

Operation: The valves are easily operated. A short pull on the lever lifts the disc off its seat, opening the valve. When the lever is released, the spring above the disc automatically closes the valve.

To facilitate the operation of the larger size valves when used in combination with whistles, the pull must be at right angles to the centerline of the whistle.

Special valves: When larger sizes or valves for greater pressures are required, wheel operated, pilot-operated, or special power valves can be used. Recommendations will be made in answer to inquiries.



No. 237, Globe
Quick-Opening
Quick-Closing

**Brass Quick-Opening
Globe Valves
For Air Lines**

For description,
see page 33.

**Brass Whistles
for
Steam and Air**

For description,
see page 437.



Plain Whistle

Standard Brass Gate Valves Quick Opening

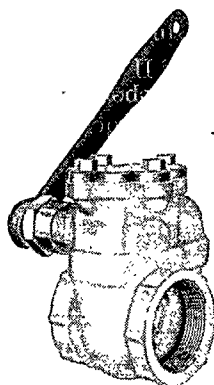
Cam Action Valves

WORKING PRESSURES

1/2 to 2-inch — 125 pounds steam
200 pounds cold water, oil,
or gas, non-shock

2 1/2 and 3-inch — 100 pounds steam
100 pounds cold water, oil,
or gas, non-shock

Patented
Air Tested

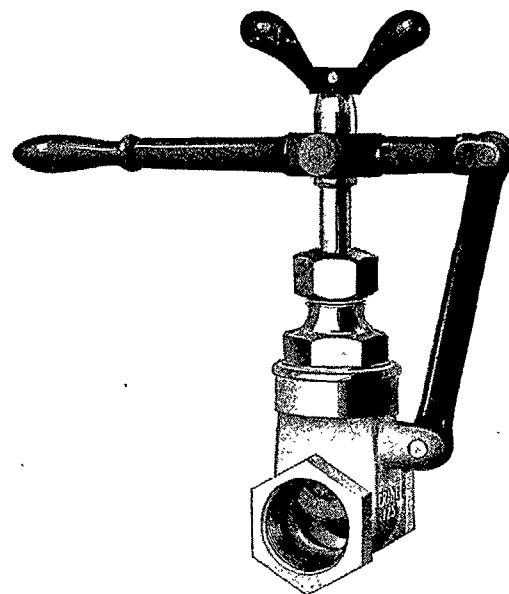


No. 432, Screwed

Sliding Stem Valves

WORKING PRESSURES

125 pounds steam
200 pounds cold water, oil, or gas, non-shock



No. 442, Screwed

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 432, Cam Action Valves	Each	8.50	9.00	10.00	12.50	17.00	24.00	40.00	57.00
No. 442, Sliding Stem Valves	Each		9.00	10.00	12.50	17.00	24.00	40.00	57.00

No. 432 Cam Action Valves: This superior line of quick opening wedge gate valves is recommended for service on steam, water, oil, or air lines.

The solid wedge disc is operated with a quick opening lever through a specially designed cam arrangement, assuring fast and positive valve action.

Sizes 1-inch and smaller have a screwed cap; the larger sizes have a bolted cap as shown in the illustration.

To insure proper seating, when closing the valves, a snappy action with plenty of force should be applied to the lever. The disc will not jam, and there is no danger of injuring parts because the valve has been designed to withstand such action.

No. 432 Gate Valves are listed by the Underwriters' Laboratories of Chicago as approved for hazardous liquid service at pressures not exceeding 50 pounds; this is the maximum pressure

prescribed by the Underwriters' Laboratories for hazardous liquid equipment.

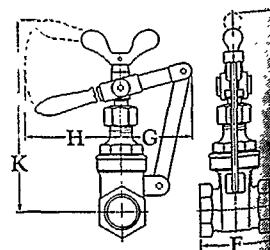
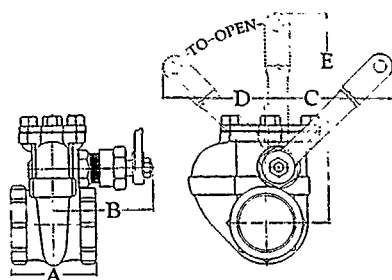
No. 442 Sliding Stem Valves: No. 442 Quick Opening Gate Valves are of the parallel seat construction. They have a sliding stem and a double disc.

They are of ample proportions, sturdily constructed, and only a short movement of the lever is required to operate the valve. The wing nut at the top of the stem permits forcing the discs to the seats after the valve has been closed, and releasing the discs before opening.

Shock: When these valves are used on liquid lines, closing a valve quickly might cause "water hammer". When severe water hammer must be eliminated by installing a suitable cushioning device in the piping. Otherwise, the shocks might damage the valves or the piping, see page 11.

Dimensions, in Inches

Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	1 7/8	2 1/8	2 1/2	2 3/4	2 7/8	3 3/8	4	4 1/4
B	2 11/16	2 7/8	3 1/8	3 1/2	3 7/8	4 1/4	4 7/8	5 3/8
C	2 1/8	3 1/8	4	5 1/2	6 3/8	7 5/8	8 3/4	10
D	3	3 1/4	3 1/2	4 5/8	5 3/8	6 3/8	7 1/2	8 1/8
E	5 9/16	6 1/4	6 3/4	8 5/8	9 13/16	12	13 7/8	15 5/16
F		2 5/8	2 13/16	3 1/4	3 7/8	4 1/8	4 5/8	5 3/8
G		2 5/8	3	3 1/2	4	4 3/8	4 5/8	5 1/4
H		4 7/8	5 3/4	7	7 3/8	8 3/8	9 1/2	10 5/8
J		7 1/8	8 5/8	10 1/8	11	13 1/4	15	16 7/8
K		7 1/2	8 1/4	9 7/8	10 3/4	13 3/8	16 1/2	17



Brass Butterfly Valves



No. 44, Screwed
Brass Body
Brass Disc
Steel Stem

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas

Crane Butterfly Valves provide easy, smooth operation in approximately one-quarter turn from the wide open to the closed position. Because the valves are not designed to close pressure-tight, they should be used only to control or regulate flow.

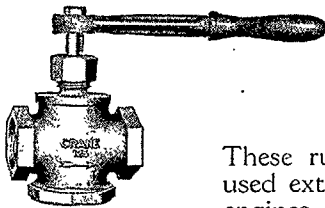
The body and disc are made of brass. The stem is steel. The valves can be equipped with a malleable iron operating lever, when so ordered, at an additional price.

For Iron Butterfly Valves, see page 148.

List Prices and Dimensions

Size	Inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
No. 44, Butterfly Valve	Each	4.20	6.00	7.70	9.00	13.50	18.50	28.00
Dimensions, in Inches	End to end	$2\frac{1}{4}$	$2\frac{9}{16}$	$2\frac{3}{4}$	$2\frac{15}{16}$	$4\frac{1}{16}$	$4\frac{3}{8}$	$5\frac{3}{16}$
	Center to top	$3\frac{1}{16}$	$3\frac{1}{4}$	$3\frac{9}{16}$	$3\frac{7}{8}$	$4\frac{7}{8}$	$5\frac{5}{16}$	$5\frac{15}{16}$
	Overall height	$4\frac{1}{16}$	$4\frac{9}{16}$	$5\frac{3}{16}$	$5\frac{9}{16}$	$6\frac{3}{4}$	$7\frac{11}{16}$	$8\frac{9}{16}$
	Diameter of stem	$1\frac{1}{32}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

Brass Quick-Acting Throttle Valves



No. 46, Screwed
All Brass with
Malleable Iron
Lever

WORKING PRESSURE
125 pounds steam

These ruggedly built throttle valves are used extensively on hoisting and traction engines. They open or close completely in one-quarter turn of the lever and have an internal stop to limit the travel of the stem. The valves are not recommended for use

where pressure-tight seating is essential.

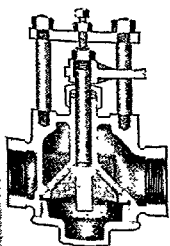
Except for the malleable iron lever, all parts are made of brass.

Iron Quick-Acting Throttle Valves are shown on page 148.

List Prices and Dimensions

Size	Inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$
No. 46, Throttle Valve	Each	13.50	15.50	19.00	27.00	34.00	47.00
Dimensions, in Inches	End to end	$2\frac{3}{4}$	$3\frac{3}{8}$	4	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$
	Center to top of stem	$3\frac{1}{2}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$5\frac{1}{8}$	$6\frac{1}{8}$	$7\frac{1}{2}$
	Center of stem to end of handle	6	6	8	10	$11\frac{1}{4}$	$12\frac{9}{16}$

Brass Chronometer Valves

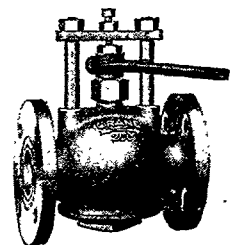


No. 4382
Screwed

Brass Chronometer Valves are designed for regulating and governing purposes on steam lines where working pressures do not exceed 250 pounds.

The valves are available in a wide range of sizes with either screwed or flanged ends. They are easy to operate. A one-eighth turn of the lever opens or closes the valve completely. An adjusting screw at the stem end varies the pressure of the disc against the seat bearing, assuring smooth operation at all times. With proper adjustment, the valves can be operated by a float.

Prices and dimensions are shown on page 476.



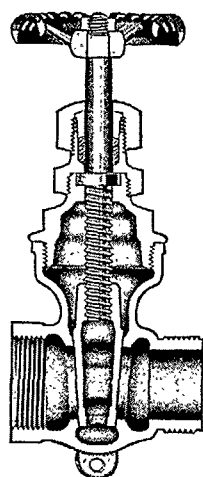
No. 4383
Flanged

Brass Hose Gate Valves

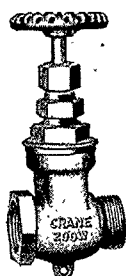
Wedge Disc—Non-Rising Stem

Standard

200 pounds
cold water working pressure

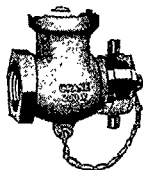


Cross Section
No. 451
Screwed



No. 451
Screwed

When so ordered, the valves shown on this page can be furnished with a brass cap and chain as illustrated below. Prices are in addition to price of valve; see the table below.



Underwriters' Pattern

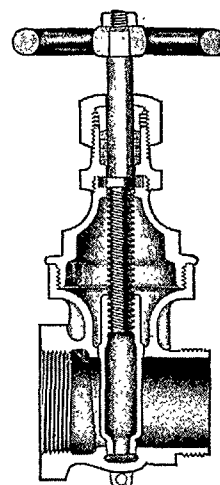
300 pounds
cold water working pressure



No. 453
Screwed



No. 453
Screwed
With Drain Cock



Cross Section
No. 453
Screwed

No. 451 Valves can be made to order with a brass wheel, and with special finishes such as rough body, nickel-plated; polished; polished and nickel-plated; and polished and chromium-plated. Prices will be furnished on application.

No. 453 Valves are furnished without drain cock unless otherwise ordered.

List Prices and Dimensions

Size			Inches	1	1¼	1½	2	2½
Rough Body, Plain (Without cap and chain)	No. 451		Each	6.70	9.40	12.50	18.00	30.00
	No. 453	Without drain cock	Each			21.60		45.60
		With drain cock	Each			24.00		48.00
Brass cap and chain for No. 451 or No. 453 Valve			Per valve	2.50	2.75	3.50	4.50	7.00
Dimensions, in Inches	No. 451	Center to female end	1⅞	1½	1⅝	1⅞	2⅞	
		Center to hose end	1⅞	1⅞	2⅞	2¼	2⅝	
		Center to top of wheel	5⅞	6½	7¼	8⅝	10	
		Diameter of wheel	2¾	3⅞	3⅝	4⅞	4¾	
	No. 453	Center to female end			1⅝		2⅝	
		Center to hose end			2¼		2½	
		Center to top of wheel			7½		11	
		Diameter of wheel			4⅞		6	

Hose threads: Unless otherwise ordered, these valves have the following thread on the male end:

- No. 451 Standard Valves
1 to 2" sizes — Chicago Standard Hose Thread
2 1/2" size — Chicago Fire Department Hose Thread

- No. 453 Underwriters' Pattern Valves
1 1/2" size — Chicago Standard Hose Thread
2 1/2" size — American (National) Standard Fire Hose Thread

When so ordered, the male end can be supplied with the following threads, without additional charge:

- No. 451 Standard Valves
All sizes — Iron Pipe Hose Thread
All sizes — California Standard Hose Thread
2 1/2" size — American (National) Standard Fire Hose Thread

- No. 453 Underwriters' Pattern Valves
Both sizes — Iron Pipe Hose Thread
Both sizes — California Standard Hose Thread
2 1/2" size — Chicago Fire Department Hose Thread

When any other hose thread is required, orders should be accompanied by a sample, preferably the male end of a hose coupling. See page 72.

Rugged construction: The Hose Gate Valves shown on this page have a non-rising stem and a wedge disc. Their deep stuffing box is fitted with a gland, and the valves are strong and ruggedly constructed. They have an American Standard Taper Pipe Thread on the female end.

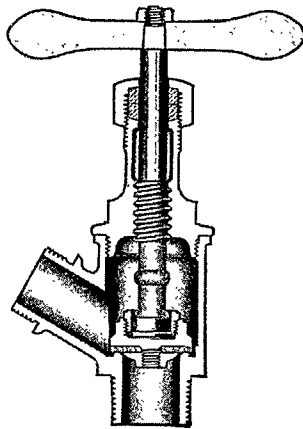
Underwriters' Specifications: No. 453 Hose Gate Valves conform to the Underwriters' Specification known as "The National Standard". They are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago, for water working pressures up to 300 pounds.

Brass Hose Valves

Chicago Hose Valves

With Leather Disc

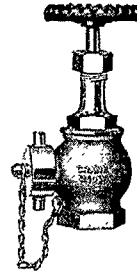
200 pounds cold water working pressure



Cross Section
No. 50



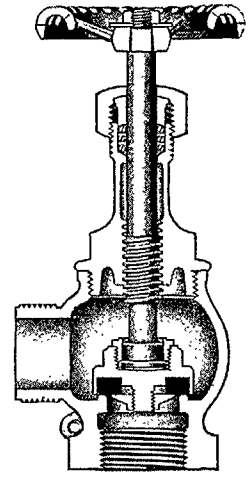
No. 50
Screwed



*Angle Hose Valve
with cap and chain



*No. 117
Screwed



Cross Section
*No. 117

*When so ordered, Angle Hose Valves can be furnished with a brass cap and chain at the extra list prices shown in the table below.

These valves can be made to order with a brass wheel, and with special finishes such as rough body, nickel-plated; polished; polished and nickel-plated; and polished and chromium-plated. Prices will be furnished on application.

List Prices and Dimensions

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 50, Rough body, plain		Each			7.50	9.00	11.50	17.00	21.00
No. 117, Rough body, plain (without cap and chain)		Each	9.50	11.00	12.50	16.00	19.00	26.00	57.00
Brass cap and chain for No. 117 Valve		Per valve	2.25	2.25	2.50	2.75	3.50	4.50	7.00
Dimensions, in Inches	No. 50	Center to hose end			2 1/2	3	3	3 1/2	4 1/16
		Over-all height, open			8 1/8	9 5/8	10 1/2	11 7/8	13 7/8
		Length of handle			5 1/8	5 3/4	6 1/2	8 1/4	8 1/4
	No. 117	Center to hose end	1 1/2	1 9/16	1 3/4	2 1/4	2 3/8	2 3/4	3 1/4
		Over-all height, open	6 1/8	7 3/16	7 7/8	9 1/8	9 7/8	12 1/4	14 1/4
		Diameter of wheel	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	5 5/8	6

For list prices of Composition Discs for No. 117 Valves, see page 178.

Service recommendations: Chicago Hose Valves are especially suitable for use on outside standpipes.

Angle Hose Valves are recommended for use on standpipes and hose racks, and for similar service.

Hose threads: Both the No. 50 and the No. 117 Valves have an American Standard Pipe Thread on the inlet. Unless otherwise ordered, they are furnished with the following thread on the male outlet:

1/2 to 2" sizes — Chicago Standard Hose Thread
2 1/2" size — Chicago Fire Department Hose Thread

When so ordered, the outlet can be supplied with the following threads, without additional charge:

All sizes — Iron Pipe Hose Thread
All sizes — California Standard Hose Thread
2 1/2" size — American (National) Standard Fire Hose Thread

When any other hose thread is required, orders should be accompanied by a sample, preferably the male end of a hose coupling. See page 72.

No. 117 Valve: No. 117 Angle Hose Valves have a Crane No. 3 Cold Water Disc; see page 178 for discs.

Garden Hose Valves

With Leather Disc

These valves are threaded the same as the Hose Valves shown above.



No. 56, Screwed

List Prices, Each

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. 56 or No. 58, Rough body, plain		1.65	1.65	2.20	3.40	4.75	7.00	15.00



No. 58, Screwed

Hose Threads

Hose Thread Standards: The table shown below gives the basic dimensions of the American (National) Standard Hose Coupling Threads and of other hose coupling threads now in general use.

The upper portion of the table includes:

1. American Standard Hose Coupling Screw Threads (ASA B33.1-1935) sizes 2-inch and smaller for valves, hose couplings, nozzles, and other fittings used in direct connection with hose intended for fire protection or for domestic, industrial, and general service.
2. American (National) Standard Fire-Hose Coupling Screw Threads (ASA B26-1925) sizes 2½-inch and larger, for fire hose valves, couplings, hydrant outlets, stand-pipe connections, Siamese connections, and all other special fittings on fire lines.

The two A.S.A. Standards mentioned above agree with the data in the Hose Thread section of the handbook of Screw-Thread Standards for Federal Services, 1939. No. H-25.

The lower portion of the table includes:

Other hose thread standards in general use: The

Chicago Hose Thread, Chicago Fire Department Hose Thread, 2½ and 3-inch Iron Pipe Hose Threads, and the California Hose Thread.

Form of thread: The basic form of all Crane hose threads is the American (National) Standard, formerly known as the "U.S. Standard Form".

Ordering: Unless otherwise ordered, Crane Hose Valves are furnished with the threads specified on pages 70 and 71, their dimensions conforming to those shown in the table below.

Special hose threads: Other hose threads included in the table below but not mentioned on pages 70 and 71 can be furnished when so specified; prices on application. When orders are received for American Standard hose threads in sizes ½ or ¾-inch, the garden hose thread will be furnished, and in sizes 1 or 1½-inch the iron pipe hose thread will be furnished, unless otherwise specified. In addition, other types of special threads can be furnished at a special price; orders should be accompanied by a sample, preferably the male end of a hose coupling.

General Classification	Name of Hose Thread		Nominal Size of Hose Inches	Number of Threads per Inch	Max. Major Dia. (O.D.) of Nipple Thread Inches	Service Recommendations
American (National) Standard Hose Coupling and Fire-Hose Coupling Screw Threads	Hose Coupling Screw Threads	Garden Hose Thread	1/2	11 1/2	1.0625	Garden and similar service
			5/8			
			3/4			
	American Standard (B33.1-1935)	Chemical Hose Thread	3/4	8	1.3750	Chemical engine and booster hose
			1			
			Fire Protection Hose Thread				1 1/2	9	1.9900	Fire protection hose
	Sizes 2-inch and smaller	Iron Pipe Hose Thread	1/2	14	.8248	Steam, water, air, oil, and all other hose connections
			3/4		1.0353	
			1		1.2951	
			1 1/4		1.6399	
			1 1/2		1.8788	
			2		2.3528	
			2 1/2		3.0686	
	Fire-Hose Coupling Screw Threads American (National) Standard (B26-1925) Sizes 2 1/2-inch and larger		3	7 1/2	3.6239	Fire hose
			3 1/2	6	4.2439	
4 1/2			4	5.7609		
1/2 or 3/4			11 1/2	1.0682	†Note: Iron Pipe Hose Threads sizes 2-inch and smaller are included in the American Standard B33.1-1935 and are shown above. The 2 1/2 and 3-inch sizes, shown here, are not included in the American Standard.	
1				1.2797		
1 1/4	1.6880					
1 1/2	1.9272					
Chicago Standard Hose Thread	2	8	2.5129			
	3	7	3.6365			
	2 1/2	7 1/2	2.9916			
Chicago Fire Department Hose Thread	2 1/2	8	2.8434			
	3		3.4412			
†Iron Pipe Hose Threads	1/2	11	1.0504			
	3/4		1.3141			
	1		1.8561			
	1 1/4		2.0870			
	1 1/2		2.5416			
	2		2.9916			
	2 1/2		7 1/2	2.9916		
California Standard (Pacific Coast) Hose Thread	1/2	11	1.0504			
	3/4		1.3141			
	1		1.8561			
	1 1/4		2.0870			
	1 1/2		2.5416			
	2		2.9916			
	2 1/2		7 1/2	2.9916		

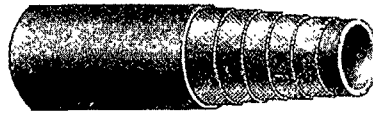
Hose Valves . . . pages 70 and 71

Hose and Hose Goods . . . pages 73 to 75

Hose and Hose Couplings

"Perfected"

Water Hose combines the advantages of the braided and wrapped types, the inner plies being wrapped duck over which is a sturdy ply of cotton braid. High quality rubber tube and wear-resisting black rubber cover. Sizes $\frac{1}{2}$ to $2\frac{1}{2}$ -inch, max. length 50 feet, for pressures from 90 to 175 pounds, depending on size.



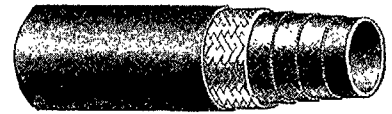
"Royal Cord"

Lawn Hose is constructed of layers of strong, tightly twisted cord laid side by side spirally throughout the entire length. Double cord construction with tough brown corrugated cover. 25 and 50-foot lengths (coupled), also in continuous lengths up to 500 feet— $\frac{5}{8}$, $\frac{3}{4}$, and 1-inch sizes.



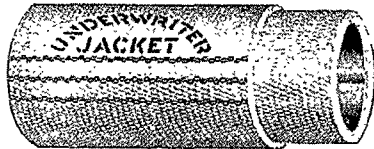
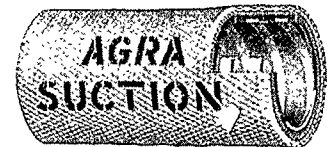
"Perfected"

Steam Hose contains multiple plies of cotton duck with an additional heavy seamless cotton braid under a heat and oil resisting cover. This braid assures long life. Sizes $\frac{1}{2}$ to 2-inch, max. length 50-feet, for saturated steam pressures from 90 to 150 pounds, depending on size.

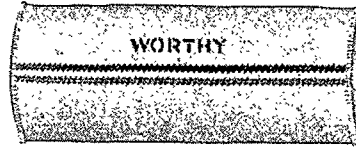


"Agra Suction" Hose,

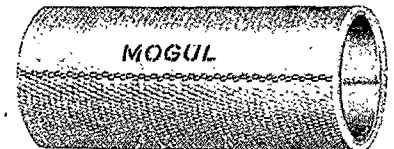
made for the average contractor, road builder, and for general purposes. has flat wire reinforcement to prevent collapse. Protected with woven cotton jacket, painted yellow. Generally furnished in 2-inch size with enlarged ends; straight ends and other sizes available. Max. length 50 feet.



Underwriters' Fire Hose, cotton rubber lined, is high grade and dependable, and carries necessary Underwriters' labels. 50-foot lengths, single jacketed in $1\frac{1}{2}$, 2, and $2\frac{1}{2}$ -inch sizes, and double jacketed in $1\frac{1}{2}$, 2, $2\frac{1}{2}$ and 3-inch.

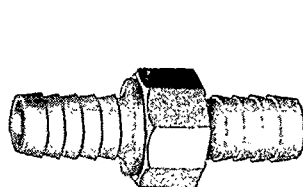


"Worthy" Unlined Linen Hose, for fire protection and inside service only, is constructed of long fibre flax line. Will meet Underwriters' specifications. Made in two grades, 1 to $2\frac{1}{2}$ -inch sizes; 25 and 50-foot lengths are standard.

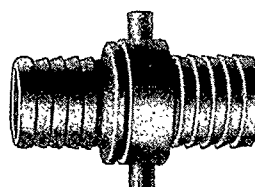


"Mogul" Mill Hose has calendered rubber tube to which is cemented a long fibre cotton woven fabric, chemically treated as a protection against mildew and rot. Made in sizes $1\frac{1}{4}$ to 4-inch, 25 and 50-foot lengths, with single or double jacket.

Prices of Hose on application; other Hose also can be furnished.



No. 17 C-A
Sizes 1-inch and smaller
(Without Lugs)



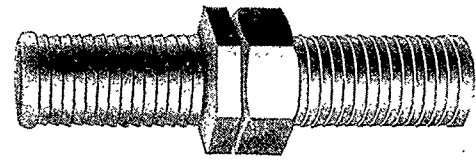
No. 89-A
Sizes $1\frac{1}{4}$ to $2\frac{1}{2}$ -inch
(Lugs on Female Half)

Brass Water Hose Couplings

No.	Size of Hose	Thread	List Prices, per Dozen		
			Full Couplings	Female Half	Male Half
No. 17C-A	$\frac{3}{8}$ "	$\frac{3}{4}$ " HPT	Prices on application		
	$\frac{1}{2}$ "	$\frac{3}{4}$ " HPT			
	$\frac{5}{8}$ "	$\frac{3}{4}$ " HPT			
	$\frac{3}{4}$ "	$\frac{3}{4}$ " HPT			
	1"	1" IPT			
No. 89-A	$1\frac{1}{4}$ "	Specify Thread Wanted	10.00	6.67	5.00
	$1\frac{1}{2}$ "		14.00	9.33	7.00
	2"		24.00	16.00	12.00
	$2\frac{1}{2}$ "		48.00	32.00	24.00

Larger sizes are available; they have lugs on both the Female and Male Half.

HPT=Chicago Hose Pipe Thread IPT=Iron Pipe Thread



No. 90-A

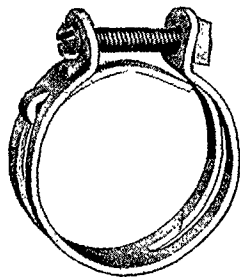
Brass Steam Hose Couplings

Size of Hose	Thread	List Prices, per Dozen		
		Full Sets	Female Half	Male Half
$\frac{1}{4}$ "	$\frac{1}{4}$ " IPT	15.00	10.00	7.50
$\frac{3}{8}$ "	$\frac{3}{8}$ " IPT			
$\frac{1}{2}$ "	$\frac{3}{4}$ " IPT			
$\frac{5}{8}$ "	$\frac{3}{4}$ " IPT			
$\frac{3}{4}$ "	$\frac{3}{4}$ " IPT			
1"	1" IPT	18.00	12.00	9.00
$1\frac{1}{4}$ "	$1\frac{1}{4}$ " IPT	24.00	16.00	12.00
$1\frac{1}{2}$ "	$1\frac{1}{2}$ " IPT	30.00	20.00	15.00
2"	2" IPT	42.00	28.00	21.00
$2\frac{1}{2}$ "	$2\frac{1}{2}$ " IPT	72.00	48.00	36.00
3"	3" IPT	148.00	98.67	74.00

These couplings have extra heavy swivels, recessed for washers. Tail-pieces are extra long.

*Can be had with $\frac{1}{2}$ " IPT (Iron Pipe Thread).

Hose Clamps, Nozzles, and Pipes



No. 1923-A

No. 1923-A
Hose Clamps
Galvanized Steel

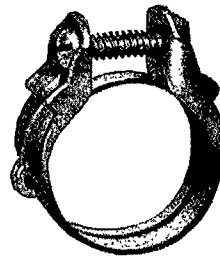
Size Inches	Ply	I.D. of Clamp	List Dozen
Water Hose Sizes			
3/16	3	7/16"	.40
1/4	3	1/2"	.40
5/8	2	9/16"	.40
	3	5/8"	
	4	11/16"	
1/2	2	3/4"	.42
	3	7/8"	
	4	15/16"	
	5	1"	
5/8	2	1"	.46
	3	1 1/16"	
	4	1 1/8"	
3/4	2	1 1/16"	.46
	3	1 1/8"	
	4	1 3/8"	
	5	1 1/4"	
1	2	1 5/16"	.78
	3	1 3/8"	
	4	1 7/8"	
	5	1 1/2"	
1 1/4	2	1 5/8"	1.48
	3	1 11/16"	
	4	1 13/16"	
	5	1 7/8"	
1 1/2	3	2"	1.76
	4	2 1/8"	
	5	2 3/16"	
1 3/4	3	2 1/4"	2.10
	4	2 3/8"	
2	3	2 7/16"	2.20
	4	2 9/16"	
	5	2 11/16"	
	*	3"	2.90
2 1/4	3	2 3/4"	2.64
	4	2 13/16"	
2 1/2	3	2 15/16"	2.90
	4	3"	
	5	3 1/8"	
2 3/4	4	3 1/4"	3.96
	3	3 7/16"	
3	4	3 1/2"	4.62

Size Inches	Ply	I.D. of Clamp	List Dozen
Steam Hose Sizes			
1/2	4	1 1/16"	.84
	5	1 3/16"	
	6	1 1/4"	
3/4	4	1 3/8"	1.10
	5	1 7/16"	
	6	1 1/2"	
1	4	1 11/16"	1.70
	5	1 3/4"	
	6	1 13/16"	
1 1/4	4	1 15/16"	1.98
	5	2"	
	6	2 1/16"	
1 1/2	4	2 1/4"	2.42
	5	2 5/16"	
	6	2 3/8"	
2	4	2 5/8"	3.74
	5	2 3/4"	
	6	2 7/8"	
2 1/4	4	2 15/16"	4.18
	5	3"	
	6	3 1/16"	

Large Size Extra Heavy Clamps			
I.D.	List Dozen	I.D.	List Dozen
2 3/4"	4.24	4 1/4"	7.70
2 7/8	4.50	4 3/8	7.81
3	4.84	4 1/2	8.36
3 1/8	4.94	4 5/8	8.58
3 1/4	5.06	4 3/4	9.35
3 3/8	5.18	4 7/8	9.68
3 1/2	5.28	5	10.00
3 5/8	5.46	5 1/4	10.45
3 3/4	5.60	5 3/8	11.00
3 7/8	6.05	5 1/2	11.44
4	6.34	6	13.75
4 1/8	7.15	6 1/2	14.00

Large Size Extra Heavy Clamps			
I.D.	List Dozen	I.D.	List Dozen
2 3/4"	4.24	4 1/4"	7.70
2 7/8	4.50	4 3/8	7.81
3	4.84	4 1/2	8.36
3 1/8	4.94	4 5/8	8.58
3 1/4	5.06	4 3/4	9.35
3 3/8	5.18	4 7/8	9.68
3 1/2	5.28	5	10.00
3 5/8	5.46	5 1/4	10.45
3 3/4	5.60	5 3/8	11.00
3 7/8	6.05	5 1/2	11.44
4	6.34	6	13.75
4 1/8	7.15	6 1/2	14.00

*For Suction Hose.



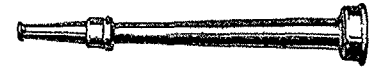
No. 3935-A

Hose Clamps
Stamped Sheet Brass

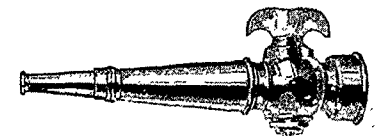
Size Inches	Ply	I.D. of Clamp	List Dozen
Water Hose Sizes			
3/16	3	7/16"	.54
1/4	3	1/2"	.54
	4	9/16"	
3/8	2	5/8"	.54
	3	3/4"	
1/2	2	7/8"	.54
	3	15/16"	
5/8	3	1 1/32"	.54
	4	13/32"	
3/4	3	1 3/16"	.54
	4	1 1/4"	
1	2	1 11/32"	2.00
	3	1 7/16"	
1 1/4	3	1 17/32"	2.50
	4	1 13/16"	
1 1/2	3	1 15/16"	3.00
	4	2 1/16"	
2	3-4	2 9/16"	4.00
2 1/4	3-4	2 7/8"	6.50
2 1/2	3-4	3 1/16"	7.00
3	3-4	3 3/4"	10.00
Steam Hose Sizes			
3/4	3	1 7/16"	2.00
	4	1 17/32"	
1	3	1 5/8"	2.50
	4	1 21/32"	
1 1/4	3-4	1 15/16"	3.00
	3-4	2 7/32"	
1 1/2	5	2 13/32"	4.00
	3-4	2 11/16"	
2	3-4	2 7/8"	5.50
	5	2 7/8"	
2 1/2	3-4	3 1/4"	8.50
	5	3 9/16"	



No. 97-A, Hose Nozzle



No. 95-A, Hose Pipe



No. 96-A, Hose Pipe

Hose Nozzles and Pipes

Size	Length	Dis-charge	List Dozen
No. 97-A, Brass Hose Nozzles			
3/4"	3"	1/4"	4.00
	6"		7.00
	8"		8.00
1	4"	5/16"	5.00
	8"		9.00
1 1/4	4 3/4"	3/8"	12.00
	10"		15.00
1 1/2	5 3/4"	7/16"	18.00
	10"		20.00
	12"	1/2"	22.00
2	6 3/4"	9/16"	26.00
	12"		34.00
2 1/2	7 1/2"	5/8"	37.00
	12"		55.00

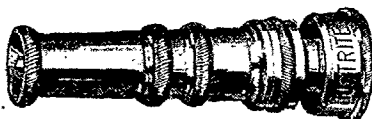
No. 95-A, Brass Hose Pipes With Screw Tip			
3/4"	6"	1/4"	7.00
	7 1/2"		8.00
	12"		10.00
1	8"	1/4"	10.00
	12 1/2"		12.00
1 1/4	12"	3/8"	20.00
1 1/2	12"	1/2"	24.00
2	12"	5/8"	38.00
2 1/2	15"	5/8"	75.00

No. 96-A, Brass Hose Pipes With Screw Tip and Stopcock			
3/4"	6"	1/4"	11.00
	7 1/2"		13.00
	12"		18.00
1	7 1/2"	1/4"	15.00
	12"		20.00
1 1/4	12"	3/8"	40.00
1 1/2	12"	1/2"	55.00

These Nozzles and Pipes are furnished with Hose Pipe Thread or Iron Pipe Thread; specify which is wanted.

Other size discharges are made to order at an extra price.

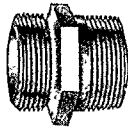
1 1/4-inch and larger are recessed for washers.



No. 8085-A, "Justrite"

The "Justrite" Garden Hose Nozzle (patented) can be quickly and easily adjusted to throw a straight stream or various sprays, and has a positive shut-off. Cast brass and highly polished, it has an internally centered spray pin which assures even sprays. Does not leak or back spray. Made for 3/4-inch hose pipe thread; prices on application. Also furnished nickel plated or chromium plated.

Hose Fittings



No. 91-A

Male Hose Nipples, Brass

Size and Thread	List Dozen
3/8" *IPT x 3/8" †IPT	3.50
1/2" *IPT x 1/2" †IPT	
1/2" †IPT x 3/4" HPT	
3/4" †IPT x 3/4" *IPT	
3/4" †IPT x 3/4" HPT	5.00
3/4" HPT x 1" †IPT	
3/4" *IPT x 1" †IPT	
1" *IPT x 1" †IPT	
1" †IPT x 1 1/4" *IPT	9.00
1" †IPT x 1 1/2" *IPT	10.00

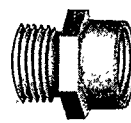
Specify threads for following:

1 1/4" x 1 1/4"	9.00
1 1/2" x 1 1/2"	10.00
2 x 2	14.00
2 1/2 x 2 1/2	28.00
3 x 3	40.00
3 1/2 x 3 1/2	50.00
4 x 4	75.00

*Straight Iron Pipe Thread.

†Taper Iron Pipe Thread.

HPT = Chicago Hose Pipe Thread.



No. 92-A

Male and Female
Brass Hose Nipples

Size and Thread Male x Female	List Dozen
3/4" HPT x 1/2" †IPT	3.50
3/4" †IPT x 3/4" HPT	
3/4" HPT x 3/4" †IPT	
1" *IPT x 1" †IPT	5.00
Specify threads for following:	
1 1/4" x 1 1/4"	9.00
1 1/2" x 1 1/2"	10.00
2 x 2	14.00
2 1/2 x 2 1/2	28.00
3 x 3	40.00
3 1/2 x 3 1/2	50.00

*Straight Iron Pipe Thread.

†Taper Iron Pipe Thread.

HPT = Chicago Hose Pipe Thread.



No. 9200-A

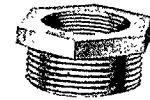
Double Female
Brass Hose Nipples

Size and Thread	List Dozen
1/2" †IPT x 3/4" HPT	6.50
3/4" †IPT x 3/4" HPT	
1" †IPT x 1" HPT	9.75

†Taper Iron Pipe Thread.

HPT = Chicago Hose Pipe Thread.

Larger sizes available specify threads.



No. 94-A

No. 94 L-A

Brass Hose Bushings

Size and Thread Male x Female	List Dozen
No. 94-A (Small sizes)	
3/4" HPT x 1/2" *IPT	6.50
1" *IPT x 3/4" HPT	

No. 94 L-A (Large sizes)
Specify threads wanted.

1 1/4" x 1"	10.00
1 1/4 x 3/4	8.00
1 1/2 x 1 1/4	12.00
1 1/2 x 1	11.50
1 1/2 x 3/4	11.50
2 x 1 1/2	18.00
2 x 1 1/4	16.00
2 x 1	14.00
2 x 3/4	13.00
2 1/2 x 2	26.00
2 1/2 x 1 1/2	24.00
2 1/2 x 1 1/4	23.00
2 1/2 x 1	22.00
2 1/2 x 3/4	20.00
3 x 2 1/2	36.00
3 x 2	30.00

*Straight Iron Pipe Thread.

HPT = Chicago Hose Pipe Thread.



No. 93-A

No. 9301-A, Less Lugs

Brass Hose Reducers

Size and Thread Female x Male	List Dozen
No. 9301-A, without Lugs	
3/4" HPT x 1/4" *IPT	6.50
3/4" HPT x 3/8" *IPT	
3/4" HPT x 1/2" *IPT	
1" *IPT x 3/4" HPT	

No. 93-A, with Lugs

Specify threads wanted.

1 1/4 x 1"	10.00
1 1/4 x 3/4	8.00
1 1/2 x 1 1/4	12.00
1 1/2 x 1	11.50
1 1/2 x 3/4	11.50
2 x 1 1/2	18.00
2 x 1 1/4	16.00
2 x 1	14.00
2 x 3/4	13.00
2 1/2 x 2	26.00
2 1/2 x 1 1/2	24.00
2 1/2 x 1 1/4	23.00
2 1/2 x 1	22.00
2 1/2 x 3/4	20.00
3 x 2 1/2	36.00
3 x 2	30.00

*Straight Iron Pipe Thread.

HPT = Chicago Hose Pipe Thread.

Brass Hose Caps



No. 120-A

Size Inches	List Dozen	Size Inches	List Dozen
3/4	4.00	2 1/2	24.00
1	6.00	3	31.00
1 1/4	8.00	3 1/2	39.00
1 1/2	10.00	4	43.00
2	15.00		

Chain.....List, Extra.....0.60

3/4 and 1-inch sizes do not have spanner lugs. Chain, charged as an extra, can be furnished on sizes 1 1/2-inch and larger, when specified.

When ordering Hose Caps, specify threads wanted.

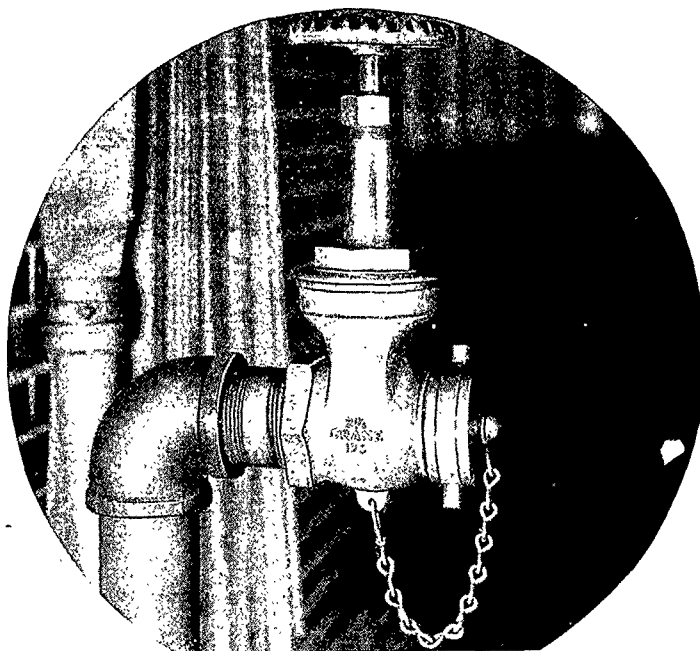
Hose Spanner



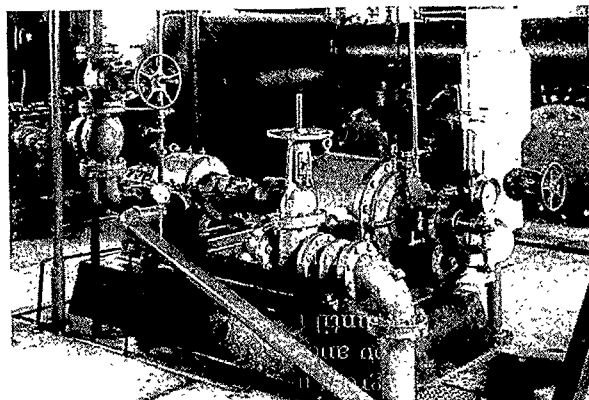
No. 9-A, Common

The No. 9-A Hose Spanner is furnished in sizes 1 1/2 x 9, 2 x 10, 2 1/2 x 10 3/4, 3 x 11, and 4 x 12 inches; prices on application.

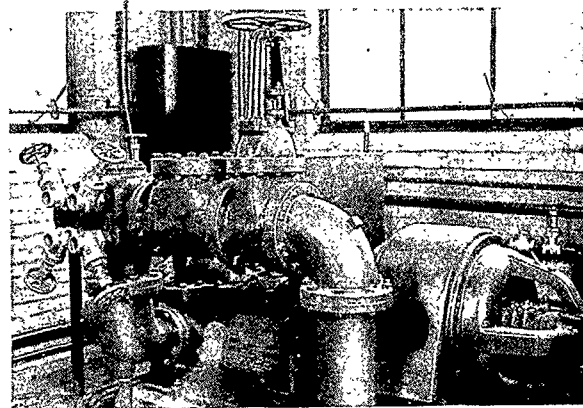
6



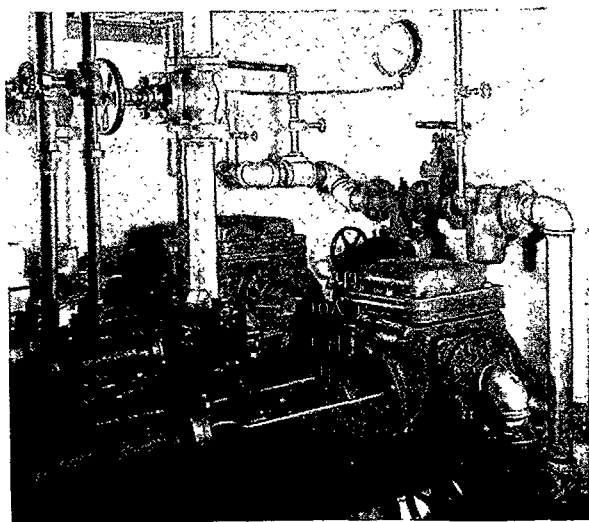
Crane hose gate valve in the fire protection system of a manufactured gas plant.



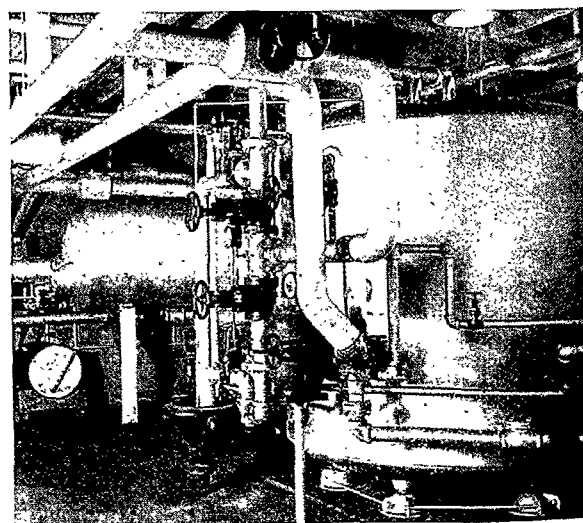
Crane valves and fittings on a steam pump in a large rubber plant.



A fire pump in a metal working plant; all piping equipment by Crane.



Crane-equipped vacuum pumps in the heating system of a large textile mill.



Hospitals everywhere find that Crane products provide dependable control.

Brass Radiator Valves

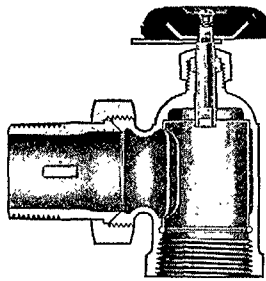
Heating Specialties

7

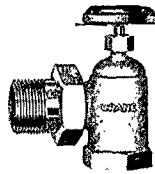
Radiator Valves for Gravity Hot Water.....	page 78
Radiator Valves for Steam.....	page 78
Radiator Valves with Self-Adjusting Packing.....	page 79
Radiator Gate Valves.....	page 80
Government Pattern Radiator Valves.....	page 81
Union Bonnet Radiator Valves, with Brass Disc.....	page 81
Bellows Type Packless Radiator Valve.....	page 84
Radiator Union Elbows.....	page 78
Lock Shields for Radiator Valves.....	page 82
Extra Length Tail-Pieces for Radiator Valves.....	page 82
Hot Water Radiator Air Valves.....	page 82
Venting Valves.....	page 83
Thermostatic Traps.....	page 84
Heating Pumps.....	page 85

Brass Radiator Valves and Union Elbows

Hot Water Valves

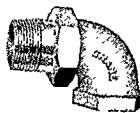


Cross Section
No. 174



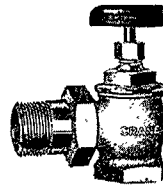
No. 174
Angle

Radiator Union Elbows

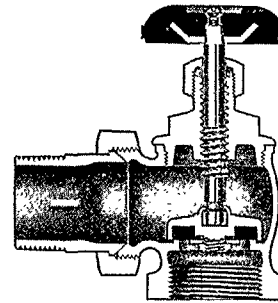


No. 192
Union Elbow

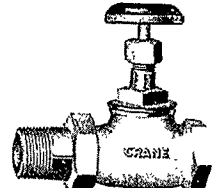
Composition Disc Steam Valves



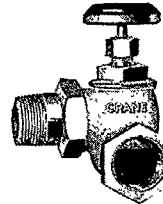
No. 112
Angle



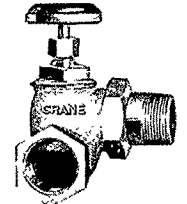
Cross Section
No. 112



No. 1213
Globe



No. 113
Left Hand Corner



No. 113
Right Hand Corner

When ordering corner valves, specify whether right hand or left hand corner valves are wanted.

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 174, Angle Valves, rough body, nickel-plated all over, for hot water	Each	1.10	1.30	1.65	2.10	2.75	4.70
No. 112, Angle Valves, rough body, nickel-plated all over, for steam	Each	1.45	1.65	2.00	2.50	3.20	5.00
No. 1213, Globe Valves, rough body, nickel-plated all over, for steam	Each	3.70	4.30	5.10	6.40	8.40	
No. 113, Corner Valves, rough body, nickel-plated all over, for steam	Each	4.10	4.75	5.60	7.05	9.25	15.00
No. 192, Union Elbows, rough body, nickel-plated all over	Each	.60	.75	1.00	1.30	1.75	3.00

For list prices of Composition Discs, see page 178.

Hot Water Valves: The No. 174 Valves are recommended for gravity hot water heating installations. They are neat in appearance, compact in design, and are well constructed.

They open or close in one-quarter turn; a pointer below the wheel shows the position of the opening in the disc. The disc, made from brass tubing, has a 1/16-inch hole to provide for circulation when the valve is closed.

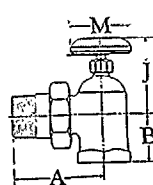
Steam Valves: The No. 112, No. 1213, and No. 113

Valves are recommended for steam and vapor heating installations. They present a neat appearance, are compact in design, and are substantially constructed.

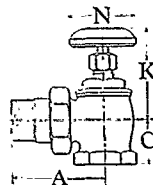
They are equipped with a No. 8 Low Pressure Composition Disc, secured in the disc holder by a brass nut and washer. For description and dimensions of discs, see page 178.

The disc holder swivels on the stem.

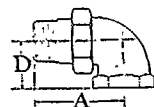
Lock Shield: Valves shown on this page can be furnished with lock shield at the same price. See page 82.



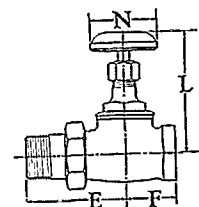
No. 174



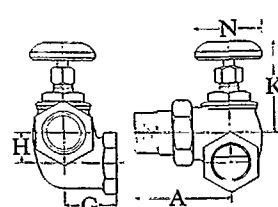
No. 112



No. 192



No. 1213



No. 113

Extra length tail-pieces... page 82

Dimensions, in Inches

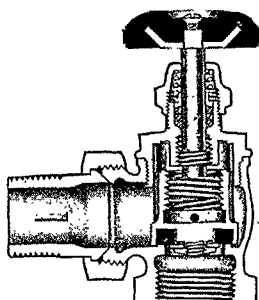
Size	1/2	3/4	1	1 1/4	1 1/2	2
A (*)	2 1/4	2 3/4	3	3 1/2	3 3/4	4 1/4
B	1 1/8	1 1/4	1 1/2	1 13/16	2 1/16	2 3/8
C	1	1 3/16	1 7/16	1 11/16	1 13/16	2 1/8
D	1 1/8	1 5/16	1 9/16	1 13/16	2 1/16	2 1/2
E	2 5/8	2 7/8	3 1/4	3 3/4	4	
F	1 3/16	1 3/8	1 5/8	1 7/8	2 1/8	
G	1 3/16	1 3/8	1 11/16	2	2 1/4	2 3/4
H	5/8	3/4	1 5/16	1 3/16	1 5/16	1 11/16
J	2 1/8	2 3/8	2 3/4	3	3 5/8	4
K—Open	3 1/8	3 7/8	4 5/8	5 1/8	6 1/8	7 1/2
L—Open	3 5/8	4 1/8	4 5/8	5 1/8	5 3/4	
M	2	2	2	2 1/4	2 1/2	2 3/4
N	2	2	2 1/4	2 1/2	2 3/4	3

(*) Dimension A conforms to the Standard adopted by the Heating and Piping Contractors' National Association in co-operation with the Manufacturers Standardization Society of the Valve and Fittings Industry.

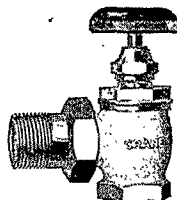
Brass Radiator Valves

With Self-Adjusting Packing and Composition Disc

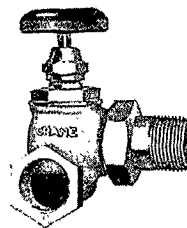
For Steam, Vacuum, Vapor, or Hot Water



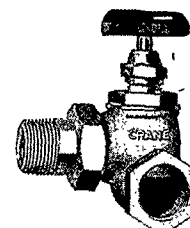
Cross Section, No. 226



No. 226
Angle



No. 227
Right Hand Corner



No. 227
Left Hand Corner

When ordering corner valves, specify whether right or left hand corner valves are wanted.

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2
No. 226, Angle, rough body, nickel-plated all over	Each	3.70	4.30	5.10	6.40	8.40
No. 227, Corner, rough body, nickel-plated all over	Each	4.10	4.75	5.60	7.05	9.25

For list prices of Composition Discs, see page 178.

Service recommendations: These valves are recommended for steam, vacuum, or vapor heating systems. In addition, the No. 226 and No. 227 are ideal for hot water systems (forced feed or gravity flow). When wanted for gravity flow hot water, orders should so specify, and the valves will be furnished with a small hole drilled through the seat to provide slow circulation when the valve is closed.

Construction: These valves are strong, compact, and neat appearing. They have a rough body and are nickel-plated all over.

The valves are equipped with a renewable No. 8 Low Pressure Composition Disc. For description and dimensions of discs, see page 178.

No. 226 and No. 227 have a rising stem with a very short vertical travel, and open or close in one and three-quarter turns of the handwheel. This is accomplished by the threads in the disc holder and by additional lifting on the part of the stem itself.

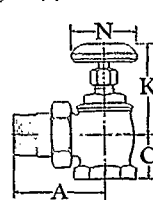
When the valve is opened, the stem rotates and rises, thereby lifting the disc and disc holder. At the same time the disc holder, engaged with the threads on the rotating stem, moves upward on the stem. The disc, therefore, is lifted by both the rising stem and by the rising disc holder. This feature provides for quick opening and closing, and eliminates the use of fast acting threads in the disc holder which frequently permit the inlet pressure to open the valve after it has been closed by hand.

Stuffing box: The stuffing box is liberal in width and depth to accommodate ample rings of packing. A

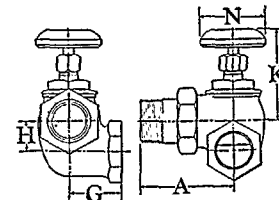
bronze spring, bearing on a brass gland, maintains constant pressure on the packing, thus minimizing the possibility of leakage. These valves can be repacked when wide open and under pressure.

Lock Shield valves: The No. 226 and No. 227 valves are regularly furnished with a moulded composition handwheel, but when so ordered, these valves can be furnished with a lock shield at no extra cost.

For description of lock shields, see page 82; for prices of keys to operate lock shield valves, see page 177.



No. 226



No. 227

Dimensions, in Inches

Size	A(*)	C	G	H	K	N
1/2	2 1/4	1	1 3/16	5/8	3 1/8	2
3/4	2 3/4	1 3/16	1 3/8	3/4	3 1/8	2
1	3	1 7/16	1 11/16	15/16	3 1/2	2 1/4
1 1/4	3 1/2	1 11/16	2	1 3/16	3 5/8	2 1/2
1 1/2	3 3/4	1 13/16	2 1/4	1 5/16	4 1/8	2 3/4

(*) Dimension A conforms to the Standard adopted by the Heating and Piping Contractors' National Association in co-operation with the Manufacturers Standardization Society of the Valve and Fittings Industry.

Extra length tail-pieces....page 82

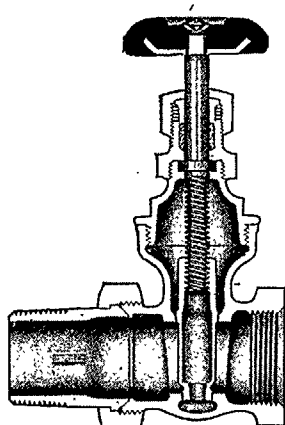
Brass Radiator Gate Valves

Wedge Disc—Non-Rising Stem

WORKING PRESSURES

125 pounds water, 200° F.

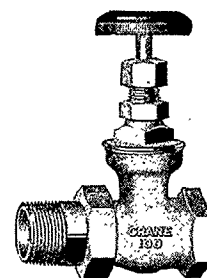
100 pounds steam



Cross Section

Crane No. 455 Brass Gate Valves are recommended for radiator valve service on hot water installations (either forced feed or gravity flow type) and on steam or vapor heating systems. They are especially suitable for use with unit heaters. In addition, the valves are ideal for general shut-off valve service at other points throughout heating systems, as on boilers and hot water heaters.

When ordering, specify style of finish desired.



No. 455
With Male Union Outlet

List Prices and Dimensions

Size		Inches	1/2	3/4	1	1 1/4	1 1/2
No. 455	Rough body, plain	Each	3.20	3.75	4.65	6.00	8.25
	Rough body, nickel-plated all over	Each	3.65	4.25	5.20	6.60	9.00
Center to female end		Inches	1	1 1/8	1 5/16	1 1/2	1 9/16
Center to union end		Inches	2 1/4	2 11/16	2 13/16	3 3/16	3 5/16
Center to top of wheel		Inches	3 3/4	4 1/2	5 1/4	5 3/4	6 1/2
Diameter of wheel		Inches	1 5/8	2	2 1/4	2 1/2	2 3/4

Hot water service: When No. 455 Valves are wanted for gravity flow hot water heating systems, orders should so specify. Such valves are furnished with a small hole drilled through the disc to provide slow circulation when the valve is closed.

Construction: No. 455 Valves present a neat appearance, are attractively finished, and are well proportioned and sturdily constructed. They have

a non-rising stem and a wedge disc.

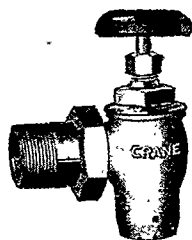
Stuffing box: The stuffing box is filled with high grade packing and is equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

Lock Shield Valves: These valves can be furnished with a lock shield without extra charge; see page 82.

Extra length tail-pieces... page 82

Brass Solder-Joint Radiator Valves and Union Elbows



Radiator Valve
With Solder-Joint Inlet

Crane Brass Radiator Valves and Crane Brass Radiator Union Elbows having solder-joint inlet for use with copper tubing are made to order; prices are furnished on application.

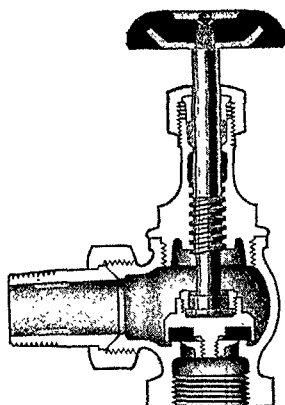
The Crane Solder-Joint line includes valves, fittings, and accessories for domestic and industrial installations; see the section devoted to Solder-Joint Valves and Fittings, pages 499 to 512.



Radiator Union Elbow
With Solder-Joint Inlet

Heavy Brass Radiator Valves

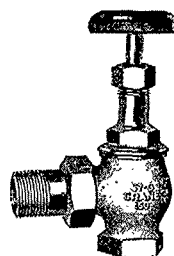
Government Pattern—with Composition Disc



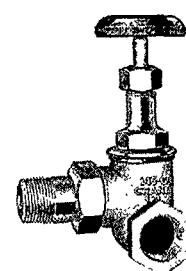
Cross Section
No. 67 G

WORKING PRESSURE—150 pounds steam

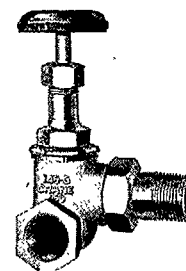
These valves are recommended for steam and hot water heating systems. When wanted for gravity flow hot water, orders should so specify; such valves are drilled with a small hole through the seat to provide slow circulation when the valve is closed.



No. 67 G
Angle



No. 145 G
Left Hand Corner



No. 145 G
Right Hand Corner

When ordering corner valves, specify whether right hand or left hand corner valves are wanted.

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 67 G, Angle, rough body, nickel-plated all over	Each	3.70	4.30	5.10	6.40	8.40	13.60
No. 145 G, Corner, rough body, nickel-plated all over	Each	4.10	4.75	5.60	7.05	9.25	15.00
A	Inches	2 3/8	3 1/4	3 1/2	3 7/8	4 3/8	5 1/4
B	Inches	1 3/16	1 5/8	1 3/4	2	2 1/4	2 13/16
C	Inches	2 5/8	3	3 3/4	4	4 3/8	5
D	Inches	1 1/4	1 1/2	1 7/8	2	2 1/4	2 5/8
E	Inches	1/2	1 1/16	1 5/16	1	1 5/16	1 5/8
F-Open	Inches	4 1/2	5 1/4	6	7 1/8	7 1/2	8 3/8
G	Inches	2 1/4	2 1/2	2 3/4	3	3	3

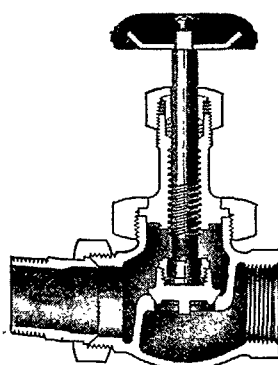
For list prices of Composition Discs, see page 178.

Construction: These valves are heavy and are unusually sturdy. They have a rising stem and a gland in the stuffing box. The valves can be repacked when wide open and under pressure.

Discs: Unless otherwise ordered, the valves are furnished with a No. 1 Steam Disc, suitable for steam service. When ordered for hot water service, they are furnished with a No. 2 Hot Water Disc. For

description and dimensions of discs, see page 178.

Government and Navy Specifications: The valves comply with Government Specifications issued by the General Supervising Architect's Office and the Quartermaster General's Office, and also with Navy Department Specification No. 66-P-1, dated February 1, 1932, on Power Plant Apparatus and Piping for Shore Use.



Cross Section
No. 4270, Globe

Union Bonnet—with Brass Disc

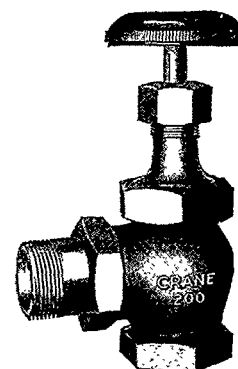
WORKING PRESSURE—200 pounds steam

When ordering, specify whether globe or angle valves are wanted.

The No. 4270 Valves are recommended for high pressure steam and hot water systems.

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4
No. 4270, rough body	Each	2.60	3.25	4.50	6.00	8.00
Center to female end	Inches	1	1 3/16	1 3/8	1 11/16	1 15/16
Center to union end	Inches	2 3/16	2 7/16	3	3 1/4	3 3/4
Center to top, open	Inches	3 3/4	4 1/4	5 1/8	6	6 3/4
Diameter of wheel	Inches	2	2 1/4	2 1/2	2 3/4	3



No. 4270
Angle

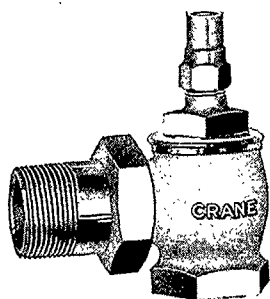
These valves have Crane Special Brass body and disc, and are heavy and ruggedly constructed. They have a union bonnet and can be reground without removing the body from the line. The stuffing box is equipped with a gland. The valves, when wide

open, can be repacked while under pressure. Sizes 1/2-inch and smaller have a one-piece disc and stem.

1/4, 1 1/2, and 2-inch No. 4270 Valves can be made to order; prices on application.

The valves shown on this page can be furnished with lock shield at the same price; see page 82.

Lock Shields for Radiator Valves



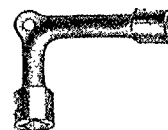
Radiator Valve
with Lock Shield

All Crane Radiator Valves can be furnished with a Lock Shield without additional charge.

Crane Lock Shields are of sufficient length to completely enclose the stem when the valve is wide open. When furnished on nickel-plated valves, the Lock Shield is nickel-plated. When furnished on rough body plain valves, it is finished but not plated.

When ordering a radiator valve equipped with a Lock Shield, the order should specify the size of the valve, its catalog number, and should state "with Lock Shield".

When ordering Lock Shields only, the order should specify the size and catalog number of the valve for which the Lock Shield is wanted.

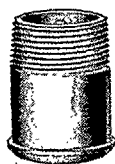


Key for
Operating
Valve
with
Lock Shield

For list prices,
see page 177.

7

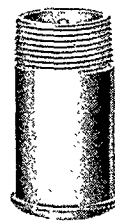
Extra Length Tail-Pieces For Radiator Valves and Radiator Union Elbows



1/2-inch Extra Length



1-inch Extra Length



1 1/2-inch Extra Length



2-inch Extra Length

List Prices, Polished and Nickel-Plated All Over

Catalog Number of Radiator Valve or Union Elbow		Nos. 112, 113, 174, 192, 226, 227, 455, 1213, and 4270				
Size of valve or elbow	Inches	1/2	3/4	1	1 1/4	1 1/2
1/2-inch Extra Length Tail-Piece	Each	.55	.65	.95	1.15	1.40
1-inch Extra Length Tail-Piece	Each	.55	.65	.95	1.15	1.40
1 1/2-inch Extra Length Tail-Piece	Each	.65	.75	1.05	1.50	1.75
2-inch Extra Length Tail-Piece	Each	.65	.75	1.05	1.50	1.75

Extra Length Tail-Pieces provide a convenient and economical means of correcting rough-in dimensions. When, after the installation of supply and return lines, it is found that the regular tail-piece is not long enough to reach the radiator, one of these can be easily substituted to make proper connections.

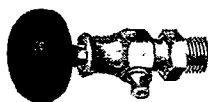
They are furnished in four different lengths, making it possible to increase the regular center to union end

dimension of radiator valves and radiator union elbows 1/2-inch, 1-inch, 1 1/2-inches, or 2-inches, depending upon the extra length used.

All tail-pieces are interchangeable on corresponding size valves and union elbows, and orders need only state the size of the valve or elbow.

All orders should specify the extra length wanted.

Hot Water Radiator Air Valves



No. 206

No. 206
Radiator Air Valves, Nickel-Plated with Wood Wheel, are furnished in 1/8-inch size only.

Prices on Application

No. 210
Radiator Air Valves, Nickel-Plated with Lock Shield, are furnished in 1/8-inch size only.



No. 210

These needle valve air vents, furnished both in wheel handle and loose key types, are used primarily to

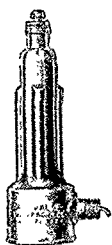
eliminate air from hot water radiation and supply lines. Keys for lock shield must be ordered extra

Hoffman Venting Valves

For Gravity, Steam, or Vacuum Heating Systems

OPEN TYPE: Open or "non-vacuum" type valves function to vent all air, but close tight against steam or water leakage. The vent port is normally open.

VACUUM TYPE: Vacuum type valves function to vent all air without loss of steam or water, and also close against the return of air through the valve port.



No. 1 Air Valve

For venting radiators or heating units of one or two-pipe gravity steam systems. Does not prevent the return of air to the system. These valves have an adjustable vent port and spit-proof double shell construction. 10 pounds maximum operating pressure; $\frac{1}{8}$ -inch connection. Made in angle pattern only.



No. 1A Air Valve

A moderately priced air valve for venting radiators or heating units of one or two-pipe gravity steam systems. Furnished with adjustable vent port and chromium finish. 10 pounds maximum operating pressure; $\frac{1}{8}$ -inch connection. Made in angle pattern only.



No. 40 Air Valve

This strictly competitive valve embodies traditional Hoffman quality manufacture. Non-adjustable vent port; nickel-plated. 10 pounds operating pressure; $\frac{1}{8}$ -inch connection. Made in angle pattern only.



MAIN VENTS

No. 4A Air Vent

A fast-venting valve of modern design and competitive price for venting mains of one and two-pipe gravity steam systems. Closes against water and steam. $\frac{3}{16}$ -inch non-adjustable port and 10 pounds operating pressure. Connections: $\frac{3}{4}$ -inch male, $\frac{3}{8}$ -inch female.



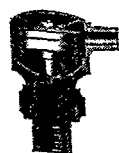
No. 75 Float Air Vent

For venting mains of one and two-pipe gravity steam systems. Large area float member closes port against water leakage. $\frac{3}{32}$ -inch non-adjustable vent port, for 10 pounds pressure. For extremely fast venting, No. 75A has a $\frac{3}{4}$ -inch port for a maximum pressure of 3 pounds. Connections: $\frac{3}{4}$ -inch male, $\frac{3}{8}$ -inch female.

MISC. VALVES

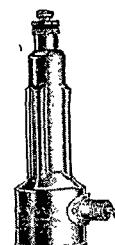
No. 3 Air Line Valve

For venting radiators of air line or Paul systems. $\frac{1}{8}$ -inch radiator connection; $\frac{1}{4}$ -inch air line connection. Maximum pressure, 10 pounds. These valves have an all-metal thermostatic element.



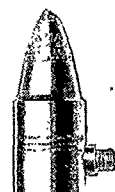
No. 2 Vacuum Valve

For radiators of one-pipe vacuum systems. The double air lock prevents the return of air after the radiator has been completely vented. The new adjustable vent port permits "controlled venting". Double shell construction eliminates water leakage. Operating pressure, 10 pounds. $\frac{1}{8}$ -inch connection. Made in angle pattern only.



No. 2A Vacuum Valve

This valve vents as freely as an open valve, no pressure being required to open the check. It has an adjustable vent port and double air locks. 10 pounds operating pressure and $\frac{1}{8}$ -inch connection. Made in angle pattern only.



MAIN VENTS

No. 16A Vacuum Vent

For venting steam mains of one-pipe vacuum systems. Closes against water and a double air lock prevents the return of air to the system. Non-adjustable vent port, $\frac{3}{16}$ -inch. Size of connections: $\frac{3}{4}$ -inch male, $\frac{3}{8}$ -inch female.



No. 76 Vacuum Float Vent

For venting steam mains of one-pipe vacuum systems. These valves have a double air lock and a $\frac{3}{32}$ -inch non-adjustable vent port for pressures to 10 pounds. For extremely fast venting, No. 76A has a $\frac{3}{4}$ -inch port — maximum pressure, 3 pounds. Size of connections: $\frac{3}{4}$ -inch male, $\frac{3}{8}$ -inch female.



ADAPTORS



Short Adaptor

Hoffman Adaptors permit the use of angle pattern valves on convector radiators or mains formerly requiring valves of straight shank pattern. Only Hoffman valves with the new "short tongue" siphon can be used with Hoffman Adaptors. Size of connections: Short Adaptor, $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{4}$ -inch; Long Adaptor, $\frac{1}{8}$ -inch.



Long Adaptor

The short Adaptor is used when there is sufficient space between convector and wall to permit turning the valve all the way around when installing.



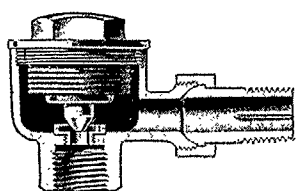
A long Adaptor is used when convector fits tightly. Space between the adaptor tapping and convector permits screwing in the Hoffman Valve.



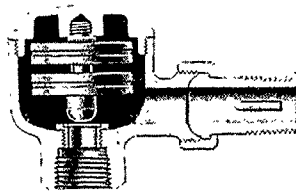
Prices and additional information on application.

Hoffman Thermostatic Traps

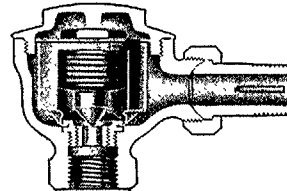
Low Pressure Radiator Traps — (15 Pounds Max. Pressure)



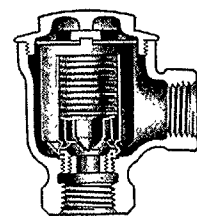
No. 17 A



No. 17 D



No. 8 A



No. 9 A

No. 17A: This trap has a renewable seat and interchangeable thermostat. Capacity, 200 sq. ft. direct radiation; port, $\frac{3}{8}$ -inch; pressures to 15 pounds. Connections: Angle pattern — $\frac{1}{2}$ ", $\frac{1}{2}$ " x $\frac{3}{4}$ ", and $\frac{3}{4}$ " x $\frac{3}{4}$ "; swivel pattern — $\frac{1}{2}$ ".

No. 17D: This trap has the same dimensions, capacities, and connections as No. 17A, but has an Adnic diaphragm thermostat of exceptional wearing qualities.

SWIVEL PATTERN

No. 8A, 17A, and 17D are available in $\frac{1}{2}$ -inch size with an easily adjustable swivel connection for straightway, right or left hand pattern, or any intermediate angle. See individual valve listings.

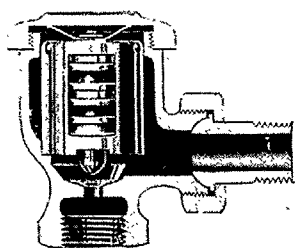
No. 8A: Thermal member, valve pin and seat are combined in a single unit. Capacity, 400 sq. ft. direct radiation; port, $\frac{3}{8}$ -inch; pressures to 25 pounds. Connections: Angle pattern — $\frac{1}{2}$ ", $\frac{1}{2}$ " x $\frac{3}{4}$ ", and $\frac{3}{4}$ " x $\frac{3}{4}$ "; swivel pattern — $\frac{1}{2}$ ".

No. 9A: Thermal member, valve pin and seat in a single unit. Capacity, 700 sq. ft. direct radiation. Port, $\frac{1}{16}$ -inch; pressures to 25 pounds. Connections: Angle pattern with union, $\frac{3}{4}$ "; without union, $\frac{3}{4}$ " or 1".

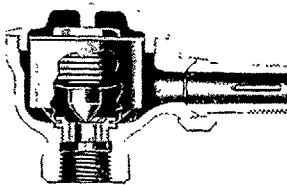
VERTICAL PATTERN

No. 17A and 17D, in $\frac{1}{2}$ -inch size, are available in a vertical straightway pattern designed for concealed radiators or convectors with bottom outlet.

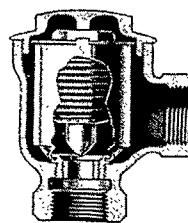
Medium and High Pressure Thermostatic Traps



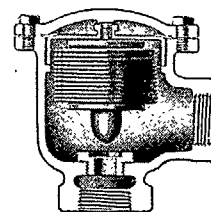
No. 8 & 9



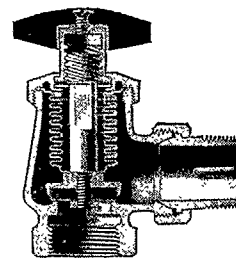
No. 20 H



No. 21 H



No. 10 A



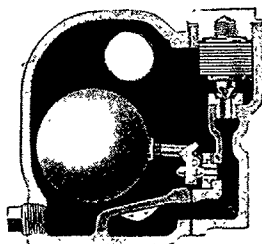
No. 37, Radiator Valve

No. 8 and 9: These traps have a diaphragm type thermostat made of Adnic. Thermostats are cage-mounted and are easy to remove.

No. 8 has a nominal capacity of 200 sq. ft.; port $\frac{3}{16}$ -inch; pressure range, vacuum to 50 pounds. Connections: $\frac{1}{2}$ -inch — Angle, R.H., L.H. Corner, and Straightway patterns. $\frac{3}{8}$ -inch — Angle pattern only.

No. 9 has a 600 sq. ft. capacity; port, $\frac{1}{4}$ -inch; pressure range, vacuum to 50 pounds. Connections: $\frac{3}{4}$ -inch — Angle and Straightway patterns. 1-inch — Angle pattern only.

Float & Thermostatic Traps



All working parts are mounted on the easily removable cover. Pipe connections need not be broken to service the trap. These Float and Thermostatic Traps, also known as the Hoffman 50 Series, have a stainless steel renewable valve seat, reversible valve pins, and a hydraulically formed bellows thermostat. These traps are also available as Mechanical Drip Traps without an internal thermostatic air by-pass. Low pressure traps up to 15 pounds pressure; high pressure traps up to 125 pounds.

No. 20H and 21H: These traps are of all-bronze construction and are furnished with a solid filled bellows thermostat which is highly resistant to water hammer. The thermostat, cage and seat are combined in a single unit. Pressure range, without adjustment, 0 to 125 pounds.

No. 20H has a $\frac{3}{8}$ -inch port and a $\frac{1}{2}$ -inch Angle pattern (with union) connection.

No. 21H has a $\frac{7}{16}$ -inch port. Connections: $\frac{3}{4}$ or 1-inch Angle pattern without union. Union connection, $\frac{3}{4}$ -inch only.

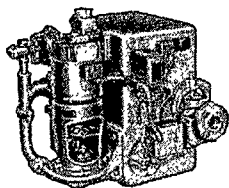
No. 10A: These Thermostatic Drip Traps have a solid filled bellows which withstands water hammer without appreciable harm and operates through a wide pressure range. They have a renewable bronze seat and interchangeable thermal members. These Traps have a nominal capacity of 2800 square feet direct radiation. Port, $\frac{9}{16}$ -inch. Operating pressures up to 25 pounds. 1-inch inlet and outlet (no union), in Angle pattern only.

No. 37: This Bellows Type Packless Radiator Supply Valve is for one and two-pipe steam systems. Angle patterns — $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", and $1\frac{1}{2}$ -inch. Swivel patterns — $\frac{1}{2}$ " and $\frac{3}{4}$ -inch. Offset patterns — 1 and $1\frac{1}{4}$ -inch.

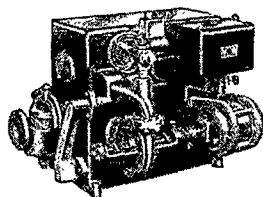
Prices and additional information on application.

Hoffman-Economy Heating Pumps

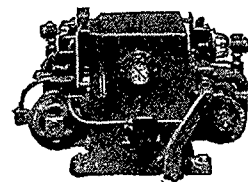
Vacuum Type



Type V-V



Type SVA — Single Unit



Duplex Unit

Hoffman-Economy Vacuum Pumps employ the jet type of vacuum producer because no other type can approach its simplicity and effectiveness in rapidly removing air from a heating system. It contains no moving parts to wear or score, hence it will produce maximum vacuums over a long period of service.

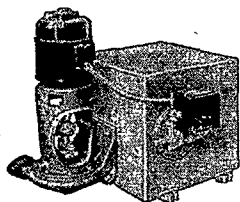
The type VV unit is unusually compact, with vertically mounted pump and motor on cast iron receiver. Bronze fitted, with enclosed type impeller, stainless steel shaft, heavy type flexible coupling. Shielded deep groove ball bearing carries the pump shaft

independent of the motor bearings. Capacities up to 15,000 sq. ft. E.D.R. in single or duplex units.

The SVA horizontal type unit is available in capacities up to 300,000 sq. ft. E.D.R. in both single and duplex styles.

Both the VV and SVA types are made in standard ratings for the ordinary installation operating between three and twelve inches of vacuum, and also in special ratings for jobs where conditions (such as "lifts" in the return lines) require carrying higher vacuums of ten to sixteen inches.

Condensation Pumps



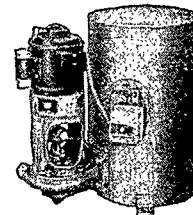
Types E and EC

Types E and EC: These units are equipped with a cast iron tank on which is mounted a ball-bearing flexible-coupled pump, bronze fitted throughout. Motor is placed on top of pump so that the unit may be installed in shallow pits with less danger of submergence in case of flood. Motors are of standard make with ample overload capacity. All

operating parts are simple and readily accessible.

Type E units operate at 1750 rpm with capacities to 65,000 sq. ft. E.D.R. and discharge pressures to 30 pounds. Type EC units operate at 3450 rpm with discharge pressures to 60 pounds. Both are available in single or duplex styles.

Type S: Type S pumps are dependable, inexpensive units for jobs where the service is not severe. These pumps have steel receivers but otherwise are generally similar in appearance and construction to the E and EC. They are bronze fitted throughout with ball thrust bearing in the motor head. Flexible coupling between pump and motor — pump carried on thrust type ball bearings. Capacities up to 8000 sq. ft. E.D.R. and discharge pressures to 30 pounds. Motors operate at 1750 rpm on 10-pound, and 3450 rpm on 15 to 30-pound units. Single or duplex.



Type S

Vertical Underground Pump



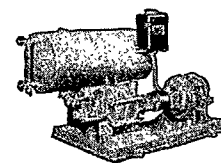
Vertical Underground Pump and Receiver

This pump is used where returns are located below floor or are otherwise too low for horizontal pumps. Where it is desired to save floor space the pump is installed flush with floor. Two pumps may be installed in a single tank of larger size if desired. The price is double that of the single unit. Capacities of this pump to 30,000 square feet of radiation. Pressures to 100 pounds.

Multi-Stage Type

Types B and C: Types B and C are for jobs operating on higher pressures and consist of a horizontal bronze-fitted multi-stage centrifugal pump with flexible coupled motor. Double outboard bearings, readily renewable. Water sealed stuffing boxes; bronze glands. Receivers are available in either steel or cast iron. B and C units are listed in capacities up to 65,000 sq. ft. E.D.R. and discharge pressures to 150 pounds. Type B units operate at 1750 rpm, and Type C at 3450 rpm. Single or duplex.

Type T: Type T pumps are similar to the Type S except they employ a turbine type pump. They are intended for commercial applications where discharge pressures up to 150 lbs. are required for capacities up to 10,000 sq. ft. E.D.R. Single or duplex.



Types B and C

Other Crane Brass Valves

The preceding pages, numbers 13 to 84, while grouped under the general headings of "Brass Valves", do not include all of the brass valves manufactured by Crane Co. Those that are designed to perform a special duty or that are made for special services are shown in other sections of this catalog, as follows:

Brass Float Valves.....	pages 380 and 381
Brass Safety and Relief Valves.....	pages 384 to 400
Brass Valves for Marine Service.....	pages 462 to 467
Crane-Seal Brass Valves.....	pages 492 and 493
Solder-Joint Brass Valves.....	pages 502 to 505

7

Crane Iron and Steel Valves

Many users classify valves not so much by materials as by services. Iron body valves, and in some cases even steel valves, are considered as alternates for brass valves. This is especially true of the smaller sizes, while in the larger sizes, the iron or steel valve is the logical continuation of the small sizes of brass valves. The selection of any type — brass, iron, or steel — depends upon the user's preference, established by considerations of service and economy. Crane Co. manufactures complete lines of iron and steel valves: see the pages referred to below:

Iron Body Gate Valves.....	pages 97 to 141
Iron Body Globe, Angle, and Cross Valves.....	pages 143 to 153
Iron Body Check and Foot Valves.....	pages 155 to 166
Steel Gate Valves.....	pages 297 to 307
Steel Globe and Angle Valves.....	pages 309 to 326
Steel Check Valves.....	pages 327 to 336

Brass Stops, Brass Cocks, and Iron Cocks

The Crane line of Brass Stops, Brass Cocks, and Iron Cocks, illustrated on pages 88 to 96, is unusually complete and affords the user a varied selection for a wide range of service conditions.

Brass Rough Stops.....	page 88
Brass Ground Key Stops.....	page 88
Brass Brine Cocks.....	page 88
Brass Ground Key Faucets.....	page 88
Brass Corporation Stops.....	page 89
Brass Hydrant Stops.....	page 89
Brass Gas Service Stops.....	page 90
Brass Gas Meter Stops.....	page 90
Brass Gas Stove Stops.....	page 90
Brass Pet Cocks.....	page 90
Brass Cylinder Cocks.....	page 90
Brass Gauge Cocks.....	page 90
Standard Brass Steam Cocks.....	page 91
250-Pound Hard Metal Steam Cocks.....	page 91
Standard Iron Cocks.....	page 92
Iron Gas Line Cocks.....	page 93
Heavy Duty Iron Cocks.....	page 93
Iron Lock Cocks, Essex Pattern.....	page 93
Brass and Iron Spring Loaded Cocks.....	page 94
Iron Asbestos Packed Cocks.....	page 95

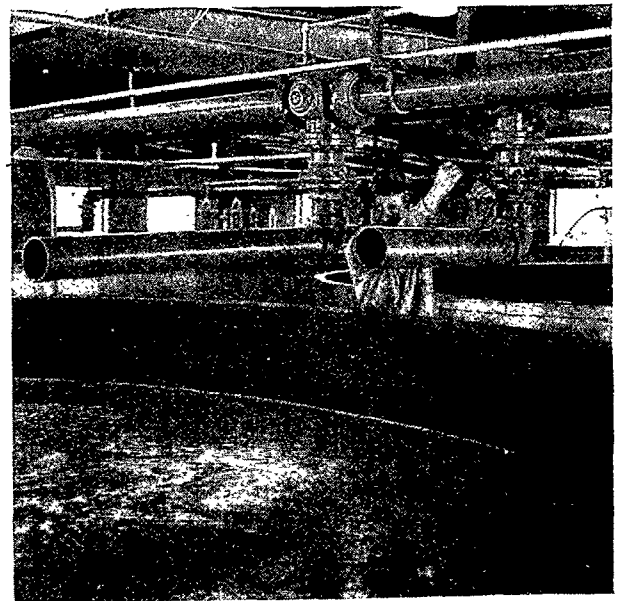
In addition, various accessories are included:

Hydrant Clamps.....	page 89
Wood Rod Couplings.....	page 89
Street Washer Keys.....	page 89
Hydrant Handles.....	page 89
Wrenches for Cocks.....	page 96

The uniformly high quality that characterizes all Crane products is maintained in these lines.

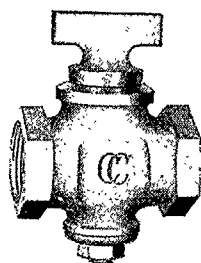


Crane Cocks in an intricate pumping system.

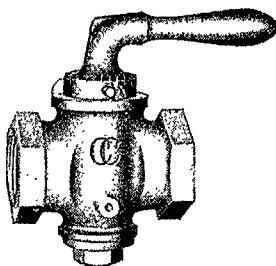


Crane Three-Way Cocks control the filling of these vats.

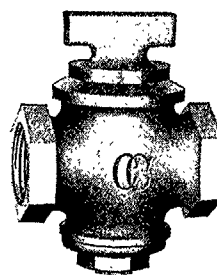
Brass Rough Stops



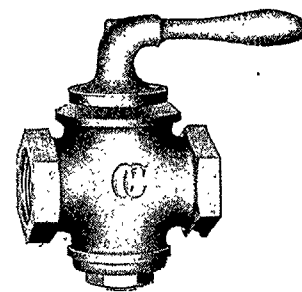
Flat-Way, Tee Head
No. 804
Without Check or Drain
No. 806, With Check and
Drilled Drain
(Not illustrated)



Flat-Way, Lever Handle
No. 804 1/2
Without Check or Drain
(Not illustrated)
No. 806 1/2, With Check
and Tapped Drain
(Tapped for drain tube)



Round-Way
No. 812, Tee Head



Round-Way
No. 812 1/2, Lever Handle

List Prices and Dimensions

Size	Inches	1/2	5/8	3/4	1
No. 812 or No. 812 1/2	Each	2.20	3.00	3.85	6.15
End to end	Inches	2 3/8	2 13/16	2 7/8	3 9/16

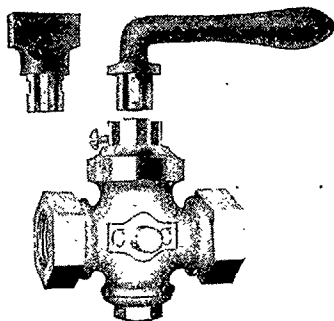
List Prices and Dimensions

Size	Inches	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2
No. 804 or No. 804 1/2	Each	1.70	1.75	2.45	3.00	4.40	7.45	12.45	21.50
No. 806 or No. 806 1/2	Each	1.75	1.80	2.50	3.05	4.50	7.60	12.70	22.00
End to end	Inches	1 7/8	2 1/8	2 1/2	2 11/16	3 1/8	3 5/8	3 15/16	4 7/16

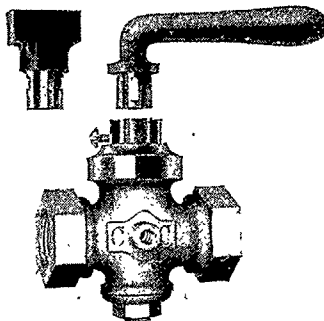
Drain Tubes (17/64" O.D., 27 threads per inch) for No. 806 1/2 Stops are extra.

Brass Ground Key Stops

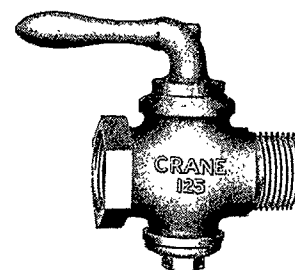
Brass Brine Cocks



With Reversible Check
No. 820, Removable Lever Handle
No. 823, Removable Tee Head



With Reversible Check & Tapped Drain
No. 821, Removable Lever Handle
No. 824, Removable Tee Head



No. 814, Lever Handle

List Prices and Dimensions

Size	Inches	1/2	5/8	3/4	1
No. 820 or No. 823	Each	1.75	2.45	3.00	4.40
No. 821 or No. 824	Each	1.80	2.50	3.05	4.50
End to end	Inches	2 7/8	3 1/8	3 1/4	3 11/16

Drain Tubes (27/64" O.D., 27 threads per inch) are extra.

List Prices and Dimensions

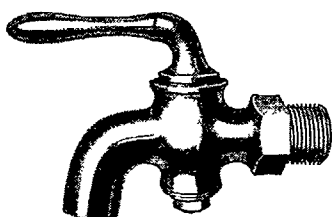
Size	Inches	3/8	1/2	3/4	1	1 1/4
No. 814	Each	1.25	1.35	2.00	3.00	4.50
End to end,	Inches	2 3/16	2 1/2	2 7/8	3 3/8	4 1/4

Brass Ground Key Faucets

When ordering, specify whether
Rough or Polished Faucets are wanted.

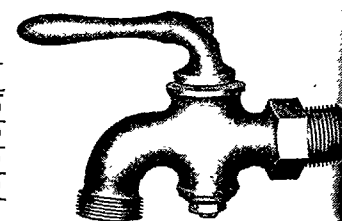
List Prices

Size	Inches	3/8	1/2	3/4	1
No. 800	Rough	Each 1.70	1.75	3.00	4.40
	Polished	Each 2.10	2.15	3.75	5.40
No. 801	Rough	Each 2.00	3.25	5.00	
	Polished	Each 2.40	4.00	6.00	
Size of Hose Thread		3/4"	3/4"	1"	



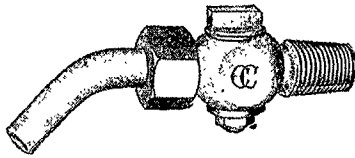
No. 800, Plain

No. 801 Faucets have Chicago Hose Threads on outlet.

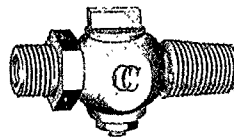


No. 801, For Hose

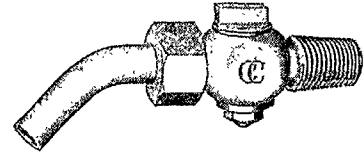
Brass Corporation Stops



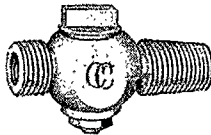
No. 830



No. 834

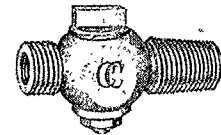


No. 831



No. 833

Size	Inches	1/2	5/8	3/4	1
No. 830	Each	.95	1.35	1.65	2.60
No. 831	Each	.95	1.35	1.65	2.60
No. 833	Each	.70	.95	1.15	1.85
No. 834	Each	.75	1.05	1.30	2.05
No. 837	Each	.70	.95	1.15	1.85



No. 837

No. 830 and No. 831 Stops have a long male thread on the inlet end, to fit Mueller, Payne, and Lennox taps. The outlet end has an inside thread to fit Mueller, Payne, and Lennox tapping machine screw plugs. These Stops have a $\frac{1}{8}$ bend (45°) tail-piece.

On No. 830 Stops, the outlet male thread engaging the union nut is one size larger iron pipe size ($\frac{5}{8}$ -inch Stops have $\frac{3}{4}$ -inch threads). On No. 831 Stops, the

outlet male thread is Mueller Standard.

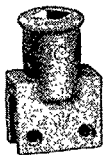
No. 833 Stops are the No. 830 with the union coupling omitted. No. 837 are the No. 831 with the union coupling omitted.

No. 834 Stops have male iron pipe threads on both ends. The $\frac{5}{8}$ -inch size has $\frac{3}{4}$ -inch threads.

No. 830 and No. 831 Stops can be furnished with a straight tail-piece, when so ordered.

8

Hydrant Clamps



No. 850
For Square Rod
Malleable Iron

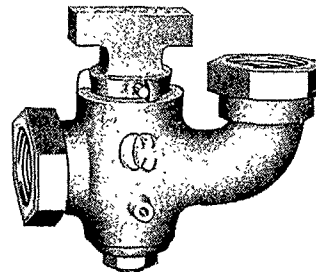
Orders should specify whether with square hole or tapped for pipe.



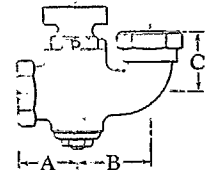
No. 850
Tapped for Pipe
Malleable Iron

		For Square Rod			Pipe Tap	
Size of rod or pipe	Inches	3/8	7/16	1/2	3/8	1/2
Width of slot	Inches	7/16	1/2	1/2	1/2	1/2
No. 850	Black	Each	.06	.08	.10	.13
	Galv.	Each			.12	.17

Brass Hydrant Stops



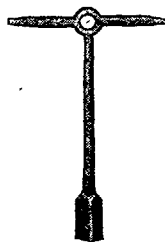
No. 816, Tee Head, With Check and Drain



Size	Inches	1/2	3/4	1	1 1/4
No. 816	Each	2.15	3.75	5.40	8.65
Dimensions	A	1 13/16	1 9/16	1 9/16	2 1/16
	B	1 13/16	2 1/8	2 7/16	2 11/16
	C	1 9/16	1 7/8	2 1/8	2 1/8

Street Washer

Keys



No. 856, Malleable Iron
Length, $8\frac{3}{4}$ Inches

No. 856	To fit $\frac{3}{8}$ -inch square rod	Each	.21
	To fit $\frac{1}{2}$ -inch square rod	Each	.23

Hydrant Handles



No. 860, Malleable Iron
To fit $\frac{3}{8}$ -inch Square Rod

No. 860	Each	.10
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Wood Rod Couplings

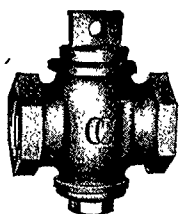


No. 854, Malleable Iron

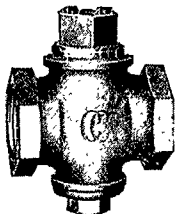
No. 854	Black	Per Set	.40
	Galv.	Per Set	.50

These couplings have a $\frac{3}{8}$ -inch pipe thread, and may be used with 1 or $1\frac{1}{8}$ -inch square rod.

Brass Gas Service Stops



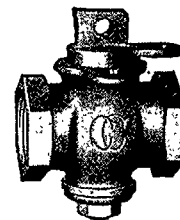
No. 270, Flat Head



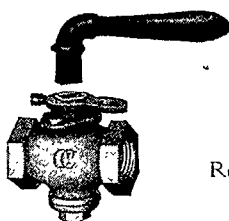
No. 272, Square Head



No. 276, Tee Head

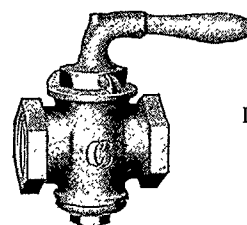
No. 278, Tee Head
With CheckNo. 284, Flat Head
With Lockup

Brass Gas Meter Stop



For
Apartment
Houses
No. 289
Removable Lever Handle,
With Lockup

Brass Gas Stove Stop



No. 298
Lever Handle,
With Check

8

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 270	Each	.90	1.00	1.10	1.30	2.10	3.25	4.60	8.00
No. 272	Each	.90	1.00	1.10	1.30	2.10	3.25	4.60	8.00
No. 276	Each	.90	1.00	1.10	1.30				
No. 278	Each	1.00	1.15	1.30	1.55				
No. 284	Each			1.40	1.60	2.50	3.85	5.35	9.00
No. 289	Each			1.50					
No. 298	Each	1.15	1.25	1.35	2.15	3.25			

Dimensions, End to End, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 270	1 5/8	1 7/8	2 1/16	2 3/8	2 11/16	3 5/16	3 11/16	4 9/16
No. 272	1 5/8	1 7/8	2 1/16	2 3/8	2 11/16	3 5/16	3 11/16	4 9/16
No. 276	1 5/8	1 7/8	2 1/16	2 3/8				
No. 278	1 5/8	1 7/8	2 1/16	2 3/8				
No. 284			2 1/8	2 5/8	3 1/16	3 5/16	3 11/16	4 1/2
No. 289			2					
No. 298	1 5/8	1 7/8	2 1/16	2 3/8	2 11/16			

The No. 284 Brass Gas Service Stops and the No. 289 Brass Apartment House Gas Meter Stop can be locked when in the closed position. The prices do not include a lock.

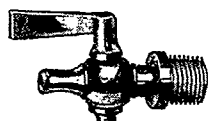
The No. 289 is recommended for use where a single gas stove or other appliance is connected to several meters, as in the laundry room of an apartment building. Each tenant can lock his own stop.

Wrenches ... page 96

Brass Pet Cocks

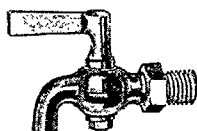


No. 700, Tee Head



No. 702, Lever Handle

Brass Cylinder Cocks



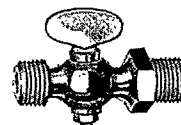
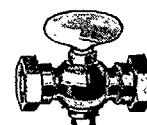
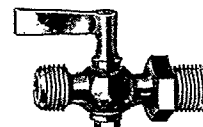
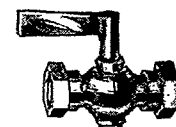
No. 724, Lever Handle

List Prices

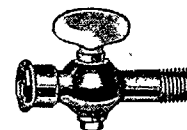
Size	Inches	1/8	1/4	3/8	1/2
No. 700	Each	.40	.45	.50	.60
No. 702	Each	.55	.60	.65	.75
No. 708	Each	.55	.65	.75	
No. 710	Each	.70	.80	.90	
No. 712	Each	.75	.85	.95	
No. 714	Each	.90	1.00	1.10	
No. 724	Each	.85	1.15	*	*
No. 744	Each		.75		

*For No. 724 Cylinder Cocks in sizes larger than 1/4-inch, use No. 800 Ground Key Faucets; see page 88

Brass Gauge Cocks

Male
No. 708, Tee HeadFemale
No. 712, Tee HeadMale
No. 710, Lever HandleFemale
No. 714, Lever Handle

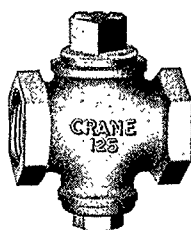
No. 744
Male and Female
Tee Head



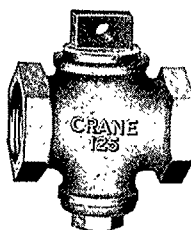
Standard Brass Steam Cocks

WORKING PRESSURES — 125 pounds steam
125 pounds cold water, oil, air, or gas, non-shock

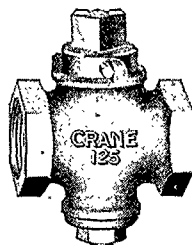
Air Tested



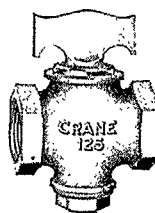
No. 250
Square Head



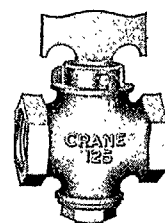
No. 252
Flat Head



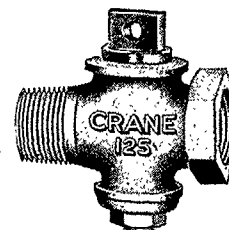
No. 254
Square Head
With Check



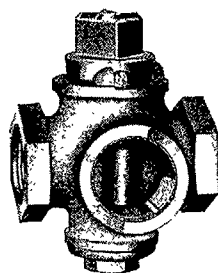
No. 256
Tee Head



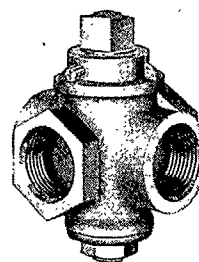
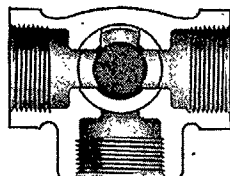
No. 258
Tee Head
With Check



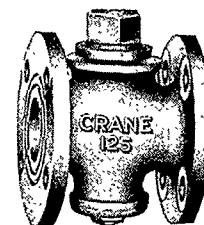
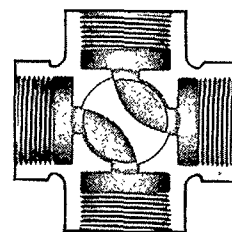
No. 266
Male and Female
Flat Head



No. 268, Three-Way
Square Head
With Check



No. 269, Four-Way
Square Head, With Check
Made to order only



No. 265
Flanged
Square Head

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
No. 250 or No. 252	Each		.85	1.00	1.25	1.70	2.35	3.70	4.85	7.30	14.50	22.50	
No. 254	Each				1.40	1.90	2.55	3.95	5.15	7.65			
No. 256	Each	.85	.85	1.00	1.25	1.70	2.35						
No. 258	Each	1.00	1.00	1.15	1.40	1.90	2.55						
No. 266	Each		1.35	1.45	2.00	2.50	3.00	5.35					
No. 268	Each		1.80	2.10	2.50	3.00	3.75	5.75	7.15	11.00			
No. 269	Each				6.00	8.50	11.00	14.50	17.50	25.00			
No. 265, Flanged, F.D.&S.F.	Each					5.50	7.30	9.70	11.75	18.00	27.50	43.00	84.00
No. 250, 252, 254, 256, and 258 End to end	Inches	1 5/8	1 5/8	1 3/4	2 1/16	2 7/16	3	3 1/2	3 3/16	4 9/16	5 3/4	6 7/8	
No. 266, End to end	Inches		1 15/16	2 3/16	2 1/2	2 7/8	3 3/8	4 1/4					
No. 268 or 269, Center to end	Inches		7/8	3 1/32	1 1/4	1 17/32	1 5/8	2	2 3/16	2 19/32			
No. 265, Face to face	Inches					2 11/16	3 1/8	3 3/4	4 3/8	5	6	7 3/8	9 3/8

Flanged cocks. The end flanges on No. 265 Cocks conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the

port and the bolt holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if cocks are ordered faced only. Full face gaskets should be used; see page 567.

Flange dimensions and templates for drilling ... page 550

Wrenches ... page 96

250-Pound Hard Metal Steam Cocks

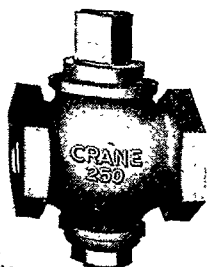
WORKING PRESSURES — 250 pounds steam
250 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 80 E	Each	1.40	1.75	1.75	2.40	3.60	6.00	7.75	11.50	23.00	35.00
End to End,	Inches	1 3/4	2	2 3/8	2 11/16	3 5/16	4	4 1/2	5 1/4	6 3/8	7 3/4

The body and plug are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness.

Wrenches ... page 96

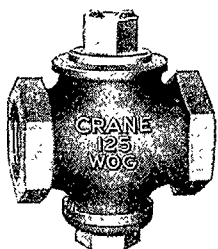


No. 80 E, Square Head

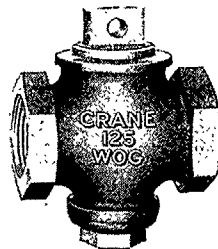
Standard Iron Cocks

WORKING PRESSURE — 125 pounds cold water, oil, air, or gas, non-shock

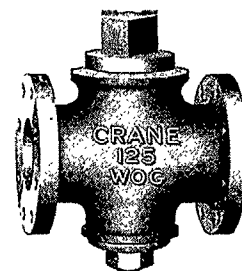
Air Tested



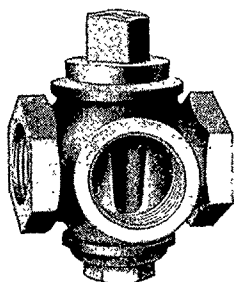
Square Head
No. 320, All-Iron
No. 322, With Brass Washer
No. 324, With Brass Plug and Washer



Flat Head
No. 320 1/2, All-Iron
No. 322 1/2, With Brass Washer
No. 324 1/2, With Brass Plug and Washer

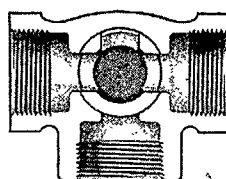


Flanged, Square Head
No. 325, All-Iron
No. 329, With Brass Plug and Washer

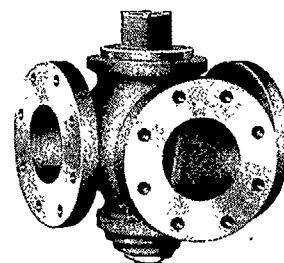


Three-Way, Square Head
No. 326, All-Iron
No. 330, With Brass Plug and Washer

All of these Cocks are regularly fitted with an iron nut.



Three-Way
Cross Section



Three-Way, Square Head, Flanged
No. 331, All-Iron
No. 335, With Brass Plug and Washer

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
No. 320	Black Each	.90	1.05	1.30	1.60	1.95	2.70	4.40	6.75	15.50
	Galv. Each	1.35	1.60	1.95	2.40	2.95	4.05	6.60	10.15	23.25
No. 320 1/2	Black Each	.90	1.05	1.30	1.60	1.95	2.70	4.40	6.75	15.50
	Galv. Each	1.35	1.60	1.95	2.40	2.95	4.05	6.60	10.15	23.25
No. 322 or No. 322 1/2	Black Each	1.00	1.20	1.55	1.95	2.35	3.20	5.15	7.75	19.00
	Galv. Each	1.40	1.75	2.15	3.00	4.15	5.75	9.50	14.00	40.00
No. 324 or No. 324 1/2	Black Each	1.75	2.15	2.60	3.55	4.85	6.70	11.00	16.30	45.25
	Galv. Each									
No. 325, Flanged, F. & D.	Black Each						4.25	6.25	9.50	19.00
No. 329, Flanged, F. & D.	Black Each						7.50	11.25	16.75	43.50
No. 326	Black Each		1.65	1.80	2.05	2.65	3.65	5.35	7.50	19.00
	Galv. Each		2.50	2.70	3.10	4.00	5.50	8.00	11.25	28.50
No. 330	Black Each		2.35	2.65	3.45	4.90	6.75	10.50	14.75	43.50
	Galv. Each		3.00	3.35	4.25	5.95	8.20	12.45	17.40	50.50
No. 331, Flanged, F. & D.	Black Each						7.00	9.00	12.75	26.00
No. 335, Flanged, F. & D.	Black Each						10.00	14.00	20.00	50.50

When so ordered, these Cocks can be furnished with a check, at an additional price.

Dimensions of Screwed Cocks, in Inches

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
End to end, Nos. 320, 322, 324		2 1/4	2 3/4	3 3/8	4 1/8	4 5/8	5 1/4	6 3/8	7 3/4	9 7/8
End to end, Nos. 320 1/2, 322 1/2, 324 1/2			2 3/4	3 3/8	4 1/8	4 5/8	5 1/4	6 3/8	7 3/4	9 7/8
Center to end of outlet, Nos. 326 and 330			1 7/16	1 11/16	2 1/16	2 1/4	2 5/8	3 3/16	3 7/8	5 1/16

Flanged cocks: The end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Prices include drilling to this Standard. No deduction is made if cocks are ordered faced only.

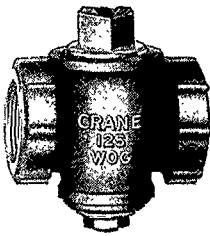
Dimensions of Flanged Cocks, in Inches

Size	2	2 1/2	3	4
Face to face	No. 325 or No. 329	6 3/8	8 5/8	9 5/8
	No. 331 or No. 335	6 3/8	8 5/8	9 5/8
Center to face of side opening	No. 331 or No. 335	4 1/8	4 5/16	4 13/16
Diameter of flanges		6	7	7 1/2
Thickness of flanges		5/8	1 1/16	3/4

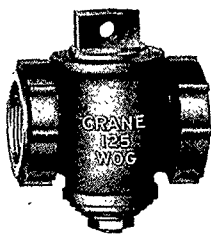
Iron Gas Line Cocks

WORKING PRESSURE — 125 pounds cold water, oil, air, or gas, non-shock

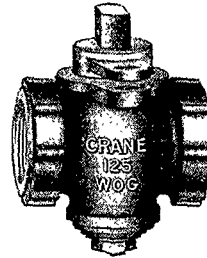
Air Tested



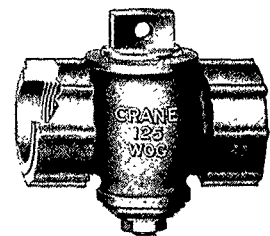
Square Head
No. 1228
With Brass Plug and Washer



Flat Head
No. 1232
With Brass Plug and Washer



Flat Head, with Lockup
No. 1234
With Brass Plug and Washer



Flat Head, with Recessed Ends
No. 1236
With Brass Plug and Washer

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 1228 Black	Each	1.55	1.85	2.40	3.25	4.95	7.20	14.70	21.10
No. 1232 Galv.	Each	1.65	1.95	2.55	3.45	5.20	7.60	15.50	22.20
No. 1234 Black	Each	1.85	2.15	2.80	3.85	5.70	8.20		
No. 1234 Galv.	Each	1.95	2.25	2.95	4.05	5.95	8.60		
End to end	Inches	2 1/4	2 5/8	3 1/4	3 3/4	4 1/4	5 1/16	6 3/8	7

List Prices and Dimensions

Size	Inches	3/4	1	1 1/4
No. 1236 Black	Each	2.35	2.90	3.75
No. 1236 Galv.	Each	2.45	3.05	3.95
End to end	Inches	3 5/8	4 1/4	4 3/4

Wrenches... page 96

When so ordered, the No. 1228 Cocks can be furnished with a check, at an additional price.

These sturdy, compact, full area cocks are especially suited for gas lines. They have a brass plug and washer, a cast iron body, and an iron nut.

All sizes of No. 1234 Cocks have a 1/2-inch hole for

Lockup in which a padlock or sealing pin may be used.

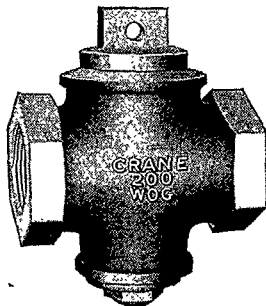
No. 1236 Cocks, ideal for underground installations, have a 1/2-inch recess at each end, which protects the threads and assists in supporting the pipe.

Heavy Duty Iron Cocks

WORKING PRESSURE

200 pounds cold water, oil, air, or gas, non-shock

Air Tested



Flat Head
No. 334, All-Iron
No. 336, With Brass Washer
No. 337, With Brass Plug and Washer

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 334 Black	Each	1.15	1.25	1.75	2.10	2.80	3.65
No. 334 Galv.	Each	1.75	1.90	2.65	3.15	4.20	5.50
No. 336 Black	Each	1.25	1.40	2.00	2.45	3.20	4.15
No. 337 Black	Each	1.80	2.40	3.05	4.20	6.00	7.50
No. 337 Galv.	Each	2.25	2.90	3.65	4.90	6.95	8.75
End to end	Inches	3	3 5/8	4	4 3/4	5 3/8	6 7/8

1" and 2" No. 336 Cocks are also known as "Oil Country Pattern".

Wrenches page 96

Iron Lock Cocks, Essex Pattern

WORKING PRESSURES

Standard — 175 pounds cold water, oil, air, or gas, non-shock

Extra Heavy — 350 pounds cold water, oil, air, or gas, non-shock

WORKING PRESSURES

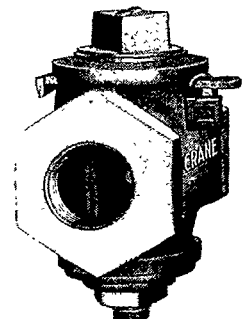
WORKING PRESSURE							
Size	Inches	No. 321, Standard			No. 323, Extra Heavy		
		2	3	4	2	3	4
Price	Each	4.00	8.00	14.00	5.00	10.00	17.50
End to end	Inches	6¾	8⅝	10	7⅞	9	11
Center to top	Inches	4¼	5½	7¾	4⅝	5¾	8½
Center to bottom	Inches	4⅝	6	6⅞	4¾	6	7⅝

Wrenches... page 96

Prices do not include lock.

Air Tested

These cocks can be locked open or closed.



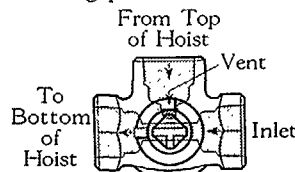
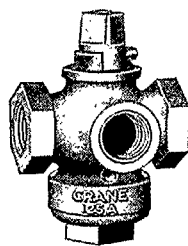
Square Head, with Brass Washer
No. 321, Standard
No. 323, Extra Heavy

Spring-Loaded Cocks

Air-Tested

Brass Three-Way Cocks For Air Hoists

125 pounds air working pressure



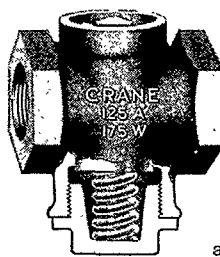
No. 308, Three-Way
Square Head With Check

No. 308 Cocks are designed for use on air hoists. The two diagrams above illustrate how they operate. Upper view (lifting position): pressure is admitted below piston, and air above escapes to atmosphere through vent in body of cock. Lower view (lowering position): with wrench turned 90°, supply is shut off, and air below piston is diverted to upper portion of cylinder.

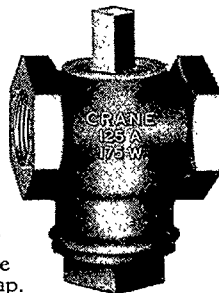
Size	Inches	3/8	1/2
No. 308, List Price	Each	5.00	6.30
Center to end,	Inches	1 1/16	1 7/32

Iron Mine Cocks WORKING PRESSURES

125 pounds air
175 pounds cold water, non-shock



No. 318
Triangular I-lead
With Lock Shield
With Brass Plug



No. 319
Square Head
With Brass Plug

The lock shield on the No. 318 prevents tampering. Use the triangular wrench, page 96. All-Iron Mine Cocks — prices on application.

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	3	4
Nos. 318 or 319	List Price	Each	2.50	2.75	3.25	4.25	6.00	9.00	31.00
	End to end,	Inches	2 1/4	2 5/8	3 1/8	4	4 1/4	5 1/8	9
No. 339	List Price	Each	3.80	5.30	8.00	12.60	19.70	30.00	
	Center to end,	Inches	1 5/16	1 9/16	1 15/16	2 1/4	2 5/8	3 1/2	

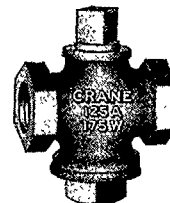
Spring loaded: All of the cocks shown on this page have a steel spring between the plug and the cap. The spring compensates for wear, assures tightness between the body and plug, and permits easy operation.

Wrenches... page 96

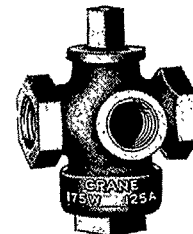
Brass Cocks

WORKING PRESSURES

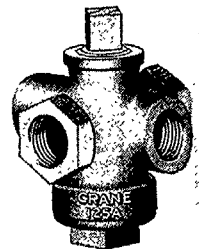
125 pounds air—175 pounds cold water, non-shock



No. 305
Square Head



No. 306 Square Head
Three-Way



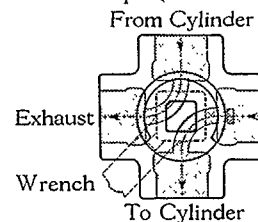
No. 307
Four-Way

Size	Inches		1/4	5/8	1/2	3/4
No. 305	List Price	Each	3.00	3.20	3.50	4.00
	C. to end,	Inches	31/32	31/32	13/32	113/32
No. 306	List Price	Each	3.50	4.00	4.80	
	C. to end,	Inches	31/32	11/16	13/32	
No. 307	List Price	Each	4.00	4.80	6.10	
	C. to end,	Inches	11/16	11/8	19/32	

Iron Four-Way Cocks

WORKING PRESSURES

250 pounds air—350 pounds cold water, non-shock

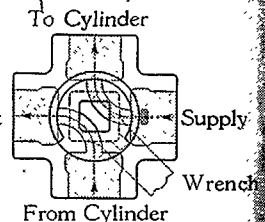


Exhaust

Wrench

Supply Exhaust

No. 339
Four-Way
Square Head
with
Brass Plug

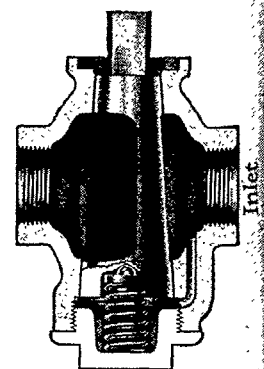


To Cylinder
From Cylinder

Wrench

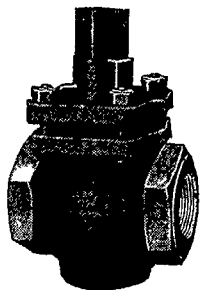
The No. 339 Cocks are used on hydraulic or air cylinders, hydraulic presses, etc. The two diagrams above illustrate how they operate. Left view: supply fluid is diverted to one end of cylinder, while fluid from opposite end passes into exhaust line; right view: with wrench turned 90°, action is reversed, moving piston in opposite direction.

The cocks must be installed as indicated. They have an equalizing duct in the body which leads from the inlet port to the chamber beneath the plug. Use series "M" wrenches, see page 96.



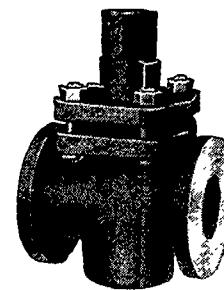
Inlet

Asbestos Packed Iron Cocks



WORKING PRESSURES

Standard U-Packed Cocks — 150 pounds steam
 Standard Bushing-Packed Cocks — 100 pounds steam
 Extra Heavy U-Packed Cocks — 250 pounds steam



List prices of Standard and Extra Heavy Flanged Cocks include facing and drilling to the American Cast Iron Flange Standards—125-Pound for the Standard Cocks and 250-Pound for the Extra Heavy Cocks. No deduction is made if the flanged cocks are ordered faced only.

Standard — Asbestos Packed Iron Cocks — List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
Screwed — U-Packed	Each	1.60	2.10	2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00
Flanged — U-Packed	Each			2.50	3.50	4.75	7.00	12.00	18.00	27.00	30.00	45.00	60.00
Screwed — Bushing-Packed	Each	1.75	2.30	2.75	3.85	5.25	7.75	13.25	20.00	30.00	35.00		
Flanged — Bushing-Packed	Each			2.75	3.85	5.25	7.75	13.25	20.00	30.00	35.00		
Screwed — U-Packed, Three-Way	Each	2.85	3.15	4.40	5.95	8.75	15.00	22.50	33.75	37.50	56.25	75.00	
End to end, Screwed	Inches	3 1/4	3 5/16	4 1/4	4 5/8	5 3/16	6	7 1/8	8 1/16	8 1/4	10 1/16	14 5/16	16 3/8
Face to face, Flanged	Inches			5 1/2	5 3/4	6	7 1/2	8 3/4	9 3/4	9 3/4	11 5/8	13 1/2	16 1/8
C. to E., Screwed, Three-Way	Inches	11 1/16	2 3/16	2 3/16	3 1/4	3 3/4	3 9/16	4	4 7/8				
Diameter of end flange	Inches			4 1/4	4 5/8	5	6	7	7 1/2	8 1/2	9	10	11
Thickness of end flange	Inches			7/16	1/2	9/16	5/8	11/16	3/4	13/16	15/16	15/16	1

Extra Heavy — Asbestos Packed Iron Cocks — List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
Screwed — U-Packed	Each	2.40	3.00	3.50	5.00	6.75	10.00	17.00	26.00	38.00	42.00	60.00	80.00
Flanged — U-Packed	Each						10.00	17.00	26.00	38.00	42.00	60.00	80.00
End to end, Screwed	Inches	3 1/16	3 3/4	4 3/4	5 1/8	6	6 5/8	8 1/4	9 1/4	9 1/4	13 1/8		
Face to face, Flanged	Inches						7 3/4	9 3/8	10 1/2	10 1/2	13 5/8	13 7/8	17
Diameter of end flange	Inches						6 1/2	7 1/2	8 1/4	9	10	11	12 1/2
Thickness of end flange	Inches						7/8	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16

Replacement Bushings and Rings for Standard Asbestos Bushing-Packed Iron Cocks — List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Bushings	Each	1.00	1.00	1.30	1.85	2.50	3.15	3.80	4.55	6.25	7.80
Top Rings	Each	.35	.35	.35	.35	.40	.55	.65	1.30	1.70	1.95

Iron Wrenches for Asbestos Packed Cocks — List Prices

Size of Cock	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
List price of Wrench	Each	.55	.55	.55	.75	.75	1.50	2.10	2.10	2.10	2.50	3.75	5.00

Service recommendations: Asbestos Packed Iron Cocks are recommended for use in steam, water, or oil lines; they are also suitable for tar, ammonia, acids, etc. Standard U-Packed Cocks are constructed for a maximum steam working pressure of 150 pounds; Extra Heavy U-Packed Cocks, for 250-pounds maximum pressure; and Standard Bushing-Packed Cocks for 100 pounds maximum pressure.

Construction: As the name implies, these cocks are made of cast iron and they are packed with asbestos.

U-Packed Cocks (sometimes referred to as "Channel-Packed Cocks") have a wide and deep groove around the two sides and the bottom of each port opening in the body. This groove is filled with an asbestos composition which is vulcanized in place. When the plug is installed, it seats upon the asbestos packings, and it does not touch the body metal. The open ends of the "U" at the top of the plug are closed

with the top ring which makes the seal complete.

Bushing-Packed Cocks are equipped with a vulcanized one-piece asbestos bushing of the same contour and pattern as the plug. This bushing fits into the body of the cock and separates the plug from the body so that direct contact between the two major parts of the cock is impossible. The upper end is sealed with a top ring similar to that used in U-Packed Cocks. This type of cock can be readily serviced in the field without removing the body from the line; the old worn bushing and ring are simply replaced with the new parts.

Asbestos Packed Iron Cocks can also be furnished Angle types or Ammonia patterns. Asbestos Packed Brass Cocks can also be furnished in Standard, Extra Heavy, Angle, or Three-Way patterns. Inquiries for special services or sizes not shown are solicited and prices are furnished on application.

Iron Body Wedge Gate Valves

Clamp Gate Valves.....pages 98 and 99

Low Pressure Valves.....page 100

Standard Valves.....pages 101 to 106

175-Pound Valves.....pages 108 and 109

250-Pound Valves.....pages 110 and 111

800-Pound Hydraulic Valves.....pages 112 and 113

By-Passes; Clean-Outs; Indicators; Lockup Caps.....page 114

Gearing; Grease Cases; Gear Covers; Stem Protectors.....page 115

Dimensions of Valves with Gearing or By-Pass.....pages 116 and 117

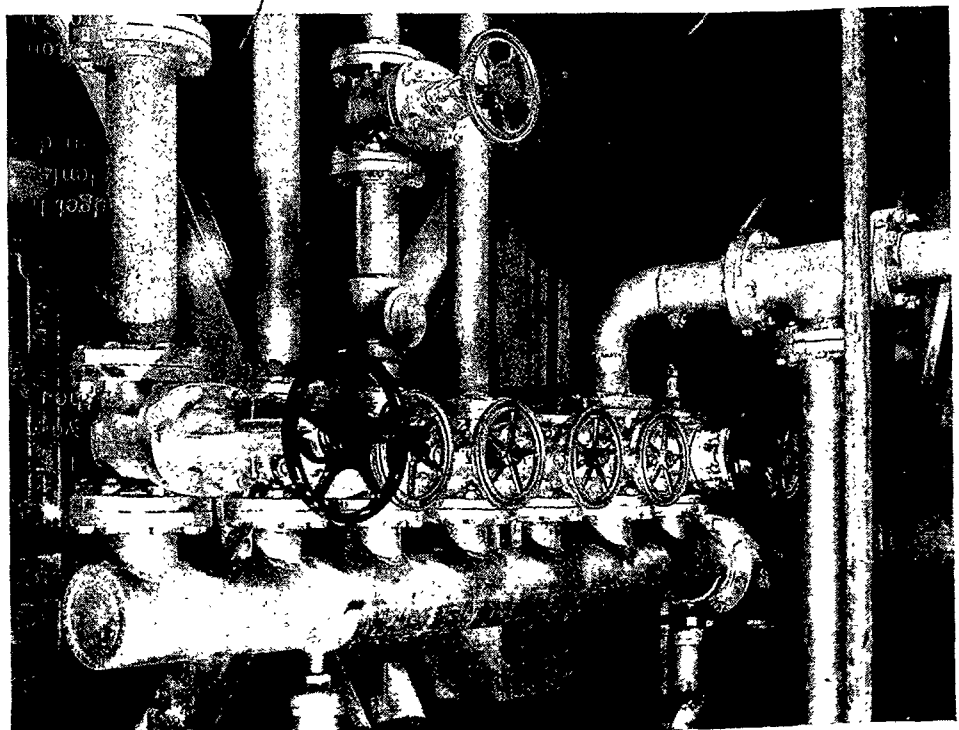
For Standard Valves for Marine service, see page 468.

For Alloy Cast Iron Valves for Process Industries, see page 456.

Crane Co. offers the user an unusually complete line of Iron Body Wedge Gate Valves. The line includes valves for steam pressures up to 250 pounds and for water, oil, or gas pressures up to 800 pounds. It includes brass trimmed valves in all pressure classes, all-iron valves in all pressure classes except the 800-Pound Hydraulic, Standard valves with "Exelloy" or "18-8 Mo" trimmings (Alloy Cast Iron, page 456), and Standard Valves for Marine service (page 468).

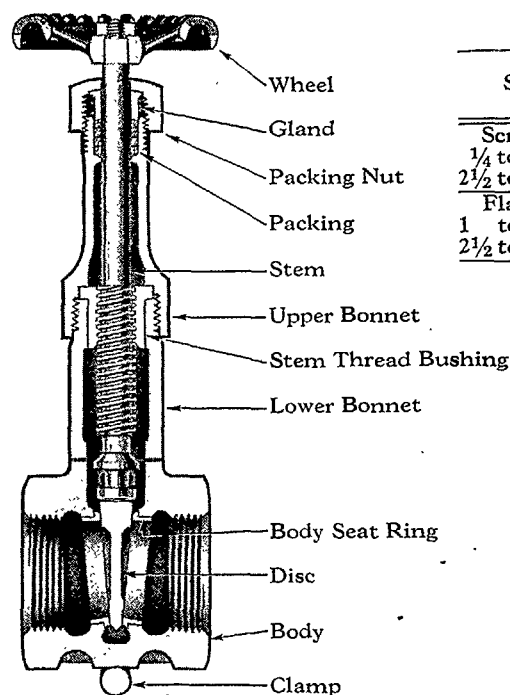
The Crane high standard of quality in design, materials, and workmanship is maintained in these valves, assuring the user satisfactory and long-time service.

Crane Iron Body
Wedge Gate Valves
on a welded mani-
fold in a paper mill.



Clamp Gate Valves

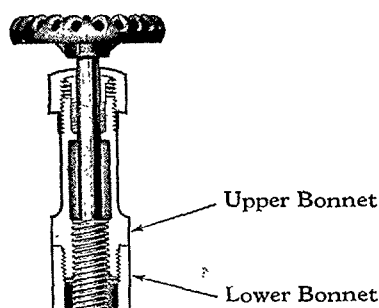
Wedge Disc—All-Iron or Brass Trimmed



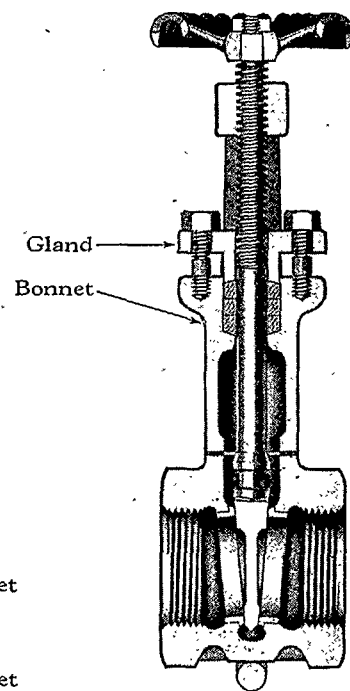
Inside Screw Valves
Sizes $\frac{1}{4}$ to 4-inch

WORKING PRESSURES		
Size	Saturated steam	Cold water, oil, or gas, non-shock
Screwed		
$\frac{1}{4}$ to 2-inch	150 pounds	225 pounds
$2\frac{1}{2}$ to 4-inch	125 pounds	175 pounds
Flanged		
1 to 2-inch	125 pounds	200 pounds
$2\frac{1}{2}$ to 4-inch	125 pounds	175 pounds

Air tested



Inside Screw Valves
Sizes $\frac{1}{4}$ to 1-inch



Outside Screw and Yoke Valves

9

Service recommendations: Crane Clamp Gate Valves are suited for a wide variety of service in process industries, in oil field or oil refinery installations, and wherever compact, sturdy valves are needed.

The brass trimmed valves are recommended for steam, water, air, or oil lines. The all-iron valves are recommended for oil, gas, or gasoline, or for fluids that corrode brass but not iron.

For special corrosive services which affect steel more than iron, the all-iron valves can be made to order with a malleable iron disc; prices on application.

Valves can also be furnished to order having all parts made of iron with the exception of a brass disc and brass body seat rings; prices on application.

Construction: The clamp construction enables dismantling the valve quickly for inspection, cleaning, or repairs. In addition, it maintains a snug and accurately aligned bonnet joint.

Brass trimmed valves: Brass trimmed valves have brass body seat rings, disc, and stem.

In inside screw valves $\frac{1}{4}$ to 1-inch, the upper portion of the bonnet engages the stem threads; it is made of brass and is renewable. Sizes $1\frac{1}{4}$ -inch and larger have a brass renewable stem thread bushing in the bonnet. This construction provides a full stem thread engagement, brass-to-brass, and assures long life of the stem threads.

Outside screw and yoke valves have a cast iron bolted gland.

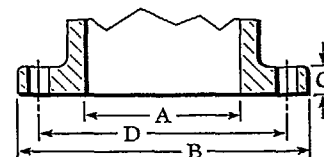
All-iron valves: The seats in all-iron valves are cast integral with the body. The disc is forged steel.

The stem is steel, the portion coming in contact with the stuffing box packing being nickel-plated.

The bonnet construction of all-iron inside screw valves $\frac{1}{2}$ -inch and larger is similar to that of brass trimmed valves, except that the top portion of the bonnet in sizes $\frac{1}{2}$ to 1-inch and the stem thread bushing in sizes $1\frac{1}{4}$ -inch and larger are made of malleable iron. $\frac{1}{4}$ and $\frac{3}{8}$ -inch all-iron valves have a one-piece cast iron bonnet.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

The flanges are plain faced with a smooth finish.



Dimensions of Flanges, in Inches

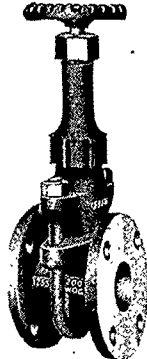
Size	A	B	C	D	No. of bolts	Dia. of bolts
1	1	$4\frac{1}{4}$	$\frac{7}{16}$	$3\frac{3}{8}$	4	$\frac{1}{2}$
$1\frac{1}{4}$	$1\frac{1}{4}$	$4\frac{5}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	4	$\frac{1}{2}$
$1\frac{1}{2}$	$1\frac{1}{2}$	5	$\frac{9}{16}$	$3\frac{3}{8}$	4	$\frac{1}{2}$
2	2	6	$\frac{5}{8}$	$4\frac{3}{4}$	4	$\frac{5}{8}$
$2\frac{1}{2}$	$2\frac{1}{2}$	7	$1\frac{1}{16}$	$5\frac{1}{2}$	4	$\frac{5}{8}$
3	3	$7\frac{1}{2}$	$\frac{3}{4}$	6	4	$\frac{5}{8}$
$3\frac{1}{2}$	$3\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{3}{16}$	7	8	$\frac{5}{8}$
4	4	9	$1\frac{5}{16}$	$7\frac{1}{2}$	8	$\frac{5}{8}$

Clamp Gate Valves

Wedge Disc — All-Iron or Brass Trimmed



Screwed
No. 488

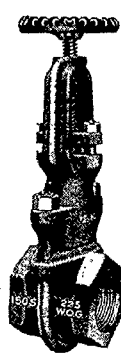


Flanged
No. 488 1/2

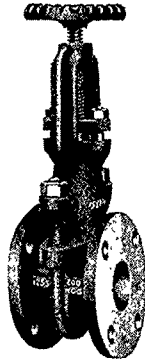
All-Iron

No. 490
Iron Body, Brass Trimmed

Inside Screw, Rising Stem



Screwed
No. 484 1/2

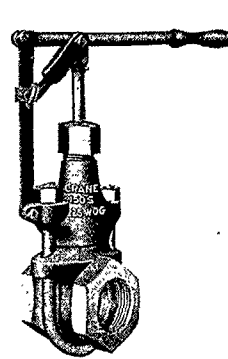


Flanged
No. 485 1/2

All-Iron

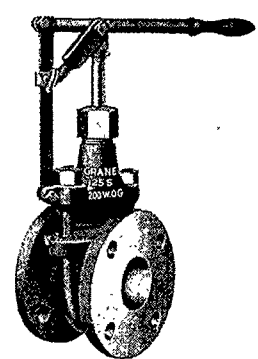
No. 486 1/2
Iron Body, Brass Trimmed

Outside Screw and Yoke



Screwed
No. 492

No. 494
Iron Body, Brass Trimmed



Flanged
No. 492 1/2

All-Iron

No. 494 1/2
Iron Body, Brass Trimmed

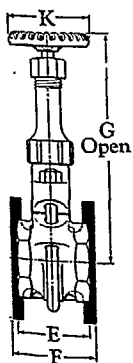
Quick Opening

List Prices, Each

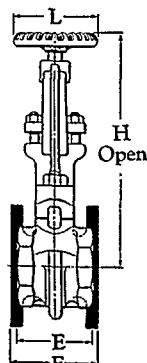
Size Inches	Inside Screw, Rising Stem				Outside Screw and Yoke				Quick Opening			
	Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.		Screwed		Flanged, F. & D.	
	No. 488	No. 490	No. 488 1/2	No. 490 1/2	No. 484 1/2	No. 486 1/2	No. 485 1/2	No. 487 1/2	No. 492	No. 494	No. 492 1/2	No. 494 1/2
1/4	4.00	3.50										
3/8	4.00	3.50										
1/2	4.20	3.70			10.50	9.90			7.40	7.00		
3/4	4.80	4.50			11.00	10.00			7.70	7.50		
1	5.50	5.00	16.00	15.00	11.50	11.00	22.00	21.00	8.50	8.00	25.00	24.00
1 1/4	6.30	6.00	18.00	17.00	14.00	14.00	23.00	22.00	10.00	10.00	27.00	26.00
1 1/2	7.00	7.00	19.00	18.00	16.00	17.00	24.50	24.00	12.00	12.50	28.00	27.00
2	10.00	10.00	20.00	20.00	21.00	22.00	26.00	26.00	19.00	19.00	29.00	29.00
2 1/2	16.00	17.00	29.00	30.00	36.00	37.00	42.00	42.00	29.00	30.00	47.00	48.00
3	20.00	21.00	35.00	37.00	42.00	44.00	46.00	47.00	35.00	36.00	53.00	54.00
3 1/2	40.00	46.00	70.00	77.00	80.00	85.00	90.00	92.00	52.00	64.00	85.00	94.00
4	51.00	48.00	80.00	88.00	100.00	98.00	100.00	107.00	55.00	66.00	87.00	98.00

When Quick Opening Valves are used in liquid lines, a suitable cushioning device should be installed to protect against water hammer; see page 11.

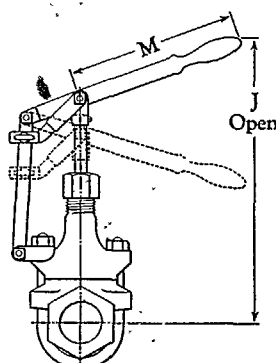
Drilling: The list prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made if valves are ordered faced only.



Inside Screw
Rising Stem



Outside Screw
and Yoke



Quick
Opening

Dimensions, in Inches

Size	E	F	G	H	J	K	L	M
1/4	1 7/8		4 1/2			2 1/16		
3/8	2		4 1/2			2 1/16		
1/2	2 1/16		6 1/4	6 1/2	7 1/4	2 1/16	2 9/16	6
3/4	2 5/16		7 1/2	7 1/2	9	2 9/16	2 9/16	7
1	2 9/16	3 3/16	8 1/2	9	9 3/4	2 3/4	2 3/4	7
1 1/4	2 7/8	3 1/2	10	10 1/4	11 3/4	3 1/16	3 1/16	7
1 1/2	3 1/8	3 3/4	11 1/2	12	14 1/2	3 5/8	3 5/8	9
2	3 5/8	4 1/4	13 1/2	13 3/4	16 1/4	4 1/16	4 1/16	9
2 1/2	4 1/8	4 15/16	15 3/4	16 1/2	19 1/2	4 3/4	4 3/4	11 1/4
3	4 9/16	5 1/16	18 1/2	19	21 1/2	5 3/8	5 3/8	11 1/4
3 1/2	5 1/16	5 15/16	21 1/4	20 3/4	23 3/4	7	7	15 1/4
4	5 9/16	6 3/4	24 1/4	23 3/4	28	9	9	15 1/4

Dimensions "E" (end to end) and "F" (face to face) apply also to Quick Opening Valves.

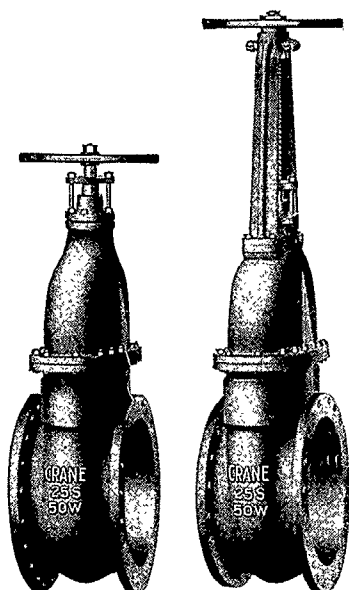
***Important Notice:** Flanged end valves in the 2-inch size were formerly furnished with a face to face dimension of 4 inches. With the issuance of

this catalog, valves having a new face to face dimension—4 1/4 inches, as shown in the table above—will be furnished.

Templates for drilling . . . page 551

Thread engagement . . . page 591

Low Pressure Iron Body Wedge Gate Valves Brass Trimmed or All-Iron



Non-Rising
Stem, Flanged

No. 491
Brass Seats
Brass Stem

No. 491½
All Iron

Outside Screw
and Yoke
Flanged

No. 493, Steel Stem
No. 496, Brass Stem
Brass Seats

No. 493½, All-Iron

RATINGS IN POUNDS PER SQUARE INCH

Size of valve	Working Pressures			Hydrostatic	
	Steam	Cold water non-shock	Cold gas	Shell test	Seat test
12 to 24-inch	25	50	25	75	65
30 and 36-inch	25	43	25	75	55
42 and 48-inch	25	35	25	50	45

List Prices and Dimensions.

Size Inches	List Prices, Each Faced and Drilled		Dimensions, in Inches					
	Non-Rising Stem	Outside Screw and Yoke	E	F	G	H	No. of turns to open	
	No. 491 or No. 491½	No. 493, No. 493½, or No. 496						
12	133.00	180.00	11	32½	59	16	25	
14	181.00	255.00	13½	36¼	64½	16	29	
16	260.00	350.00	14	40½	71½	18	33	
18	350.00	470.00	14½	44¾	79¼	18	37	
20	425.00	565.00	15½	48¾	88	20	41½	
*24	600.00	775.00	17	56½	106	22	49½	
*30	1100.00	1400.00	21	67½	127¾	24	62	
*36	1700.00	2150.00	24	79¼	150½	30	74	
*42	2450.00	3100.00	27		179			
*48	3400.00	4300.00	30		203½			

Larger sizes, prices on application.

*Should have by-pass. Prices on page 114; dimensions on page 117.

†Should be geared. Prices on page 115; dimensions on page 117.

Low Pressure Iron Body Wedge Gate Valves are especially suited for exhaust and low pressure saturated steam, and for gas or water lines.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water service.

The body seat rings and the disc faces are brass, and are rolled into the body and the disc.

Non-rising stem valves have a Cast Manganese Bronze stem; the disc is brass-bushed where it engages the stem threads.

Outside screw and yoke valves have a brass stem or a nickel-plated steel stem, as ordered.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass but not iron. The seats are cast integral with the body and the disc; the stem is steel, nickel-plated.

Stuffing box: The stuffing box is filled with high grade packing. The valves can be repacked when wide open and under pressure.

By-passes: Sizes 24-inch and larger should have a by-pass to enable equalizing the pressure on both sides of the disc before opening the main valve. See page 114 for prices and page 117 for dimensions.

Gearing: Sizes 42-inch and larger should be geared, to facilitate operation. See page 115 for prices and page 117 for dimensions.

Vacuum service: When valves for vacuum exhaust lines are desired, orders must so specify. Such

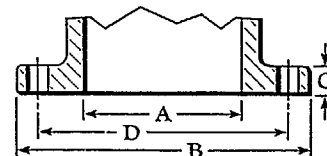
valves are especially air-tested to assure absolute tightness. An extra charge is made for air-testing.

Hub end valves: When Low Pressure hub end valves are required, use the Double Disc Gate Valves shown on pages 122 and 123.

Flange dimensions, facing, and drilling: The dimensions and drilling of the end flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931).

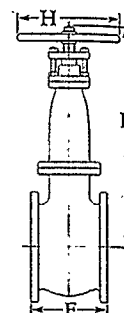
When so ordered, the end flanges can be drilled to the American Standard, Class 125. A full face gasket should be used.

List prices include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made if valves are ordered faced only.

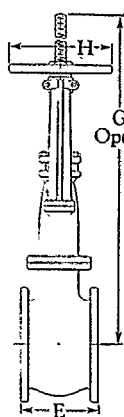


Dimensions of Flanges, in Inches

Size	A	B	C	D	No. of bolts	Dia. of bolts
12	12	19	1	17	12	5/8
14	14	21	1½	18¾	12	¾
16	16	23½	1½	21¼	16	¾
18	18	25	1¼	22¾	16	¾
20	20	27½	1¼	25	20	¾
24	24	32	1¾	29½	20	¾
30	30	38¾	1½	36	28	7/8
36	36	46	1½	42¾	32	7/8
42	42	53	1¾	49½	36	1
48	48	59½	2	56	44	1



Non-Rising



O. S. & Y.

Standard Iron Body Wedge Gate Valves

General Description

Crane Standard Iron Body Wedge Gate Valves sizes 12-inch and smaller are a new, improved design, embodying many features of unusual merit. They set a new peak for quality in iron body wedge gate valves, having greater strength, longer life, and better all-around adaptability for all types of services.

The line, unusually complete, includes the following valves:

Brass trimmed valves.....pages 102 and 103
All-iron valves.....pages 102 and 103
Underwriters' pattern valves.....page 104
Quick-Opening valves.....page 104
Valves for process industries.....page 456
Valves for marine service.....page 468

Body and bonnet: The cast iron body and bonnet are oval-shaped; liberal metal sections combined with proper metal distribution assure maximum strength. Flanged valves sizes 12-inch and smaller have straight through ports with tie ribs between the bonnet flange and the end flanges, providing additional resistance to line strains.

Disc: The disc is made of cast iron, and in brass trimmed valves has large brass seating faces rolled securely into machined dovetails. Sizes 12-inch and smaller are made to order with solid brass disc; prices on application.

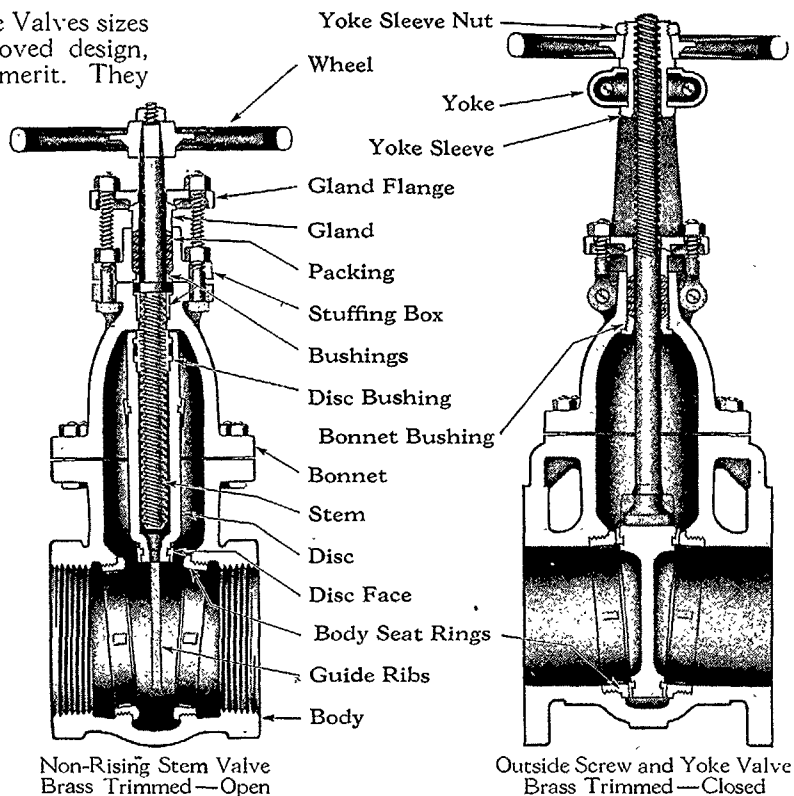
Sizes 12-inch and smaller have a solid web disc, the disc for the non-rising stem being built up at the center to accommodate the stem hole. In non-rising stem brass trimmed valves that portion of the disc that engages the stem threads is brass-bushed.

The valves have long disc guides consisting of ribs in the body and machined grooves in the disc. These minimize the drag on the seating surfaces and thereby prolong their life. In sizes 12-inch and smaller, where the disc guide is at least 50 per cent of the port diameter, the engaging surfaces are tapered to prevent a line bearing contact which would cause excessive wear of the guides.

Stem: The stem is of liberal diameter and amply strong. Stem threads have long engagement in the disc or yoke sleeve. Outside screw and yoke valves sizes 12-inch and smaller have a tee-head disc-stem connection; larger sizes have a threaded disc-stem connection, locked together with a pin.

Gland and stuffing box: These valves have a two-piece ball-type gland, consisting of a gland and a gland flange. This construction maintains an even load on the packing and prevents binding on the stem even when the gland bolt nuts are not pulled up evenly.

In sizes 12-inch and smaller, the non-rising stem valves have through bolts holding the stuffing box



These illustrations are representative of sizes 12-inch and smaller only; larger sizes are made similar to the higher pressure wedge gate valves shown on page 107.

to the bonnet, and the stem collar recess in the brass trimmed valves is brass-bushed, top and bottom, to minimize friction and to prevent corrosion. Outside screw and yoke valves in these sizes have swinging gland eye bolts which move out of the way when the stuffing box is being repacked but which will not become detached and lost.

The stuffing box is exceptionally deep and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure. Outside screw and yoke brass trimmed valves in sizes 12-inch and smaller have a brass stem hole bushing, offering a better back seat for the stem and making this point non-corrosive.

Yoke sleeve: The yoke sleeve used in outside screw and yoke valves is made of Cast Manganese Bronze.

Yoke: The yoke in O. S. & Y. valves 4-inch and smaller is cast integral with the bonnet. In larger sizes, the yoke consists of two halves which are bolted together at the top, and also to the bonnet.

Wheel: Wheels 24 inches or less in diameter are malleable iron, assuring maximum strength; they have an oval-shaped rim, affording an easy grip. Larger wheels are cast iron.

For Valves with Split-Wedge Disc, see page 105.

Standard Iron Body Wedge Gate Valves

Brass Trimmed or All-Iron

Size of valve	Working pressures			Hydrostatic test pressures	
	Screwed or flanged valves		Hub end valves	Screwed, flanged, or hub end valves	
	Saturated steam	Cold water, oil, or gas, non-shock	Cold water or gas non-shock	Shell test	Seat test
2 to 12-inch	125 pounds	200 pounds	200 pounds	350 pounds	225 pounds
14 and 16-inch	125 pounds	150 pounds	150 pounds	250 pounds	175 pounds
18 to 24-inch	*	150 pounds	150 pounds	250 pounds	175 pounds
30 to 48-inch	*	120 pounds	120 pounds	200 pounds	150 pounds

*For steam lines larger than 16-inch, Crane 150-Pound Cast Steel Gate Valves are recommended; see page 304.

Crane Standard Iron Body Wedge Gate Valves are sturdy, rugged, well proportioned valves which find wide application in nearly every kind of industry. Sizes 12-inch and smaller have been recently redesigned and now include many features of unusual merit, such as straight through ports in flanged end bodies with tie ribs between the bonnet flange and the end flanges, tee-head disc-stem connection in outside screw and yoke valves, solid web disc, brass bushed stem collar bearing in non-rising stem brass trimmed valves, etc. These and other features are described below or on the preceding page.

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil lines.

The body seat rings are brass, screwed into the body. The disc faces are brass, rolled into the disc.

In non-rising stem valves, the stem is Cast Manganese Bronze, and the disc is brass-bushed where it engages the stem threads. In sizes 12-inch and smaller, brass bushings are used above and below the stem collar to reduce friction and prevent corrosion.

Outside screw and yoke valves are made with a brass stem or a nickel-plated steel stem, as ordered. Sizes 12-inch and smaller have a tee-head disc-stem connection with a renewable brass bushing in the top of the bonnet.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied to order; prices on application.

The stem is steel, and the portion which comes in contact with the packing is nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Gland: These valves have a two-piece gland, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves or a nickel-plated steel gland in all-iron valves.

In sizes 12-inch and smaller, brass trimmed valves have Cast Manganese Bronze gland bolt nuts, and all-iron valves have zinc-plated steel gland bolts and

gland bolt nuts. The outside screw and yoke valves in these sizes have swinging type gland eye bolts.

Hub end valves: The hubs on hub end valves are suitable for Class "D" cast iron pipe. In place of a wheel, these valves have a square operating nut.

By-passes: A by-pass is recommended on Standard Valves sizes 14-inch and larger. The by-pass enables equalizing the pressure on both sides of the disc before opening the main valve. See page 114 for prices and page 117 for dimensions.

Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears. See page 115 for prices and page 117 for dimensions.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, is ideal for this purpose. For description, see pages 171 to 173.

Indicators: The stem of an outside screw and yoke valve indicates the position of the disc. Non-rising stem valves can be supplied with an indicator. See page 114.

Cleanouts: For use on lines carrying an unusual amount of sediment, tarry fluids, etc., flanged valves can be equipped with a cleanout on the side of the body to facilitate cleaning. See page 114.

Standards: Flanged valves conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch.

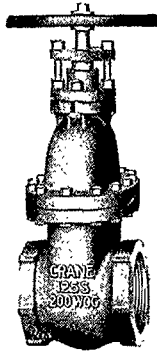
Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 125-Pound Cast Iron Wedge Gate Valves. This Standard includes sizes 2 to 24-inch, inclusive.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced with a smooth finish.

Flange dimensions are shown on page 106.

Standard Iron Body Wedge Gate Valves

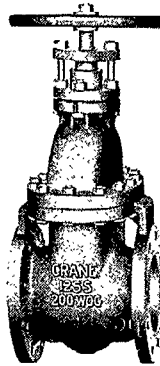
Brass Trimmed or All-Iron



Non-Rising Stem
Screwed

No. 460
Brass Seats, Brass Stem

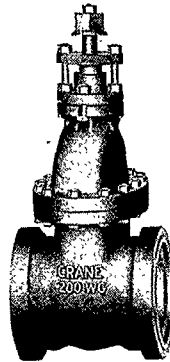
No. 472
All-Iron



Non-Rising Stem
Flanged

No. 461
Brass Seats, Brass Stem

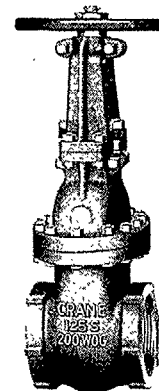
No. 473
All-Iron



Non-Rising Stem
Hub Ends

No. 462
Brass Seats, Brass Stem

No. 461½
All-Iron

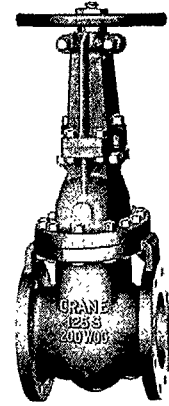


Outside Screw and Yoke
Screwed

No. 464
Brass Seats, Steel Stem

No. 464½
Brass Seats, Brass Stem

No. 475
All-Iron



Outside Screw and Yoke
Flanged

No. 465
Brass Seats, Steel Stem

No. 465½
Brass Seats, Brass Stem

No. 475½
All-Iron

For working pressures and description, see the preceding page.

List Prices, Each

Size	Non-Rising Stem			Outside Screw and Yoke	
	Screwed	Flanged, F. & D.	Hub Ends	Screwed	Flanged, F. & D.
Inches	No. 460 Brass Seats Brass Stem or No. 472 All-Iron	No. 461 Brass Seats Brass Stem or No. 473 All-Iron	No. 462 Brass Seats Brass Stem or No. 461½ All-Iron	No. 464 Brass Seats, Steel Stem, No. 464½ Brass Seats, Brass Stem, or No. 475, All-Iron	No. 465 Brass Seats, Steel Stem, No. 465½ Brass Seats, Brass Stem, or No. 475½, All-Iron
For sizes smaller than 2-inch, use Clamp Gate Valves. See page 99.					
2	10.00	12.00	10.00	19.00	21.00
2½	11.50	13.50		20.50	22.50
3	14.00	16.50	14.00	23.50	26.00
3½	17.00	19.50		27.00	29.50
4	19.00	23.00	19.00	32.50	36.50
5	27.50	31.50	27.50	45.00	49.00
6	32.50	36.50	32.50	52.00	56.00
8	54.00	58.00	54.00	86.00	90.00
10	90.00	95.00	90.00	131.00	136.00
12	125.00	133.00	125.00	172.00	180.00
*14		181.00	173.00		255.00
*16		260.00	250.00		350.00
*18		350.00	340.00		470.00
*20		425.00	415.00		565.00
*24		600.00	590.00		775.00
*30		1100.00	1075.00		1400.00
*36		1700.00	1675.00		2150.00
*42		2450.00	2400.00		3100.00
*48		3400.00	3350.00		4300.00

*Sizes 14-inch and larger should have a by-pass; see page 114 for prices and page 117 for dimensions.

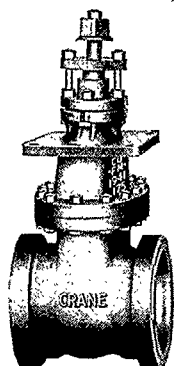
†Sizes 24-inch and larger should be geared; see page 115 for prices and page 117 for dimensions.

Drilling: Flanged valves are furnished faced and drilled (F. & D.), unless ordered faced only. List prices include facing and drilling to the American

Cast Iron Flange Standard, Class 125. When valves are ordered faced only, they will be furnished at the same price as for faced and drilled.

Standard Iron Body Wedge Gate Valves

Underwriters' Pattern

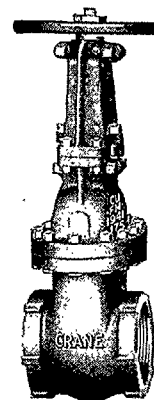


Non-Rising Stem
Hub Ends
No. 462 1/2

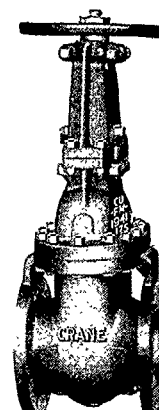
WORKING PRESSURE
175 pounds cold water, non-shock
HYDROSTATIC TEST PRESSURES
350 pounds shell 200 pounds seat

List Prices, Each

Size Inches	No. 462 1/2 Hub End	No. 467 1/2 Screwed	No. 467 Flanged, F. & D.
2 1/2		20.50	22.50
3		23.50	26.00
3 1/2		27.00	29.50
4	19.00	32.50	36.50
5		45.00	49.00
6	32.50	52.00	56.00
8	54.00	86.00	90.00
10	90.00		136.00
12	125.00		180.00



Outside Screw and Yoke Valves
Screwed
No. 467 1/2



Flanged
No. 467

These valves, designed for fire protection service, are similar to the valves described on the preceding three pages.

They conform to the Underwriters' Specifications known as "The National Standard". They are listed as approved and inspected by the Associated Factory-Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. The valves are marked "CU" and "FM".

Trimming: Body seat rings are brass, screwed into the body. Disc faces are brass, rolled into the disc.

The stem is brass, and the bonnet and stuffing box are brass-bushed where they come in contact with the stem. In non-rising stem valves, the disc is brass-bushed where it engages the stem threads.

The brass to brass contacts prevent corrosion and assure easy operation of the valve.

The gland is brass and is of the ball type; the gland flange is malleable iron. The gland nuts are brass.

Hub end valves: The hub ends fit Class "D" cast iron pipe. The bonnet has a square flange cast integral, to permit bolting on an indicator post when the valve is installed underground.

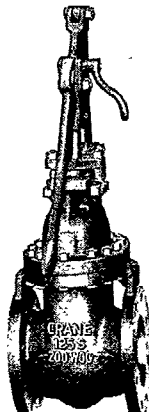
Outside screw and yoke: Outside screw and yoke valves are usually used indoors. The rising stem indicates whether the valve is open or closed.

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

Quick Opening—Brass Trimmed or All-Iron



Screwed
No. 470
Brass Trimmed



Flanged
No. 471
Brass Trimmed

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas, non-shock
HYDROSTATIC TEST PRESSURES
350 pounds shell 225 pounds seat

Except for the quick-opening mechanism and the disc-stem connection, these valves are the same as the outside screw and yoke valves described on the preceding three pages. To secure the extra rigidity necessary in this type of valve, the disc is threaded on the stem and pinned to it.

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. (No deduction for valves ordered faced only.)

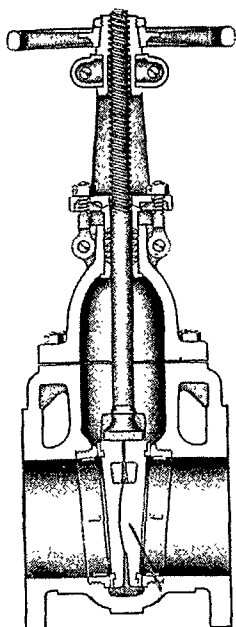
Shock: Closing one of these valves quickly on liquid lines may cause "water hammer". When severe, water hammer must be eliminated by installing a suitable cushioning device; see page 106.

List Prices, Each

Size Inches	No. 470 Brass Trimmed or No. 476 All-Iron	No. 471 Brass Trimmed or No. 477 All-Iron Flanged F. & D.
3	22.00	24.50
3 1/2	25.00	27.50
4	30.00	34.00
5	42.00	46.00
6	48.00	52.00
8		84.00
10		127.00
12		168.00

For sizes smaller than 3", see
Clamp Gate Valves (page 99)

Standard Iron Body Wedge Gate Valves With Split-Wedge Disc



Cross Section
Outside Screw and Yoke
Flanged
With
Split-Wedge Disc

**Prices
furnished
on application.**

WORKING PRESSURES

125 pound steam
200 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES

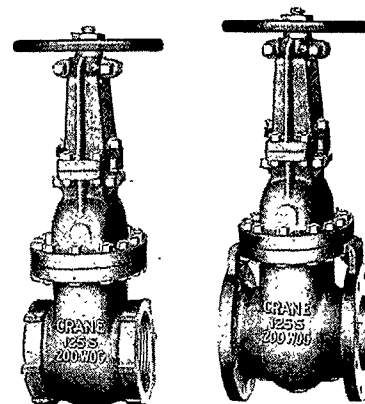
350 pounds shell 225 pounds seat

Except for their split-wedge disc, these Standard Iron Body Gate Valves are the same as those with solid wedge disc described on pages 101 to 103. All parts, including the disc, are interchangeable.

Split-Wedge Disc: The disc is made in two halves with large concave-convex contacting surfaces, assuring proper and uniform spreading action. It is ideal for use in valves which may require refacing of the body seat rings because of unusually severe service. The freedom of the two halves and the spreading movement at the point of closure compensate for the slight differences in taper and for the increased gauge after the body seat rings have been remachined.

The disc has a slot for the tee-head on the stem, and each half is completely guided on both sides. There are no auxiliary parts, and the two parts cannot become loose or separate when in service.

Available types and sizes: Valves with split-wedge disc are regularly made in the Outside Screw and Yoke pattern, with screwed ends in sizes 2 to 6-inch



Outside Screw and Yoke

Screwed
Sizes 2 to 6-inch

With
Brass Seats
and Brass Stem
or
All-Iron

Flanged
Sizes 2 to 12-inch

With
Brass Seats
and Brass Stem
or
All-Iron

inclusive and with flanged ends in sizes 2 to 12-inch inclusive. They are available with brass seating surfaces and brass stems or in all-iron construction.

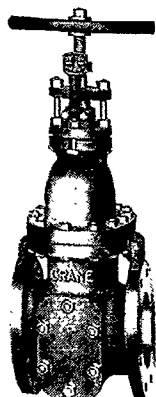
Dimensions: The dimensions of these valves are the same as those of Standard Iron Body Wedge Gate Valves with solid wedge disc; see page 106.

Standard Iron Body Gate Valves For Marine Service

The many improvements made in the new flanged end Standard Iron Body Wedge Gate Valves make them ideal for Marine service.

To comply fully with Marine Specifications, they can be furnished with a solid brass disc, with bronze gland bolts, and, in the Non-Rising Stem pattern, with an approved type indicator.

Typical of the Marine valves is the No. 4467 illustrated at the left. Equipped with an indicator and a single side clearout, it is particularly suited for cargo oil systems. The body has tapped and plugged bosses suitable for steaming-out connections. For complete description of the No. 4467 as well as other Standard Iron Body Wedge Gate Valves for Marine service, see page 468.



No. 4467, Flanged
Non-Rising Stem

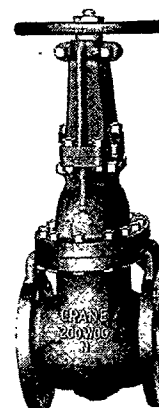
Standard Iron Body Gate Valves For Process Industries

Included in the Crane line of Standard Iron Body Wedge Gate Valves are alloy cast iron valves suitable for service in process industries.

Made with alloy cast iron body and either Exelloy or 18-8 Mo Alloy trimming, process industry valves are similar in design and construction to the Standard Valves described on the preceding pages.

They are available with flanged ends only in both the Non-Rising Stem and the Outside Screw and Yoke patterns.

The valves are ideal for many industrial services where superior corrosion resistance is desired. For complete description and list prices, see page 456.

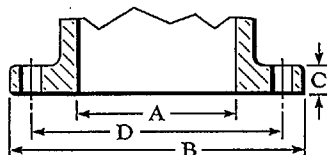


Outside Screw
and Yoke
Flanged
Exelloy or
18-8 Mo Alloy
Trimmed

Standard Iron Body Wedge Gate Valves

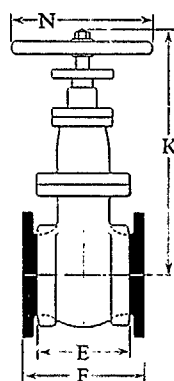
Dimensions, in Inches

For general description
of Standard Valves,
see pages 101 to 105.

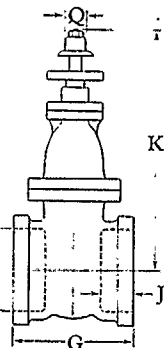


Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

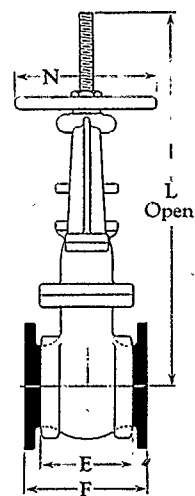
The flanges are plain faced, with a smooth finish.



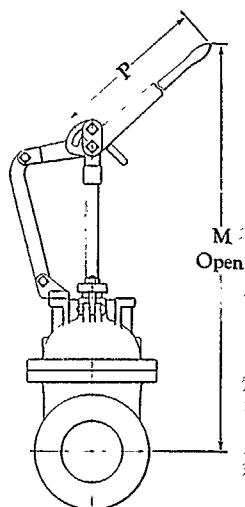
Screwed or
Flanged



Hub
Ends



Screwed or Flanged
O.S. & Y. Valve
Without By-Pass



Quick Opening Valve
Dimensions "E" and
"F" apply also to
Quick Opening Valves

Size	Flanges						E	F	G	H	J	K	L	M	N	P	Q	No. of turns to open
	A	B	C	D	Bolts													
					No.	Dia.												
2	2	6	5/8	4 3/4	4	5/8	6 1/8	7	8 3/4	3.25	2.75	12 3/4	14 3/4		8		2	7
2 1/2	2 1/2	7	1 1/16	5 1/2	4	5/8	6 1/2	7 1/2				13 5/8	17		8			8 1/2
3	3	7 1/2	3/4	6	4	5/8	6 3/4	8	9 1/4	4.66	2.75	15 1/2	19 1/2	25	9	12	2	10 1/2
3 1/2	3 1/2	8 1/2	1 3/16	7	8	5/8	7 3/8	8 1/2				16 1/2	21 1/4	28 1/2	9	12		12
4	4	9	1 5/16	7 1/2	8	5/8	7 5/8	9	10 3/8	5.70	3.00	18 1/2	23 3/4	34 1/2	10	15 1/2	2	9
5	5	10	1 5/16	8 1/2	8	3/4	8 1/2	10	10 3/4	6.75	3.00	21 1/4	28 3/4	39 1/2	12	23	2	11
6	6	11	1	9 1/2	8	3/4	8 7/8	10 1/2	11 1/4	7.80	3.00	23 3/8	32 5/8	44 1/2	12	23	2	13
8	8	13 1/2	1 1/8	11 3/4	8	3/4	10 1/4	11 1/2	13	10.00	3.50	27 3/8	41 7/8	67	16	29	2	17
10	10	16	1 3/16	14 1/4	12	7/8	11 3/8	13	13 3/4	12.10	3.50	33	50 1/4	70	20	41	2	21
12	12	19	1 1/4	17	12	7/8	12 5/8	14	14 1/2	14.20	3.50	36 1/4	58	73 3/4	20	41	2	25 1/2
14	14	21	1 3/8	18 3/4	12	1		15	13 3/4	16.50	3.50	42	67 3/4		20		2	30
16	16	23 1/2	1 7/16	21 1/4	16	1		16	16	18.75	4.00	48	76 1/4		22		2	34
18	18	25	1 9/16	22 3/4	16	1 1/8		17	17	20.87	4.00	49 3/4	83 1/2		24		2	38
20	20	27 1/2	1 11/16	25	20	1 1/8		18	17	23.00	4.00	54 1/2	91 1/4		24		2	42 1/4
24	24	32	1 7/8	29 1/2	20	1 1/4		20	18	27.25	4.00	64	109		30		3	50
30	30	38 3/4	2 1/8	36	28	1 1/4		24	24	34.00	4.50	78 1/2	137		36		3	95
36	36	46	2 3/8	42 3/4	32	1 1/2		28	27	40.50	4.50							
42	42	53	2 5/8	49 1/2	36	1 1/2		33	33	46.75	5.00							
48	48	59 1/2	2 3/4	56	44	1 1/2		36	36	53.00	5.00							

Face to face: The face to face dimensions of flanged valves conform to the American Petroleum Institute (A.P.I.) Standard, No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2 1/2, 3, 4, 6, 8, 10, and 12-inch.

Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 125-Pound Cast Iron Wedge Gate Valves. This Standard includes sizes 2 to 24-inch inclusive.

By-passes and gearing: Sizes 14-inch and larger should have a by-pass to enable equalizing the pres-

sure on both sides of the main valve before opening.

To facilitate operation, valves 24-inch and larger should be equipped with gears.

For dimensions of valves equipped with by-pass or gearing, see pages 116 and 117.

Bevel geared valves with by-pass: Bevel geared valves with by-pass have the by-pass on the bottom, with the stem of the by-pass valve parallel to the pinion shaft; see page 116 for illustration.

Hub dimensions: The hubs on the hub end valves are suitable for Class "D" cast iron pipe.

175-Pound, 250-Pound, and 800-Pound Hydraulic Iron Body Wedge Gate Valves General Description

175-Pound Valves.....pages 108 and 109
250-Pound Valves.....pages 110 and 111
800-Pound Hydraulic Valves.....pages 112 and 113

Crane 175-Pound, 250-Pound, and 800-Pound Hydraulic Wedge Gate Valves are very similar in construction, the important differences being in their proportions and in the materials used. The illustrations here show typical valves; the principal variations in construction are explained below. (These illustrations also are typical of Standard Iron Body Wedge Gate Valves sizes 14-inch and larger; see page 101).

Body and bonnet: All lines of valves have oval-shaped bodies and bonnets. Metal sections are more than ample, and the metal is distributed to assure maximum strength. In 175-Pound Valves, the body is made of Crane Ferrosteel; the bonnet is Ferrosteel in sizes 8-inch and larger, and cast iron in the smaller sizes. 250-Pound and 800-Pound Hydraulic Valves have a Ferrosteel body and bonnet.

Wedge disc: The disc is a single casting with tapered faces. Two ribs cast in opposite sides of the body engage machined slots in the disc. They guide the disc, and prevent contact between the seating surfaces until the valve is practically closed.

Except for certain small size valves having an all-brass disc, brass trimmed valves have a cast iron disc with brass seating faces in 175-Pound Valves and Crane Hard Metal seating faces in 250-Pound and 800-Pound Hydraulic Valves. The faces are securely rolled into machined dovetails in the disc, assuring tightness under pressure.

In all-iron valves, the seating faces are cast integral with the disc.

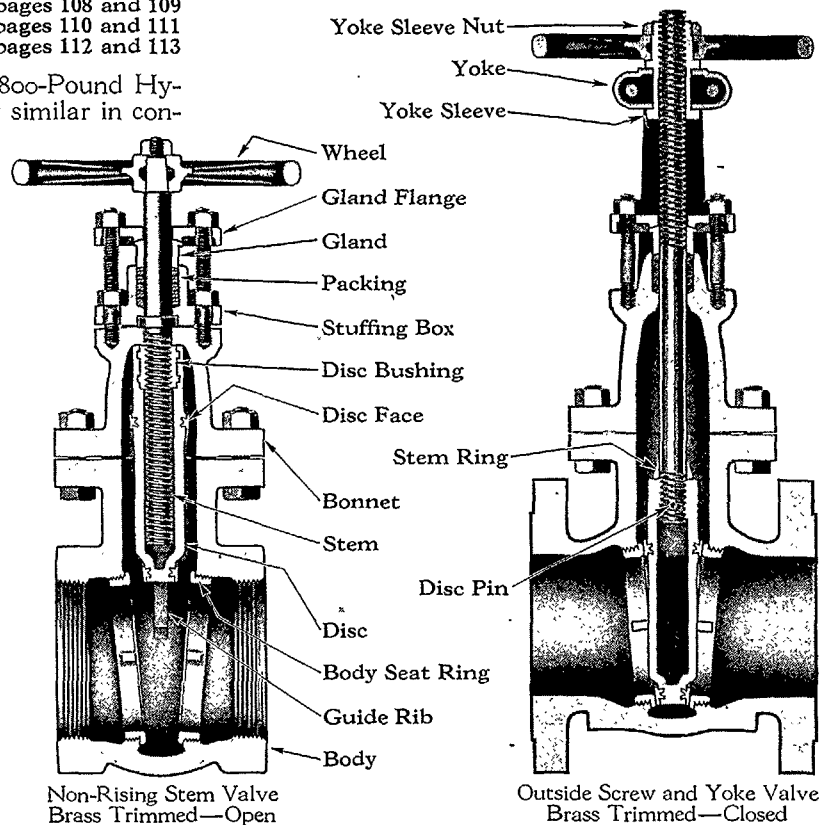
In brass trimmed non-rising stem, the portion of the disc that engages the stem threads is brass-bushed.

Body seat rings: In 175-Pound Brass Trimmed Valves, the body seat rings are brass; and in 250-Pound and 800-Pound Hydraulic Valves, Crane Hard Metal. They are screwed into the body.

All-iron valves are regularly furnished with the seats integral with the body. However, all-iron valves can be furnished with screwed-in body seat rings; prices on application.

Stem: In non-rising stem brass trimmed valves, the stem is Crane Cast Manganese Bronze. Outside screw and yoke brass trimmed valves have a rolled brass stem or a nickel-plated steel stem.

All-iron valves have a steel stem, the portion in



contact with the packing being nickel-plated.

Gland and stuffing box: These valves have a two-piece gland consisting of a gland flange and a gland. This construction prevents binding on the valve stem and assures an even load on the packing.

Stuffing boxes are packed with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

In non-rising stem valves, jamming the disc in the wide open position forces the stem collar against the machined top of the bonnet, making a pressure-tight joint. In outside screw and yoke valves, when the valve is jammed wide open, the tapered stem ring engages a tapered machined surface in the under side of the top of the bonnet, forming a tight joint.

Yoke: In the smaller size O. S. & Y. valves, the yoke is cast integral with the bonnet. In the larger sizes, the yoke consists of two halves which are bolted together at the top, and also to the bonnet.

Yoke sleeve: The yoke sleeve in outside screw and yoke valves is Crane Cast Manganese Bronze.

Wheel: Wheels having a diameter of 24 inches or less are made of malleable iron to assure maximum strength. They have an oval-shaped rim, affording an easy grip. Larger wheels are cast iron.

175-Pound Ferrosteel Body Wedge Gate Valves Brass Trimmed or All-Iron

Size of valve	Working Pressures		Hydrostatic Test Pressures	
	Saturated Steam	Cold water, oil, or gas, non-shock	Shell test	Seat test
2 to 12"	175 pounds	400 pounds	700 pounds	450 pounds

Crane 175-Pound Ferrosteel Body Wedge Gate Valves are designed to meet the requirements of service more severe than Standard Iron Body Valves can safely withstand but where the use of 250-Pound Valves is not justified. They are of high quality construction and are considerably heavier than the Standard Valves, affording an ample safety factor under all rated service conditions.

Body and bonnet: The body and bonnet are rigidly constructed, assuring adequate strength and freedom from distortion. All sizes have Ferrosteel bodies. Sizes 8-inch and larger have Ferrosteel bonnets; smaller sizes have cast iron bonnets.

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil, or for use on fluids that do not corrode brass or iron.

The brass body rings are screwed into the body. Disc faces are brass and are rolled into the disc.

The stem in the non-rising stem valves is made of Cast Manganese Bronze, and the disc is brass-bushed where it engages the stem threads.

Outside screw and yoke valves have a brass stem or a nickel-plated steel stem, as ordered. The brass stem acts as a safeguard against corrosion.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass but not iron.

These valves have the seats cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied to order; prices on application.

The stem is steel, the portion in contact with the stuffing box being nickel-plated.

Stuffing box: The stuffing box is packed with high grade packing and may be repacked while the valve is wide open and under pressure.

Gland: The gland is the two-piece type, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves, or a nickel-plated steel gland in all-iron valves.

By-passes: A by-pass is recommended on 175-Pound Valves sizes 8-inch and larger.

By-passes are made in "built-up" and "bolted" types. The built-up by-pass is furnished only on valves for steam lines; the bolted by-pass is furnished on valves for water, oil, or gas lines. See page 114 for prices and page 117 for dimensions.

Gearing: To facilitate operation, 10 and 12-inch valves can be equipped with gears. See page 115 for prices and page 117 for dimensions.

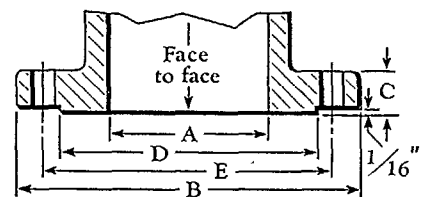
Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation, such as an electric or air motor drive, or an operating cylinder. For details, see pages 171 to 173.

Standards: Flanged valves conform to the A.P.I. Standard, No. 5-G-1, Second Edition, September, 1938, for 350-Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch. Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 175-Lb. Cast Iron Flanged Wedge Gate Valves. This Standard includes sizes 2 to 12-inch inclusive.

Flange dimensions and facings: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

End flanges are regularly furnished with a 1/16-inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

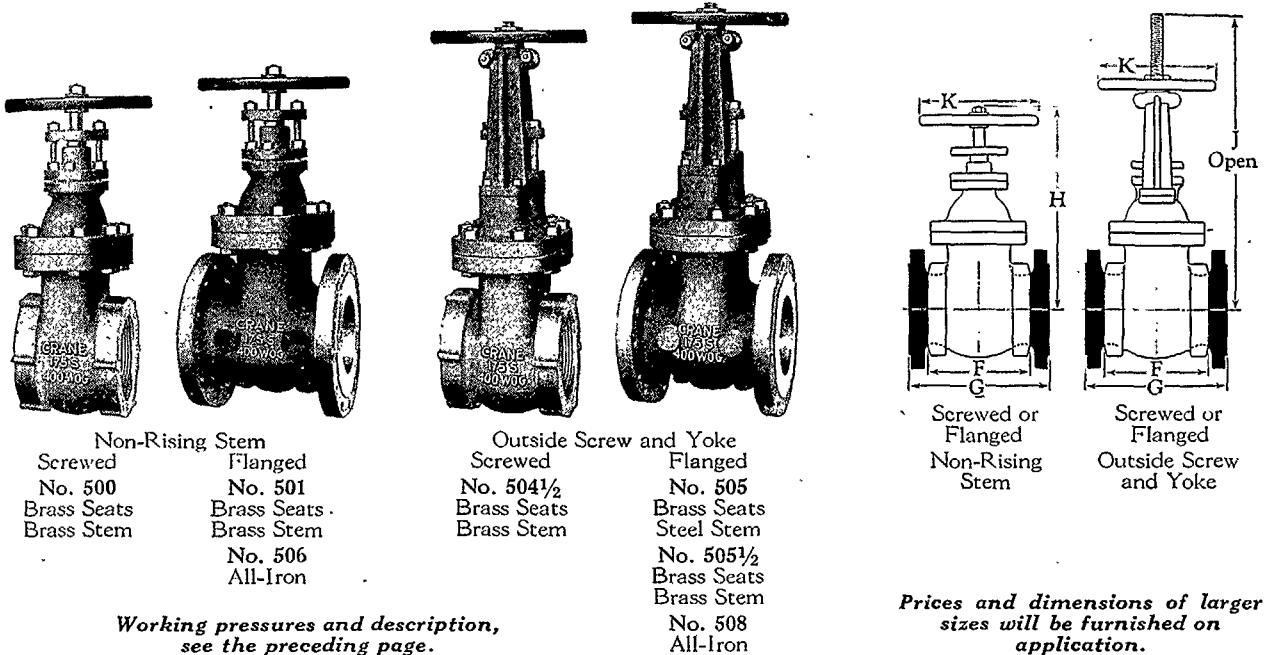


Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. of bolts
2	2	6½	7/8	43/16	5	8	5/8
2½	2½	7½	1	415/16	57/8	8	3/4
3	3	8¼	1⅛	511/16	65/8	8	3/4
3½	3½	9	13/16	65/16	7¼	8	3/4
4	4	10	1¼	615/16	77/8	8	3/4
5	5	11	13/8	85/16	9¼	8	3/4
6	6	12½	17/16	911/16	105/8	12	3/4
8	8	15	15/8	1115/16	13	12	7/8
10	10	17½	17/8	141/16	15¼	16	1
12	12	20½	2	167/16	17¾	16	1⅛
14	13¾	23	2⅛	1819/16	20¼	20	1⅛
16	15¼	25½	2¼	211/16	22½	20	1¼
18	17	28	23/8	235/16	24¾	24	1¼
20	19	30½	2½	259/16	27	24	1¼
24	23	36	2¾	305/16	32	24	1½

Additional description . . . page 107

175-Pound Ferrosteel Body Wedge Gate Valves Brass Trimmed or All-Iron



List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches					
	Non-Rising Stem		Outside Screw and Yoke		F	G	H	J	K	No. of turns to open
	No. 500 Screwed	No. 501 or No. 506 Flanged F. & D.	No. 504½ Screwed	No. 505, No. 505½, or No. 508 Flanged F. & D.						
2	15.00	17.50	24.50	27.00	5½	7¼	11½	15¼	8	6¾
2½	17.00	19.50	26.50	29.00	6	8	12¾	16¾	8	8¼
3	20.00	23.00	30.50	33.50	7¼	9¼	14¼	19½	9	10
3½	25.00	28.00	37.00	40.00	7½	10	15¼	21¾	9	11½
4	28.00	33.00	42.50	47.50	7¾	10½	17	24½	10	9
5	40.00	45.00	57.00	62.00	8½	11½	20	28¾	12	11
6	50.00	57.00	69.00	76.00	8¾	13	21½	32¾	12	25
* 8		94.00		123.00		14¼	25½	41¼	14	34
* 10		153.00		187.00		16¾	32¾	50¼	16	42
* 12		195.00		237.00		17½	36¼	57½	18	50

*Sizes 8-inch and larger should have a by-pass. See page 114 for prices and page 117 for dimensions.

†Sizes 10 and 12-inch can be equipped with gears. See page 115 for prices and page 117 for dimensions.

Drilling: List prices of flanged valves include facing to Flange Standard. No deduction is made if valves and drilling to the 250-Pound American Cast Iron are ordered faced only.

†Important Notice

Flanged valves in 2, 3, 6, 8, 10, and 12-inch sizes. Unless otherwise ordered, valves with the new face formerly had face to face dimensions other than to face dimensions are furnished. When so desired, valves having the old dimensions can be furnished (for prices, refer to the Crane Discount Sheet), but orders must specifically indicate that such valves are wanted.

Comparison of Face to Face Dimensions

Size	2	3	6	8	10	12
New	7¼	9¼	13	14¼	16¾	17½
Old	7½	9½	12	13½	15	16

250-Pound Ferrosteel Wedge Gate Valves Brass Trimmed or All-Iron

Crane 250-Pound Ferrosteel Wedge Gate Valves are admirably suited for a wide variety of service conditions requiring the use of rugged, substantially constructed valves. They will give excellent results on steam lines

where the pressure and temperature do not require the use of steel valves, on high pressure cold water lines, on natural gas lines, oil pipe lines, etc.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron approximately 35 per cent stronger than cast iron. Metal sections are more than ample, and the metal is distributed to provide maximum strength.

Brass trimmed valves: Brass trimmed valves are recommended for steam, water, or oil, or for other fluids that do not corrode brass or iron.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

In sizes 2-inch and smaller, the disc is Crane Special Brass; in the larger sizes, the disc is cast iron faced with Crane Hard Metal.

The stem in non-rising stem valves is Cast Manganese Bronze; the disc is brass-bushed where it engages the stem threads, except on the sizes having a solid Crane Special Brass Disc (1¼ to 2-inch).

Outside screw and yoke valves have a brass stem or a nickel-plated steel stem, as ordered. The brass stem serves as a safeguard against corrosion.

All-iron valves: All-iron valves are recommended for gas or oil service, or for fluids that corrode brass but not iron.

They have seats cast integral with the body and the disc. Valves with screwed-in body seat rings can be supplied when ordered; prices on application.

The stem is steel, the portion in contact with the packing being nickel-plated.

Stuffing box and gland: The stuffing box is packed with high grade packing. The valves, when wide open, can be repacked while under pressure.

The gland flange is malleable iron or steel; the gland is brass in brass trimmed valves and nickel-plated steel in all-iron valves.

By-passes: A by-pass is recommended on 250-Pound Valves sizes 6-inch and larger.

By-passes are made in "built-up" and "bolted" types. The built-up by-pass is furnished only on valves for steam lines; the bolted by-pass is furnished on valves for water, oil, or gas lines. See page 114 for prices and page 117 for dimensions.

Motor or cylinder operation: Valves used for emergency purposes or installed in inaccessible loca-

Size of valve	Working Pressures		Hydrostatic Test Pressures	
	Saturated steam	Cold water, oil, or gas, non-shock	Shell test	Seat test
1¼ to 12"	250 pounds	500 pounds	1000 pounds	550 pounds
14 and 16"	250 pounds	400 pounds	700 pounds	450 pounds
18 to 24"	*	400 pounds	700 pounds	450 pounds

*For steam lines larger than 16", Crane 300-Pound Cast Steel Gate Valves are recommended; see page 304.

tions should preferably be equipped with some easy means of operation such as an electric or air motor drive or an operating cylinder. See pages 171 to 173.

Gearing: To facilitate operation, valves 14-

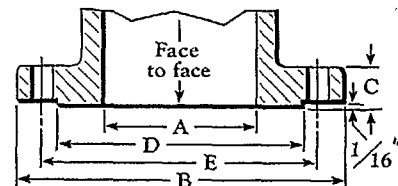
inch and larger should be equipped with gears. See page 115 for prices and page 117 for dimensions.

Standards: Flanged valves conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 500-Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch.

Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939) for 250-Lb. Cast Iron Flanged Wedge Gate Valves. This Standard includes sizes 2 to 12-inch inclusive.

Flange dimensions and facing: Dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

End flanges are regularly furnished with a 1/16-inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish. Valves with male, female, tongue, or groove faces can be furnished. See the Crane Discount Sheet for prices and page 560 for dimensions.

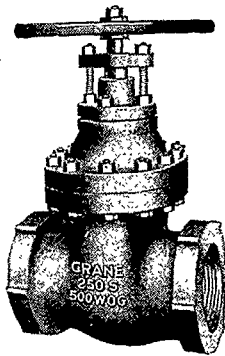


Dimensions of Flanges, in Inches

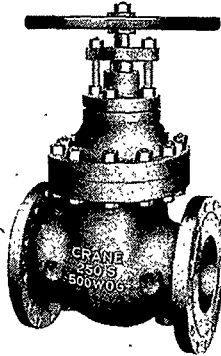
Size	A	B	C	D	E	No. of bolts	Dia. of bolts
1¼	1¼	5¼	¾	31/16	37/8	4	5/8
1½	1½	6½	13/16	39/16	4½	4	¾
2	2	6½	7/8	43/16	5	8	5/8
2½	2½	7½	1	415/16	57/8	8	¾
3	3	8¼	11/8	511/16	65/8	8	¾
3½	3½	9	13/16	65/16	7¼	8	¾
4	4	10	1¼	615/16	77/8	8	¾
5	5	11	13/8	85/16	9¼	8	¾
6	6	12½	17/16	911/16	105/8	12	¾
8	8	15	15/8	1115/16	13	12	7/8
10	10	17½	17/8	141/16	15¼	16	1
12	12	20½	2	167/16	17¾	16	11/8
14	13¼	23	23/8	1815/16	20¼	20	11/8
16	15¼	25½	2¼	211/16	22½	20	1¼
18	17	28	23/8	235/16	24¾	24	1¼
20	19	30½	2½	259/16	27	24	1¼
24	23	36	2¾	305/16	32	24	1½

Additional description...page 107

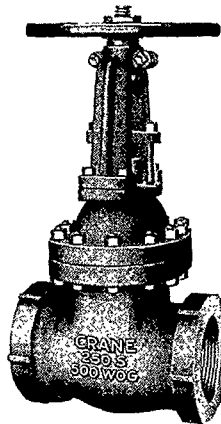
250-Pound Ferrosteel Wedge Gate Valves Brass Trimmed or All-Iron



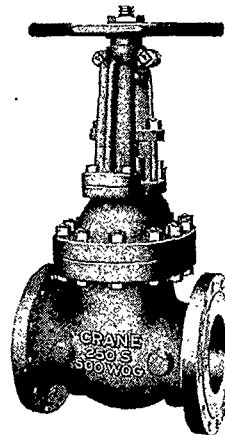
Non-Rising
Stem
Screwed
No. 2 E
Hard Metal Seats
Brass Stem
No. 4 E
All-Iron



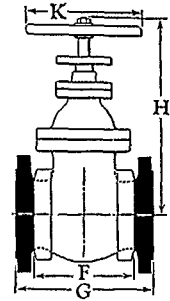
Non-Rising
Stem
Flanged
No. 3 E
Hard Metal Seats
Brass Stem
No. 8 E
All-Iron



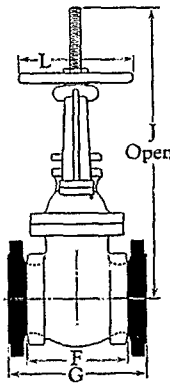
Outside Screw
and Yoke
Screwed
No. 6 E
Hard Metal Seats
Steel Stem
No. 6½ E
Hard Metal Seats
Brass Stem
No. 10 E
All-Iron



Outside Screw
and Yoke
Flanged
No. 7 E
Hard Metal Seats
Steel Stem
No. 7½ E
Hard Metal Seats
Brass Stem
No. 14 E
All-Iron



Screwed or Flanged
Non-Rising Stem



Screwed or Flanged
Outside Screw & Yoke

Working pressures and description,
see the preceding page.

List Prices, Each

Size	Non-Rising Stem		Outside Screw and Yoke		Outside Screw & Yoke						
	No. 2 E or No. 4 E Screwed	No. 3 E or No. 8 E Flanged F. & D	No. 6 E, No. 6½ E, or No. 10 E Screwed	No. 7 E, No. 7½ E, or No. 14 E Flanged F. & D.	Dimensions, in Inches						
Inches					F	G	H	J	K	L	Turns to open
1¼	24.00	26.50	34.50	37.00	5½	6½	9¼	11½	6	7	13½
1½	25.00	27.50	35.50	38.00	6¼	7½	9¾	13¼	7	8	12
2	27.50	30.00	38.50	41.00	7	8½	11	14½	8	8	15
2½	33.00	35.50	44.50	47.00	8	9½	13¼	17½	9	9	15½
3	45.00	48.00	58.00	61.00	9	11⅝	14¾	20½	10	10	14
3½	57.00	60.00	72.00	75.00	10	11¾	15½	22	10	10	16½
4	60.00	65.00	78.00	83.00	11	12	17½	24¾	12	12	18½
5	85.00	90.00	108.00	113.00	13½	15	20¼	29¾	14	14	23
*6	100.00	107.00	124.00	131.00	15⅞	15⅞	23	34½	16	16	27
*8	155.00	162.00	194.00	201.00	16½	16½	30¾	42¾	20	20	35
*10	250.00	258.00	297.00	305.00	18	18	36	52¾	22	22	38
*12	325.00	335.00	410.00	420.00	19¾	19¾	39¾	60	24	24	46
*14		440.00		540.00		22½	45¼	69¼	24	24	53
*16		675.00		800.00		24	49	76	27	27	60
*18		890.00		1030.00		26	52	83¾	30	30	67
*20		1075.00		1250.00		28	56	93	30	30	74
*24		1500.00		1700.00		31	68½	112¼	36	36	88

*Sizes 6-inch and larger should have a by-pass; see page 114 for prices and page 117 for dimensions.

†Sizes 14-inch and larger should be geared; see page 115 for prices and page 117 for dimensions.

Drilling: List prices of flanged valves include facing Flange Standard. No deduction is made if valves are and drilling to the 250-Pound American Cast Iron ordered faced only.

By-passes and gearing...pages 114 to 117 Templates for drilling...page 552 Thread engagement...page 591

800-Pound Hydraulic Ferrosteel Wedge Gate Valves Brass Trimmed

WORKING PRESSURE

800 pounds cold water, oil, or gas, non-shock

TEST PRESSURES

Shell test — 1600 pounds hydrostatic

Seat test — 850 pounds hydrostatic

Crane 800-Pound Hydraulic Ferrosteel Wedge Gate Valves are recommended for service on water, oil, or gas lines up to 800 pounds cold working pressure, non-shock.

Shock: When the valves are used in lines subjected to shock, properly designed shock absorbers should be installed to protect the piping and the valves; see explanation on page 111.

Body and bonnet: The body and bonnet of these valves are extremely heavy and rugged. They are made of Crane Ferrosteel.

Hard Metal seats: The body seat rings and disc faces are made of Crane Hard Metal, a tough, hard, copper-tin bronze having excellent resistance to wear.

The body seat rings are screwed into the body.

Stem: The valves are made with a brass stem. The brass stem acts as a safeguard against corrosion.

Stuffing box and gland: High grade packing is used in the stuffing box. The valves can be repacked when wide open and under pressure. The gland consists of two pieces, a malleable iron gland flange and a brass gland.

By-passes: A by-pass is recommended on 800-Pound Gate Valves sizes 5-inch and larger. It enables equalizing the pressure on both sides of the disc before opening the main valve. See page 114 for prices and page 117 for dimensions.

Gearing: 800-Pound Valves 10-inch and larger should be equipped with gears, to facilitate operation. The several styles of gearing are shown on page 115. For dimensions of gear-equipped valves, see page 117.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, is ideal for this purpose. For description, see pages 171 to 173.

Standards: Flanged valves conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 800-

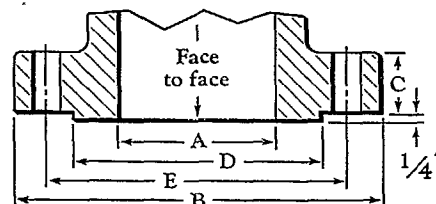
Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch.

Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939) for 800-Lb. Hydraulic Cast Iron Flanged Wedge Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16.11-1931).

800-Pound Valves are regularly furnished with a ¼-inch male face (large male) on the end flanges. The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

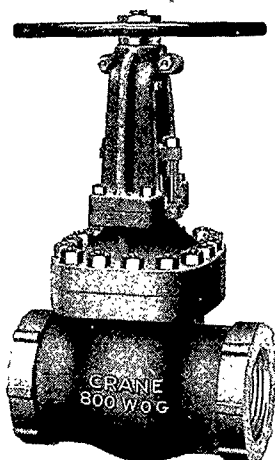
Valves with female, tongue, or groove faces are made to order. See page 561 for dimensions and the Crane Discount Sheet for prices.



Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. of bolts
2	2	6½	1¼	3⅝	5	8	⅝
2½	2½	7½	1⅜	4⅛	5⅞	8	¾
3	3	8¼	1½	5	6⅝	8	¾
4	4	10¾	1⅞	6⅜	8½	8	⅞
5	5	13	2⅛	7⅝	10½	8	1
6	6	14	2¼	8½	11½	12	1
8	7⅞	16½	2½	10⅝	13¾	12	1⅛
10	9¾	20	2⅞	12¾	17	16	1¼
12	11¾	22	3	15	19¼	20	1¼

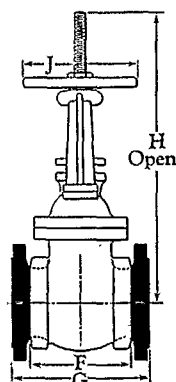
800-Pound Hydraulic Ferrosteel Wedge Gate Valves Brass Trimmed



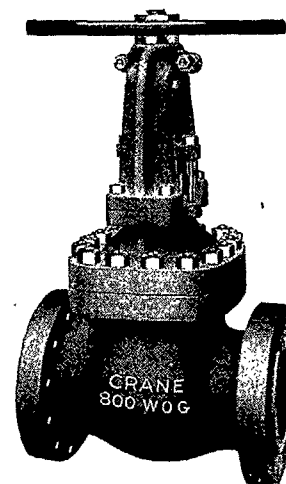
Outside Screw and Yoke
Screwed

No. 804½ H
Hard Metal Seats
Brass Stem

*For working pressures and description,
see the preceding page.*



Screwed or
Flanged



Outside Screw and Yoke
Flanged

No. 805½ H
Hard Metal Seats
Brass Stem

*These valves can be made to order with a steel
stem; prices are furnished on application.*

List Prices and Dimensions

Size Inches	List Prices, Each		Dimensions, in Inches				
	No. 804½ H Screwed	No. 805½ H Flanged, F.&D.	F	G	H	J	No. of turns to open
2	43.50	48.50	11½	11½	18½	10	9½
2½	65.00	73.00	13½	13	20¾	12	12
3	88.00	97.00	14½	14	23½	14	14
4	122.00	129.00	16½	17	28	16	18
* 5	162.00	172.00	18½	20	32¼	18	23
* 6	211.00	226.00	20	22	36¾	20	27
* 8		340.00		26	46¼	24	30
*†10		532.00		31	53¾	27	38½
*†12		695.00		33	63¾	30	45

*Sizes 5-inch and larger should have a by-pass. See page 114 for prices and page 117 for dimensions.

†Sizes 10-inch and larger should be geared. See page 115 for prices and page 117 for dimensions.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard. When valves are ordered faced only they are furnished at the same price as for faced and drilled.

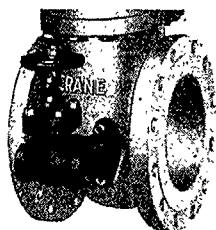
By-passes: A by-pass is recommended on 800-Pound Gate Valves sizes 5-inch and larger. It enables equalizing the pressure on both sides of the

disc before opening the main valve. See page 114 for prices of by-passes and page 117 for dimensions of valves with by-passes.

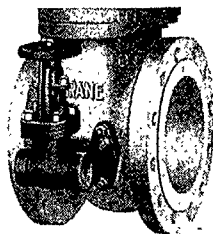
Gearing: These valves in sizes 10 and 12-inch should be equipped with gears, to facilitate operation.

The several styles of gears and prices are shown on page 115; dimensions of valves with gears are shown on page 117.

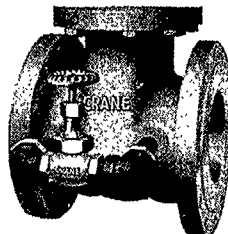
By-Passes for Iron Body Wedge Gate Valves



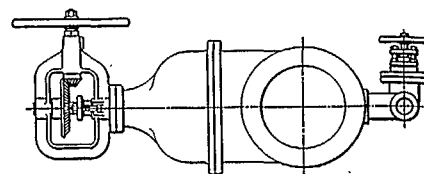
Bolted By-Pass
Non-Rising Stem



Bolted By-Pass
Outside Screw and Yoke



Built-Up By-Pass
For Steam only



Bevel geared valves with by-pass have the by-pass on the bottom of the valve, as shown in the illustration above.

Extra List Prices for Bolted By-Pass For Flanged or Hub End Valves					Extra List Prices for Built-Up By-Pass For Flanged End Valves			
Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Non-Rising Stem By-Pass Each	O. S. & Y. By-Pass Each	Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Built-Up By-Pass Each
Low Pressure Page 100	14	2	49.00	54.00	175-Pound Page 109	6 and 8	3/4	36.00
	16 to 20	3	74.00	80.00		10 and 12	1	50.00
	24 and 30	4	99.00	106.00	250-Pound Page 111	5 to 8	3/4	43.00
	36 and 42	6	140.00	152.00		10 and 12	1	66.00
	48	8	190.00	208.00		14 and 16	1 1/4	75.00
Standard Page 103	12 and 14	2	49.00	54.00				
	16 to 20	3	74.00	80.00				
	24 and 30	4	99.00	106.00				
	36 and 42	6	140.00	152.00				
	48	8	190.00	208.00				
175-Pound Page 109	6	1 1/4	36.00	43.00				
	8	1 1/2	43.00	50.00				
	10	1 1/2	50.00	58.00				
	12	2	58.00	66.00				
250-Pound Page 111	5 and 6	1 1/4	43.00	51.00				
	8	1 1/2	50.00	58.00				
	10	1 1/2	66.00	76.00				
	12 and 14	2	75.00	86.00				
	16 to 20	3	112.00	125.00				
800-Pound Hydraulic Page 113	24	4	164.00	180.00				
	5 and 6	1 1/4		80.00				
	8 and 10	1 1/2		94.00				
	12	2		115.00				

Dimensions . . . pages 116 and 117

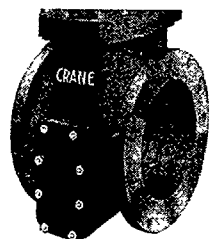
When so ordered, Crane Hub End and Flanged End Iron Body Wedge Gate Valves can be furnished with a by-pass. Extra list prices are shown in the table.

By-passes for screwed end valves will be furnished on special order; prices on application.

The bolted by-pass will be supplied on Low Pressure, Standard, and 800-Pound Valves; also on 175 and 250-Pound Valves when not specifically ordered for steam. Non-rising stem valves will be equipped with a non-rising stem by-pass; O. S. & Y. valves, with an O. S. & Y. by-pass.

The built-up by-pass will be supplied only on 175 and 250-Pound Valves when specifically ordered for steam.

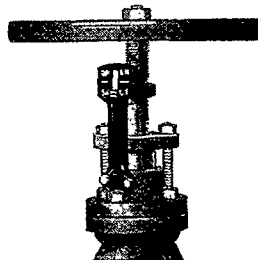
Cleanouts and Indicators For Standard Iron Body Wedge Gate Valves



Side Cleanout
(For Flanged Valves)

Size of Flanged Valve Inches	Extra for Side Cleanout Each
3	6.50
4	7.50
5	9.00
6	10.50
8	12.00
10	15.00
12	16.50

Cleanouts should be used where sediment will accumulate in a valve. They may be either on the side as listed here, or on the bottom. Prices on bottom cleanouts are furnished on application.



Needle and Slot Indicator

Indicators of the Needle and Slot type may be applied to Standard Non-Rising Stem Valves 12-inch and smaller. Prices on application.

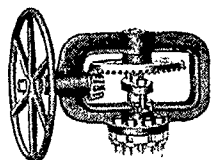
Lockup Caps



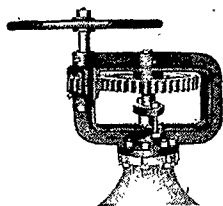
Lockup Caps

Lockup caps can be furnished for any class of Crane Non-Rising Stem Gate Valve. Prices on application.

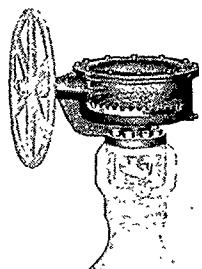
Gearing for Iron Body Wedge Gate Valves



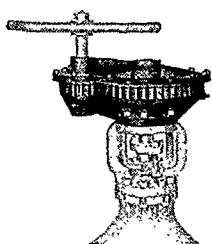
Style U, Bevel Gearing
Non-Rising Stem



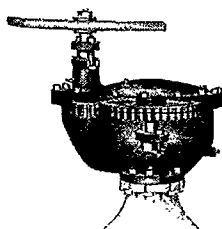
Style S, Spur Gearing
Non-Rising Stem



Grease Case on Style U
Bevel Gearing for
Non-Rising Stem Valves



Grease Case on Style S
Spur Gearing for
Non-Rising Stem Valves



Pressure-Tight
Grease Case
Enclosing Stuffing Box
and Gland, for Non-Rising
Stem Geared Valves
Prices on application

When desired, Crane Iron Body Wedge Gate Valves can be supplied with gears. Extra list prices are shown below.

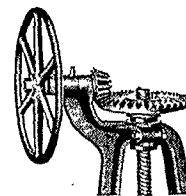
Bevel gearing: Unless otherwise ordered, non-rising stem bevel geared valves are furnished with the pinion shaft extending at right angles to the run of the valve. They can also be furnished with the shaft parallel to the run.

With Style N bevel gearing for outside screw and yoke valves, the pinion shaft extends at right angles to the run of the valve; with Style O, parallel to the run. Unless otherwise ordered, Style N will be furnished.

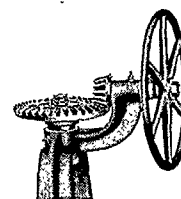
Grease cases and gear covers: Non-rising stem bevel or spur geared valves can be supplied with a grease case completely enclosing the gears. A sheet metal guard (not illustrated) can be built around the stuffing box or a pressure-tight grease case can be furnished; prices on application.

Outside screw and yoke valves can not be equipped with a grease case, but can be supplied with a gear cover.

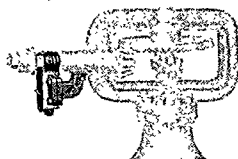
Indicator: Non-rising stem geared valves can be supplied with a worm-gear indicator; prices on application.



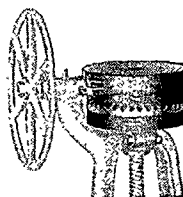
Style N
Bevel Gearing
Outside Screw and Yoke



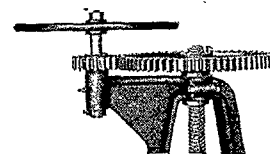
Style O
Bevel Gearing
Outside Screw and Yoke



Worm-Gear Indicator
For Non-Rising Stem Valves
Prices on application



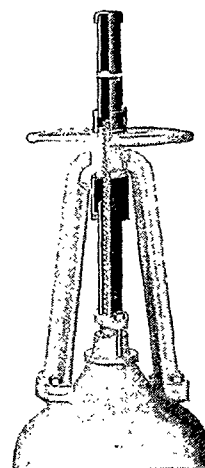
Gear Cover
for
Outside Screw and Yoke Valves



Style P
Spur Gearing
Outside Screw and Yoke

Pressure Class of Valve	Size of Valve Inches	Extra List Prices per Valve					
		Non-Rising Stem		Outside Screw & Yoke			
		Gearing	*Grease	Gearing	*Gear		
		Bevel	Spur	Cases	Bevel	Spur	Covers
Low Pressure Page 100	14 to 20	62.00	58.00	41.00	66.00	62.00	41.00
	24	70.00	66.00	50.00	74.00	70.00	50.00
	30	78.00	74.00	62.00	82.00	78.00	62.00
	36	148.00	140.00	74.00	156.00	148.00	74.00
	42	188.00	172.00	86.00	204.00	188.00	86.00
	48	330.00	305.00	100.00	355.00	330.00	100.00
Standard Page 103	12	54.00	50.00	41.00	58.00	54.00	41.00
	14 to 20	62.00	58.00	41.00	66.00	62.00	41.00
	24	70.00	66.00	50.00	74.00	70.00	50.00
	30	78.00	74.00	62.00	82.00	78.00	62.00
	36	148.00	140.00	74.00	156.00	148.00	74.00
	42	188.00	172.00	86.00	204.00	188.00	86.00
.175-Lb. Page 109	48	330.00	305.00	100.00	355.00	330.00	100.00
	10	62.00	58.00	41.00	66.00	62.00	41.00
250-Lb. Page 111	12	70.00	66.00	50.00	74.00	70.00	50.00
	8	54.00	50.00	41.00	58.00	54.00	41.00
	10	70.00	66.00	50.00	74.00	70.00	50.00
	12 to 16	80.00	76.00	64.00	84.00	80.00	64.00
	18 & 20	93.00	88.00	68.00	98.00	93.00	68.00
	24	186.00	176.00	86.00	196.00	186.00	86.00
800-Lb. Hyd. Page 113	6 & 8				66.00	62.00	41.00
	10 & 12				78.00	74.00	62.00

*The prices shown for the Grease Cases and for the Gear Covers are in addition to the prices for the Gearing.



Stem Protector
For Outside Screw
and Yoke Valves
without Gears
Prices on application

Dimensions of
geared valves,
pages 116 and 117.

Iron and Ferrosteel Wedge Gate Valves with Gearing or By-Pass

For dimensions, see the following page.

The dimensions of Iron and Ferrosteel Wedge Gate Valves equipped with gearing or by-pass are shown on the opposite page. For dimensions of the same valves without gearing or by-pass, refer to the following pages:

Low Pressure Valves... see page 100
Standard Valves... see page 106
175-Pound Valves... see page 109
250-Pound Valves... see page 111
800-Pound Hydraulic Valves... see page 113

Gearing: Equipping the larger size wedge gate valves with gears will greatly facilitate their operation. Gears, both bevel and spur, are available for a wide range of sizes in each pressure class.

Face to face or end to end dimensions of valves with gears are the same as those of valves without gears; see the pages referred to above.

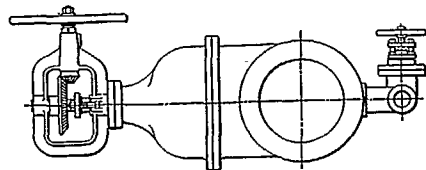
By-passes: The bolted by-pass is furnished on flanged and hub end valves for water, oil, or gas lines and is available in all pressure classes. The built-up by-pass is furnished only on flanged valves in the 175 and 250-Pound classes, for steam lines.

Center to top and wheel diameter dimensions of valves with by-pass are the same as those of valves without by-pass; face to face dimensions are explained below.

Face to face of valves with by-pass: Low Pressure, Standard in sizes 24-inch and smaller, 175-Pound, 250-Pound, and 800-Pound Hydraulic Wedge Gate Valves with by-pass have the same face to face as the valves without by-pass; these dimensions are repeated on the opposite page for convenience.

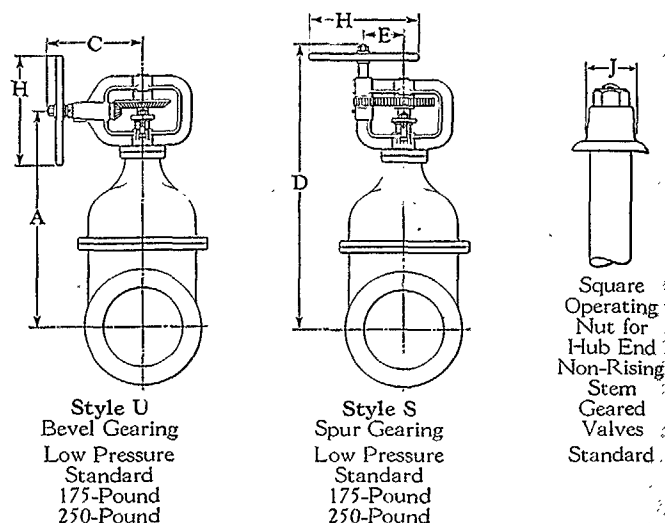
On sizes larger than 24-inch, Standard Wedge Gate Valves with by-pass have a longer face to face dimension than the same valves without by-pass.

Geared valves with by-pass: Spur geared valves with by-pass have the by-pass connected at the side of the valve body.

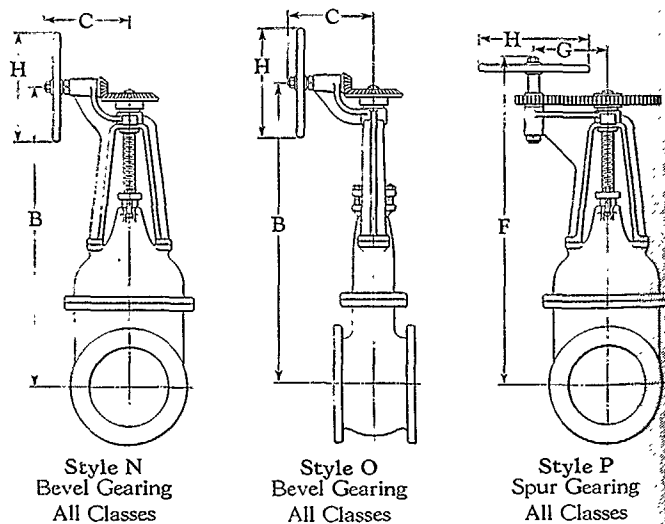


Bevel geared valves with by-pass have the by-pass on the bottom, with the stem of the by-pass valve parallel to the pinion shaft; see illustration above.

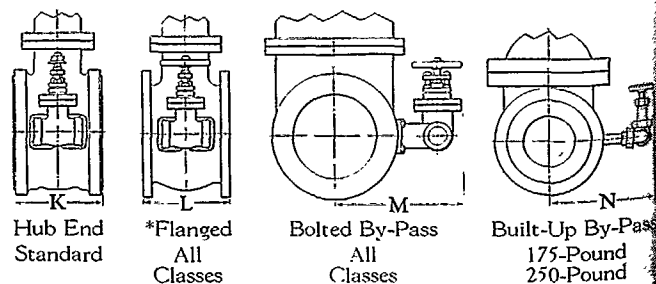
*Dimension "L" includes the $\frac{1}{8}$ -inch raised faces on 175 and 250-Pound Flanged Valves and the $\frac{1}{4}$ -inch male faces on 800-Pound Hydraulic Flanged Valves.



Non-Rising Stem Valves with Bevel or Spur Gears



Outside Screw and Yoke Valves with Bevel or Spur Gears



Flanged and Hub End Valves with By-Pass

Iron and Ferrosteel Wedge Gate Valves with Gearing or By-Pass

Dimensions, in Inches

For list prices, description, and dimensions of valves without gearing or by-pass, see pages 100 to 113.

Size of Valve	Valves with Gears										Valves with By-Pass							
	Bevel Geared			Spur Geared				H	J	No. of turns to open	K	*L	Bolted By-Pass		Built-Up By-Pass			
													Size	M	Size	N		
Low Pressure Wedge Gate Valves																		
14	33 ¹¹ / ₁₆	50 ¹ / ₈	11 ³ / ₄	44 ¹ / ₂	6	53 ³ / ₄	10	14		58		*13 ¹ / ₂	2	19 ³ / ₄				
16	38 ⁵ / ₈	55 ¹ / ₄	12 ³ / ₄	50 ¹ / ₄	6	59 ³ / ₄	12	18		66		*14	3	23 ³ / ₄				
18	42 ¹ / ₄	61 ³ / ₁₆	12 ³ / ₄	53 ³ / ₄	6	65 ¹ / ₂	12	18		74		*14 ¹ / ₂	3	24 ¹ / ₄				
20	45 ³ / ₄	67 ³ / ₈	12 ³ / ₄	57 ¹ / ₄	6	71 ³ / ₄	12	18		83		*15 ¹ / ₂	3	26 ¹ / ₄				
24	55 ¹ / ₂	81 ¹¹ / ₁₆	17	69 ¹ / ₂	8	87 ¹ / ₂	14 ⁵ / ₈	22		148 ¹ / ₂		*17	4	28 ¹ / ₄				
30	64 ⁷ / ₈	96 ⁵ / ₈	17	79	8	102 ¹ / ₄	14 ⁵ / ₈	22		186		*21	4	34				
36	75 ¹ / ₈	113 ⁵ / ₁₆	20 ¹ / ₂	91	10 ³ / ₄	119 ¹ / ₂	17	27		259		*24	6	40				
42	89 ⁹ / ₁₆	135 ⁵ / ₈	23	106 ¹ / ₄	12	141 ¹ / ₄	19	30		261		*27	6	48				
48	101 ⁹ / ₁₆	153 ⁵ / ₈	23	118 ¹ / ₄	12	159 ¹ / ₄	19	30		298 ¹ / ₂		*30	8	49 ³ / ₄				
Standard Wedge Gate Valves																		
12	33 ¹ / ₄	45 ³ / ₄	12 ³ / ₄	44 ³ / ₄	6	50 ¹ / ₄	12	18	2	50	16	*14	2	19 ¹ / ₂				
14	37 ³ / ₄	53 ³ / ₄	12 ³ / ₄	49 ¹ / ₄	6	58	12	18	2	60	16	*15	2	20 ³ / ₄				
16	43 ¹ / ₂	60 ³ / ₄	17	57 ¹ / ₂	8	66 ¹ / ₂	14 ¹¹ / ₁₆	22	2	102	19	*16	3	24				
18	45 ¹ / ₂	65 ¹ / ₄	17	59 ¹ / ₂	8	71	14 ¹¹ / ₁₆	22	2	114	20	*17	3	25 ¹ / ₂				
20	49 ¹ / ₄	71 ¹ / ₄	17	63 ¹ / ₄	8	77	14 ¹¹ / ₁₆	22	2	127	21	*18	3	26 ¹ / ₂				
24	56 ³ / ₄	85 ¹ / ₄	20 ¹ / ₂	72 ¹ / ₂	10 ¹³ / ₁₆	90 ³ / ₄	17	27	3	175	22	*20	4	29 ¹ / ₄				
30	70	106 ¹ / ₄	23	86 ¹ / ₂	12	111 ³ / ₄	19	30	3	380	30	30	4	34				
36	84 ³ / ₄	122	26 ¹ / ₄	103	15	128 ¹ / ₄	19 ¹ / ₂	30	3	560	32	32	6	41 ³ / ₄				
42	98 ¹ / ₂	144	29 ¹ / ₂	118 ¹ / ₂	17 ¹ / ₂	148 ³ / ₄	22 ³ / ₄	36	3	390	33	33	6	45 ¹ / ₄				
48	107	160	29 ¹ / ₂	126 ¹ / ₂	17 ¹ / ₂	164 ³ / ₄	22 ³ / ₄	36	3	450	36	36	8	51				
175-Pound Wedge Gate Valves																		
6												*13	1 ¹ / ₄	14 ¹ / ₂	³ / ₄	12		
8												*14 ¹ / ₄	1 ¹ / ₂	15 ³ / ₄	³ / ₄	13 ¹ / ₄		
10	30	40 ³ / ₄	12 ³ / ₄	41 ¹ / ₄	6	45	12	18		85		*16 ³ / ₄	1 ¹ / ₂	17	1	15		
12	33 ¹ / ₄	45 ¹ / ₂	12 ³ / ₄	44 ¹ / ₂	6	50	12	18		102		*17 ¹ / ₂	2	20	1	16 ¹ / ₄		
250-Pound Wedge Gate Valves																		
5												*15	1 ¹ / ₄	14 ³ / ₄	³ / ₄	11 ³ / ₄		
6												*15 ⁷ / ₈	1 ¹ / ₄	15 ¹ / ₂	³ / ₄	12 ¹ / ₂		
8	25 ¹ / ₄	35	12 ³ / ₄	36 ¹ / ₂	6	39 ¹ / ₄	12	18		70		*16 ¹ / ₂	1 ¹ / ₂	18	³ / ₄	13 ¹ / ₄		
10	29 ³ / ₄	43	15 ¹ / ₂	43	7	47 ³ / ₄	13 ¹ / ₂	20		95		*18	1 ¹ / ₂	19 ³ / ₄	1	16 ¹ / ₂		
12	33	48	15 ¹ / ₂	46 ¹ / ₄	7	53	13 ¹ / ₂	20		115		*19 ³ / ₄	2	21 ¹ / ₂	1	17 ³ / ₄		
14	38 ¹ / ₄	55	17	52 ¹ / ₄	8	60 ³ / ₄	14 ⁵ / ₈	22		159		*22 ¹ / ₂	2	23	1 ¹ / ₄	20		
16	41 ³ / ₄	60	17	55 ³ / ₄	8	65 ³ / ₄	14 ⁵ / ₈	22		180		*24	3	27	1 ¹ / ₄	21 ¹ / ₂		
18	44 ¹ / ₄	66 ¹ / ₄	20 ¹ / ₂	60	10 ¹³ / ₁₆	71 ³ / ₄	17	27		235		*26	3	28 ¹ / ₄				
20	48 ¹ / ₄	73	20 ¹ / ₂	64 ¹ / ₄	10 ¹³ / ₁₆	78 ¹ / ₄	17	27		259		*28	3	29 ¹ / ₂				
24	59	87 ³ / ₄	23	75 ¹ / ₂	12	93 ¹ / ₄	19	30		352		*31	4	34				
800-Pound Hydraulic Wedge Gate Valves																		
5												*20	1 ¹ / ₄	15 ¹ / ₂				
6		30 ¹ / ₄	12 ³ / ₄			34 ¹ / ₂	12	18		54		*22	1 ¹ / ₄	16 ¹ / ₄				
8		37 ³ / ₄	15 ¹ / ₂			42 ³ / ₄	13 ¹ / ₂	20		75		*26	1 ¹ / ₂	19				
10		44 ¹ / ₂	17			50	14 ¹¹ / ₁₆	22		116		*31	1 ¹ / ₂	20 ¹ / ₂				
12		51 ³ / ₄	20 ¹ / ₂			57 ¹ / ₄	17	27		158		*33	2	22 ¹ / ₂				

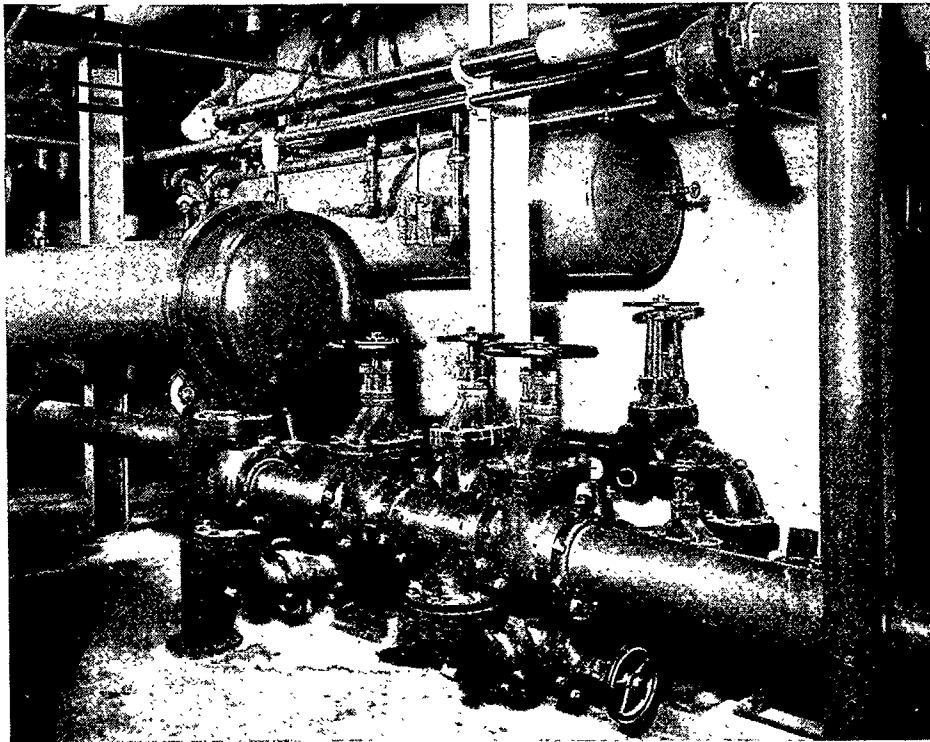
*Dimension "L", the face to face of flanged valves with by-pass, includes the ¹/₁₆-inch raised faces on 175 and 250-Pound Valves and the ¹/₄-inch male faces on 800-Pound Hydraulic Valves. Dimensions identified by an asterisk are the same as for valves without by-pass.

For Higher Pressures and Temperatures Use Crane Steel Gate Valves

For pressures and temperatures that are beyond the scope of iron valves and for unusually severe services, Crane Co. manufactures a complete line of Cast or Forged Steel Wedge Gate Valves. Of outstanding quality, they are made in a wide range of sizes and with screwed, flanged, butt-welding, or socket-welding ends.

Crane Steel Gate Valves are available for pressures as high as 2500 pounds at 1000° F., or 6000 pounds at 100° F. For prices, dimensions, and complete details, see pages 297 to 308.

9



Crane Iron Gate Valves and Fittings installed in raw water circulating piping in a power plant.

The care and accuracy used in finishing Crane products assure perfect fitting and alignment, even in the most compact assemblies.

Iron Body Double Disc Gate Valves

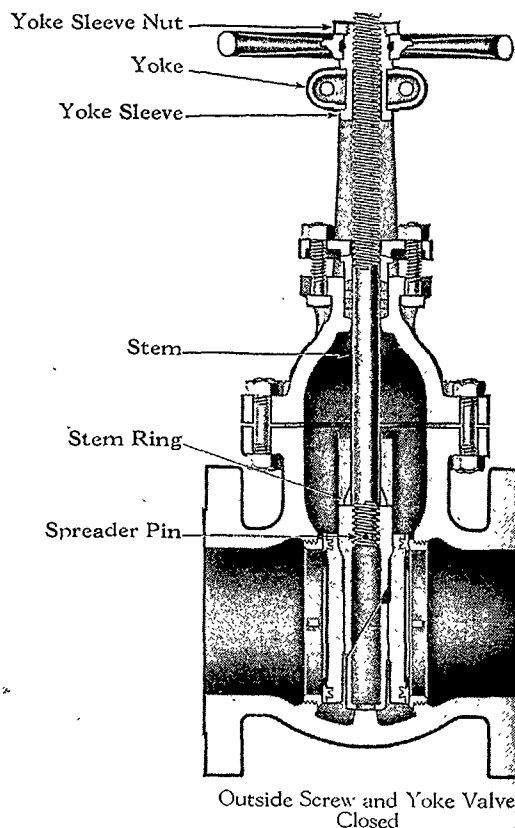
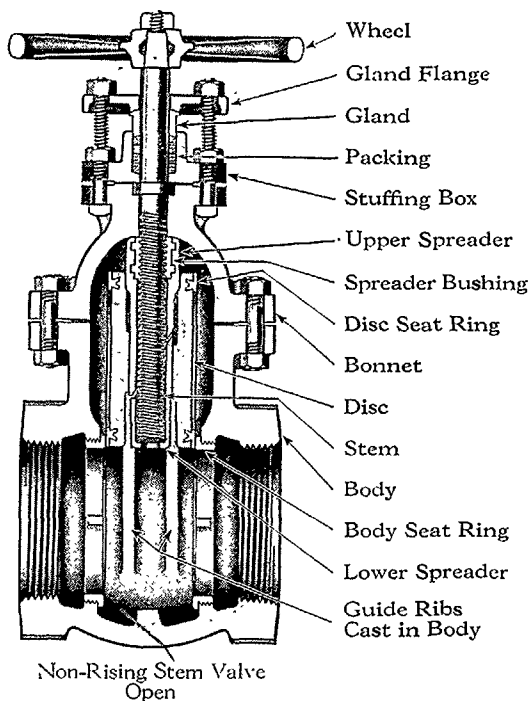
A.W.W.A. Valves.....	pages 126 and 127
Low Pressure Valves.....	pages 122 and 123
Light Standard Valves.....	pages 124 and 125
Standard Valves.....	pages 128 and 129
400-Pound W.O.G. Valves.....	pages 130 and 131
500-Pound W.O.G. Valves.....	pages 132 and 133
500-Pound Gas Valves.....	pages 134 and 135
800-Pound W.O.G. Valves.....	pages 136 and 137
By-Passes; Cleanouts; Lockup Caps.....	page 138
Gearing; Grease Cases; Gear Covers; Stem Protectors.....	page 139
Dimensions of Valves with Gearing or By-Pass....	pages 140 and 141

10

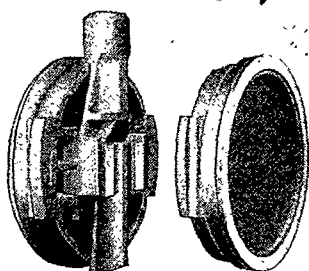
The Crane line of Iron Body Double Disc Gate Valves includes valves for water, oil, or gas pressures up to 800 pounds, also valves for low pressure steam. It includes Brass Trimmed and All-Iron Valves, A.W.W.A. Valves, and 500-Pound Spur Geared Valves especially designed for gas line construction.

The uniformly superior quality that distinguishes all Crane products has been maintained in this line. Excellence of design, high grade materials, and workmanship of the highest order assure dependability in service.

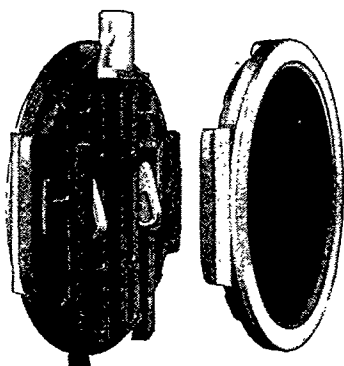
Iron Body Double Disc Gate Valves



*Flanged end bodies for
400, 500, and 800-Pound W.O.G. Valves
have straight through ports;
see page 121.*



Discs with Spreaders



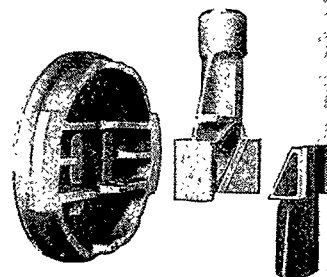
Discs with Wedges

The Discs

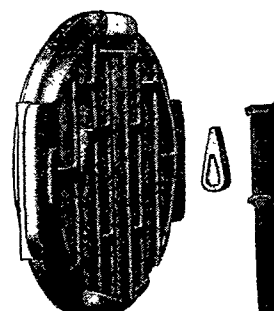
Depending upon the size of the valve and the pressure class, two types of disc construction are used in Crane Iron Body Double Disc Gate Valves.

Discs with spreaders: The upper spreader, engaging the valve stem, raises and lowers the discs. When the valve is being closed, the lower spreader strikes a stop in the bottom of the body; further rotation of the wheel brings the wedging surfaces of the spreaders into contact, and the spreaders force the discs outward against the seats.

Discs with wedges: A disc nut, engaging the valve stem, raises and lowers the discs. When the valve is being closed, two hooks, carrying Manganese Bronze wedges, strike a stop in the bottom of the body; further rotation of the wheel forces the wedges between the discs, and the wedges force the discs outward against the seats.



Discs with Spreaders



Discs with Wedges

General Description

The general characteristics of Crane Iron Body and Ferrosteel Double Disc Gate Valves are illustrated on the preceding page. Except for their proportions and for the materials used, the various lines are very similar in construction.

Double discs: The seats in the valves are parallel. The disc mechanism, illustrated and described on the preceding page, assures positive, tight seating and easy opening.

Except for certain small size valves having all-brass discs, brass trimmed valves have cast iron or Ferrosteel discs with brass or Crane Hard Metal seating faces. The faces are securely rolled into machined dovetails in the discs, assuring tightness under pressure.

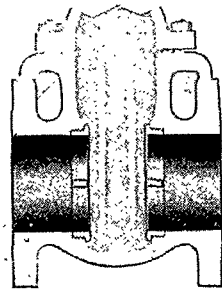
In all-iron valves, the seating faces are cast integral with the discs.

In non-rising stem brass trimmed valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

In brass trimmed valves with spreader type discs, the lower spreader is brass in the smaller sizes, and cast iron with brass wedging faces in the larger sizes.

Body and bonnet: All lines of valves have oval-shaped bodies and bonnets. Metal sections are more than ample, and the metal is distributed to assure maximum strength.

Flanged end 400, 500, and 800-Pound W.O.G. Valves have straight through ports, as shown in the illustration at the right. The metal sections adjacent to the bonnet and end flanges are heavily reinforced.



Straight Through Ports in Flanged End
400, 500, and 800-Pound W.O.G. Valves

Body seat rings: In brass trimmed valves, the body seat rings are brass or Crane Hard Metal.

In brass trimmed Low Pressure Valves 14-inch and larger, the body seat rings are rolled into machined dovetails in the body. In 10 and 12-inch Low Pressure Valves, and in all brass trimmed valves for higher pressures, the body seat rings are screwed into the body.

All-iron valves are regularly furnished with the seats integral with the body. However, they can be furnished with screwed-in body seat rings when so ordered; prices on application.

Stem: The stem in non-rising stem brass trimmed valves is made of Crane Cast Manganese Bronze or rolled brass, depending upon the pressure class.

Outside screw and yoke brass trimmed valves are made with a rolled brass stem.

All-iron valves have a steel stem; the portion coming in contact with the packing is nickel-plated.

Gland and stuffing box: All valves have a two-

piece ball-type gland, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves or a nickel-plated steel gland in all-iron valves.

This construction provides for even distribution of the compressive loading on the packing, the ball-type bearing between the gland and flange compensating for unequal adjustment of the bolts. Binding on the valve stem and frequent stuffing box maintenance are avoided.

Repacking: These valves, when wide open, can be repacked while under pressure.

In non-rising stem valves, jamming the disc in the wide open position forces the stem collar against the machined top of the bonnet, making a pressure-tight joint.

In outside screw and yoke valves, when the valve is jammed wide open, the tapered stem ring engages a tapered machined surface in the under side of the top of the bonnet, forming a tight joint.

Yoke: In smaller size outside screw and yoke valves, the yoke is cast integral with the bonnet. In larger sizes, the yoke is made in two halves, bolted to the bonnet and bolted together at the top.

Yoke sleeve: The yoke sleeve is made of Crane Cast Manganese Bronze.

Wheel: Wheels having a diameter of 24 inches or less are made of malleable iron to assure maximum strength. They have an oval-shaped rim, affording an easy grip. Wheels of larger than 24 inches diameter are cast iron.

In non-rising stem valves, the wheel has a tapered square hole fitting the tapered square end of the stem, and is held in place by a steel nut.

In outside screw and yoke valves, the hole in the wheel is hexagonal and tapered, and fits the tapered hexagonal top of the yoke sleeve. The wheel is held in place by a malleable iron nut.

In both types of valves, the wheel is attached securely, yet can be removed easily.

Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged valves conform to the American Cast Iron Flange Standard for their respective working pressures.

On Low Pressure, Light Standard, and Standard valves, the flanges are plain faced, with a smooth finish.

400-Pound W.O.G., 500-Pound W.O.G., and 500-Pound Gas flanged valves are regularly furnished with a raised face $\frac{1}{16}$ -inch high on the end flanges. Valves with male, female, tongue, or groove faces can be made to order at an additional price.

800-Pound W.O.G. flanged valves are regularly furnished with a $\frac{1}{4}$ -inch male face (large male) on the end flanges. Valves with female, tongue, or groove faces can be made to order, at an additional price.

Low Pressure Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

Crane Low Pressure Iron Body Double Disc Gate Valves, illustrated on the opposite page, are admirably suited for a great variety of service conditions that do not require the use of "Standard" weight

valves. They will give excellent service in low pressure steam, water, or gas lines, in exhaust or condenser piping, in water works, irrigation, filtration, or sewage disposal systems, in pumping engine suction lines, or in by-product coke installations.

They are short and compact, occupying a minimum of space in the pipe line.

In addition to the types listed, the valves can be furnished with spigot ends, with ends for wood pipe, Universal pipe, or Transite pipe, or with combinations thereof; hub end outside screw and yoke valves also can be furnished. Prices on application.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water lines.

The body seat rings are brass. In sizes 10 and 12-inch they are screwed into the body. In the larger sizes they are rolled into the body. When so ordered, screwed-in rings can be furnished in the larger sizes; prices on application.

The discs are cast iron with a brass face, and the stem is brass. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

The valves have a two-piece gland consisting of a brass gland and a malleable iron gland flange.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass.

The seating surfaces are integral with the body and discs. Valves with screwed-in body seat rings in sizes 24-inch and smaller only, can be made to order; prices on application.

The stem is steel and that portion which comes in contact with the packing is nickel-plated.

The gland is two-piece and consists of a nickel-plated steel gland and a malleable iron flange.

Stuffing boxes: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Hub end valves: The hubs on hub end valves are suitable for Class "B" cast iron pipe. In place of a wheel, the valves have a square operating nut.

By-passes: Sizes 24-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 138 for prices and pages 140 and 141 for dimensions.

Gearing: To facilitate operation, 42 and 48-inch

Size of valve	Working pressures					Hydrostatic test pressures	
	Flanged valves			Hub end valves		Flanged or hub end valves	
	Saturated steam	Cold gas	Cold water non-shock	Cold gas	Cold water non-shock	Shell test	Seat test
10 to 24-inch	25 pounds	25 pounds	50 pounds	25 pounds	50 pounds	75 pounds	60 pounds
30 & 36-inch	25 pounds	25 pounds	43 pounds	25 pounds	43 pounds	75 pounds	55 pounds
42 & 48-inch	25 pounds	25 pounds	35 pounds	25 pounds	35 pounds	50 pounds	45 pounds

valves should be equipped with gears. See page 130 for prices and pages 140 and 141 for dimensions.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should be equipped with some easy means of operation, such as an electric or air motor drive, or an operating cylinder; see pages 171 to 173.

Vacuum or air service: Valves for vacuum exhaust lines or for air service should be specially air-tested; an extra charge is made. Unless orders specify air-tested, water-tested valves are furnished.

Disc rollers: Brass trimmed valves, 14-inch and larger, ordered for use in a horizontal pipe with the valve stem horizontal, will be equipped with a brass track in the lower side of the body, and brass rollers and brass scrapers in the lower side of the discs.

Cleanouts: When so ordered, these valves can be furnished with cleanouts; see opposite page.

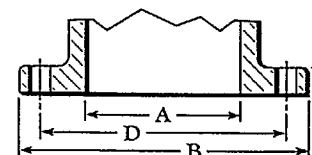
Stem protectors: Outside screw and yoke valves can be equipped with a shield around the stem to protect the stem threads from accumulations of dust (illustrated on page 139). Prices on application.

Bottom outlet valves: Bottom outlet gate valves for turbine exhaust relief and bleeder connections can be made to order; prices on application.

Flange dimensions and facing: The dimensions and drilling of the

end flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flanges are plain faced, with a smooth finish.

On special order, valves can be drilled to the American Cast Iron Flange Standard, Class 125 (B16a-1939). When so drilled, full face gaskets should be used to avoid distorting the end flanges.



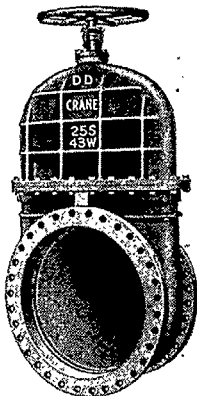
Dimensions of Flanges, in Inches

Size	A	B	C	D	No. of bolts	Dia. of bolts
10	10	16	7/8	14 1/4	12	5/8
12	12	19	1	17	12	5/8
14	14	21	1 1/8	18 3/4	12	3/4
16	16	23 1/2	1 1/8	21 1/4	16	3/4
18	18	25	1 1/4	22 3/4	16	3/4
20	20	27 1/2	1 1/4	25	20	3/4
24	24	32	1 3/8	29 1/2	20	3/4
30	30	38 3/4	1 1/2	36	28	7/8
36	36	46	1 5/8	42 3/4	32	7/8
42	42	53	1 3/4	49 1/2	36	1
48	48	59 1/2	2	56	44	1

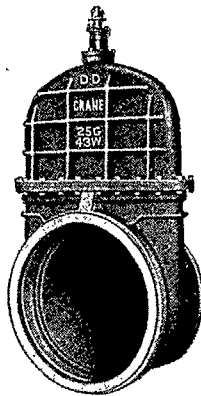
Additional description . . . pages 120 and 121

Low Pressure Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

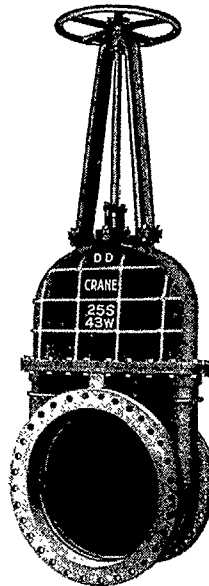
For working pressures
and description,
see the preceding page.



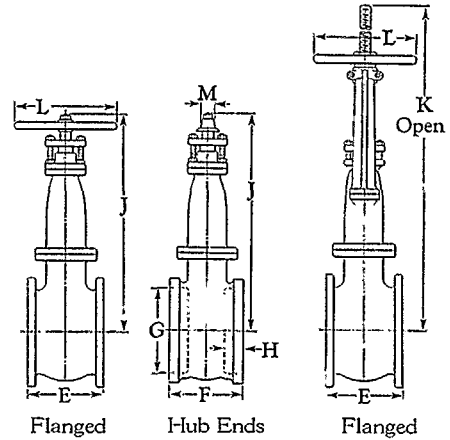
Non-Rising Stem
Flanged
No. 791
Brass Trimmed
No. 891
All-Iron



Non-Rising Stem
Hub Ends
No. 798
Brass Trimmed
No. 898
All-Iron



Outside Screw and Yoke
Flanged
No. 793 1/2
Brass Trimmed
No. 893
All-Iron



Non-Rising
Stem
Valves
Without
By-Pass

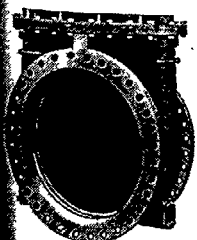
Outside Screw
and Yoke
Valve
Without
By-Pass

The hubs on the hub end valves
are suitable for Class "B"
cast iron pipe.

List Prices and Dimensions

Cleanout: Valves 14-inch and larger can be fitted with two side cleanouts as illustrated below. Prices are shown in the table.

The cleanouts are useful on valves installed in gas lines. They permit passing a rod through the valve between the seats to dislodge coke or other sediment.



Double Cleanout

Size Inches	List Prices, Each				Dimensions, in Inches									
	Non-Rising Stem		O.S.&Y.	Extra for Two Clean- outs Per Valve	E	F	G	H	J	K	L	M	No. of turns to open	
	No. 791 or No. 891 Flanged F. & D.	No. 798 or No. 898 Hub Ends	No. 793½ or No. 893 Flanged F. & D.											
10	128.00	118.00	160.00		9½	12¾	12.10	3.50	27¾	47	12	2	22	
12	170.00	155.00	212.00		10	12⅝	14.20	3.50	30¾	54¼	12	2	26	
14	238.00	223.00	286.00	51.00	10½	13⅝	16.10	3.50	33¾	64½	14	2	29	
16	332.00	307.00	382.00	51.00	11	14⅞	18.40	4.00	36¼	71¾	14	2	33	
18	442.00	417.00	510.00	51.00	11½	14½	20.50	4.00	41	80¼	18	2	38	
20	544.00	514.00	615.00	57.00	12	15¼	22.60	4.00	44½	88¼	18	2	42	
*24	850.00	800.00	950.00	57.00	13	15¾	26.80	4.00	51¼	104	20	2	49	
*30	1530.00	1450.00	1725.00	127.00	14½	17⅞	33.00	4.50	62¼	128	22	2	124	
*36	2380.00	2270.00	2650.00	127.00	16	18½	39.30	4.87	72¼	149¼	27	3	147	
*42	3400.00	3260.00	3800.00	127.00	17½	21	45.50	5.00	86¼	176½	30	3	131	
*48	4750.00	4575.00	5300.00	150.00	19	22	51.80	5.00	99	201	36	3	149	

Dimensions and prices of larger sizes furnished on application.

*Sizes 24-inch and larger should have a by-pass; see page 138 for prices and page 141 for dimensions.

†Sizes 42-inch and larger should be geared; see page 139 for prices and page 141 for dimensions.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the 25-Pound American Tenta-

tive Cast Iron Flange Standard. When valves are ordered faced only they will be furnished at the same price as for faced and drilled.

Templates for drilling . . . page 551

By-passes and gearing . . . pages 138 to 141

Light Standard Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

Size of valve	Working pressures		Hydrostatic test pressures	
	Flanged valves	Hub end valves	Flanged or hub end valves	
	Cold water, oil, or gas non-shock	Cold water or gas, non-shock	Shell test	Seat test
2 to 24-inch	100 pounds	100 pounds	200 pounds	125 pounds
30 and 36-inch	80 pounds	80 pounds	150 pounds	100 pounds
42 and 48-inch	60 pounds	60 pounds	120 pounds	75 pounds

Crane Light Standard Iron Body Double Disc Gate Valves, illustrated on the opposite page, are recommended for service conditions that do not require the use of "Standard" weight valves but that are too severe for Low Pressure valves. They are particularly suitable for moderate water, oil, or gas pressures.

In addition to the types listed, the valves can be furnished with spigot ends, with ends for Universal pipe, or with any combination of ends. Hub-end outside screw and yoke valves also can be furnished. Prices on application.

Brass trimmed valves: Brass trimmed valves are recommended for water or oil lines.

The body seat rings are brass, screwed into the body.

The discs, in sizes 2 to 3-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem (Cast Manganese Bronze in non-rising stem valves); the bonnet and stuffing box are brass-bushed where in contact with the stem. In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

The valves have a two-piece gland consisting of a brass gland and a malleable iron gland flange.

All-iron valves: All-iron valves are recommended for gas or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, and that portion which comes in contact with the packing is nickel-plated.

The valves have a two-piece gland consisting of a nickel-plated steel gland and a malleable iron gland flange.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Hub end valves: The hubs on hub end valves are suitable for Class "C" cast iron pipe. In place of a wheel, the valves have a square operating nut.

By-passes: Sizes 18-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 138 for prices and pages 140 and 141 for dimensions.

Gearing: To facilitate operation, valves 30-inch and larger should be equipped with gears. Refer to

page 139 for prices, 140 and 141 for dimensions.

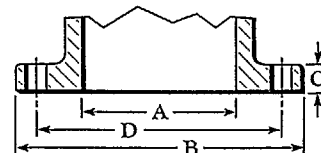
Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation, such as an electric or air motor drive, or an operating cylinder. See pages 171 to 173.

Air service: Valves for air service should be specially air-tested to assure absolute tightness; an extra charge is made. Orders must specify air-tested, otherwise water-tested valves will be furnished.

Disc rollers: When Light Standard brass trimmed valves are ordered for use in a horizontal pipe with the valve stem horizontal, sizes 14-inch and larger will be equipped with a brass track in the lower side of the body, and with brass rollers and brass scrapers in the lower side of the discs.

Cleanouts: When so ordered, Light Standard Valves 14-inch and larger can be fitted with two side cleanouts, as shown on the opposite page.

Flange dimensions and facing: Dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.



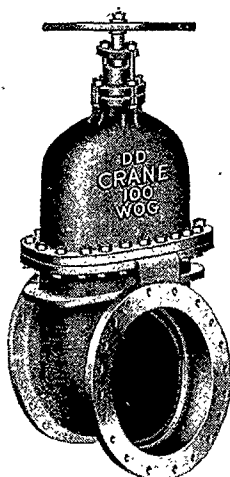
Dimensions of Flanges, in Inches

Size	A	B	C	D	No. of bolts	Dia. of bolts
2	2	6	5/8	4 3/4	4	5/8
2 1/2	2 1/2	7	1 1/16	5 1/2	4	5/8
3	3	7 1/2	3/4	6	4	5/8
4	4	9	1 5/16	7 1/2	8	5/8
5	5	10	1 5/16	8 1/2	8	3/4
6	6	11	1	9 1/2	8	3/4
8	8	13 1/2	1 1/8	11 3/4	8	3/4
10	10	16	1 3/16	14 1/4	12	7/8
12	12	19	1 1/4	17	12	7/8
14	14	21	1 3/8	18 3/4	12	1
16	16	23 1/2	1 7/16	21 1/4	16	1
18	18	25	1 9/16	22 3/4	16	1 1/8
20	20	27 1/2	1 11/16	25	20	1 1/8
24	24	32	1 7/8	29 1/2	20	1 1/4
30	30	38 3/4	2 1/8	36	28	1 1/4
36	36	46	2 3/8	42 3/4	32	1 1/2
42	42	53	2 5/8	49 1/2	36	1 1/2
48	48	59 1/2	2 3/4	56	44	1 1/2

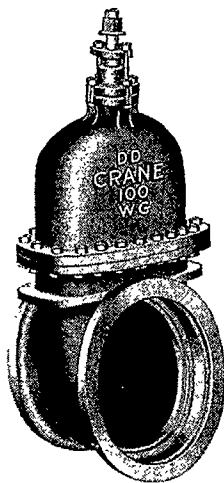
Additional description ... pages 120 and 121

Light Standard Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

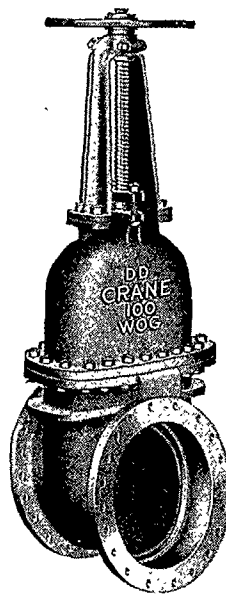
For working pressures and description,
see the preceding page.



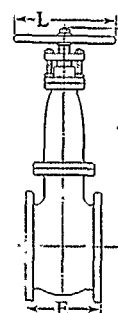
Non-Rising Stem
Flanged
No. 776
Brass Trimmed
No. 779
All-Iron



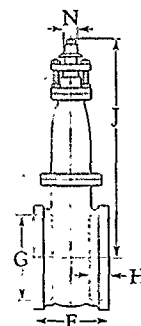
Non-Rising Stem
Hub Ends
No. 777
Brass Trimmed
No. 780
All-Iron



Outside Screw and Yoke
Flanged
No. 778
Brass Trimmed
No. 781
All Iron

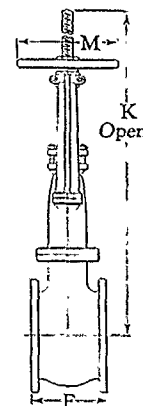


Flanged



Hub Ends

Non-Rising
Stem
Valves
Without
By-Pass



Flanged

Outside Screw
and Yoke
Valve
Without
By-Pass

The hubs on the hub end valves
are suitable for Class "C"
cast iron pipe.

10

List Prices and Dimensions

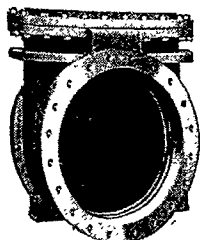
Size Inches	List Prices, Each				Dimensions, in Inches										No. of turns to open
	Non-Rising Stem No. 776 or No. 779 Flanged F. & D.	O.S. & Y. No. 777 or No. 780 Hub Ends	O.S. & Y. No. 778 or No. 781 Flanged F. & D.	Extra for Two Clean- outs Per Valve	E	F	G	H	J	K	L	M	N		
2	20.00	19.00	26.00		5½	8¾	3.25	3.00	11¼	14	6	7	2	7½	
2½	25.00		32.50		6				11¾	16	6	7		9	
3	30.00	26.00	37.50		6¾	10¼	4.66	3.50	13¼	18¾	8	8	2	10½	
4	38.00	33.00	47.50		8	11¾	5.70	4.00	15¾	22¾	9	9	2	13½	
5	51.00	46.00	64.00		8½	12¼	6.70	4.00	17¼	27¼	9	9	2	16¾	
6	60.00	55.00	75.00		8¾	12½	7.80	4.00	20	31¼	10	10	2	13¼	
8	90.00	85.00	112.00		10	13¼	10.00	4.00	24¾	40½	12	12	2	17½	
10	128.00	118.00	160.00		11	14	12.10	4.00	28¼	47¾	12	12	2	22	
12	170.00	155.00	212.00		12	14½	14.20	4.00	32¼	56	14	14	2	26	
14	238.00	223.00	286.00	51.00	13½	15¼	16.45	4.00	35¾	62½	14	14	2	30	
16	332.00	307.00	382.00	51.00	15	15½	18.80	4.00	40¾	71¼	16	16	2	34	
*18	442.00	417.00	510.00	51.00	16½	16½	20.92	4.00	44	78¾	18	18	2	38	
*20	544.00	514.00	615.00	57.00	18	18	23.06	4.00	48½	86½	20	20	2	42	
*24	850.00	800.00	950.00	57.00	19½	19½	27.32	4.00	57	102½	24	24	2	50½	
*30	1530.00	1450.00	1725.00	127.00	23	23	33.40	4.50	72¼	130¼	30	30	3	63½	
*36	2380.00	2270.00	2650.00	127.00	25½	25½	39.70	4.50	86	153¾	36	36	3	114	
*42	3400.00	3260.00	3800.00	127.00	28	28	46.10	5.00							
*48	4750.00	4575.00	5300.00	150.00	32	32	52.40	5.00							

*Sizes 18" and larger should have a by-pass. See page 138 for prices and page 141 for dimensions.

†Sizes 30" and larger should be geared. See page 139 for prices and page 141 for dimensions.

Cleanouts: When so ordered, Light Standard Valves 14-inch and larger can be fitted with two side cleanouts as illustrated below. Prices are shown in the table.

The cleanouts are useful on valves installed in gas lines. They permit passing a rod through the valve between the seats to dislodge coke or other sediment.



Double Cleanout

Templates for drilling page 551

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125.

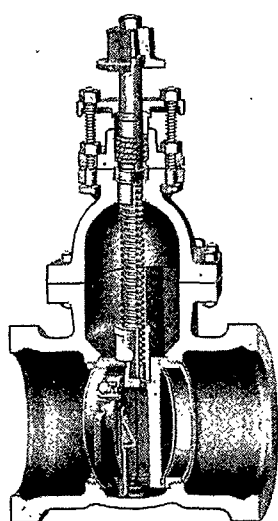
When valves are ordered faced only they will be furnished at the same price as for faced and drilled.

By-passes and gearing pages 138 to 141

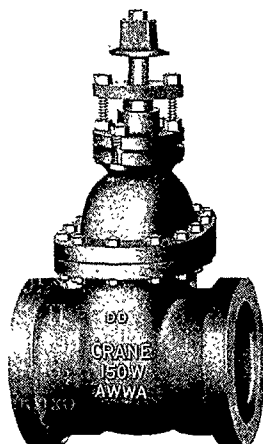
Prices of larger sizes on application

A.W.W.A. Iron Body Double Disc Gate Valves Brass Trimmed

Sizes	Working Pressures	Hydrostatic Test Pressures
2 to 12"	200 pounds cold water, non-shock	350 pounds, shell — 225 pounds, seat
14 to 48"	150 pounds cold water, non-shock	300 pounds, shell — 175 pounds, seat



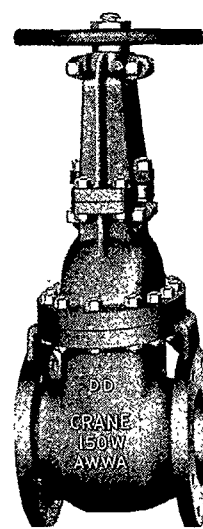
Cross Section
Non-Rising Stem



Non-Rising Stem
No. 480 1/2, Hub Ends

The design and materials of the valves described on this page comply with specifications for Gate Valves for Ordinary Water Works Service, effective May 1, 1939, as adopted jointly by the American Water Works Association and the New England Water Works Association.

In addition to the valves illustrated, the complete Crane line includes a wide assortment of similarly constructed valves having other types of end connections. Valves regularly furnished are listed in the table below.



Outside Screw and Yoke
No. 2495, Flanged

Prices on application.

List of A.W.W.A. Valve Types and Sizes
Dimensions are shown on the opposite page.

Catalog Nos.		End Connections	Sizes Available
Non-Rising Stem	Outside Screw & Yoke		
480 1/2	2490 1/2	Hub Ends	2 to 48-inch
2480	2490	Hub and Spigot Ends	2 to 24-inch
2481	2491	Hub and Flanged Ends	2 to 24-inch
2482	2492	Flanged and Spigot Ends	2 to 24-inch
2483	2493	Spigot Ends	2 to 24-inch
2484	2494	Screwed Ends	2 to 12-inch
2485	2495	Flanged Ends	2 to 48-inch
2486	2496	Hubs for Concrete Pipe	4 to 48-inch
2487	2497	Hubs for Transite Pipe	2 to 36-inch
2488	2498	Dayton Ends	2 to 24-inch
2489	2499	Universal Ends	2 to 24-inch
2489 1/2		For Tapping Service	2 to 12-inch

Other styles and larger sizes can be furnished.

Body and bonnet: The body and bonnet, oval in shape with uniformly thick metal sections to provide maximum strength, are made of cast iron in the smaller sizes and of Ferrosteel in the larger sizes.

Flanged bodies have straight-through ports permitting uninterrupted fluid flow; tie ribs between the bonnet flange and end flanges assure proper support of the body and guard against line strains.

Double discs: The parallel seat and double disc construction contributes to the accurate operation of these valves. Brass wedges, controlled by hooks, exert equal pressure on the discs and act independently of the stem nut, thus eliminating the possibility of binding or stripping stem threads. Angular in design, the wedges provide instant release of the entire wedging mechanism at the first movement of the stem.

Seats and discs: The body seat rings, made of brass, are screwed into the body. The discs in sizes 3-inch and smaller are brass; in the larger sizes, they are made with a brass face.

Stem: Non-rising stem valves have a stem made of Crane Cast Manganese Bronze, an alloy of unusually high tensile and torsional strength with excellent

wearing quality. A brass-bushed stem collar, set between graphited stem bearings, assures long trouble-free service. Outside screw and yoke valves have a brass stem and a brass stem hole bushing.

Gland and stuffing box: The valves have a two-piece gland consisting of a brass gland and a malleable iron gland flange. Zinc-plated gland bolts and brass gland bolt nuts eliminate the possibility of corrosion.

The stuffing box is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Hub dimensions: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

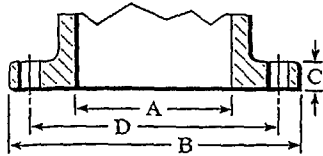
Disc rollers: When valves, sizes 16-inch and larger, are to be installed horizontally, they are equipped with a brass track in the lower side of the body, and with brass rollers and brass scrapers in the lower side of the discs.

By-passes: Sizes 16-inch and larger can be equipped with a by-pass when so ordered.

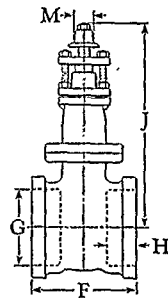
Gearing: To facilitate operation, sizes 24-inch and larger should be equipped with gears. Dimensions are shown on the opposite page.

Dimensions of A.W.W.A. Gate Valves, in Inches

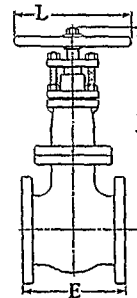
Valves Without Gears



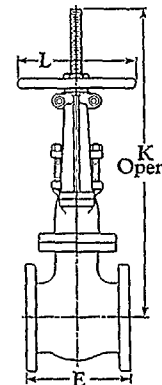
Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged valves conform to the American Cast Iron Flange Standard, Class 125 (B16a-1930). The flanges are plain faced, with a smooth finish.



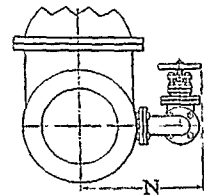
Non-Rising Stem
Hub Ends



Non-Rising Stem
Flanged



Outside Screw and Yoke
Flanged

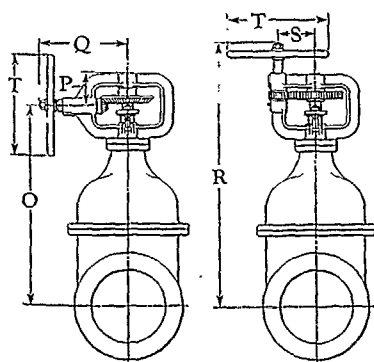


By-Pass on Side

Dimension "N", showing clearance of by-pass, also applies to valves having the by-pass installed on the bottom.

Size	Flanges						E		F		G	H	J	K	L	M	N	Size of by-pass
	A	B	C	D	Bolts		With-out by-pass	With by-pass	With-out by-pass	With by-pass								
					No.	Dia.												
2	2	6	5/8	4 3/4	4	5/8	7		9 1/4		3.38	3.00	13 1/2	13 3/4	8	2		
3	3	7 1/2	3/4	6	4	5/8	8		11		4.66	3.50	16 3/4	17 1/2	9	2		
4	4	9	15/16	7 1/2	8	5/8	9		12 1/4		5.70	4.00	18 1/2	21 3/4	10	2		
6	6	11	1	9 1/2	8	3/4	10 1/2		13 1/4		7.80	4.00	22 1/4	30 1/2	12	2		
8	8	13 1/2	1 1/8	11 3/4	8	3/4	11 1/2		13 3/4		10.00	4.00	25 3/4	39 1/2	14	2		
10	10	16	1 3/16	14 1/4	12	7/8	13		14 1/2		12.10	4.00	30 1/2	48 1/4	16	2		
12	12	19	1 1/4	17	12	7/8	14	18	15	20 1/2	14.20	4.00	34	55 1/4	18	2	21 1/4	2
14	14	21	1 3/8	18 3/4	12	1	15 3/4	18 1/2	16 1/2	20 1/2	16.45	4.00	39 1/4	66 3/4	20	2	22 1/4	2
16	16	23 1/2	1 7/16	21 1/4	16	1	17	26 1/2	17	21 1/2	18.80	4.00	44 1/2	74	22	2	25 1/2	3
18	18	25	1 9/16	22 3/4	16	1 1/8	18 1/2	27	18	22 5/8	20.92	4.00	48	82 1/2	24	2	26 7/8	3
20	20	27 1/2	1 11/16	25	20	1 1/8	20	28	19	24	23.06	4.00	51 3/4	92	24	2	28 1/4	3
24	24	32	1 7/8	29 1/2	20	1 1/4	24	32	21	27 3/8	27.32	4.00	63 1/2	109 3/4	30	3	32 1/4	4
30	30	38 3/4	2 1/8	36	28	1 1/4	24	32 3/4	24	32 3/4	33.74	4.50	76	137	36	3	37 5/8	4
36	36	46	2 3/8	42 3/4	32	1 1/2	28	33 1/2	27	38 1/2	40.16	4.50				3	44 5/8	6
42	42	53	2 5/8	49 1/2	36	1 1/2	33	34	33	41 7/8	46.58	5.00				3	48	6
48	48	59 1/2	2 3/4	56	44	1 1/2	36	36	36	47 1/2	52.98	5.00				3	55 1/8	8

*Valves With Gears

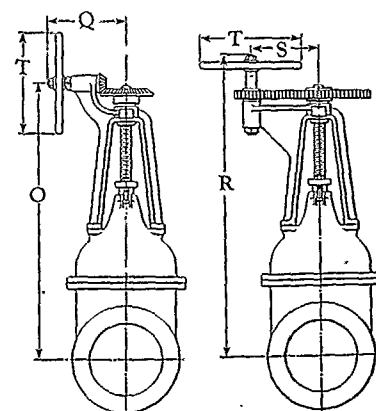


Bevel Gearing Spur Gearing
Non-Rising Stem Valves

Size	O	P	Q	R	S	T
12	30 3/4	6	12 3/4	42 1/4	6	18
14	35 1/4	6	12 3/4	46 3/4	6	18
16	40 3/4	7 1/4	17	54 3/4	8	22
18	44 1/2	7 1/4	17	58 1/2	8	22
20	47	7 1/4	17	61	8	22
24	56 1/4	8 1/2	20 1/2	72 1/4	10 3/4	27
30	68	9 1/4	23	84 1/2	12	30
36	79 1/4	10 3/4	26 1/4	97 1/4	15	30
42	93	12 1/2	29 1/2	112 3/4	17 1/2	36
48	102	12 1/2	29 1/2	122	17 1/2	36
12	43		12 3/4	47 1/4	12	18
14	52 1/2		12 3/4	55 1/4	12	18
16	58		17	63 3/4	14 3/4	22
18	64 1/2		17	70 1/4	14 3/4	22
20	71		17	76 3/4	14 3/4	22
24	85 1/2		20 1/2	91	17	27
30	106 1/2		23	111 3/4	19	30
36	121 3/4		26 1/4	127 3/4	19 1/2	30
42	140 1/4		29 1/2	144	22 3/4	36
48	155 1/2		29 1/2	159	22 3/4	36

Non-Rising Stem

Outside Screw and Yoke



Bevel Gearing Spur Gearing
Outside Screw and Yoke Valves

*Dimensions not given for valves with gears are the same as those shown for valves without gears.

These valves are regularly made to open to the left; can be made to open to the right when so ordered.

Templates for drilling,
page 551.

Standard Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

WORKING PRESSURES

2 to 12-inch — 200 pounds cold water, oil, or gas, non-shock
14 to 24-inch — 150 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES

2 to 12-inch — 350-pound shell test
— 225-pound seat test
14 to 24-inch — 250-pound shell test
— 175-pound seat test

Air tested

Crane Standard Iron Body Double Disc Gate Valves, illustrated on the opposite page, are especially recommended for use in the oil and gas industry, and for water lines requiring rugged, substantially constructed valves. In oil or gas fields, in oil refineries, and in stations for storing and dispensing gasoline or oil, they are exceptionally well suited for general utility service in oil, gas, or water lines.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are brass, screwed into the body. The discs in sizes 2 to 3½-inch are brass; in the larger sizes, they are cast iron with a brass face.

Brass trimmed valves have a brass stem (Cast Manganese Bronze in non-rising stem valves). In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, and that portion which comes in contact with the packing is nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Gland: The gland is the two-piece type, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves or a nickel-plated steel gland in all-iron valves.

Hub end valves: Hub end valves conforming to the American Water Works Association specifications can be made to order; see page 126 for description.

By-passes: Sizes 14-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 138 for prices and pages 140 and 141 for dimensions.

Gearing: To facilitate operating the valve, sizes 24-inch and larger should be equipped with gears. See page 139 for prices, 140 and 141 for dimensions.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes

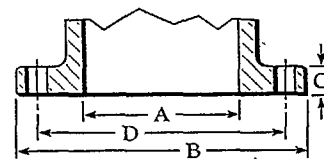
should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, is ideal for this purpose. For details, see pages 171 to 173.

Cleanouts: For use on lines carrying an unusual amount of sediment, tarry fluids, etc., flanged valves can be equipped with a cleanout on the side of the body to facilitate cleaning: see page 138.

Standards: Flanged valves without by-pass conform to the A.P.I. Standard No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Gate Valves. This Standard includes sizes 2, 2½, 3, 4, 6, 8, 10, and 12-inch.

Flanged valves without by-pass also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 125-Lb. Cast Iron Flanged Double Disc Gate Valves. This Standard includes sizes 2 to 12-inch inclusive.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16.1-1939). The flanges are plain faced, with a smooth finish.



Dimensions of Flanges, in Inches

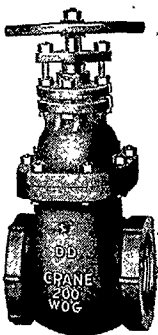
Size	A	B	C	D	No. of bolts	Dia. of bolts
2	2	6	5/8	4 3/4	4	5/8
2½	2½	7	11/16	5 1/2	4	5/8
3	3	7½	3/4	6	4	5/8
3½	3½	8½	13/16	7	8	5/8
4	4	9	15/16	7½	8	5/8
5	5	10	15/16	8½	8	3/4
6	6	11	1	9½	8	3/4
8	8	13½	1 1/8	11¾	8	3/4
10	10	16	1 3/16	14¼	12	7/8
12	12	19	1 1/4	17	12	7/8
14	14	21	1 3/8	18¾	12	1
16	16	23½	1 7/16	21¼	16	1
18	18	25	1 9/16	22¾	16	1 1/8
20	20	27½	1 11/16	25	20	1 1/8
24	24	32	1 5/8	29½	20	1 1/4

Additional description

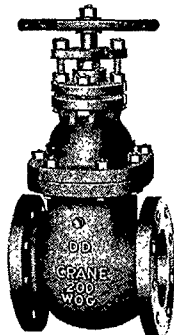
pages 120 and 121

Standard Iron Body Double Disc Gate Valves Brass Trimmed or All-Iron

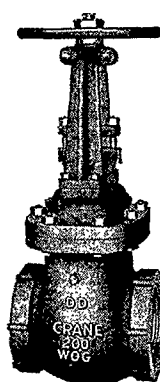
Working pressures and description,
see the preceding page.



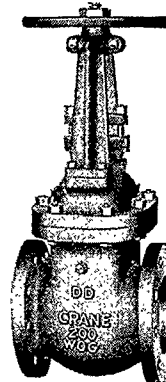
Non-Rising Stem Valves
Screwed
No. 490
Brass Trimmed
No. 1080
All-Iron



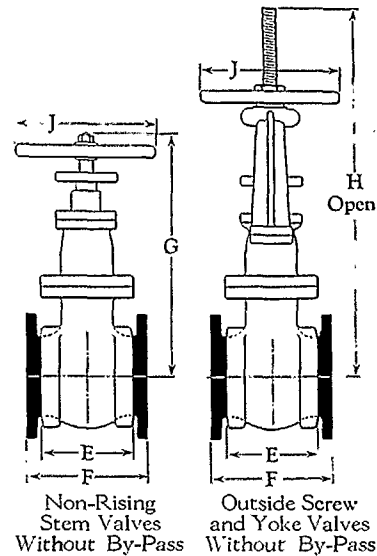
Flanged
No. 481
Brass Trimmed
No. 1081
All-Iron



Outside Screw and Yoke Valves
Screwed
No. 482
Brass Trimmed
No. 1082
All-Iron



Flanged
No. 483
Brass Trimmed
No. 1083
All-Iron



List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches						No. of turns to open
	Non-Rising Stem		Outside Screw and Yoke		E	F	G	H	J		
	No. 480 or No. 1080 Screwed	No. 481 or No. 1081 Flanged, F. & D.	No. 482 or No. 1082 Screwed	No. 483 or No. 1083 Flanged, F. & D.							
2	19.00	20.00	25.00	26.00	5½	7	12	14¾	8	7½	
2½	24.00	25.00	31.50	32.50	6¼	7½	12½	16	8	9	
3	28.50	30.00	36.00	37.50	7	8	14	19	9	10½	
3½	32.50	34.00	41.00	42.50	7⅞	8½	15¼	21¼	9	12	
4	36.00	38.00	45.50	47.50	7½	9	17¼	23¼	10	9	
5	48.50	51.00	61.50	64.00	11	10	19½	28½	12	11	
6	57.00	60.00	72.00	75.00	11¼	10½	21	32	12	13	
8	90.00	90.00	112.00	112.00	12⅝	11½	26	41	14	18	
10	128.00	128.00	160.00	160.00	13⅝	13	30	49¾	16	22	
12	170.00	170.00	212.00	212.00	15⅝	14	34¼	57	18	26	
*14		238.00		286.00		15¾	40	66¾	20	31	
*16		332.00		382.00		17	45¼	75½	22	35	
*18		442.00		510.00		18½	48¾	83½	24	39	
*20		544.00		615.00		20	52½	93	24	44	
*24		850.00		950.00		24	63½	109¾	30	52	

Larger sizes, prices and dimensions on application.

*Sizes 14-inch and larger should have a by-pass. See page 138 for prices and pages 140 and 141 for dimensions.

†Size 24-inch should be geared. See page 139 for prices and pages 140 and 141 for dimensions.

Drilling: Flanged valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American Cast Iron Flange Standard, Class 125. When valves are ordered faced only, they will be furnished at the same price as for faced and drilled.

†Important Notice

Flanged valves *without by-pass* formerly had face to face dimensions different from those shown above.

The new dimensions, adopted with the issuance of this catalog agree with the A.P.I. Standard and the American Ferrous Flanged Valve Standard.

Comparison of Face to Face Dimensions												
Size	2	2½	3	3½	4	5	6	8	10	12		
New	7	7½	8	8½	9	10	10½	11½	13	14		
Old	5⅝	6¼	6⅞	7½	8¼	10¾	11⅞	13¼	13¾	14⅝		

Templates for drilling . . . page 551

By-passes and gearing . . . pages 138 to 141

Thread Engagement . . . page 591

Unless otherwise ordered, valves with the new face to face dimension are furnished. Valves having the old dimension can be furnished (for prices, refer to the Crane Discount Sheet), but orders must specifically indicate that such valves are wanted.

400-Pound W.O.G. Ferrosteel Double Disc Gate Valves Brass Trimmed or All-Iron

WORKING PRESSURE

400 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES

700-pound shell test

450-pound seat test

Air tested

Crane 400-Pound W.O.G. Ferrosteel Double Disc Gate Valves, illustrated on the opposite page, are of the pressure class formerly known commercially as "700-Pound Test" valves. They are especially recommended for use in the oil and gas industry. In oil or gas fields, in oil refineries, in pump houses, or in pipe lines, they are well suited for service where the pressures and operating conditions require the use of somewhat heavier iron body valves than "Standard" weight.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent greater than that of cast iron. This assures added strength and rigidity in these parts.

Flanged valves have straight-through ports. Metal sections adjacent to the bonnet flange and end flange are heavily reinforced to provide maximum safety.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are brass, screwed into the body. The discs in sizes 2 to 3-inch are brass; in the larger sizes, they are cast iron with a brass face.

The valves have a brass stem (Cast Manganese Bronze in non-rising stem valves). In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, and that portion which comes in contact with the packing is nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Gland: The gland is the two-piece type, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves or a nickel-plated steel gland in all-iron valves.

By-passes: Sizes 8-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 138 for prices and pages 140 and 141 for dimensions.

Gearing: When so ordered, sizes 10 and 12-inch can be equipped with gears to facilitate operation.

The various styles of gearing are illustrated and listed on page 139. For dimensions, see 140 and 141.

Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency pur-

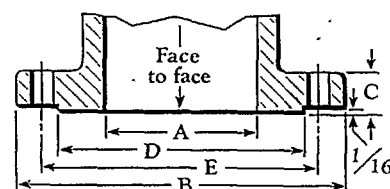
poses should preferably be equipped with some easy means of operation. An electric or air motor drive or an operating cylinder, is ideal for this purpose. For description, see pages 171 to 173.

Standards: Flanged valves without by-pass conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September 1938, for 350-Pound Iron Pipe Line Gate Valves. Flanged valves without by-pass also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 175-Lb. Cast Iron Flanged Double Disc Gate Valves.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

End flanges are regularly furnished with a $\frac{1}{16}$ -inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order. See the Crane Discount Sheet for prices and page 560 for dimensions.



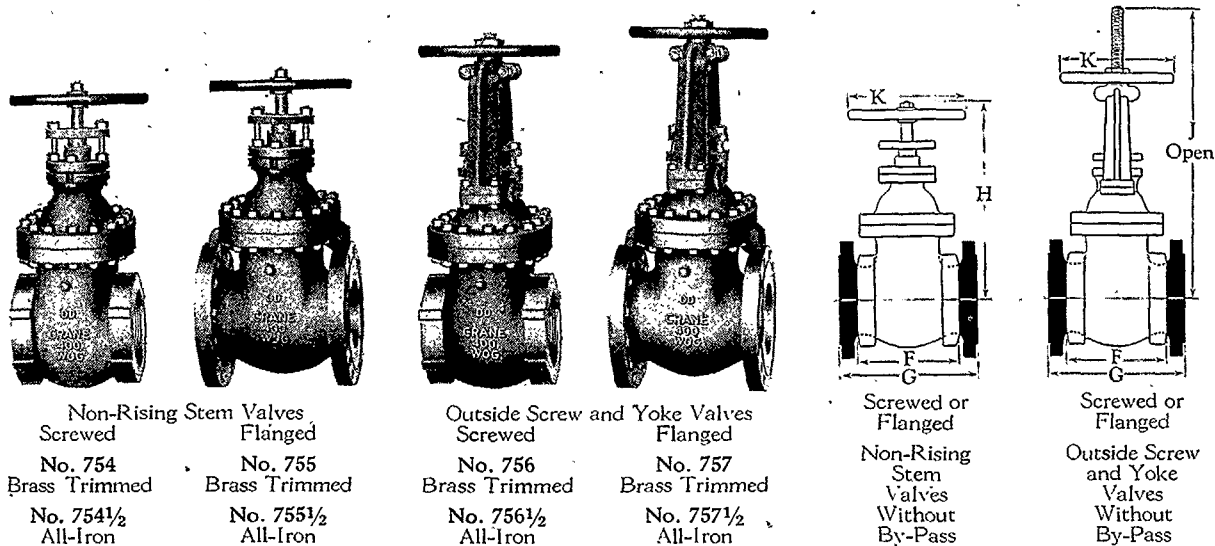
Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. bolt
2	2	6 $\frac{1}{2}$	$\frac{7}{8}$	4 $\frac{3}{16}$	5	8	$\frac{5}{8}$
2 $\frac{1}{2}$	2 $\frac{1}{2}$	7 $\frac{1}{2}$	1	4 $\frac{15}{16}$	5 $\frac{7}{8}$	8	$\frac{3}{4}$
3	3	8 $\frac{1}{4}$	1 $\frac{1}{8}$	5 $\frac{11}{16}$	6 $\frac{5}{8}$	8	$\frac{3}{4}$
4	4	10	1 $\frac{1}{4}$	6 $\frac{15}{16}$	7 $\frac{7}{8}$	8	$\frac{3}{4}$
6	6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	9 $\frac{11}{16}$	10 $\frac{5}{8}$	12	$\frac{3}{4}$
8	8	15	1 $\frac{9}{8}$	11 $\frac{15}{16}$	13	12	$\frac{7}{8}$
10	10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	14 $\frac{1}{16}$	15 $\frac{1}{4}$	16	1
12	12	20 $\frac{1}{2}$	2	16 $\frac{7}{16}$	17 $\frac{3}{4}$	16	1 $\frac{1}{2}$

Additional description ... pages 120 and 121

400-Pound W.O.G. Ferrosteel Double Disc Gate Valves Brass Trimmed or All-Iron

For working pressures and description, see the preceding page.



Non-Rising Stem Valves
Screwed Flanged
No. 754 No. 755
Brass Trimmed Brass Trimmed
No. 754½ No. 755½
All-Iron All-Iron

Outside Screw and Yoke Valves
Screwed Flanged
No. 756 No. 757
Brass Trimmed Brass Trimmed
No. 756½ No. 757½
All-Iron All-Iron

Screwed or Flanged
Non-Rising Stem Valves Without By-Pass

Screwed or Flanged
Outside Screw and Yoke Valves Without By-Pass

List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches					
	Non-Rising Stem		Outside Screw and Yoke		F	G	H	J	K	No. of turns to open
	No. 754 or No. 754½ Screwed	No. 755 or No. 755½ Flanged F.D.&S.F.	No. 756 or No. 756½ Screwed	No. 757 or No. 757½ Flanged F.D.&S.F.						
2	33.00	34.00	43.00	44.00	6	7¼	11¾	14½	8	7
2½	42.50	43.50	55.50	56.50	6¾	8	12¾	16	8	9
3	49.50	51.00	62.50	64.00	7¼	9¼	14	19¼	9	10¼
4	63.00	65.00	79.00	81.00	7⅞	10½	17¼	24	10	9
6	99.00	102.00	124.00	127.00	10½	13	22½	32¼	12	13
* 8		153.00		191.00		14¼	26	42	14	35
*10		218.00		272.00		16¾	30½	51	16	42½
*12		290.00		362.00		17½	34	58¼	18	51

Larger sizes, prices and dimensions on application.

*Sizes 8-inch and larger should have a by-pass. See page 138 for prices and pages 140 and 141 for dimensions.

Drilling: Prices of flanged valves include facing and flange Standard, and spot facing; no deduction is made if valves are ordered faced only.

†Important Notice

Flanged valves *without by-pass* in the 4-inch size Unless otherwise ordered, valves with the new face to face dimension will be furnished. Valves having the old dimension can be furnished (for prices, refer to the Crane Discount Sheet), *but orders must specifically indicate that such valves are wanted.*

Comparison of Face to Face Dimensions	
Size	
New	10½
Old	9½

By-passes and gearing . . . pages 138 to 141

Templates for drilling . . . page 552

Thread engagement . . . page 591

500-Pound W.O.G. Ferrosteel Double Disc Gate Valves Brass Trimmed or All-Iron

Crane 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves, shown on the opposite page, are of the pressure class formerly known commercially as "1000-Pound Test" valves. They are especially suitable for use in oil or gas fields, in oil refineries, in pump houses, in pipe lines, in high pressure water lines, or for similar service requiring heavy, massive iron body valves.

Rugged construction: All parts are unusually rugged, assuring a high factor of safety in operation.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron approximately 35 per cent stronger than cast iron. The metal sections are heavy, and the metal is distributed to provide maximum strength.

Flanged valves have straight through ports. Metal sections adjacent to the bonnet flange and end flange are heavily reinforced to provide maximum safety.

Brass trimmed valves: Brass trimmed valves are recommended for water, oil, or gas lines.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

The discs, in sizes 2 to 4-inch, are Crane Hard Metal; in the larger sizes, they are cast iron faced with Crane Hard Metal.

The valves have a brass stem (Cast Manganese Bronze in non-rising stem valves). In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass-bushed.

All-iron valves: All-iron valves are recommended for oil or gas, or for fluids that corrode brass.

The seats are cast integral with the body and discs. Valves with screwed-in body seat rings can be made to order; prices on application.

The stem is steel, and that portion which comes in contact with the packing is nickel-plated.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Gland: The gland is the two-piece type, consisting of a malleable iron gland flange and a brass gland in brass trimmed valves or a nickel-plated steel gland in all-iron valves.

By-passes: Sizes 6-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the valve before opening. See page 138 for prices and pages 140 and 141 for dimensions.

WORKING PRESSURE

500 pounds cold water, oil, or gas, non-shock

HYDROSTATIC TEST PRESSURES

1000-pound shell test

550-pound seat test

Air tested

Gearing: Sizes 8-inch and larger can be equipped with gears; see page 139 for prices and pages 140 and 141 for dimensions.

Motor or cylinder operation: Valves installed in inaccessible locations or

used for emergency purposes should preferably be equipped with some easy means of operation, such as an electric or air motor drive, or an operating cylinder. For details, see pages 171 to 173.

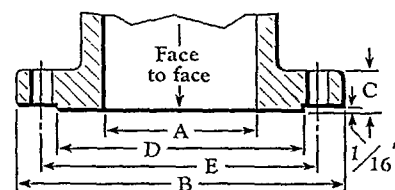
Standards: Flanged valves without by-pass in all sizes and those with by-pass in the 6, 8, and 10-inch sizes conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 500-Pound Iron Pipe Line Gate Valves.

Flanged valves without by-pass in all sizes and those with by-pass in the 6, 8, and 10-inch sizes also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 250-Lb. Cast Iron Flanged Double Disc Gate Valves.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

End flanges are regularly furnished with a $\frac{1}{16}$ -inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.



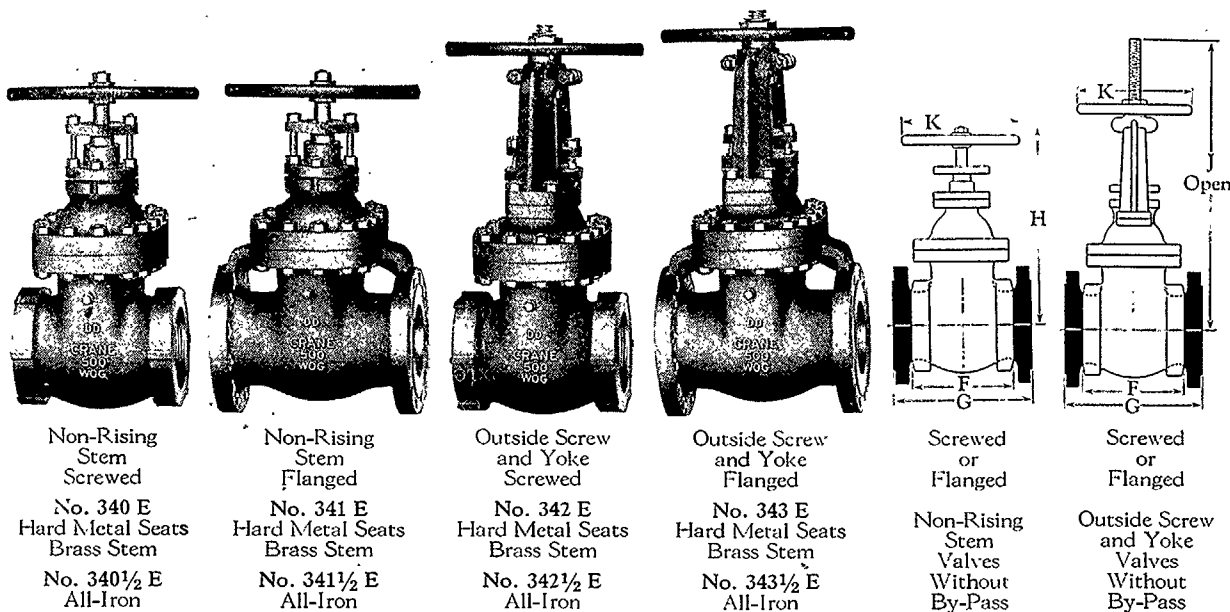
Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. bolt
2	2	6 $\frac{1}{2}$	$\frac{7}{8}$	$\frac{43}{16}$	5	8	$\frac{5}{8}$
2 $\frac{1}{2}$	2 $\frac{1}{2}$	7 $\frac{1}{2}$	1	$\frac{415}{16}$	5 $\frac{7}{8}$	8	$\frac{3}{4}$
3	3	8 $\frac{1}{4}$	1 $\frac{1}{8}$	$\frac{511}{16}$	6 $\frac{5}{8}$	8	$\frac{3}{4}$
4	4	10	1 $\frac{1}{4}$	$\frac{615}{16}$	7 $\frac{7}{8}$	8	$\frac{3}{4}$
6	6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	$\frac{911}{16}$	10 $\frac{3}{8}$	12	$\frac{3}{4}$
8	8	15	1 $\frac{5}{8}$	$\frac{1115}{16}$	13	12	$\frac{1}{2}$
10	10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	$\frac{1411}{16}$	15 $\frac{1}{4}$	16	1
12	12	20 $\frac{1}{2}$	2	$\frac{1671}{16}$	17 $\frac{3}{4}$	16	1 $\frac{1}{2}$

Additional description pages 120 and 121

500-Pound W.O.G. Ferrosteel Double Disc Gate Valve Brass Trimmed or All-Iron

For working pressures and description, see the preceding page.



Non-Rising
Stem
Screwed
No. 340 E
Hard Metal Seats
Brass Stem
No. 340½ E
All-Iron

Non-Rising
Stem
Flanged
No. 341 E
Hard Metal Seats
Brass Stem
No. 341½ E
All-Iron

Outside Screw
and Yoke
Screwed
No. 342 E
Hard Metal Seats
Brass Stem
No. 342½ E
All-Iron

Outside Screw
and Yoke
Flanged
No. 343 E
Hard Metal Seats
Brass Stem
No. 343½ E
All-Iron

Screwed
or
Flanged
Non-Rising
Stem
Valves
Without
By-Pass

Screwed
or
Flanged
Outside Screw
and Yoke
Valves
Without
By-Pass

List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches					
	Non-Rising Stem		Outside Screw and Yoke		F	G	H	J	K	No. of turns to open
	No. 340 E or No. 340½ E Screwed	No. 341 E or No. 341½ E Flanged F.D.&S.F.	No. 342 E or No. 342½ E Screwed	No. 343 E or No. 343½ E Flanged F.D.&S.F.						
2	37.00	38.00	49.00	50.00	8	†8½	12½	17	9	15
2½	47.00	48.00	62.00	63.00	8⅞	†9½	14½	18¾	9	18
3	55.50	57.00	69.50	71.00	9⅝	†11⅞	15¼	21	10	15
4	70.00	72.00	88.00	90.00	10½	†12	17¾	25¼	12	19
* 6	117.00	120.00	147.00	150.00	13¼	†15⅞	22¾	34	16	28
*† 8		180.00		225.00		†16½	28	42¾	20	36
*†10		255.00		320.00		†18	35	53¼	22	44
*†12		340.00		425.00		†19¾	39	61	24	52

*Sizes 6-inch and larger should have a by-pass; see page 138 for prices and pages 140 and 141 for dimensions.

†For dimensions of valves with gears, see pages 140 and 141; for prices of gears, see page 139.

Drilling: Prices of flanged valves include facing Flange Standard, and spot facing; no deduction is and drilling to the 250-Pound American Cast Iron made if valves are ordered faced only.

When larger sizes are required, use the 500-Pound Gas Valves shown on pages 134 and 135.

†Important Notice

Flanged valves *without by-pass* formerly had face to face dimensions different from those shown above. The new dimensions, adopted with the issuance of this catalog, agree with the A.P.I. Standard and the American Ferrous Flanged Valve Standard. Unless otherwise ordered, valves with the new face to face are furnished. Valves having the old dimensions can be furnished (for prices, see the Crane Discount Sheet), but orders must specifically indicate that such valves are wanted.

Comparison of Face to Face Dimensions										
Size	2	2½	3	4	6	8	10	12		
New	8½	9½	11⅞	12	15⅞	16½	18	19¾		
Old	7¼	8	9¼	9½	13	14¼	16¾	17½		

By-passes and gearing . . . pages 138 to 141 Templates for drilling . . . page 552 Thread engagement . . . page 591

500-Pound Gas Ferrosteel Double Disc Gate Valves Brass Trimmed — With Spur Gears

WORKING PRESSURE
500 pounds gas

HYDROSTATIC TEST PRESSURES
800-pound shell test
500-pound seat test

Air tested

Crane 500-Pound Gas Ferrosteel Double Disc Gate Valves with spur gears, illustrated on the opposite page, are especially designed and built for heavy duty service on gas lines where working pressures do not exceed 500 pounds. They are not recommended for use on water or oil lines.

The valves are regularly equipped with spur gears to facilitate operation.

Rugged construction: The valves are unusually rugged and are liberally ribbed. Metal sections in the body and bonnet are more than ample, and the metal is distributed to assure maximum strength and to avoid distortion. All parts have a high factor of safety.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron having a tensile strength approximately 35 per cent greater than that of cast iron.

Tie ribs between the end flanges and the bonnet flange on the body assure proper support of the end flanges and impart greater resistance to line strains.

Seats and discs: The body seat rings and disc faces are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. The body seat rings are screwed into the body.

In non-rising stem valves, the portion of the disc engaging the stem threads is brass-bushed.

Stem: The stem is made of brass as a safeguard against corrosion.

Stuffing box and gland: The stuffing box is the lantern-type. It is unusually deep and is filled with high grade packing. Alemite fittings are provided to assure quick, easy lubrication.

The gland is the two-piece ball-type, consisting of a malleable iron gland flange and a brass gland.

These valves, when wide open, can be repacked while under pressure.

By-passes: 500-Pound Gas Valves in all sizes should be equipped with a by-pass, to enable equalizing the pressure on both sides of the disc before opening the main valve.

By-passes should preferably be built around the main valve, but single valve by-passes mounted on the main valve can be furnished; see the opposite page for prices and dimensions.

In addition, three valve by-passes, mounted on the main valve and built up so that either side can be

opened to a draw-off line, are available on special order. Prices and information will be furnished on application.

Reduced seat openings: Valves (Venturi-type) with flared ends and reduced seat openings can be made to order with a 22-inch port opening and an 18 or 20-inch seat, or with a 24-inch port opening and a 20-inch seat; prices on application.

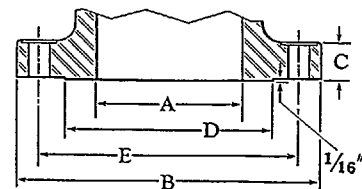
Motor or cylinder operation: Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, fulfills this need admirably. For details, see pages 171 to 173.

Face to face: The face to face dimensions of these valves conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939) for 250-Lb. Cast Iron Flanged Double Disc Gate Valves.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

The valves are regularly furnished with a $\frac{1}{16}$ -inch raised face on the end flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be furnished to order at an additional price. See page 560 for dimensions and the Crane Discount Sheet for prices.



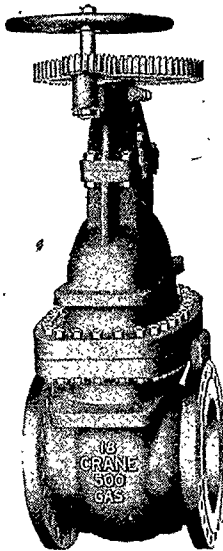
Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. of bolts
14	13 $\frac{1}{4}$	23	2 $\frac{1}{8}$	18 $\frac{15}{16}$	20 $\frac{1}{4}$	20	1 $\frac{1}{8}$
16	15 $\frac{1}{4}$	25 $\frac{1}{2}$	2 $\frac{1}{4}$	21 $\frac{1}{16}$	22 $\frac{1}{2}$	20	1 $\frac{1}{4}$
18	17	28	2 $\frac{3}{8}$	23 $\frac{5}{16}$	24 $\frac{3}{4}$	24	1 $\frac{1}{4}$
20	19	30 $\frac{1}{2}$	2 $\frac{1}{2}$	25 $\frac{9}{16}$	27	24	1 $\frac{1}{4}$
24	23	36	2 $\frac{3}{4}$	30 $\frac{5}{16}$	32	24	1 $\frac{1}{2}$

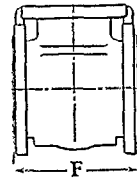
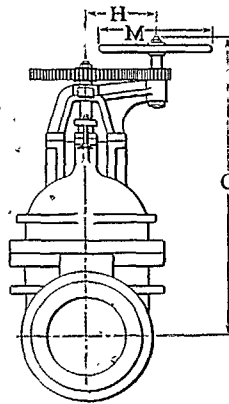
Additional description . . . pages 120 and 121

500-Pound Gas Ferrosteel Double Disc Gate Valves Brass Trimmed—With Spur Gears

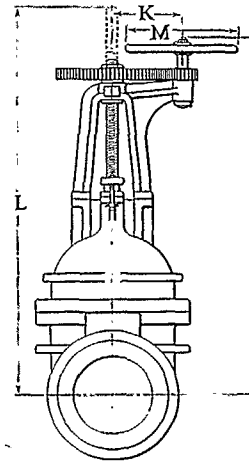
*For working pressures and description,
see the preceding page.*



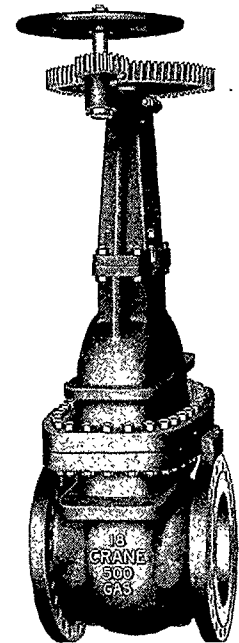
Non-Rising Stem Valve with Spur Gears
No. 348 E, Flanged



Face to Face
Dimension
For All Valves

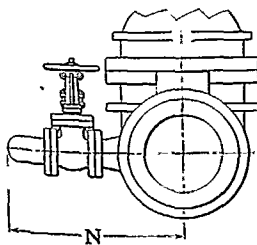


Outside Screw and Yoke Valve with Spur Gears
No. 349 E, Flanged



List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches								
	For Valves With Spur Gears Flanged, F.D.& S.F.		Extra for Single Valve By-Pass		F	Non-Rising Stem		Outside Screw and Yoke			M	Valves With By-Pass	
	No. 348 E	No. 349 E	For Non- Rising Stem Valve	For Outside Screw and Yoke Valve		G	H	J	K	L		N	Size of By- Pass
	Non- Rising Stem	Outside Screw and Yoke											
14	550.00	650.00	136.00	152.00	22½	56	10½	64½	15	74¾	22	33½	3
16	740.00	845.00	200.00	220.00	24	61½	10½	74½	15	86	24	37½	4
18	970.00	1100.00	200.00	220.00	26	64¾	10½	78	15	91½	24	38⅝	4
20	1200.00	1355.00	200.00	220.00	28	70¼	12⅞	84½	18½	100	27	39⅞	4
24	1875.00	2100.00	200.00	220.00	31	82	12⅞	99½	18⅞	117	30	44½	4



Clearance of Valves
Equipped with By-Pass

Drilling: Flanged valves are furnished faced, drilled, and spot faced (F.D. & S.F.) unless ordered faced only. List prices include facing and drilling to the 250-Pound American Cast Iron Flange Standard, and spot facing. No deduction is made if valves are ordered faced only.

By-passes: All sizes of these valves should be equipped with a by-pass, to enable equalizing the pressure on both sides of the disc before opening the main valve.

Three valve by-passes mounted on the main valve or by-passes built around the main valve also are available on special order. Prices, dimensions, and information will be furnished on application.

800-Pound W.O.G. Ferrosteel Double Disc Gate Valves Brass Trimmed

WORKING PRESSURE

800 pounds cold water, oil, or gas, non-shock

Crane 800-Pound W.O.G. Ferrosteel Double Disc Gate Valves, illustrated on the opposite page, are of the pressure class formerly known commercially as "1600-Pound Test" valves. They are especially suitable for use in oil or gas fields, in oil refineries, in pump houses, in pipe lines, in high pressure water lines, or for similar service requiring unusually heavy iron body valves.

Rugged construction: All parts are exceptionally rugged and massive, assuring a high factor of safety in operation.

Ferrosteel body and bonnet: The body and bonnet are made of Crane Ferrosteel, a high grade iron approximately 35 per cent stronger than cast iron. The metal sections are heavy, and the metal is distributed to provide maximum strength.

The joint between the body and bonnet is made with tongue and groove facing; the bonnet gasket is retained inside and outside, to minimize the possibility of blowing out in service.

Flanged valves are made with straight through ports. Metal sections adjacent to the bonnet and end flanges are heavily reinforced to provide maximum safety.

Lipped for lead: The threaded ends of screwed valves are recessed for lead.

Materials: These valves are recommended for water, oil, or gas lines.

The body seat rings are made of Crane Hard Metal, a copper-tin bronze of unusual strength and hardness. They are screwed into the body.

The discs in sizes 2 to 4-inch are Crane Hard Metal; in the larger sizes, they are cast iron faced with Crane Hard Metal.

The valves have a brass stem (Cast Manganese Bronze in non-rising stem valves). In non-rising stem valves, the portion of the discs that engages the stem threads is brass or brass bushed.

The gland is two-piece, consisting of a malleable iron gland flange and a brass gland.

Stuffing box: The stuffing boxes are filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

By-passes: Sizes 6-inch and larger should have a by-pass, to enable equalizing the pressure on both sides of the main valve before opening. See page 138 for prices, pages 140 and 141 for dimensions.

Gearing: To facilitate operation, sizes 10 and 12-

**HYDROSTATIC
TEST PRESSURES**
1600-pound shell test
850-pound seat test

Air tested

inch should be equipped with gears. See page 139 for prices and pages 140 and 141 for dimensions.

Motor or cylinder operation:

Valves installed in inaccessible locations or used for emergency purposes should preferably be equipped with some easy means of operation. An electric or air motor drive, or an operating cylinder, is ideal for this purpose. For description, see pages 171 to 173.

Standards: Flanged valves conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 800-Pound Iron Pipe Line Gate Valves.

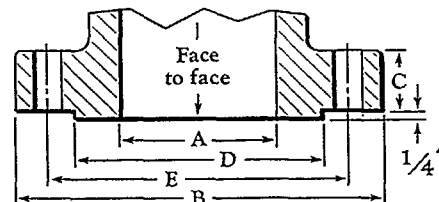
Flanged valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 800-Lb. Hydraulic Cast Iron Flanged Double Disc Gate Valves.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931).

End flanges are regularly furnished with a 1/4-inch male face (large male). The male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces are made to order. See page 560 for dimensions and the Crane Discount Sheet for prices.

Valves with tongue or groove flanges conforming to the National Transit (Pipe Line) Standard can be made to order; prices on application.



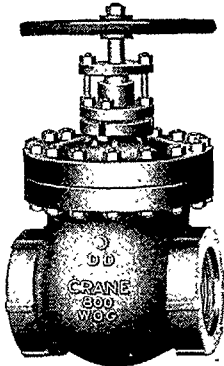
Dimensions of Flanges, in Inches

Size	A	B	C	D	E	No. of bolts	Dia. of bolts
3	3	8 1/4	1 1/2	5	6 5/8	8	3/4
4	4	10 3/4	1 7/8	6 3/16	8 1/2	8	7/8
6	6	14	2 1/4	8 1/2	11 1/2	12	1
8	7 7/8	16 1/2	2 1/2	10 5/8	13 3/4	12	1 1/8
10	9 3/4	20	2 7/8	12 3/4	17	16	1 1/4
12	11 3/4	22	3	15	19 1/4	20	1 1/4

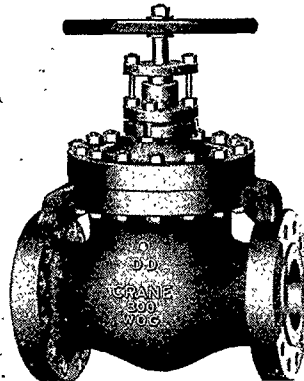
Additional description pages 120 and 121

800-Pound W.O.G. Ferrosteel Double Disc Gate Valves Brass Trimmed

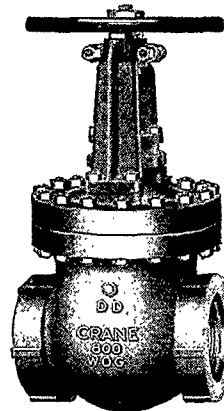
For working pressures and description, see the preceding page.



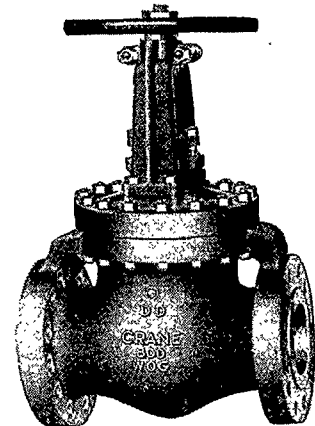
Non-Rising Stem
Screwed
No. 214 H
Hard Metal Seats
Brass Stem



Non-Rising Stem
Flanged
No. 215 H
Hard Metal Seats
Brass Stem



Outside Screw and Yoke
Screwed
No. 216 H
Hard Metal Seats
Brass Stem



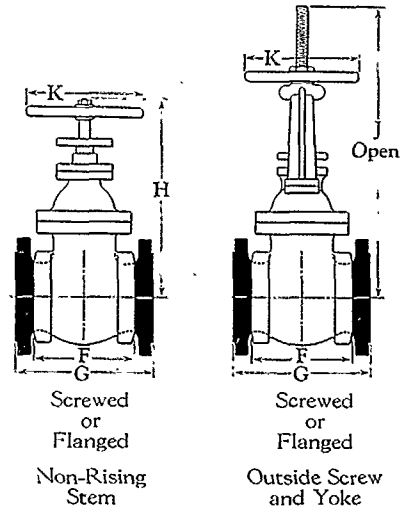
Outside Screw and Yoke
Flanged
No. 217 H
Hard Metal Seats
Brass Stem

List Prices and Dimensions

Size	List Prices, Each				Dimensions, in Inches					
	Non-Rising Stem		Outside Screw and Yoke		F	G	H	J	K	No. of turns to open
	No. 214 H Screwed	No. 215 H Flanged F. D. & S. F.	No. 216 H Screwed	No. 217 H Flanged F. D. & S. F.						
Inches										
2	43.00				7 1/2		13		9	15
2 1/2	55.00		72.00		8 7/8		15	18 1/2	9	18
3	73.50	75.00	92.50	94.00	9 5/8	14	16 3/4	20 3/4	10	15
4	98.00	100.00	123.00	125.00	10 1/2	17	19	26 1/2	12	19
* 6	182.00	185.00	228.00	231.00	14 3/4	22	23 1/2	34	16	28
* 8		300.00		375.00	26	29 1/4	42 3/4	20	36	
* 10		550.00		690.00	31	36 1/2	53 1/2	22	46	
* 12		975.00		1220.00	33	39 3/4	61 1/4	24	54	

*Sizes 6-inch and larger should have a by-pass. See page 138 for prices and pages 140 and 141 for dimensions.

†Sizes 10 and 12-inch should be geared. See page 139 for prices and pages 140 and 141 for dimensions.



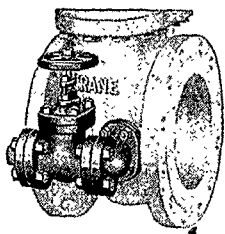
Drilling: Prices of flanged valves include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard, and spot facing; no deduction is made if valves are ordered faced only.

By-passes: A by-pass is recommended on 800-Pound W.O.G. Valves sizes 6-inch and larger. It enables equalizing the pressure on both sides of the disc

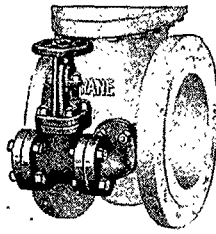
before opening the main valve. Prices of by-passes are shown on page 138. Dimensions of valves with by-passes are shown on pages 140 and 141.

Gearing: Sizes 10 and 12-inch valves should be equipped with gears, to facilitate operation. Prices and styles of gears are shown on page 139. Dimensions are shown on pages 140 and 141.

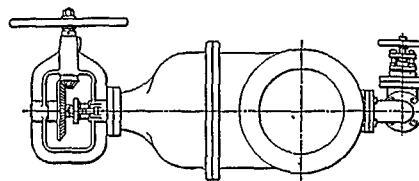
By-Passes for Iron Body Double Disc Gate Valves



Bolted By-Pass
Non-Rising Stem



Bolted By-Pass
Outside Screw and Yoke



Bevel Geared Valve with By-Pass

Extra List Prices for Bolted By-Pass
For Flanged and Hub End Valves

Pressure Class of Valve	Size of Valve Inches	Size of By-Pass Inches	Non-Rising Stem By-Pass Each	O. S. & Y. By-Pass Each
Low Pressure Page 123	14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24 and 30	4	120.00	129.50
	36 and 42	6	170.00	185.00
	48	8	230.00	252.00
Light Standard Page 125	12 and 14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24 and 30	4	120.00	129.50
	36 and 42	6	170.00	185.00
	48	8	230.00	252.00
Standard Page 129	12 and 14	2	60.00	66.00
	16 to 20	3	90.00	97.50
	24	4	120.00	129.50
	400-Pound W.O.G. Page 131	6	11 1/4	44.00
400-Pound W.O.G. Page 131	8	1 1/2	52.00	61.00
	10	1 1/2	60.00	70.00
	12	2	70.00	80.00
	500-Pound W.O.G. Page 133	6	11 1/4	52.00
500-Pound W.O.G. Page 133	8	1 1/2	61.00	71.00
	10	1 1/2	80.00	93.00
	12	2	91.00	105.00
	800-Pound W.O.G. Page 137	6	11 1/4	83.00
800-Pound W.O.G. Page 137	8 and 10	1 1/2	100.00	115.00
	12	2	125.00	140.00

When so ordered, Crane Hub End and Flanged End Iron Body Double Disc Gate Valves can be furnished with a by-pass. Extra list prices are shown in the table.

By-passes for screwed end valves will be furnished on special order; prices on application.

These by-passes facilitate the operation of the main valve by enabling equalization of the pressure on both sides of the disc.

Non-rising stem valves will be equipped with a non-rising stem by-pass; O.S. & Y. valves, with an O.S. & Y. by-pass.

Brass trimmed valves will be furnished with a brass trimmed by-pass; all-iron valves will be furnished with an all-iron by-pass.

Bevel geared valves with by-pass have the by-pass on the bottom of the valve, as shown in the illustration above.

Dimensions . . . pages 140 and 141

Lockup Caps



Lockup caps can be furnished for any class of Crane Non-Rising Stem Gate Valve. Prices are furnished on application.

Single Cleanouts for Standard Iron Double Disc Flanged Gate Valves

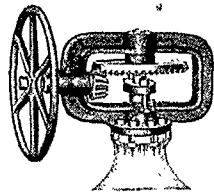


Single Side Cleanout
For Flanged Valve

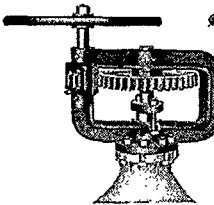
Cleanouts should be used where sediment will accumulate in a valve. They may be either on the side as listed here, or on the bottom. Prices on bottom cleanouts are furnished on application.

Size of Valve Inches	Extra for Single Side Cleanout Per Valve
3	8.00
4	9.00
5	10.50
6	12.00
8	14.00
10	18.00
12	20.00

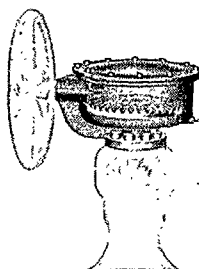
Gearing for Iron Body Double Disc Gate Valves



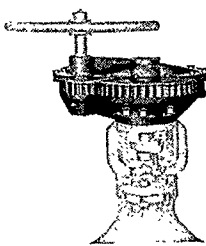
Style U, Bevel Gearing
Non-Rising Stem



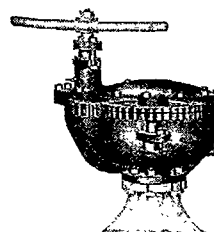
Style S, Spur Gearing
Non-Rising Stem



Grease Case on Style U
Bevel Gearing for
Non-Rising Stem Valves



Grease Case on Style S
Spur Gearing for
Non-Rising Stem Valves



Pressure-Tight
Grease Case
Enclosing Stuffing Box
and Gland, for Non-Rising
Stem Geared Valves
Prices on application

When desired, Crane Iron Body Double Disc Gate Valves can be supplied with gears. Extra list prices are shown below.

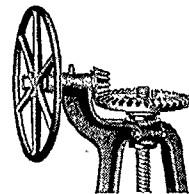
Bevel gearing: Unless otherwise ordered, non-rising stem bevel geared valves are furnished with the pinion shaft extending at right angles to the run of the valve. They can also be furnished with the shaft parallel to the run.

With Style N bevel gearing for outside screw and yoke valves, the pinion shaft extends at right angles to the run of the valve; with Style O, parallel to the run. Unless otherwise ordered, Style N will be furnished.

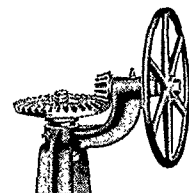
Grease cases and gear covers: Non-rising stem bevel or spur geared valves can be supplied with a grease case completely enclosing the gears. A sheet metal guard (not illustrated) can be built around the stuffing box or a pressure-tight grease case can be furnished; prices on application.

Outside screw and yoke valves cannot be equipped with a grease case, but can be supplied with a gear cover.

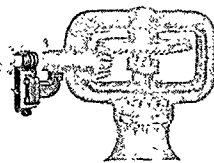
Indicator: Non-rising stem geared valves can be supplied with a worm-gear indicator; prices on application.



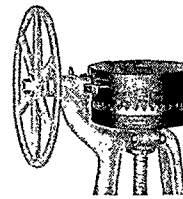
Style N
Bevel Gearing
Outside Screw and Yoke



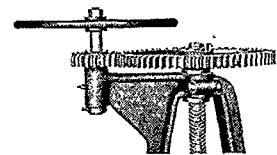
Style O
Bevel Gearing
Outside Screw and Yoke



Worm-Gear Indicator
For Non-Rising Stem Valves
Prices on application



Gear Cover
for
Outside Screw and Yoke Valves

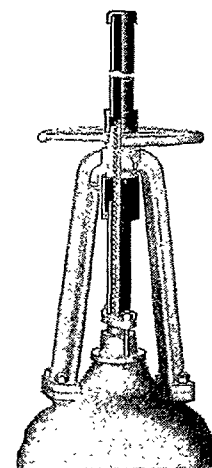


Style P
Spur Gearing
Outside Screw and Yoke

10

Pressure Class of Valve	Size of Valve Inches	Extra List Prices per Valve					
		Non-Rising Stem Gearing		*Grease Cases	Outside Screw & Yoke Gearing		*Gear Covers
		Bevel	Spur		Bevel	Spur	
Low Pressure Page 123	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
	24	85.00	80.00	60.00	90.00	85.00	60.00
	30	95.00	90.00	75.00	100.00	95.00	75.00
	36	180.00	170.00	90.00	190.00	180.00	90.00
	42	230.00	210.00	105.00	250.00	230.00	105.00
	48	400.00	370.00	120.00	430.00	400.00	120.00
Light Standard Page 125	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
	24	85.00	80.00	60.00	90.00	85.00	60.00
	30	95.00	90.00	75.00	100.00	95.00	75.00
	36	180.00	170.00	90.00	190.00	180.00	90.00
	42	230.00	210.00	105.00	250.00	230.00	105.00
	48	400.00	370.00	120.00	430.00	400.00	120.00
Standard Page 129	12	65.00	60.00	50.00	70.00	65.00	50.00
	14 to 20	75.00	70.00	50.00	80.00	75.00	50.00
400-Lb. WOG Page 131	24	85.00	80.00	60.00	90.00	85.00	60.00
	10	75.00	70.00	50.00	80.00	75.00	50.00
500-Lb. WOG Page 133	12	85.00	80.00	60.00	90.00	85.00	60.00
	8	65.00	60.00	50.00	70.00	65.00	50.00
	10	85.00	80.00	60.00	90.00	85.00	60.00
800-Lb. WOG Page 137	12	97.00	92.00	75.00	102.00	97.00	75.00
	6 & 8	75.00	70.00	50.00	80.00	75.00	50.00
	10 & 12	92.00	87.00	75.00	97.00	92.00	75.00

*Grease Case and Gear Cover prices are additional to prices of Gearing.



Stem Protector
For Outside Screw
and Yoke Valves
without Gears
Prices on application

Dimensions of
geared valves,
pages 140 and 141

Iron Body and Ferrosteel Double Disc Gate Valves with Gearing or By-pass

For dimensions, see the following page.

With the exception of 500-Pound Gas Geared Valves, the dimensions of Crane Iron Body and Ferrosteel Double Disc Gate Valves equipped with gearing or by-pass are shown on the opposite page. For dimensions of the 500-Pound Gas Geared Valves and for dimensions of the other valves without gearing or by-pass, refer to the following pages:

Low Pressure Valves.....see page 123
Light Standard Valves.....see page 125
Standard Valves.....see page 129
400-Pound W.O.G. Valves.....see page 131
500-Pound W.O.G. Valves.....see page 133
500-Pound Gas Valves.....see page 135
800-Pound W.O.G. Valves.....see page 137

Gearing: Equipping the larger size Double Disc Gate Valves with gears will greatly facilitate their operation. Gears, both bevel and spur, are available for a wide range of sizes in each pressure class.

Face to face or end to end dimensions of valves with gears are the same as those of valves without gears; see pages referred to above.

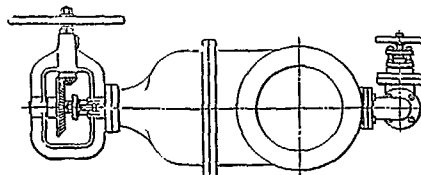
By-passes: Flanged and hub end valves in all pressure classes can be furnished with a bolted by-pass.

Center to top and wheel diameter dimensions of valves with by-pass are the same as those of valves without by-pass; face to face dimensions are explained below.

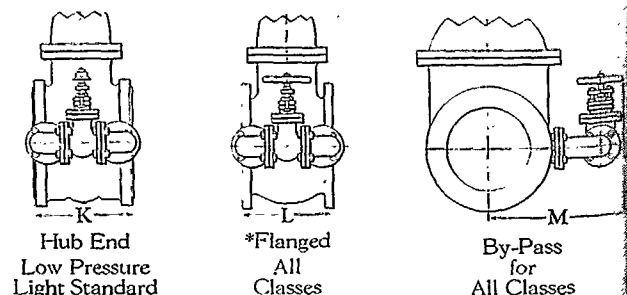
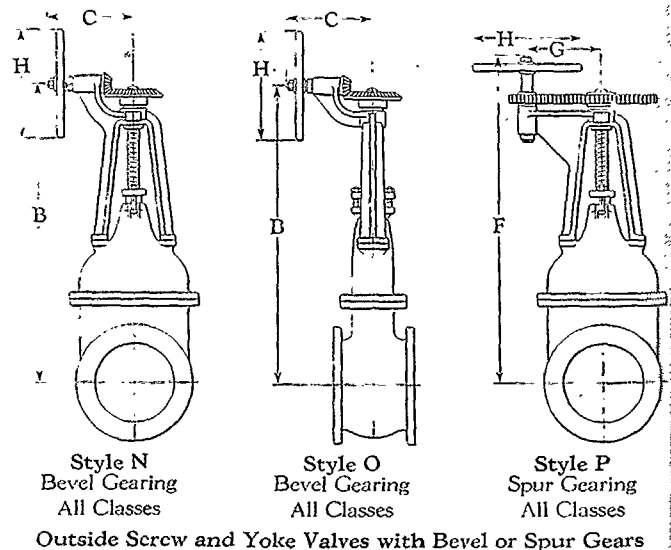
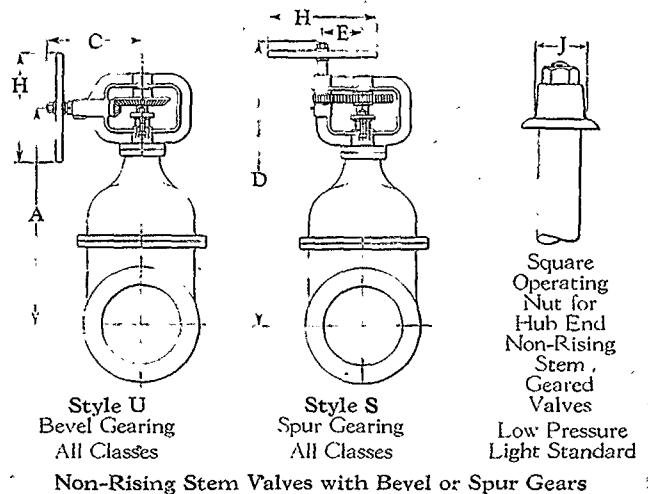
Face to face with by-pass: Low Pressure, Light Standard in sizes 42-inch and smaller, Standard, 400-Pound W.O.G. in 12-inch size, and 500-Pound W.O.G. Double Disc Gate Valves with by-pass have a longer face to face dimension than the same valves without by-pass.

Light Standard in the 48-inch size, 400-Pound W.O.G. in sizes 10-inch and smaller, and all 800-Pound W.O.G. Valves with by-pass have the same face to face as the valves without by-pass. These dimensions are repeated on the opposite page for convenience.

Geared valves with by-pass: Spur-gear valves with by-pass have the by-pass connected at the side of the valve body.



Bevel geared valves with by-pass have the by-pass on the bottom, with the stem of the by-pass valve parallel to the pinion shaft; see illustration above.



*Dimension "L" includes the 1/16-inch raised faces on 400 and 500-Pound W.O.G. Flanged Valves and the 1/4-inch male faces on 800-Pound W.O.G. Flanged Valves.

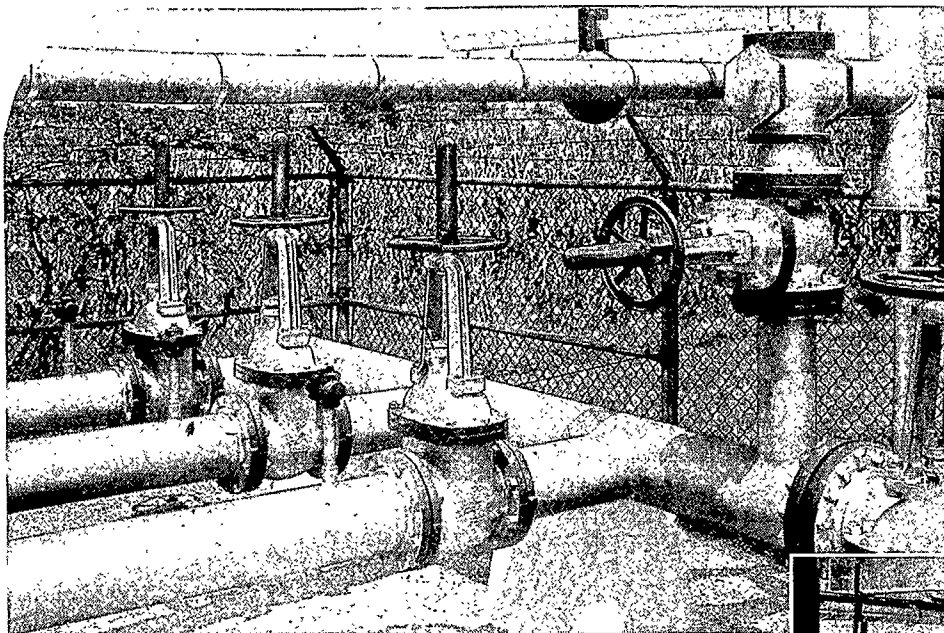
Iron Body and Ferrosteel Double Disc Gate Valves with Gearing or By-Pass

Dimensions, in Inches

For list prices, description, and dimensions of valves
without gearing or by-pass, see pages 120 to 137.

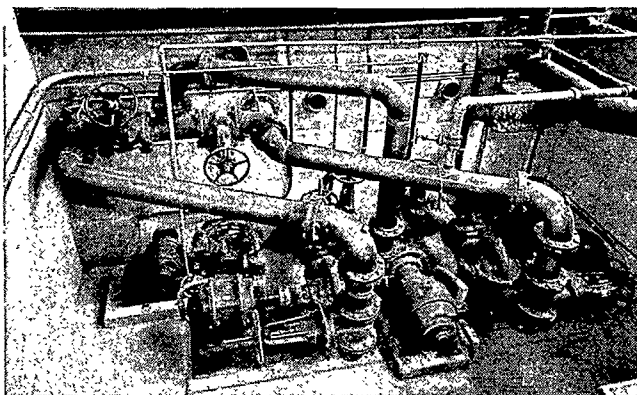
Size of Valve	Valves with Gears								Valves with By-Pass						
	Bevel Geared			Spur Geared				H	J	No. of turns to open	K	*L	M	Size of by-pass	
	A	B	C	D	E	F	G								
Low Pressure Double Disc Gate Valves															
14	30 ¹³ / ₁₆	48	11 ³ / ₄	41 ³ / ₄	6	51 ¹ / ₂	10	14	2	58	18	16	20	2	
16	33 ¹³ / ₁₆	52 ⁷ / ₈	11 ³ / ₄	44 ³ / ₄	6	56 ¹ / ₂	10	14	2	66	21	18	24 ¹ / ₄	3	
18	39 ⁵ / ₈	59 ⁹ / ₁₆	12 ³ / ₄	51 ¹ / ₄	6	64	12	18	2	76	21	18 ¹ / ₂	25	3	
20	46 ¹ / ₄	68 ⁵ / ₈	12 ³ / ₄	57 ³ / ₄	6	73	12	18	2	84	21 ¹ / ₂	18 ¹ / ₂	26	3	
24	49 ³ / ₄	76 ¹ / ₄	12 ³ / ₄	61 ¹ / ₄	6	80 ³ / ₄	12	18	2	98	22 ¹ / ₂	20	30 ¹ / ₄	4	
30	59 ¹ / ₈	91 ⁷ / ₈	12 ³ / ₄	70 ³ / ₄	6	96 ¹ / ₄	12	18	2	248	23 ¹ / ₂	20 ¹ / ₂	33 ¹ / ₄	4	
36	70	109 ⁹ / ₁₆	17	84	8	115 ¹ / ₂	14 ⁵ / ₈	22	2	441	27 ¹ / ₂	24	40 ³ / ₄	6	
42	80 ¹ / ₄	128 ³ / ₁₆	20 ¹ / ₂	96 ¹ / ₄	10 ¹³ / ₁₆	133 ³ / ₄	17	27	3	459	28	25 ¹ / ₂	44 ¹ / ₂	6	
48	91 ¹³ / ₁₆	144 ³ / ₈	23	107 ³ / ₄	12	150	19	30	3	596	32	29 ¹ / ₂	51 ¹ / ₂	8	
Light Standard Double Disc Gate Valves															
12											19 ¹ / ₄	19 ¹ / ₄	20 ³ / ₄	2	
14	32 ¹ / ₂	49 ¹ / ₄	11 ³ / ₄	43 ¹ / ₄	6	52 ³ / ₄	10	14	2	60	20	20	22	2	
16	37 ³ / ₄	55 ¹ / ₂	12 ³ / ₄	49 ¹ / ₄	6	59 ³ / ₄	12	18	2	68	23	23	25	3	
18	40 ³ / ₄	60 ³ / ₄	12 ³ / ₄	52 ¹ / ₄	6	65 ¹ / ₄	12	18	2	76	23 ¹ / ₂	23 ¹ / ₂	26 ¹ / ₄	3	
20	44 ¹ / ₄	66 ¹ / ₂	12 ³ / ₄	55 ³ / ₄	6	70 ³ / ₄	12	18	2	84	24	24	27 ¹ / ₂	3	
24	52 ³ / ₄	78 ³ / ₄	17	66 ³ / ₄	8	84 ¹ / ₂	14 ¹¹ / ₁₆	22	2	152	26	26	31 ¹ / ₄	4	
30	65 ¹ / ₄	100 ¹ / ₄	20 ¹ / ₂	81	10 ¹³ / ₁₆	105 ³ / ₄	17	27	3	223	26 ¹ / ₂	26 ¹ / ₂	35 ¹ / ₄	4	
36	77 ¹ / ₂	116 ³ / ₄	23	94	12	122 ¹ / ₂	19	30	3	456	27 ¹ / ₂	27 ¹ / ₂	43 ¹ / ₂	6	
42	87	132	23	104 ¹ / ₂	12	139	19	30	3	520	31	31	47 ¹ / ₄	6	
48	99 ³ / ₄	146 ³ / ₄	26 ¹ / ₄	118	15	153	19 ¹ / ₂	30	3	742	32	*32	53	8	
Standard Double Disc Gate Valves															
12	31 ¹ / ₄	44 ³ / ₄	12 ³ / ₄	42 ¹ / ₂	6	49	12	18		51		18	22	2	
14	35 ¹ / ₂	52 ¹ / ₂	12 ³ / ₄	46 ³ / ₄	6	57	12	18		60		18 ¹ / ₂	23	2	
16	41	59 ³ / ₄	17	55	8	65 ¹ / ₂	14 ¹¹ / ₁₆	22		102		26 ¹ / ₂	25 ³ / ₄	3	
18	44 ¹ / ₂	65 ¹ / ₄	17	58 ¹ / ₂	8	71	14 ¹¹ / ₁₆	22		114		27	27 ¹ / ₄	3	
20	47 ¹ / ₄	72	17	61 ¹ / ₄	8	77 ³ / ₄	14 ¹¹ / ₁₆	22		128		28	28 ¹ / ₂	3	
24	56 ¹ / ₄	85 ¹ / ₂	20 ¹ / ₂	72 ¹ / ₄	10 ¹³ / ₁₆	91	17	27		182		32	32 ¹ / ₂	4	
400-Pound W.O.G. Double Disc Gate Valves															
6												*13	18 ¹ / ₂	1 ¹ / ₄	
8												*14 ¹ / ₄	21 ¹ / ₂	1 ¹ / ₂	
10	27 ¹ / ₂	41 ¹ / ₄	12 ³ / ₄	39 ¹ / ₄	6	45 ¹ / ₂	12	18		85		*16 ³ / ₄	22 ³ / ₄	1 ¹ / ₂	
12	31 ¹ / ₄	46 ¹ / ₄	12 ³ / ₄	42 ³ / ₄	6	50 ³ / ₄	12	18		102		19	24	2	
500-Pound W.O.G. Double Disc Gate Valves															
6												16	18 ¹ / ₄	1 ¹ / ₄	
8	24 ¹ / ₄	34 ¹ / ₂	12 ³ / ₄	35 ³ / ₄	6	38 ³ / ₄	12	18		72		18	20	1 ¹ / ₂	
10	29 ¹ / ₂	41	15 ¹ / ₂	42 ¹ / ₂	7	46	13 ¹ / ₂	20		110		20	21 ¹ / ₂	1 ¹ / ₂	
12	33 ¹ / ₄	48 ¹ / ₄	15 ¹ / ₂	46 ¹ / ₂	7	53	13 ¹ / ₂	22		130		22	24 ¹ / ₂	2	
800-Pound W.O.G. Double Disc Gate Valves															
6	19 ³ / ₄	28	11 ³ / ₄	30 ¹ / ₂	6	31 ³ / ₄	10	14		54		*22	20 ¹ / ₄	1 ¹ / ₄	
8	25 ¹ / ₄	34 ¹ / ₂	12 ³ / ₄	36 ³ / ₄	6	39	12	18		72		*26	22	1 ¹ / ₂	
10	30 ¹ / ₂	43 ¹ / ₂	15 ¹ / ₂	43 ¹ / ₂	7	48 ¹ / ₂	13 ¹ / ₂	20		112		*31	24	1 ¹ / ₂	
12	34	49	15 ¹ / ₂	47 ¹ / ₄	7	54	13 ¹ / ₂	20		133		*33	24 ³ / ₄	2	

*Dimension "L", the face to face of flanged valves with by-pass, includes the ¹/₁₆-inch raised faces on 400 and 500-Pound W.O.G. Valves and the ¹/₄-inch male faces on 800-Pound W.O.G. Valves. Dimensions identified by an asterisk are the same as for valves without by-pass.

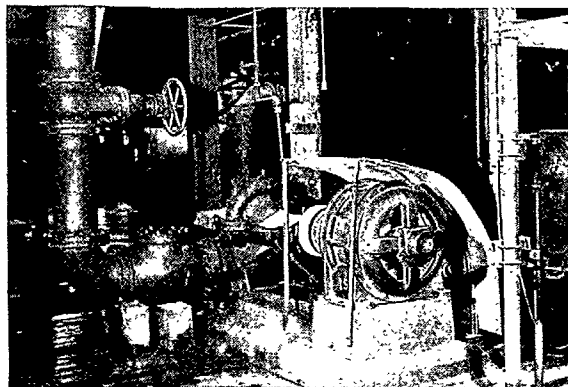


Metering station in a natural gas line; using Crane iron body double disc gate valves with stem protectors, and lever and weight safety valve.

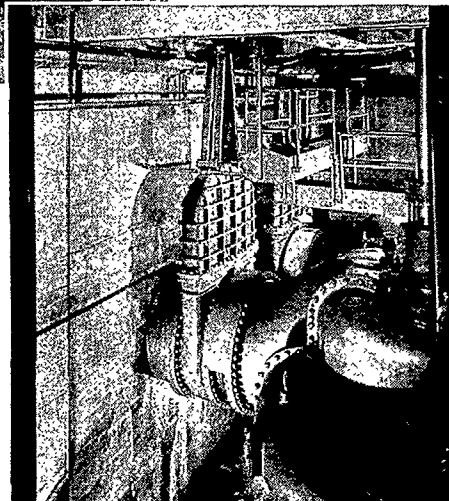
10



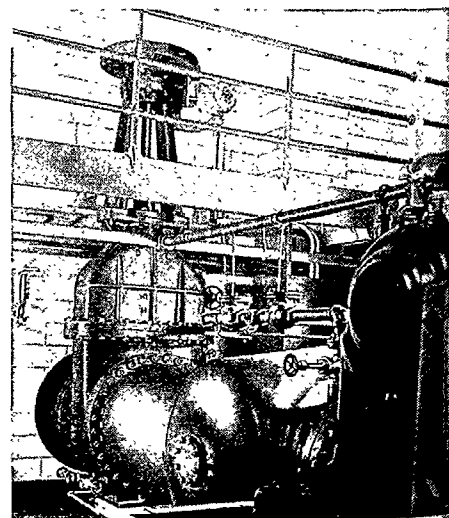
Crane iron body valves, flanged and welding fittings in cooling water lines in a Diesel plant.



Flanged iron body wedge gate and swing check valves on a centrifugal pump control the water supply in this completely Crane-equipped mine.



Circulating water lines in a central station, with large Crane valves.



Crane products are extensively used in water pumping stations. Shown is a 36-in. motor-operated gate valve.

Iron Body Globe, Angle, and Cross Valves

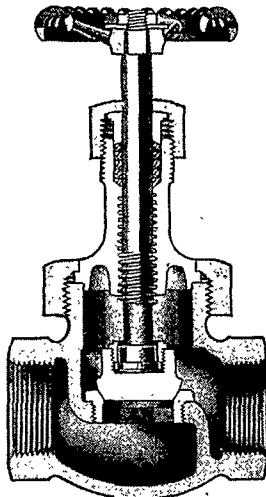
Union Bonnet Valves (2½ and 3-inch sizes have bolted bonnet)	
150-Pound, Brass Trimmed with Nickel Alloy Seats	page 144
150-Pound, All-Iron with Nickel Alloy Seats	page 144
150-Pound, All-Iron with Iron or Steel Seats	page 144
150-Pound, Brass Trimmed with Composition Disc	page 145
150-Pound, All-Iron with Composition Disc	page 145
150-Pound, Brass Trimmed with Plug Type Disc	page 146
400-Pound W.O.G. Malleable Iron, with Plug Type Disc .	page 147
Standard Screwed Bonnet Brass Trimmed Valves	page 148
Iron Body Butterfly Valves	page 148
Iron Body Throttle Valves	page 148
Bolted Bonnet Valves, with Yoke Type Bonnet	
General Description	page 149
Standard, Brass Trimmed or All-Iron	page 150
Standard, with Composition Disc	page 151
175-Pound, Brass Trimmed	page 152
250-Pound, Brass Trimmed	page 153

* * * * *

The Crane line of Iron Body Globe, Angle, and Cross Valves is described and illustrated on pages 144 to 153.

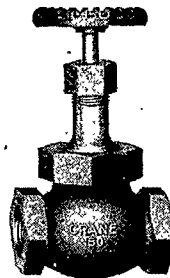
Special attention is directed to the unusually complete line of 150-Pound Iron Body Union Bonnet Globe and Angle Valves shown on pages 144, 145, and 146. These small size valves will find wide application in many industries. The wide variety of seating surfaces and trim materials available and the interchangeability of parts will appeal to users whose requirements warrant standardization and the stocking of replacement parts.

150-Pound Iron Body Globe and Angle Valves Brass Trimmed or All-Iron



Cross Section
No. 350 1/2, Globe

WORKING PRESSURES
150 pounds steam
250 pounds cold water, oil, or gas, non-shock

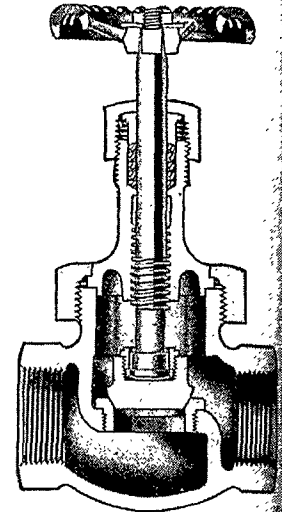


Globe, Screwed

No. 350 1/2 — Brass Trim, Nickel Alloy Seats — No. 352 1/2
No. 354 1/2 — All-Iron, Nickel Alloy Seats — No. 356 1/2
No. 355 1/2 — All-Iron, Iron or Steel Seats — No. 357 1/2



Angle, Screwed



Cross Section
No. 354 1/2, Globe
No. 355 1/2, Globe

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 350 1/2 or No. 352 1/2, Screwed	Each	3.50	3.60	4.00	5.00	6.00	8.60	12.00	19.00	26.00	35.00
No. 354 1/2 or No. 356 1/2, Screwed	Each	4.90	5.30	5.80	7.80	10.00	12.50	17.00	24.00	*	*
No. 355 1/2 or No. 357 1/2, Screwed	Each	5.00	5.50	6.00	8.00	11.00	13.00	17.00	22.00	*	*

*Use the Standard Iron Body Globe and Angle Valves, shown on page 150.

Service recommendations: Made with a sturdy cast iron body and a tough malleable iron union bonnet ring and packing nut, these rugged, compact valves are ideal for steam, water, oil, gas, and similar services. They find wide application in many industries, including oil and gas fields, oil refineries, gas plants, mines, sugar refineries, chemical plants, etc.

Nos. 350 1/2 and 352 1/2; Brass Trimmed Valves with Nickel Alloy Seat and Disc: These valves have a Crane Nickel Alloy seat and disc, and a brass bonnet (except 2 1/2 and 3"), stem, and gland; they are suitable for general non-corrosive services.

Nos. 354 1/2 and 356 1/2; All-Iron Valves with Nickel Alloy Seat and Disc: Having a malleable iron bonnet, a steel stem and gland, and a Crane Nickel Alloy seat and disc, these valves are suitable for many corrosive fluids which attack brass but not Crane Nickel Alloy.

Nos. 355 1/2 and 357 1/2; All-Iron Valves with Iron Seat and Disc: These are completely all-iron in

construction, being the same as the Nos. 354 1/2 and 356 1/2 but having a steel or cast iron seat and disc.

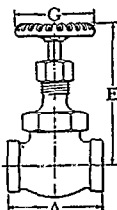
Disc and seat: The disc and seat are finished to a 35° taper and have wide contacting surfaces; they hold pressure easily and offer good resistance to wear. Seat rings are screwed into the body.

Bonnet construction: Valves 2-inch and smaller have a union bonnet — metal to metal joint. Larger sizes have a cast iron yoke-type bolted bonnet, with gasket, similar to the valves shown on page 150.

Stuffing box: The stuffing box is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Interchangeability: Except for materials and the design of the seat and disc, the parts of all the 150-Pound Valves shown on this page and pages 145 and 146 are completely interchangeable, size for size. This feature adds to the general utility of the valves and reduces stocks maintained for repairs.

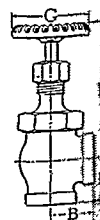
A metal tag, secured under the wheel nut, shows the catalog number of the valve.



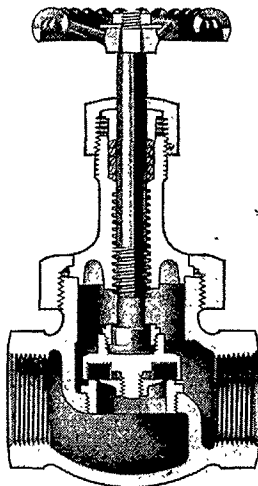
Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2 3/8	2 5/8	3	3 1/2	4 1/8	4 5/8	5 1/4	6 5/8	7	8
B	1 1/8	1 1/4	1 3/8	1 9/16	1 7/8	2 3/16	2 3/8	3	3 1/2	4
E — open	4 3/16	4 11/16	5 1/4	6 1/16	7	7 11/16	8 3/4	10 1/4	11 3/8	13 1/4
F — open	4 1/8	4 5/8	5 3/16	6	6 7/8	7 5/8	8 5/8	10	12	13 3/4
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	8	9

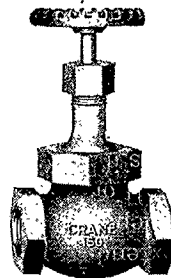
Thread engagement ... page 591



150-Pound Iron Body Globe and Angle Valves Cranite Composition Disc



Cross Section
No. 350 1/2 C, Globe
Brass Trimmed

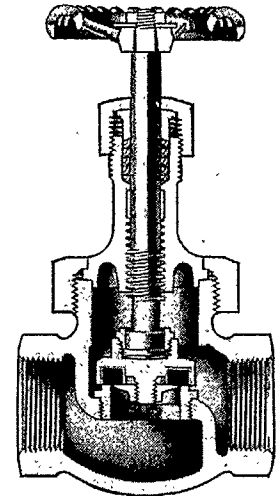


Globe, Screwed

No. 350 1/2 C — Brass Trim, Nickel Alloy Seat — No. 352 1/2 C
No. 355 1/2 C — All-Iron, Iron or Steel Seat — No. 357 1/2 C



Angle, Screwed



Cross Section
No. 355 1/2 C, Globe
All-Iron

WORKING PRESSURES

150 pounds steam
250 pounds cold water, oil, or gas, non-shock

Cranite
Composition
Disc
Renewable
Body Seat Ring
Union Bonnet

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 350 1/2 C or No. 352 1/2 C, Screwed	Each	3.50	3.60	4.00	5.00	6.00	8.60	12.00	19.00
No. 355 1/2 C or No. 357 1/2 C, Screwed	Each	7.00	7.70	8.40	11.20	15.40	18.20	23.80	30.80

For list prices of Composition Discs, see page 178.

Service recommendations: These rugged globe and angle valves, made with a cast iron body and a malleable iron union bonnet ring and packing nut, are suitable for a wide variety of service. Equipped with a composition disc, a renewable body seat ring, and made either brass trimmed or all-iron, they find wide application in many industries, especially on lines where discs must be easily and quickly renewed.

The valves, when fitted with the proper disc, are suitable for steam, hot water, cold water, oil, gas, and similar fluids. All-iron valves are for use with fluids that attack brass but not iron or steel.

Nos. 350 1/2 C and 352 1/2 C; Brass Trimmed Valves with Composition Disc: These brass trimmed valves have a brass bonnet, stem, gland, disc holder and disc nut, and a Crane Nickel Alloy screwed-in body seat ring.

Nos. 355 1/2 C and 357 1/2 C; All-Iron Valves with Composition Disc: These valves are completely all-iron in construction except for the composition disc. They have a malleable iron bonnet and disc holder, a steel stem and gland, and a steel or cast iron screwed-in body seat ring.

Composition disc: Unless otherwise ordered, these valves are equipped with No. 4 Cranite Discs, suitable for high pressure steam.

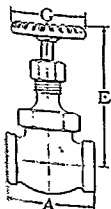
When ordered for hot water, oil, gas, or gasoline, they are furnished with a No. 2 Disc. When ordered for cold water or air, they are furnished with a No. 3 Disc. For list prices, data, and dimensions of Composition Discs, see page 178.

Bonnet construction: The valves have a strong, serviceable, and practical union bonnet construction which provides a tight body-bonnet connection. This feature facilitates dismantling for disc replacement, without danger of damaging the valve.

Stuffing box: The stuffing box on all these valves is fitted with a gland and is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Interchangeability: Except for the materials and the design of the seat and disc, the parts of all the 150-Pound Valves shown on this page and pages 144 and 146 are completely interchangeable, size for size. This feature adds to the general utility of the valves and reduces stocks of repair parts.

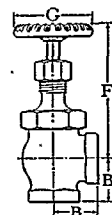
A metal tag, secured under the wheel nut, shows the valve number and grade of disc.



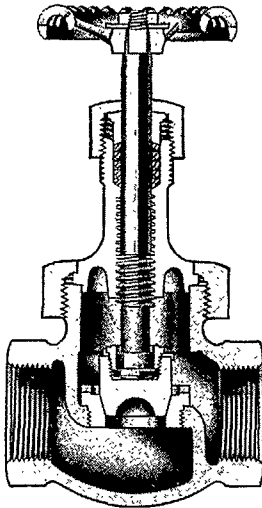
Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	2 3/8	2 5/8	3	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8
B	1 1/8	1 1/4	1 3/8	1 9/16	1 7/8	2 3/16	2 3/8	3
E — open	4 5/16	4 3/4	5 5/8	6 1/8	7 1/8	7 7/8	8 3/4	10
F — open	4 1/4	4 5/8	5 1/4	6	7	7 3/4	8 5/8	10
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4

Thread engagement . . . page 591



150-Pound Iron Body Globe and Angle Valves Plug Type Disc

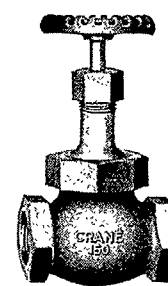


*Cross Section
No. 314 1/2 P, Globe

WORKING PRESSURES
150 pounds steam
250 pounds cold water, oil, or gas, non-shock

FEATURES
Exelloy Renewable Seat
Nickel Alloy Plug Type Disc
Union or Bolted Bonnet

These valves are the same as the No. 350 1/2 Globe and No. 352 1/2 Angle shown on page 144 except that they have a plug type disc and seat instead of a 35° wide bearing seat. The seat is made of Exelloy instead of Crane Nickel Alloy.



*No. 314 1/2 P, Globe
Screwed



*No. 316 1/2 P, Angle
Screwed

**2 1/2 and 3-inch sizes
have bolted bonnet.*

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 314 1/2 P or No. 316 1/2 P, Screwed	Each	4.00	4.20	4.50	6.10	7.50	10.50	15.00	23.00	32.00	44.00

Service recommendations: Crane No. 314 1/2 P Globe and No. 316 1/2 P Angle Valves are ideally suited for installations where operating conditions are severe. Strong, compact, rugged, and durable, they are recommended for throttling and for soot blower, blow-off, boiler feed, drip, and drain lines.

Plug type disc and seat: The plug type disc and seat with their wide seating surface offer excellent resistance to foreign matter and to wire drawing, assuring long life. In addition, the tapered disc permits easy flow regulation when throttling, the rate of flow being in direct proportion to the lift.

The renewable body seat ring is made of Exelloy, and the disc, of Crane Nickel Alloy. This combination withstands wear, temperature, galling, and scoring exceptionally well. The metals are harder, stronger, and tougher than metals ordinarily used in iron valves.

Bonnet construction: Sizes 2-inch and smaller have a union bonnet; 2 1/2 and 3-inch sizes have a

bolted bonnet similar to the No. 350 Valves shown on page 150. Both types of bonnets provide a strong, tight joint, yet they can be easily dismantled and reassembled without danger of injury to the valve.

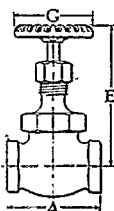
Materials: Sizes 2-inch and smaller have a brass bonnet and a malleable iron union bonnet ring; 2 1/2 and 3-inch sizes have a cast iron bonnet. All sizes have a cast iron body and a brass stem.

Stuffing box: The stuffing box is unusually deep and is fitted with a gland. It is filled with high grade packing.

Repacking: The valves, when wide open, can be repacked while under pressure.

Interchangeability: Except for the plug type disc and seat and the materials used in these valves, the various parts of the Nos. 314 1/2 P and 316 1/2 P valves are completely interchangeable, size for size, with all of the 150-Pound Globe and Angle Valves shown on pages 144 and 145.

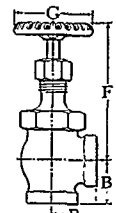
A metal tag, secured under the wheel nut, shows the catalog number of the valve.



Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	2 3/8	2 5/8	3	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8	7	8
B	1 1/8	1 1/4	1 5/8	1 9/16	1 7/8	2 3/16	2 3/8	3	3 1/2	4
E, open	4 3/16	4 3/4	5 1/4	6	6 15/16	7 3/4	8 3/4	10	11 1/2	14
F, open	4 1/8	4 5/8	5 3/16	6	6 7/8	7 5/8	8 5/8	9 3/4	11 3/4	13 3/4
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	8	9

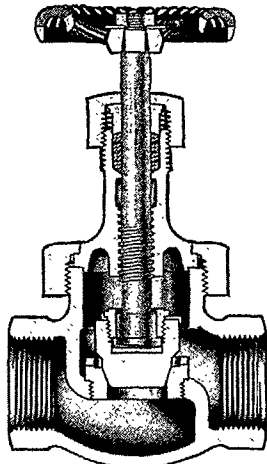
Thread engagement . . . page 591



400-Pound W.O.G. Malleable Iron Globe and Angle Valves Plug Type Disc

WORKING PRESSURES
250 pounds steam, 550° F.
400 pounds cold water, oil, or gas, non-shock

Air Tested



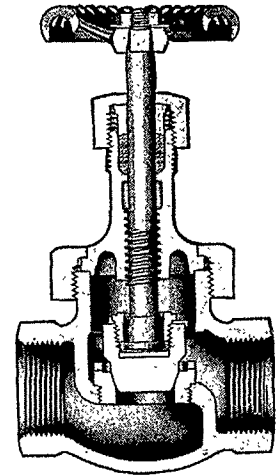
Cross Section
No. 254 P, Globe
Exelloy Stem



Globe, Screwed
No. 254 P, Exelloy Stem
No. 255 P, Steel Stem



Angle, Screwed
No. 256 P, Exelloy Stem
No. 257 P, Steel Stem



Cross Section
No. 255 P, Angle
Steel Stem

Nickel Alloy Plug Type Disc and Exelloy Renewable Seat

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 254 P or No. 256 P, Screwed	Each	9.30	9.40	10.00	12.00	15.00	19.00	28.00	38.00
No. 255 P or No. 257 P, Screwed	Each	9.30	9.40	10.00	12.00	15.00	19.00	28.00	38.00

Service recommendations: Crane 400-Pound W.O.G. Malleable Iron Globe and Angle Valves are exceptionally strong, compact, and rugged. They are ideal for oil lines where fire hazard legislates against the use of cast iron and for services where a material stronger than cast iron is desired.

These valves hold pressure easily and when throttling, permit accurate regulation of flow. The wide and tapered plug type disc and seat is unusually resistant to wiredrawing and to damage from foreign matter.

Materials and construction: The bodies, bonnets, and union bonnet rings are made from high grade malleable iron. Because of the generous metal sections provided in their design and the durability of the materials used, these parts contribute unusual ruggedness to the valves. They have a very liberal factor of safety at their maximum recommended working pressure.

No. 254 P and No. 256 P valves are equipped with an Exelloy stem; No. 255 P and No. 257 P valves have a steel stem, nickel-plated.

Plug type disc and seat: All of these valves are

equipped with a Crane Nickel Alloy plug type disc and an Exelloy renewable body seat ring. The tapered plug disc and seat have a wide bearing surface which offers excellent resistance to wiredrawing and to damage caused by foreign particles.

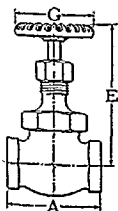
The metals used in the disc and seat are an ideal combination and are superior to those ordinarily found in iron valve construction. They are strong, hard, and tough and are resistant to wear, temperature, galling, and seizing.

Union bonnet: The union bonnet connection, joining the body and bonnet in a metal to metal contact, is made up with a heavy malleable iron union ring. The joint is strong, tight, simple, and practical, yet when occasion demands, it can be easily dismantled and reassembled quickly. Gaskets are not required.

Stuffing box: The stuffing box is unusually deep; it is fitted with a steel gland, a malleable iron packing nut, and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

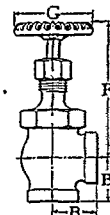
A metal tag, secured under the wheel nut, shows the catalog number of the valve.



Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	2 3/8	2 5/8	3	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8
B	1 1/8	1 1/4	1 3/8	1 9/16	1 7/8	2 3/16	2 3/8	3
E — open	4 3/8	4 5/8	5 1/4	6 1/8	7 1/8	7 7/8	8 7/8	10
F — open	4 3/8	4 5/8	5 1/4	6 1/8	7 1/8	7 7/8	8 7/8	10
G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 3/8	4 1/16	4 3/4

Thread engagement . . . page 591

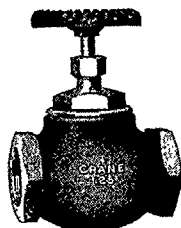


Standard Iron Body Globe and Angle Valves

WORKING PRESSURE — 125 pounds steam

TEST PRESSURES — Shell test — 300 pounds hydrostatic

Seat test — 225 pounds hydrostatic



No. 354, Globe
Screwed



No. 356, Angle
Screwed

For general service on steam, water, oil, and gas lines. Crane Iron Body Brass Mounted Globe and Angle Valves are ideal. Made with cast iron bodies, screwed-in brass bonnets with inside stem threads, and brass stems, body seat rings, and discs, they are sturdily constructed.

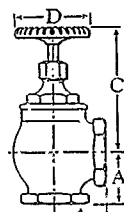
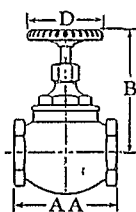
The disc, made of solid brass, swivels on the stem. It is securely fastened to the stem with a disc stem ring and a lock washer.

Repacking: These valves, when wide open, can be repacked while under pressure.

List Prices and Dimensions

Size	Inches	2	2½	3
No. 354 or No. 356	Each	18.00	24.00	31.00
AA — End to end, Globe	Inches	6½	7	8
A — Center to end, Angle	Inches	3¼	3½	4
B — Center to top, open, Globe	Inches	7¾	9	10
C — Center to top, open, Angle	Inches	7	8¼	9¼
D — Diameter of wheel	Inches	4½	5½	6

For
Union Bonnet
Iron Body Globe
and Angle Valves,
see
pages 144 to 147.



Iron Body Butterfly Valves

Butterfly Valves provide easy operation in about one-quarter turn from the wide open to the closed position. They are not intended to close pressure tight and should be used only to control or regulate flow.

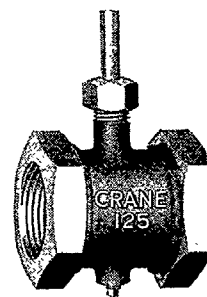
The valves have iron body, steel stem, and brass disc. A malleable iron operating lever (not regularly furnished) can be supplied when ordered, at an extra price.

On flanged valves, the dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced with a smooth finish. Prices include drilling to this Standard; no deduction is made when valves are ordered faced only.

For Brass Butterfly Valves, see page 69.

WORKING PRESSURES

12-inch and smaller — 125 pounds steam
or 200 pounds cold water, oil, or gas
14-inch and larger — 100 pounds steam
or 150 pounds cold water, oil, or gas



No. 380, Screwed
No. 381, Flanged

List Prices and Dimensions, in Inches

Size	Inches	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
No. 380	Each	8.00	9.50	12.00	16.00	18.50	28.50	42.50								
No. 381, F. & D.	Each	9.50	11.50	15.00	19.00	22.00	32.00	47.00	90.00	125.00	160.00	275.00	350.00	425.00	525.00	700.00
End to end, Screwed		4¼	4¾	5¼	5½	6	6¾	7½								
Face to face, Flanged		4¼	4¾	5¼	5½	6	6¾	7½	9¼	10¾	12½	14	16	17½	19	22
Diameter of stem		½	½	9/16	9/16	5/8	5/8	¾	15/16	1¼	1¾	19/16	1¾	17/8	21/8	2½
C. to top of stem		6⅞	7	7⅞	8½	9⅞	10¼	11½	12½	12¾	15	16½	18	20¼	22¾	26

Sizes 10-inch and larger have a
bolted gland (not illustrated).

Iron Body Throttle Valves

Quick Acting

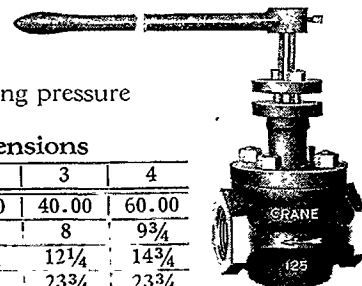
These ruggedly built throttle valves are used extensively on hoisting and traction engines when absolute tightness is not essential. They open completely in one-quarter turn of the lever; stops are provided to limit the travel. The valves have a cast iron body, bonnet, and disc, and a brass stem. When required for 250 pounds steam, they can be made of cast steel; prices on application.

125 pounds steam working pressure

List Prices and Dimensions

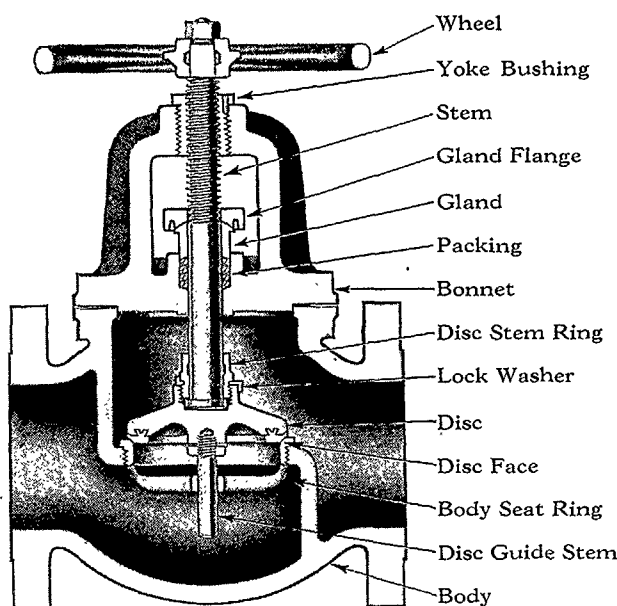
Size	Inches	2½	3	4
No. 382	Each	30.00	40.00	60.00
End to end	Inches	7⅞	8	9¾
C. to top of stem	Inches	11½	12¼	14¾
C. to end of lever	Inches	23¾	23¾	23¾

For Brass Throttle Valves, see page 69.

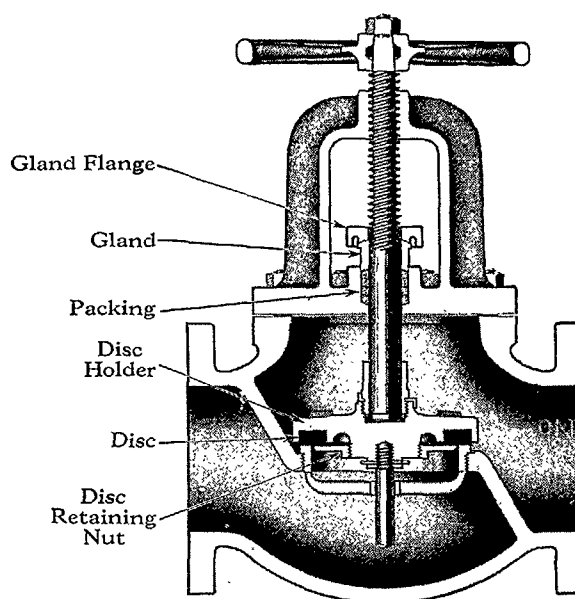


No. 382, Screwed

Iron Body Globe, Angle, and Cross Valves With Yoke Bonnet



Globe Valve, Brass Trimmed



Globe Valve, with Composition Disc

General Description

Crane Iron Body Globe, Angle, and Cross Valves with yoke bonnet are made in three weights.

Standard Valves.....pages 150 and 151
175-Pound Valves.....page 152
250-Pound Valves.....page 153

All of these valves are similar in construction, differing principally in proportions and in materials. The illustrations appearing above show cross sections of typical valves. Variations in design are covered in detail on the pages that follow, numbers 150 to 153.

Rugged construction: The valves are well proportioned and are ruggedly constructed. They have amply thick metal sections, and the metal is properly distributed to assure maximum strength.

Bonnet: The bonnet is the yoke type. Stem threads are engaged in the yoke on the outside where they are not affected by the fluid in the line and where they can be easily lubricated, thereby minimizing wear.

In Standard Composition Disc Valves sizes 6-inch and smaller, the stem threads engage directly with the iron bonnet. For all other valves, the stem threads are engaged in a brass yoke bushing which is screwed into the top of the bonnet yoke.

Disc-stem connection: All of these valves have a swivel disc or disc holder securely fastened to the stem with a disc stem ring. The connection is locked with a special lock washer.

Guided disc: Except for the 2-inch Standard All-Iron Valves, the disc or disc holder is closely guided throughout its travel by a guide stem operating in

the bridge cast integral with the body seat ring. Vibration of the internal parts is thereby eliminated, and true seating of the disc is assured.

The disc guide stem is integral with the disc in Standard Brass Trimmed Valves and in the smaller sizes of other valves. In larger sizes of other valves the disc guide stem is screwed into the disc or disc holder and pinned.

Gland and gland flange: All Crane Iron Body Globe, Angle, and Cross Valves have a two-piece gland and gland flange. The gland flange is made of malleable iron or forged steel. The gland is made of brass for brass trimmed and composition disc valves; for all-iron valves, it is steel.

Gland studs and nuts for all brass trimmed valves are made of bronze; for composition disc valves and all-iron valves, they are steel.

Stuffing box: Stuffing boxes are of liberal depth and are filled with high grade packing. A brass stem hole bushing, fitted in the bottom of the stuffing box, is furnished on all Standard Brass Trimmed Valves and on Standard Composition Disc Valves 8-inch and larger. A steel stem hole bushing is furnished in Standard All-Iron Valves.

Repacking: These valves, when wide open, can be repacked while under pressure.

Wheel: The wheel, having a tapered square hole, fits snugly on the square stem end and is held in place with a steel nut. It can be easily removed.

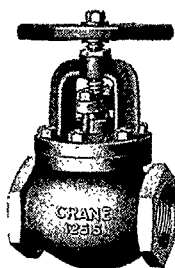
Wheels of 2.4-inch and smaller diameter are made of malleable iron; larger diameters are cast iron.

Standard Iron Body Globe, Angle, and Cross Valves Brass Trimmed or All-Iron

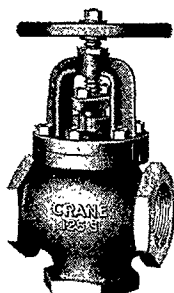
WORKING PRESSURE — 125 pounds steam

TEST PRESSURES

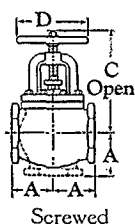
12-inch and smaller — Shell test, 300 pounds hydrostatic
— Seat test, 225 pounds hydrostatic
14 and 16-inch — Shell test, 250 pounds hydrostatic
— Seat test, 175 pounds hydrostatic



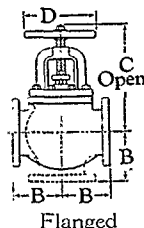
Globe, Screwed
No. 350
Brass Trimmed
No. 350 $\frac{1}{4}$, All-Iron



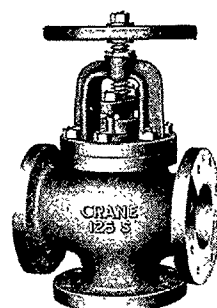
Cross, Screwed
No. 362
Brass Trimmed



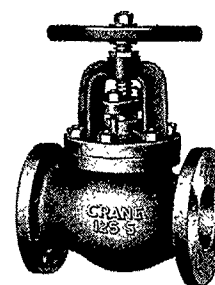
Screwed



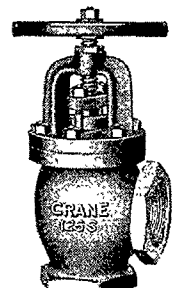
Flanged



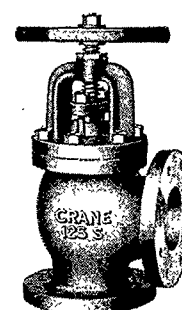
Cross, Flanged
No. 363, Brass Trimmed



Globe, Flanged
No. 351, Brass Trimmed
No. 351 $\frac{1}{4}$, All-Iron



Angle, Screwed
No. 352
Brass Trimmed
No. 352 $\frac{1}{4}$, All-Iron



Angle, Flanged
No. 353, Brass Trimmed
No. 353 $\frac{1}{4}$, All-Iron

Brass trimmed valves: Brass trimmed valves are ideal for steam or water lines, or for fluids that do not corrode brass or iron. They have iron bodies and bonnets, brass screwed-in body seat rings, solid brass discs, and Cast Manganese Bronze stems.

All-iron valves: For fluids that corrode brass but not iron, Crane all-iron valves are recommended. The bodies, bonnets, seats, and discs are iron; and the stems are steel, nickel-plated.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Face to face and center to face: The face to face and center to face dimensions of Flanged Globe and

Angle Valves in sizes 8-inch and smaller conform to the American Ferrous Flanged Valve Standard (B16.10-1939) for 125-Pound Cast Iron Globe and Angle Valves. This Standard does not include sizes larger than 8-inch or Cross Valves.

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

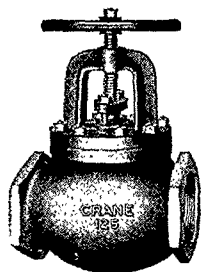
List Prices, Each

Size Inches	Brass Trimmed				All-Iron	
	Screwed		Flanged, F. & D.		Screwed	Flanged, F. & D.
	No. 350 Globe, No. 352 Angle	No. 362 Cross	No. 351 Globe, No. 353 Angle	No. 363 Cross	No. 350 $\frac{1}{4}$ Globe, No. 352 $\frac{1}{4}$ Angle	No. 351 $\frac{1}{4}$ Globe, No. 353 $\frac{1}{4}$ Angle
2	7.00	8.50	8.60	11.00	7.00	8.60
2 $\frac{1}{2}$	9.00	11.75	10.75	14.50	9.00	10.75
3	12.50	16.25	15.00	20.00	12.50	15.00
3 $\frac{1}{2}$	15.25	20.00	18.50	25.00		
4	19.00	23.50	22.50	28.50	19.00	22.50
5	27.00	35.25	31.00	41.00		31.00
6	37.50	47.25	42.00	54.00		42.00
8	72.00	92.00	77.00	100.00		77.00
10			123.00	175.00		
12			187.00	265.00		
14			350.00			
16			475.00			

Dimensions, in Inches

A	B	C		D	Flange Dimensions			
		Globe	Angle or Cross		E	F	G	No. and dia. of bolts
3 $\frac{1}{4}$	4	11 $\frac{1}{4}$	11 $\frac{1}{4}$	8	6	5 $\frac{5}{8}$	4 $\frac{3}{4}$	4 - 5 $\frac{5}{8}$
3 $\frac{1}{2}$	4 $\frac{1}{4}$	11 $\frac{3}{4}$	11 $\frac{3}{4}$	8	7	11 $\frac{1}{16}$	5 $\frac{1}{2}$	4 - 5 $\frac{5}{8}$
4	4 $\frac{3}{4}$	13 $\frac{1}{4}$	13	9	7 $\frac{1}{2}$	3 $\frac{3}{4}$	6	4 - 5 $\frac{5}{8}$
4 $\frac{1}{2}$	5 $\frac{1}{4}$	13 $\frac{1}{2}$	13 $\frac{1}{2}$	9	8 $\frac{1}{2}$	13 $\frac{1}{16}$	7	8 - 5 $\frac{5}{8}$
5	5 $\frac{3}{4}$	15 $\frac{1}{2}$	15	10	9	15 $\frac{1}{16}$	7 $\frac{1}{2}$	8 - 5 $\frac{5}{8}$
5 $\frac{5}{8}$	6 $\frac{1}{2}$	17 $\frac{1}{4}$	17	10	10	15 $\frac{1}{16}$	8 $\frac{1}{2}$	8 - 3 $\frac{3}{4}$
6 $\frac{1}{2}$	7	19 $\frac{1}{2}$	19 $\frac{1}{4}$	12	11	1	9 $\frac{1}{2}$	8 - 3 $\frac{3}{4}$
9 $\frac{1}{4}$	9 $\frac{3}{4}$	25 $\frac{1}{4}$	22 $\frac{1}{2}$	16	13 $\frac{1}{2}$	1 $\frac{1}{8}$	11 $\frac{3}{4}$	8 - 3 $\frac{3}{4}$
12 $\frac{1}{4}$	30 $\frac{1}{2}$	26 $\frac{1}{2}$	18	16	13 $\frac{1}{16}$	14 $\frac{1}{4}$	12	12 - 7 $\frac{5}{8}$
13 $\frac{3}{4}$	33 $\frac{1}{2}$	30	20	19	1 $\frac{1}{4}$	17	12	12 - 7 $\frac{5}{8}$
15 $\frac{1}{2}$	38 $\frac{1}{2}$	33 $\frac{1}{2}$	24	21	1 $\frac{3}{8}$	18 $\frac{3}{4}$	12	12 - 1
18	42 $\frac{3}{4}$	37 $\frac{3}{4}$	27	23 $\frac{1}{2}$	1 $\frac{1}{16}$	21 $\frac{1}{4}$	16	16 - 1

Standard Iron Body Globe, Angle, and Cross Valves Composition Disc



Globe, Screwed
No. 358

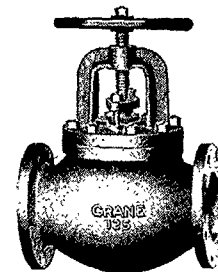
WORKING PRESSURE — 125 pounds steam

TEST PRESSURES

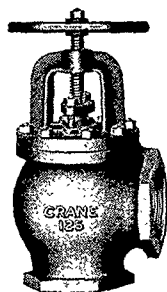
Shell test — 300 pounds hydrostatic
Seat test — 125 pounds steam

Service Recommendations

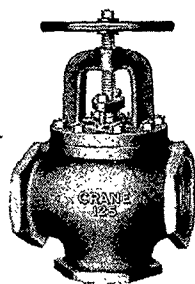
These valves are sturdy and well proportioned. Being equipped with a composition disc, they are suitable for a wide range of service. They will give excellent results on steam or water lines.



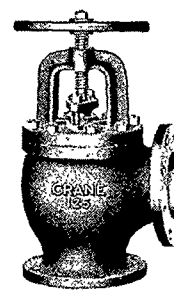
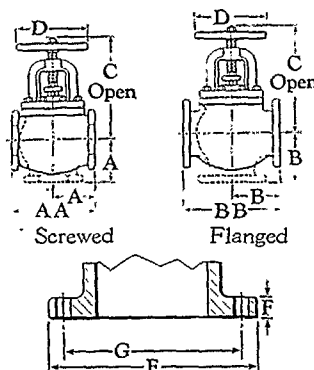
Globe, Flanged
No. 359



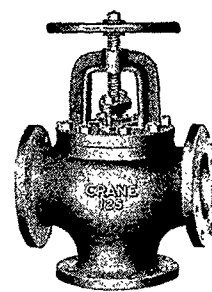
Angle, Screwed
No. 360 1/2



Cross, Screwed
No. 358 1/2



Angle, Flanged
No. 361 1/2



Cross, Flanged
No. 359 1/2

Materials: These valves have iron bodies and bonnets. The stems are Cast Manganese Bronze, and the body seat rings are made of brass. Disc holders in the 2 1/2 and 3-inch sizes are made of brass; in larger sizes, of cast iron.

Discs: Crane Iron Body Globe, Angle, and Cross Valves with Composition Discs will regularly be furnished with No. 1 Steam Discs, suitable for steam service, unless orders specify the service for which the valves are required.

When ordered for use in hot water service, they are furnished with a No. 2 Hot Water Disc.

When ordered for cold water service, they are furnished with a No. 3 Cold Water Disc.

For description, service recommendations, and dimensions of composition discs, see page 178.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches											
	Screwed		Flanged, F. & D.		AA	A	BB	B	C		D	Flange Dimensions				
	No. 358 Globe, No. 360½ Angle	No. 358½ Cross	No. 359 Globe, No. 361½ Angle	No. 359½ Cross					Globe	Angle or Cross		E	F	G	No. of Bolts	Dia. of Bolts
2½	12.00	16.00	14.00	19.00	8	4	9½	4¾	11	10¼	8	7	11/16	5½	4	5/8
3	16.75	21.00	18.50	24.00	8¼	4⅛	10	5	12¾	12¼	9	7½	¾	6	4	5/8
3½	19.50		21.50		9½	4¾	11	5½	13½	13½	9	8½	13/16	7	8	5/8
4	24.00	30.00	26.00	33.00	10½	5¼	12	6	15½	14½	10	9	15/16	7½	8	5/8
5	40.00	45.00	42.00	48.00	12¾	6⅛	14	7	17¾	16¼	10	10	15/16	8½	8	¾
6	48.00	58.00	50.00	62.00	14	7	16	8	19½	19¼	12	11	1	9½	8	¾
8	90.00	100.00	90.00	100.00	18½	9¼	19½	9¾	24¼	22½	16	13½	1⅛	11¾	8	¾
10			130.00	180.00			24½	12¼	29	26¼	18	16	13/16	14¼	12	7/8
12			185.00	270.00			27½	13¾	33	30¾	20	19	1¼	17	12	7/8

Description . . . page 149

Templates for drilling . . . page 551

Composition Discs . . . page 178

175-Pound Ferrosteel Body Globe, Angle, and Cross Valves Brass Trimmed

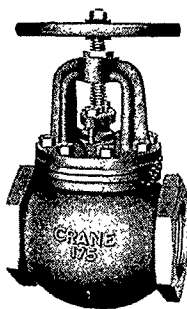
WORKING PRESSURE — 175 pounds steam

TEST PRESSURES

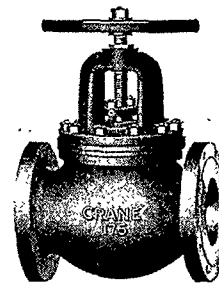
Shell test — 600 pounds hydrostatic
Seat test — 450 pounds hydrostatic

Service Recommendations

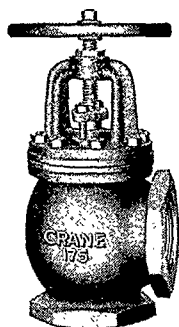
Crane 175-Pound Ferrosteel Body Globe, Angle, and Cross Valves are ideally suited for the services that are more severe than Standard Iron Body Valves can safely withstand but where the use of 250-Pound Valves is not justified. Throughout their entire design and construction, these valves are heavier, sturdier, and more rugged than Standard Valves; they are recommended for general service on steam or water lines.



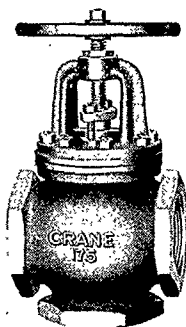
Globe, Screwed
No. 340



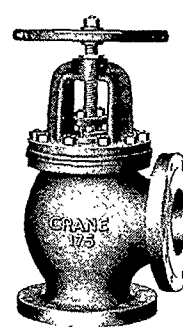
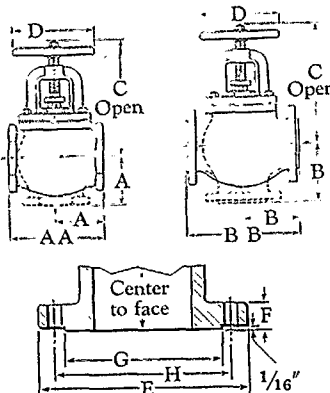
Globe, Flanged
No. 341



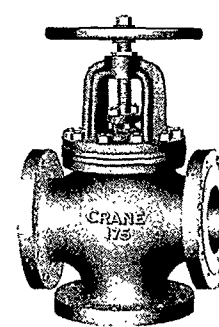
Angle, Screwed
No. 342



Cross, Screwed
No. 344



Angle, Flanged
No. 343



Cross, Flanged
No. 345

Materials: Bodies are made of Ferrosteel; bonnets are made of cast iron on sizes 6-inch and smaller, and of Ferrosteel on sizes 8-inch and larger. All size body seat rings and discs in 5-inch and smaller are made of solid Crane Special Brass; larger size discs are iron with a rolled in seating face of Crane Special Brass. Stems are made of Cast Manganese Bronze.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Flanges have a $\frac{1}{16}$ -inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish. Valves with male, female, tongue, or groove faces are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Drilling: List prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

List Prices and Dimensions

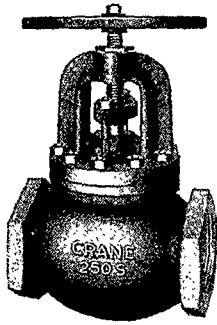
Size Inches	List Prices, Each				Dimensions, in Inches											
	Screwed		Flanged, F. & D.		Screwed		Flanged		C	D	Flange Dimensions					
	No. 340 Globe, No. 342 Angle	No. 344 Cross	No. 341 Globe, No. 343 Angle	No. 345 Cross	AA	A	BB	B			E	F	G	H	No. of Bolts	Dia. of Bolts
2	13.00		15.00		7 $\frac{3}{4}$	3 $\frac{7}{8}$	9	4 $\frac{1}{2}$	11 $\frac{1}{2}$	8	6 $\frac{1}{2}$	7 $\frac{1}{8}$	4 $\frac{3}{16}$	5	8	5 $\frac{1}{8}$
2 $\frac{1}{2}$	16.00	22.00	18.00	25.00	8	4	10	5	12 $\frac{1}{2}$	9	7 $\frac{1}{2}$	1	4 $\frac{15}{16}$	5 $\frac{7}{8}$	8	3 $\frac{3}{4}$
3	20.00	27.00	23.00	31.00	8 $\frac{1}{4}$	4 $\frac{1}{8}$	11	5 $\frac{1}{2}$	14 $\frac{1}{4}$	10	8 $\frac{1}{4}$	1 $\frac{1}{8}$	5 $\frac{11}{16}$	6 $\frac{5}{8}$	8	3 $\frac{3}{4}$
3 $\frac{1}{2}$	24.00	32.00	28.00	37.00	9 $\frac{1}{2}$	4 $\frac{3}{4}$	12	6	15 $\frac{1}{2}$	10	9	1 $\frac{3}{16}$	6 $\frac{5}{16}$	7 $\frac{1}{4}$	8	3 $\frac{3}{4}$
4	28.00	37.00	33.00	43.00	10 $\frac{1}{2}$	5 $\frac{1}{4}$	13	6 $\frac{1}{2}$	16 $\frac{1}{4}$	10	10	1 $\frac{1}{4}$	6 $\frac{15}{16}$	7 $\frac{7}{8}$	8	3 $\frac{3}{4}$
5	42.00	54.00	47.00	60.00	12 $\frac{1}{4}$	6 $\frac{1}{8}$	14 $\frac{1}{2}$	7 $\frac{1}{4}$	18 $\frac{1}{4}$	12	11	1 $\frac{3}{8}$	8 $\frac{5}{16}$	9 $\frac{1}{4}$	8	3 $\frac{3}{4}$
6	50.00	65.00	55.00	72.00	14	7	16	8	20 $\frac{1}{4}$	14	12 $\frac{1}{2}$	1 $\frac{7}{16}$	9 $\frac{11}{16}$	10 $\frac{5}{8}$	12	3 $\frac{3}{4}$
8	90.00	115.00	95.00	122.00	18 $\frac{1}{2}$	9 $\frac{1}{4}$	20	10	24 $\frac{3}{4}$	16	15	1 $\frac{5}{8}$	11 $\frac{5}{16}$	13	12	7 $\frac{1}{8}$
10			145.00	195.00			22 $\frac{1}{2}$	11 $\frac{1}{4}$	28 $\frac{1}{2}$	20	17 $\frac{1}{2}$	1 $\frac{7}{8}$	14 $\frac{1}{16}$	15 $\frac{1}{4}$	16	1
12			200.00	275.00			25 $\frac{1}{2}$	12 $\frac{3}{4}$	31 $\frac{1}{4}$	20	20 $\frac{1}{2}$	2	16 $\frac{7}{16}$	17 $\frac{3}{4}$	16	1 $\frac{1}{8}$

Description . . . page 149

Templates for drilling . . . page 552

Special Facings . . . page 560

250-Pound Ferrosteel Globe, Angle, and Cross Valves Brass Trimmed



Globe, Screwed
No. 20 E

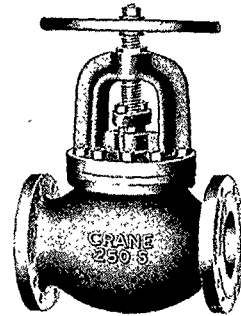
WORKING PRESSURE — 250 pounds steam, 500° F.

HYDROSTATIC TEST PRESSURES

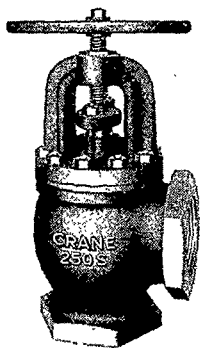
Shell test — 800 pounds Seat test — 550 pounds

Service recommendations: These valves have very heavy metal sections and are unusually rugged. They are recommended for high pressure and severe service on steam or water lines.

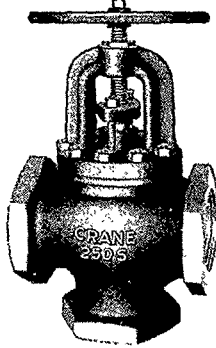
Materials: The body and bonnet are Ferrosteel. The disc is solid Crane Hard Metal in sizes 3 1/2-inch and smaller, and iron with a large Hard Metal seating face rolled in on larger sizes. The body seat ring, too, is Crane Hard Metal, a strong, wear-resisting bronze. The stem is Cast Manganese Bronze.



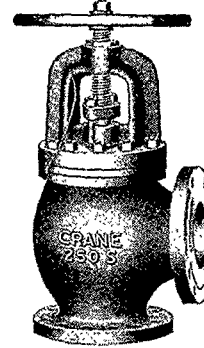
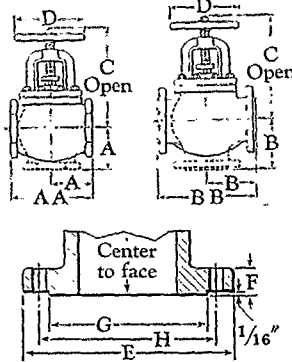
Globe, Flanged
No. 21 E



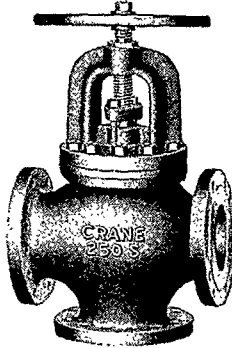
Angle, Screwed
No. 22 E



Cross, Screwed
No. 24 E



Angle, Flanged
No. 23 E



Cross, Flanged
No. 25 E

Seat: Sizes 6-inch and smaller have a 45° seat; larger sizes have a flat seat.

Face to face: The face to face and center to face dimensions of the Flanged Globe and Angle Valves sizes 8-inch and smaller conform to the American Ferrous Flanged Valve Standard (B16.10-1939). This Standard does not include the 10-inch size and Cross Valves.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Flanges have a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Drilling: List prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches												
	Screwed		Flanged, F. & D.		Screwed		Flanged		C Globe | Angle or Cross		D	Flange dimensions					
	No. 20 E Globe, No. 22 E Angle	No. 24 E Cross	No. 21 E Globe, No. 23 E Angle	No. 25 E Cross	AA	A	BB	B				E	F	G	H	No. of bolts	Dia of bolts
2	26.00	33.00	27.50	35.00	9½	4¾	10½	5¼	13¾	13	9	6½	7⁄8	4³⁄₁₆	5	8	5⁄8
2½	33.00	40.00	35.00	43.00	10¾	5⅝	11½	5¾	14¾	13¾	10	7½	1	4¹⁵⁄₁₆	5⁷⁄₈	8	¾
3	37.00	45.00	40.00	50.00	11¾	5⅞	12½	6¼	16¼	15¼	10	8¼	1⅛	5¹¹⁄₁₆	6⅝	8	¾
3½	42.00	50.00	45.00	55.00	12¼	6⅞	13¼	6⅝	17	17¼	10	9	1³⁄₁₆	6⁵⁄₁₆	7¼	8	¾
4	46.00	55.00	50.00	60.00	13	6½	14	7	18¾	17½	12	10	1¼	6¹⁵⁄₁₆	7⁷⁄₈	8	¾
5	61.00	75.00	65.00	80.00	15	7½	15¾	7⅞	21	19½	14	11	1⅝	8⁵⁄₁₆	9¼	8	¾
6	75.00	95.00	80.00	100.00	16½	8¼	17½	8¾	23½	22	16	12½	1⅞	9¹¹⁄₁₆	10⅝	12	¾
8			120.00	150.00			21	10½	28¾	26¼	20	15	1⅝	11¹⁵⁄₁₆	13	12	⅞
10			200.00	250.00			24½	12¼	33	29¾	24	17½	1⅞	14¹⁄₁₆	15¼	16	1

Description page 149

Templates for drilling page 552

Special facings page 560

Other Crane Iron Body Valves

Pages 97 to 166 show the commonly used types of Crane Iron Body Valves: Wedge Gate, pages 97 to 118; Double Disc Gate, pages 119 to 141; Globe, Angle, and Cross, pages 143 to 153; and Check and Foot, pages 155 to 166. In addition to these, Crane Co. supplies a wide assortment of Iron Body Valves for special services and in designs that will automatically perform a specified duty in piping installations. For greater convenience, such valves are shown in other sections of this catalog, along with related products.

Ferrosteel Stop-Check Valves.....	page 372
Ferrosteel Blow-Off Valves.....	page 376
Iron Body Back Pressure Valves.....	pages 378 and 379
Iron Body Float Valves.....	pages 380 and 381
Iron Body Pulp Stock Valves.....	page 375
Iron Body Safety Valves.....	pages 389 to 393
Iron Body Relief Valves.....	pages 401 to 407
Alloy Cast Iron Gate Valves.....	page 456
Iron Body Valves for Marine Service.....	pages 468, 469, and 476
Ferrosteel Valves for Ammonia.....	pages 481 and 482

11

Crane Steel Valves

For severe services and for pressures and temperatures that are beyond the scope of brass or iron valves, Crane Co. manufactures a complete line of forged or cast steel valves. Crane Steel Valves are of outstanding quality; they embody many worthwhile refinements in design, materials and workmanship which contribute to longer life, more efficient operation, and more satisfactory service.

Steel Gate Valves.....	pages 297 to 307
Steel Globe and Angle Valves.....	pages 309 to 326
Steel Check Valves.....	pages 327 to 336

Iron Body Check and Foot Valves

Check Valves

150-Pound with Union Cap, Nickel Alloy Seat and Disc.....	page 156
150-Pound with Union Cap, Composition Disc.....	page 156
Union Cap, for Gasoline Service.....	page 157
Union Cap, for Pump Service.....	page 157
400-Pound W.O.G. Malleable Iron, Swing Type.....	page 156
Standard with Bolted Cap, Lift Type.....	page 159
Standard with Bolted Cap, Swing Type.....	pages 160 and 161
Standard with Bolted Cap, Underwriters' Pattern.....	page 164
250-Pound with Bolted Cap, Swing Type.....	page 165
800-Pound Hydraulic with Bolted Cap, Swing Type.....	page 166
Swing Check, with Outside Lever and Weight.....	page 163

Foot Valves

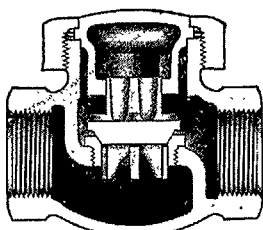
With Brass Disc.....	page 162
With Leather Disc.....	page 162
With Multiple Rubber Disc.....	page 163
For High Pressure Service.....	page 163

The liberal variety of sizes and types of Crane Iron Body Check and Foot Valves assures an adequate selection for all ordinary service requirements. In addition, the Stop-Check Valves shown on pages 370 to 374 are frequently used to excellent advantage for regular check valve service in boiler feed lines, in the discharge lines from high pressure pumps, and in the discharge lines from air compressors. The Ferrosteel Check Valves for ammonia, shown on page 482, also are frequently used on water and air lines under pulsating service.

150-Pound Iron Body Check Valves Nickel Alloy or Composition Disc

WORKING PRESSURES

150 pounds steam
250 pounds cold water, oil, or gas, non-shock



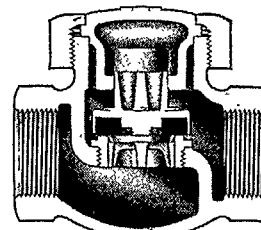
Cross Section
No. 366½, Horizontal
Crane Nickel Alloy Disc
Crane Nickel Alloy Seat



Horizontal, Screwed
No. 366½, Nickel Alloy Disc
No. 366½ C, Composition Disc



Angle, Screwed
No. 367½, Nickel Alloy Disc
No. 367½ C, Composition Disc



Cross Section
No. 366½ C, Horizontal
Composition Disc
Crane Nickel Alloy Seat

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 366½, No. 367½, No. 366½ C, or No. 367½ C	Each	3.20	3.30	3.60	4.50	5.50	6.60	10.00	17.00
End to end, Horizontal	Inches	2 3/8	2 5/8	3	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8
Center to end, Angle	Inches	1 7/8	1 1/4	1 3/8	1 9/16	1 7/8	2 3/16	2 3/8	3
Center to top	Horizontal	Inches	1 7/16	1 9/16	1 3/4	2 1/16	2 5/16	2 11/16	3 3/16
	Angle	Inches	1 3/8	1 1/2	1 11/16	2	2 1/4	2 9/16	3 3/8

For list prices of Composition Discs for No. 366½ C or No. 367½ C Valves, see page 178.

Service recommendations: These check valves are recommended for small lines carrying steam, hot water, cold water, oil, gas, and similar fluids. They are compact and are ruggedly constructed.

Construction: The valves have a union cap, providing a strong, tight joint. The disc or disc holder is guided both at the top and at the bottom, assuring square seating.

Materials: The body is cast iron; the cap is brass; and the cap ring, malleable iron.

The No. 366½ and No. 367½ Valves have a Nickel

Alloy disc and body seat ring. Crane Nickel Alloy is hard and offers excellent resistance to wear.

The No. 366½ C and No. 367½ C Valves have a brass disc holder and a Nickel Alloy body seat ring.

Unless otherwise ordered, the Nos. 366½ C and 367½ C Valves are furnished with a No. 1 Steam Disc, suitable for steam. When ordered for hot water, oil, or gas, they are furnished with a No. 2 Hot Water Disc; when ordered for cold water or air, with a No. 3 Cold Water Disc. For description and dimensions of discs, see page 178.

12

400-Pound W.O.G. Malleable Iron Swing Check Valves

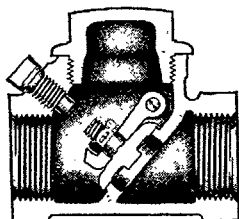
WORKING PRESSURES

250 pounds oil, 550° F.
400 pounds cold water, oil, or gas, non-shock

Air tested

List Prices and Dimensions

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 346½, Screwed	Each	4.00	5.00	6.50	8.00	11.00	14.00	20.00
End to end	Inches	2 3/4	2 3/4	3 1/16	3 5/8	4 1/8	4 13/16	5 13/16
Center to top of cap	Inches	1 7/8	1 7/8	2 1/8	2 1/2	2 7/8	3 3/8	3 3/8



Cross Section, No. 346½



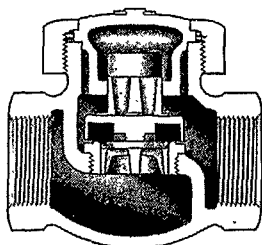
Service recommendations: These valves are especially suitable for oil lines where fire hazard legislates against the use of cast iron, and for corrosive services where all-iron valves are satisfactory but where a material stronger than cast iron is desired. The valves are compact and rugged.

Materials: The body, cap, disc, and hinge are made

of tough, durable malleable iron. The hinge pin is made of Exelloy.

Regrinding: The valves can be reground without taking the body from the line. By removing the stop plug, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding.

Iron Body Check Valves For Gasoline Service



Cross Section
No. 642

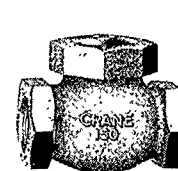
WORKING PRESSURES — 15 pounds gasoline

Air Tested

Patent Pending

Crane No. 642 and No. 644 Check Valves are especially suited for gasoline service. They are recommended for suction lines and gravity pressures up to 15 pounds maximum, where the valves are installed in accessible locations.

Construction and materials: These valves are made with a cast iron body, a brass cap, a malleable iron cap ring, and a brass disc holder; the body and the cap ring are galvanized. The design and materials in the seat and disc — a Crane No. 6 Gasoline Disc and an aluminum alloy renewable body seat ring — are specifically selected for their successful resistance to the action of gasoline.



No. 642, Horizontal
Screwed



No. 644, Angle
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 642 or 644, Galvanized	Each	3.75	5.25	7.00	9.30	12.55	19.00
End to end, Horizontal	Inches	3	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8
Center to end, Angle	Inches	1 7/16	1 5/8	1 7/8	2 3/16	2 7/16	3
Center to top	Horizontal	Inches	1 3/4	2 1/16	2 5/16	2 11/16	3
	Angle	Inches	1 11/16	2	2 1/4	2 9/16	2 7/8

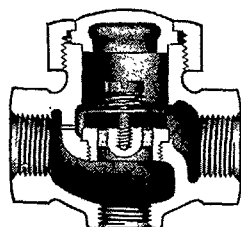
Composition Discs

page 178

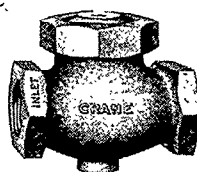
Brass Check and Foot Valves for gasoline service .. page 53

Testing: Each valve is shell tested with 80 pounds air. The seat is tested with one foot head of kerosene.

Iron Check Valves For Pump Service



No. 25, Horizontal, Screwed
With 1/2-inch Bottom Outlet

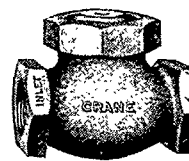


WORKING PRESSURES

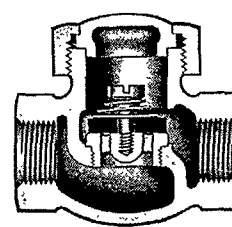
40 pounds cold water,
with Soft Rubber Disc.

75 pounds cold water,
with Hard Rubber Disc.

Orders must specify pressure, or advise if soft or hard disc is wanted.



No. 25 1/2, Horizontal, Screwed
Without Bottom Outlet



Service recommendations: These valves are ideal for installation between Deep Well Pumps and Storage Tanks for pulsating service when pressures do not exceed 75 pounds. The No. 25 Check Valve has a 1/2-inch bottom outlet for direct supply to system; the hole through the diaphragm permits bleeding of pressures to actuate a pressure switch.

Materials: The valves have cast iron body, brass and bronze spring; the body and cap ring are galvanized. Discs are made of either hard or soft rubber.

List Prices and Dimensions

Size	Inches	3/4	1	1 1/4	1 1/2	2
No. 25, with 1/2" bottom outlet	Each	4.75	5.50	6.50		
No. 25 1/2, without bottom outlet	Each	4.00	4.75	5.75	7.00	9.50
End to end	Inches	3 1/2	4 1/8	4 5/8	5 1/4	6 3/8
Center to top	Inches	2 1/8	2 3/8	2 3/4	3	3 5/8
Center to end of bottom outlet	Inches	1 3/8	1 1/2	1 3/4		

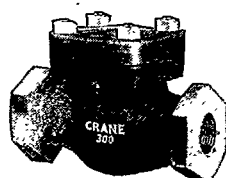
Ferrosteel Check Valves

Crane Co. manufactures a complete line of small size Ferrosteel Check Valves for ammonia service; see page 482.

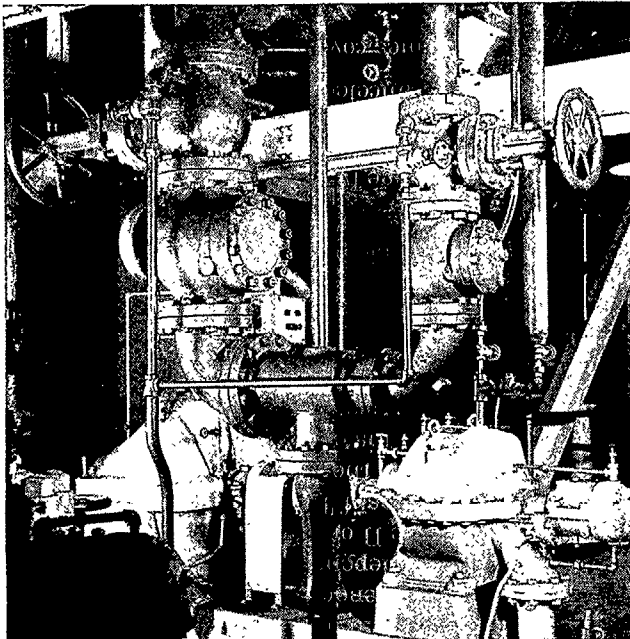
These valves, because of their dashpot cushion design, are used successfully to combat pulsation in pipe lines leading from air compressors or reciprocating types of boiler feed pumps.

The disc is very effectively cushioned by means of an attached piston which operates in a dashpot. Friction rings on sizes 1 1/2-inch and larger tend to reduce dashpot leakage further and assist in slowing down the disc.

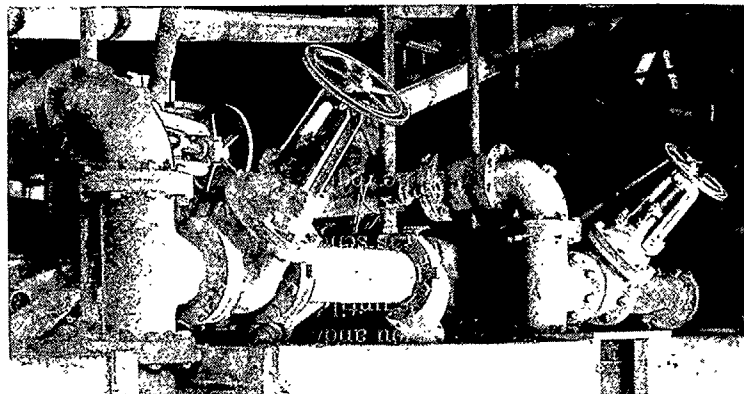
For complete description, prices, and dimensions, see page 482.



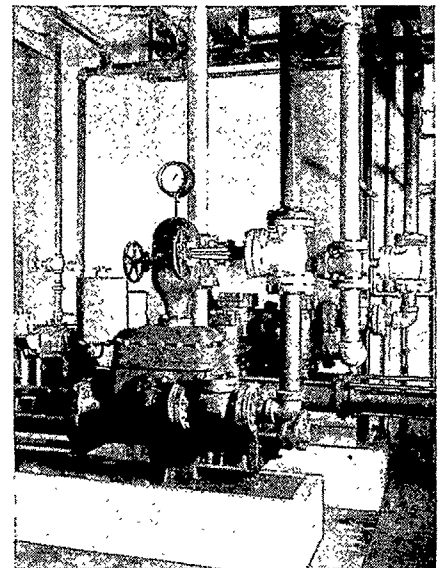
No. 150 1/2 Horizontal
Screwed



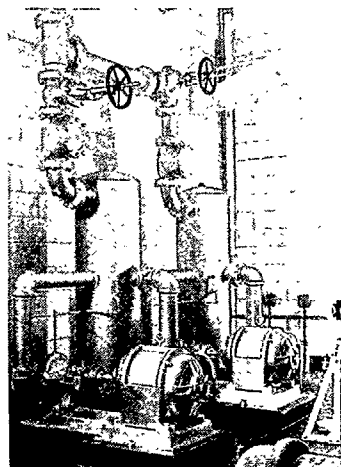
Crane iron body swing check valves, iron body wedge gate valves, and iron flanged fittings and flanges on water lines in an electric light and power plant.



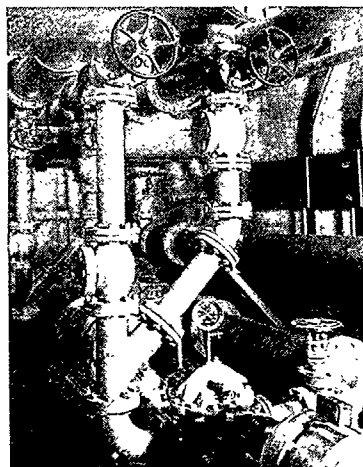
Crane iron body gate valves and cast iron flanged fittings in the water lines to mixing boxes in a paper mill.



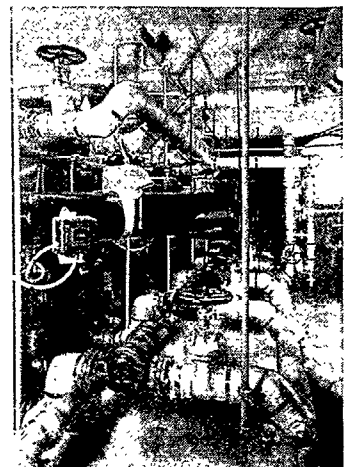
Crane valves and fittings are widely used in textile mills.



Centrifugal pumps in a municipal water works using Crane Underwriters' check valves.

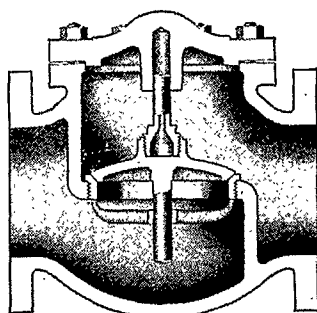


The diesel plant piping of a large irrigation system, fitted with Crane products.

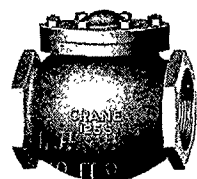


A multiple boiler automatic school heating installation completely Crane-equipped.

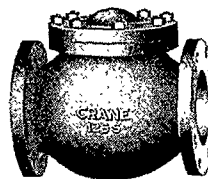
Standard Iron Body Check Valves Brass Trimmed



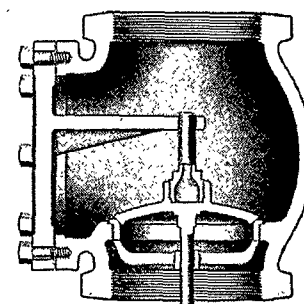
Cross Section
No. 367, Horizontal



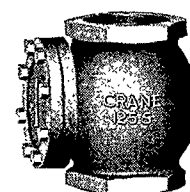
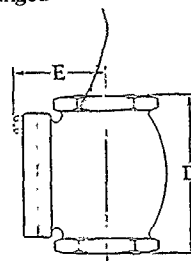
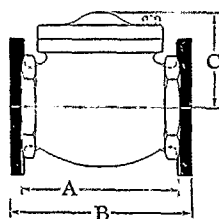
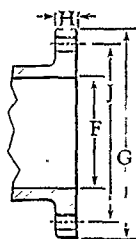
No. 366, Horizontal
Screwed



No. 367, Horizontal
Flanged



Cross Section
No. 368, Vertical



No. 368, Vertical
Screwed

List Prices and Dimensions

Size Inches	List Prices, Each			Dimensions, in Inches										No. of Bolts	Dia. of Bolts
	Horizontal		Vertical	A	B	C	D	E	F	G	H	J			
	No. 366 Screwed	No. 367 Flanged F & D.	No. 368 Screwed												
2	3.60			6½		3½			2						
2½	6.50		9.50	7		4¼	7	4¼	2½						
3	8.90	11.50	12.50	8	9½	5	8	5	3	7½	¾	6	4	⅝	
4	14.25	18.00	21.00	10	11½	6¼	10	6	4	9	15⁄16	7½	8	⅝	
5	22.00	26.00	33.00	11¼	13	7	11¼	7	5	10	15⁄16	8½	8	¾	
6	30.00	35.00	40.00	13	14	8¾	13	7¾	6	11	1	9½	8	¾	
8		62.00			19½	11¼			8	13½	1⅛	11¾	8	¾	

Service recommendations: These horizontal and vertical check valves are recommended for general service on steam lines.

Construction: The valves are rugged and well proportioned. The disc is accurately guided both at the top and bottom, assuring square seating. The body seat ring is screwed into the body.

Horizontal check valves: The No. 366 Valves have a brass screwed-in cap on sizes 3-inch and smaller and an iron bolted cap on larger sizes. The No. 367 Valves have an iron bolted cap on all sizes. All horizontal check valves in sizes 6-inch and smaller have a solid brass disc; the 8-inch size has an iron disc with a brass seating face. All of these valves have a brass body seat ring.

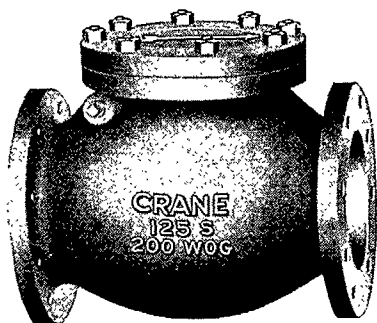
Vertical check valves: The No. 368 Vertical Check Valves have an iron bolted cap, a solid brass disc, and a brass body seat ring.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced, with a smooth finish.

Drilling: The list prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

Larger sizes: When larger size check valves are wanted, we recommend the use of the swing check valves shown on page 161.

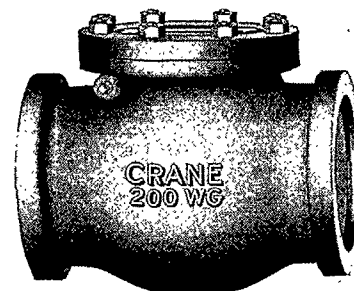
Standard Iron Body Swing Check Valves Brass Trimmed or All-Iron



No. 373, Flanged

Brass Trimmed Valves
No. 372, Screwed
No. 373, Flanged
No. 374 $\frac{1}{4}$, Hub Ends

All-Iron Valves
No. 372 $\frac{1}{2}$, Screwed
No. 373 $\frac{1}{2}$, Flanged

No. 374 $\frac{1}{4}$, Hub End

These valves may be used either in a horizontal position or in a vertical position for upward flow.

Brass trimmed valves: Brass trimmed valves are recommended for steam or water, or for fluids that do not corrode brass.

Unless otherwise ordered, No. 372, No. 373, and No. 374 $\frac{1}{4}$ brass trimmed valves are furnished with a brass or brass faced disc. Sizes 3-inch and smaller have a solid brass disc; larger sizes have a cast iron disc with a brass seating face.

The brass body seat ring is screwed into the body.

All-iron valves: All-iron valves are recommended for gas, or for fluids that corrode brass but not iron.

The seating surfaces are cast integral with the body and disc. Valves with screwed-in body seat rings can be supplied when ordered; prices on application.

Leather disc: When so ordered, any of the brass trimmed valves can be furnished with a leather faced disc. The table of list prices shown on the opposite page includes the extra charge for leather faced discs.

Leather faced disc valves are recommended only for cold water lines.

Construction: Standard Iron Body Swing Check Valves are well proportioned and are sturdily constructed. The bodies are oval or globular in shape, providing an ample flow area around the disc when the valve is wide open. All sizes have the hinge suspended in the body.

The valves are designed so that the disc cannot stick in the open position.

Hub end valves: The hubs on hub end valves are suitable for Class "D" cast iron pipe.

By-passes: Extra list prices for by-passes on sizes 12-inch and larger are shown on the opposite page. By-passes are the "bolted" type, made with a brass trimmed iron wedge gate valve having a non-rising stem.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced, with a smooth finish.

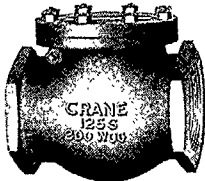
Face to face dimensions: The face to face dimensions of the flanged valves sizes 6-inch and smaller conform to the American Ferrous Flanged Valve Standard (B16.10-1939), for 125-Pound Cast Iron Swing Check Valves. Sizes 8-inch and larger are not included in this Standard.

A.P.I. Standard: When used on pressures not exceeding 175 pounds at atmospheric temperatures, the flanged valves in 2, 2 $\frac{1}{2}$, 3, 4, and 6-inch sizes conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Swing Check Valves.

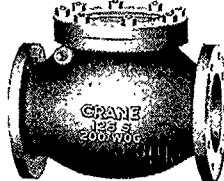
Size of Valve	Working pressures			Hydrostatic test pressures	
	Screwed or flanged valves		Hub end valves	Screwed, flanged, or hub end valves	
	Saturated steam	Cold water, oil, or gas, non-shock	Cold water or gas non-shock	Shell test	Seat test
2 to 12-inch	125 pounds	200 pounds	200 pounds	350 pounds	225 pounds
14 and 16-inch	125 pounds	150 pounds	150 pounds	250 pounds	175 pounds
18 to 24-inch		150 pounds	150 pounds	250 pounds	175 pounds

Standard Iron Body Swing Check Valves Brass Trimmed or All-Iron

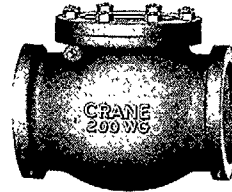
For working pressures, see the preceding page.



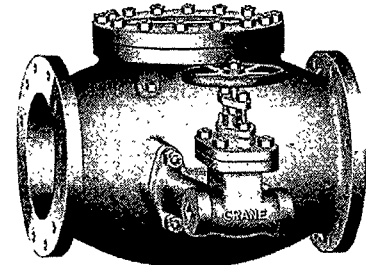
Screwed
No. 372, Brass Trimmed
No. 372½, All-Iron



Flanged
No. 373, Brass Trimmed
No. 373½, All-Iron



Hub Ends
No. 374¼, Brass Trimmed



No. 373 Check Valve
with Bolted By-Pass

The list prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

List Prices

Size Inches	Brass Trimmed Valves			All-Iron Valves		Extra for Leather Faced Disc for No. 372, No. 373, or No. 374¼ Valves Per Valve	Extra for Bolted By-Pass	
	No. 372 Screwed Each	No. 373 Flanged F. & D. Each	No. 374¼ Hub Ends Each	No. 372½ Screwed Each	No. 373½ Flanged F. & D. Each		Size of By-Pass Inches	Per Valve
2	11.00	13.00		11.00	13.00	1.00		
2½	12.00	14.50		12.00	14.50	1.50		
3	13.50	17.00	17.00	13.50	17.00	2.00		
3½	17.50	21.00				2.50		
4	20.00	24.00	24.00	20.00	24.00	3.00		
5	30.00	34.00			34.00	4.00		
6	36.00	41.00	41.00		41.00	4.00		
8	70.00	75.00	75.00		75.00	7.50		
10		115.00	115.00			10.00		
12		168.00	168.00			12.00		
14		340.00	340.00			No Extra Charge	2	49.00
16		450.00	450.00				3	74.00
18		600.00	600.00					
20		700.00	700.00					
24		1000.00	1000.00				4	99.00

Dimensions, in Inches

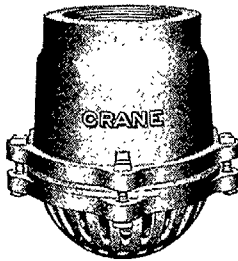
Size		2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Screwed	End to end	6½	7	8	9	10	11¼	12½	18½							
	Face to face	8	8½	9½	10½	11½	13	14	19½	24½	27½	31	36	36	40	48
	I.D. of port	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
	Flange dia.	6	7	7½	8½	9	10	11	13½	16	19	21	23½	25	27½	32
Flanged	Flange thick.	⅝	11/16	¾	13/16	15/16	1	1⅛	1⅜	1⅝	1⅞	2	2⅛	2⅜	2½	2⅞
	Bolt circle	4¾	5½	6	7	7½	8½	9½	11¾	14¼	17	18¾	21¼	22¾	25	29½
	No. of bolts	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20
	Dia. of bolts	⅝	⅝	⅝	⅝	⅝	¾	¾	¾	7/8	7/8	1	1	1⅛	1⅛	1¼
Hub Ends	End to end			10½		12		14	19½	24½	27½	31	36	32	35	40
	I.D. of hub			4.75		5.62		7.87	10.00	12.25	14.37	16.50	18.75	20.87	23.00	27.25
	Depth of hub			2.75		3.00		3.00	3.50	3.50	3.50	3.50	4.00	4.00	4.00	4.00
By-Pass	Size of by-pass										2	2	3	3	3	4
	C. to outside										22	23¾	27½	29¼	30¾	34¾
	Center to top										11½	11½	14¼	14¼	14¼	17
Center to top of valve		4½	4¾	5½	6	6½	7¼	8	10⅝	12⅝	13¾	16	17¾	17½	20	21

Templates for drilling . . . page 551

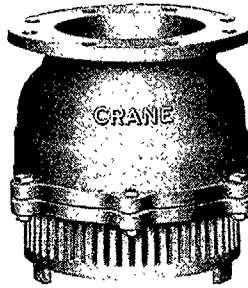
Normal thread engagement . . . page 591

Iron Body Foot Valves

Leather or Brass Disc



Screwed



Flanged

Leather or Brass Disc Foot Valves

- No. 394, Leather Disc, Screwed
 No. 395, Leather Disc, Flanged
 No. 394½, Brass Disc, Screwed
 No. 395½, Brass Disc, Flanged

SERVICE RECOMMENDATIONS

These valves are recommended for suction lines on shallow well pumps where the pressure does not exceed 34-foot head (approximately 15 pounds), but they will safely stand 25 pounds pressure on priming pump service, when not subjected to the pulsations of the pump.

The leather disc valves are especially suitable for cold water; the brass disc valves, for hot water.

List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125 on sizes 3½-inch and smaller, and to the 25-Pound American Tentative Cast Iron Flange Standard on sizes 4-inch and larger. No deduction is made if ordered faced only.

Size Inches	List Prices, Each								Dimensions, in Inches									
	Leather Disc Valves				Brass Disc Valves				Largest Outside Diameter of Body				Flange dimensions					
	No. 394 Screwed		No. 395 Flanged F. & D.		No. 394½ Screwed		No. 395½ Flanged F. & D.											
	Black	Galv.	Black	Galv.	Black	Galv.	Black	Galv.	No. 394	No. 395	No. 394½	No. 395½	Diam-eter	Thick-ness	Bolt circle	No. of bolts	Dia. of bolts	
¾	1.15	1.75							3¾									
1	1.30	2.00							3¾									
1¼	1.40	2.10			8.00	8.30			4⅞		4⅞							
1½	1.90	2.85			9.00	9.40			4¾		4¾							
2	2.40	3.60	3.50	5.50	10.00	10.50			5½	6	5½		6	½	4¾	4	⅝	
2½	3.30	5.00	4.50	7.00	11.00	11.70			6¼	7	6¼		7	9/16	5½	4	⅝	
3	3.90	5.75	5.75	9.00	12.00	12.80	13.00	14.30	7	7½	7	7½	7½	⅝	6	4	⅝	
3½	5.60	8.50	7.50	12.00	13.00	14.20	14.00	15.80	8⅞	8⅞	8⅞	8⅞	8½	11/16	7	8	⅝	
4	7.30	11.00	9.50	15.00	14.00	15.50	15.00	17.25	8⅞	9	8⅞	9	9	¾	7½	8	⅝	
5	11.25	16.75	14.00	22.00	15.00	17.20	16.00	19.20	10½	10½	10½	10½	10	¾	8½	8	⅝	
6	14.75	22.00	17.50	27.00	18.00	21.00	20.00	23.85	11¾	11¾	11¾	11¾	11	¾	9½	8	⅝	
8	41.00	62.00	45.00	72.00	45.00	53.50	48.00	59.00	15⅞	15⅞	15⅞	15⅞	13½	¾	11¾	8	⅝	
10	64.00	110.00	70.00	120.00	80.00	98.50	85.00	105.00	18	18	20¼	20¼	16	⅞	14¼	12	⅝	
12	100.00	155.00	112.00	170.00			135.00	159.00	20¼	20¼		24⅞	19	1	17	12	⅝	
14			150.00										21	1⅞	18¾	12	¾	
16			200.00										23½	1⅞	21¼	16	¾	

Shape of strainer: Sizes 6-inch and smaller have a semi-spherical strainer as shown on the illustration of the screwed end valve; the larger sizes have a flat bottom strainer as shown on the illustration of the flanged end valve.

Materials and construction: The leather disc valves have a cast iron body, strainer, and seat. Sizes 6-inch and smaller have one disc; larger sizes have two discs.

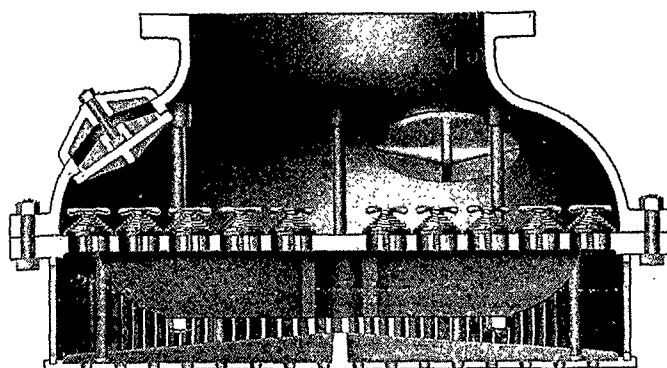
The brass disc valves have a cast iron body and strainer and a brass seat. Size 6-inch and smaller have one disc; larger sizes have four discs.

Flange dimensions and facing: The dimensions and drilling of the end flange on valves 4-inch and larger conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). On smaller sizes, the diameter and drilling of the end flange conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flange is plain faced, with a smooth finish.

When so ordered, the flange on sizes 5-inch and larger can be drilled to the 125-Pound American Standard. Full face gaskets should then be used to avoid distorting the flange.

Ferrosteel Foot Valves

Multiple Rubber Disc



Multiple Rubber Disc Foot Valve
No. 397, Flanged

Service recommendations: These valves are recommended for the same service as the leather disc valves shown on the opposite page.

Materials and construction: The valves have a Ferrosteel body, cast iron strainer and seat, and brass valve stems and springs; they have handholes to facilitate cleaning and repairing.

Flange dimensions and facing: The dimensions and drilling of the end flange conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). The flange is plain faced, with a smooth finish.

Size	List Prices	Dimensions, in Inches					
	No. 397 Flanged F. & D. Black Each	Largest Outside Diameter of Body	Flange dimensions				
Inches			Diameter	Thickness	Bolt Circle	No. of Bolts	Dia. of Bolts
16	190.00	34 $\frac{3}{4}$	23 $\frac{1}{2}$	1 $\frac{1}{8}$	21 $\frac{1}{4}$	16	$\frac{3}{4}$
18	235.00	40 $\frac{3}{4}$	25	1 $\frac{1}{4}$	22 $\frac{3}{4}$	16	$\frac{3}{4}$
20	265.00	46	27 $\frac{1}{2}$	1 $\frac{1}{4}$	25	20	$\frac{3}{4}$
24	400.00	54 $\frac{1}{2}$	32	1 $\frac{3}{8}$	29 $\frac{1}{2}$	20	$\frac{3}{4}$
30	780.00	69 $\frac{1}{2}$	38 $\frac{3}{4}$	1 $\frac{1}{2}$	36	28	$\frac{7}{8}$
36	1200.00	82	46	1 $\frac{5}{8}$	42 $\frac{3}{4}$	32	$\frac{7}{8}$

When so ordered, the flange can be drilled to the American Cast Iron Flange Standard, Class 125. Full face gaskets should then be used to avoid distorting the flange.

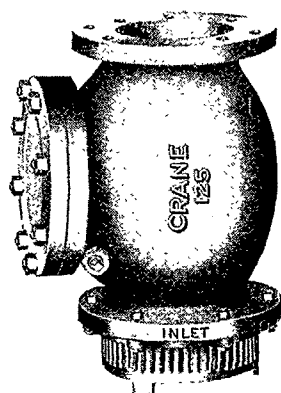
Drilling: List prices include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made if valves are ordered faced only.

Brass disc valves: Multiple Brass Disc Foot Valves can be made to order; prices on application.

Templates for drilling . . . page 551

12

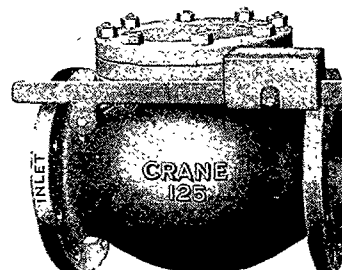
High Pressure Iron Body Foot Valves



When foot valves are wanted for high pressures or for severe service, Crane No. 373 Flanged Standard Iron Body Swing Check Valves having a strainer bolted on the inlet end, as illustrated above, are recommended. These are furnished with either a leather faced disc or a solid brass or brass faced disc.

Prices on application

Swing Check Valves With Outside Lever and Weight

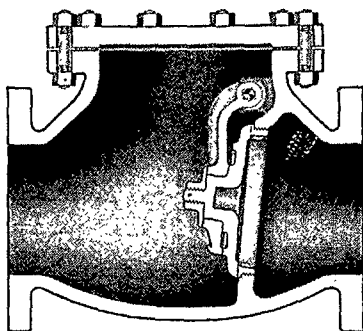


Any Crane Iron Body, Ferrosteel, or Cast Steel Swing Check Valve can be furnished with an outside lever and weight as illustrated above. The weight is mounted on the lever either in a position that will assist the disc in closing, thereby making the valve extremely sensitive to a reversal of flow, or in a position where it will balance the disc, causing the valve to open under a minimum of pressure. Orders must specify which type is wanted.

Unless otherwise ordered, the lever and weight are placed on the side that is on the right when looking into the valve inlet.

Prices on application

Standard Iron Body Clearway Swing Check Valves Underwriters' Pattern

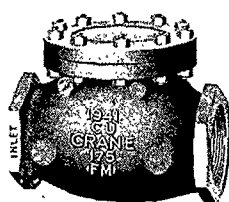


Cross Section, No. 375

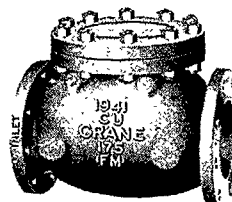
WORKING PRESSURE — 175 pounds cold water, non-shock

HYDROSTATIC TEST PRESSURES

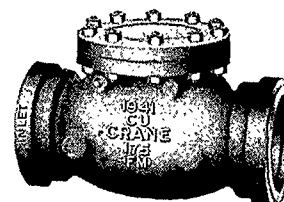
Shell test — 250 pounds Seat test — 200 pounds



No. 374 1/2, Screwed



No. 375, Flanged

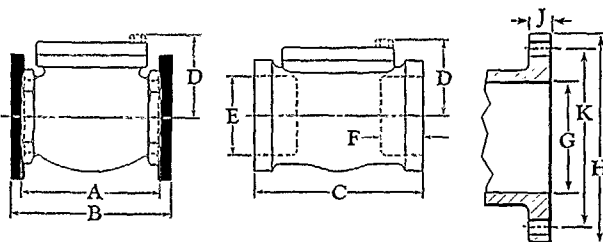


No. 375 1/2, Hub Ends

For use in a horizontal position, or in a vertical position for upward flow.

UNDERWRITERS' REQUIREMENTS

Designed for fire protection service, these valves conform to the Underwriters' Specifications known as "The National Standard", and they are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. They are marked "FM" and "CU". The valves are not recommended for use on "interconnection service".



List Prices and Dimensions

Size Inches	List Prices, Each				Dimensions, in Inches												
	No. 374½ Screwed	No. 375 Flanged F. & D.	No. 375½ Hub Ends	Extra for Leather Faced Disc	A	B	C	D	E	F	G	H	J	K	No. of bolts	Dia. of bolts	
2½	14.50	14.50		1.50	10	10		6¼			2½	7	11/16	5½	4	⅝	
3	17.00	17.00		2.00	11	11		6¾			3	7½	¾	6	4	⅝	
3½		21.00		2.50		12		7			3½	8½	13/16	7	8	⅝	
4	24.00	24.00	24.00	3.00	13	13	16½	7½	5.62	3.00	4	9	15/16	7½	8	⅝	
5	34.00	34.00		4.00	15	15		8½			5	10	15/16	8½	8	¾	
6	41.00	41.00	41.00	4.00	16	16	20	9¼	7.87	3.00	6	11	1	9½	8	¾	
8	75.00	75.00	75.00	7.50	18	18	22¼	11¼	10.00	3.50	8	13½	1⅛	11¾	8	¾	
10		115.00	115.00	10.00		22	26	13½	12.25	3.50	10	16	13/16	14¼	12	⅞	
12		168.00	168.00	12.00		26	29½	15¼	14.37	3.50	12	19	1¼	17	12	⅞	

Construction: The body is large, providing liberal clearance around the disc. When opening, the disc swings entirely clear of the waterway; it is so constructed that it will not stick in the open position.

Through bolt-studs with a nut on each end are used in the cap joint. The hinge pin is accessible from both sides of the body, being retained by brass plugs.

Materials: The body seat ring is brass and is screwed into the body. Sizes 6-inch and smaller have a brass disc and a brass hinge. In larger sizes, the disc is iron with a brass seating face and has a brass collar where it engages the hinge; the hinge is malleable iron, having a brass hinge-pin bushing and a brass disc-hub bushing. All sizes have a brass hinge pin.

Leather disc: An extra charge is made for leather

faced disc valves. See the list prices shown above.

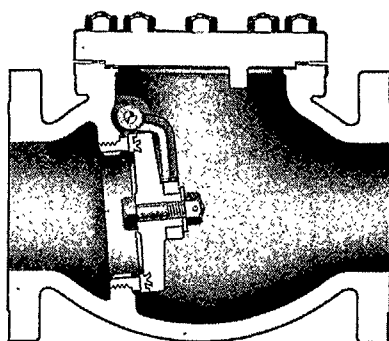
Hub end valves: The No. 375 1/2 Valves have hub ends suitable for Class "D" cast iron pipe.

Bosses on body: Each valve is equipped with four bosses for by-pass, two on each side of the body. An extra charge is made for drilling and tapping the bosses and for furnishing a by-pass.

Flange dimensions and facings: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: The list prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

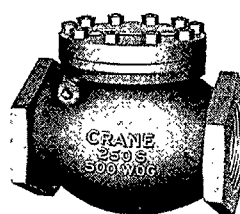
250-Pound Ferrosteel Swing Check Valves Brass Trimmed



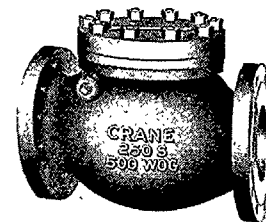
Cross Section, No. 39 E

Size of Valve	Working pressures		Hydrostatic test pressures	
	Steam 500° F.	Cold water, oil, or gas, non-shock	Shell test	Seat test
2 to 12-inch	250 pounds	500 pounds	1000 pounds	550 pounds
14-inch	250 pounds	400 pounds	700 pounds	450 pounds

*These valves also
may be used in a
vertical position
for upward flow.*



No. 38 E, Screwed



No. 39 E, Flanged

List Prices

Size	Inches	2	2½	3	3½	4	5	6	8	10	12	14
No. 38 E, Screwed	Each	15.00	20.00	28.00	36.00	41.00	54.00	66.00				
No. 39 E, Flanged, F. & D.	Each	17.00	22.00	30.00	38.00	44.00	57.00	70.00	105.00	175.00	250.00	350.00

Service recommendations: Crane 250-Pound Ferrosteel Swing Check valves are well suited for a wide variety of services requiring the use of rugged, sturdily constructed valves. They will give excellent results on steam lines where the pressure and temperature do not require the use of steel valves, on high pressure water, oil, or gas lines, and on similar service.

Construction: The valves are heavily proportioned and are unusually rugged. The body is oval in shape, providing ample flow area when the valve is open. The valves have a disc stop which keeps the disc from sticking in the open position.

Materials: The body and cap are made of Crane Ferrosteel. The body seat ring is made of Crane Hard Metal; it is screwed into the body. Sizes 3½-inch and smaller have a solid Crane Hard Metal disc; larger sizes have an iron disc with a Hard Metal seating face. Crane Hard Metal is a copper-tin bronze having unusual strength and hardness.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the 250-Pound American Cast Iron Flange Standard

(B16b-1928). Flanges have a 1/16-inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with male, female, tongue, or groove faces can be made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Drilling: The list prices of flanged valves include facing and drilling to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

Face to face dimensions: The face to face dimensions of the flanged valves sizes 12-inch and smaller conform to the American Ferrous Flanged Valve Standard (B16.10-1939), for 250-Pound Cast Iron Flanged Swing Check Valves. The 14-inch size is not included in this Standard.

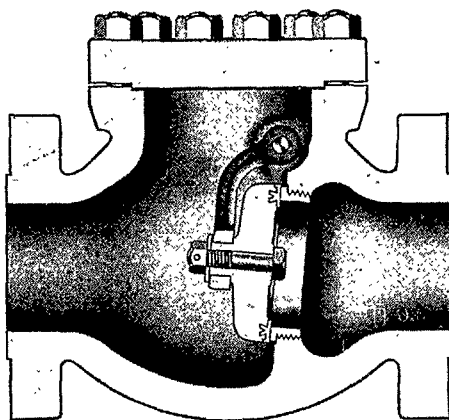
A.P.I. Standard: The flanged valves in all sizes except the 3½, 5, and 14-inch conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 500-Pound Iron Pipe Line Check Valves.

Dimensions, in Inches

Size	2	2½	3	3½	4	5	6	8	10	12	14
Screwed	End to end	9½	10¾	11¾	12¼	13	15	16½			
	*Face to face	10½	11½	12½	13¼	14	15¾	17½	21	24½	33
	Inside diameter of port	2	2½	3	3½	4	5	6	8	10	13¼
	Diameter of flange	6½	7½	8¼	9	10	11	12½	15	17½	23
Flanged	*Thickness of flange	7/8	1	1½	1¾	1¾	1¾	1¾	1¾	2	2½
	Diameter of raised face	4¾	4½	5½	6½	6½	8½	9½	11½	14½	18½
	Diameter of bolt circle	5	5½	6½	7¼	7¾	9¼	10¾	13	15¼	20¼
	Number of bolts	8	8	8	8	8	8	12	12	16	20
	Diameter of bolts	5/8	¾	¾	¾	¾	¾	¾	1	1½	1½
Center to top of valve		5¼	5¾	6¼	6¾	7¼	8¼	9	11	13	15¾

*Face to face and thickness of flange dimensions include the 1/16-inch raised face.

800-Pound Hydraulic Ferrosteel Swing Check Valves Brass Trimmed

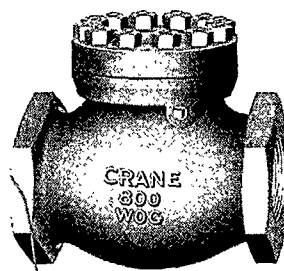


Cross Section, No. 821 H

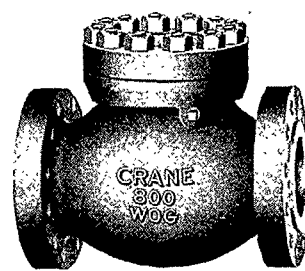
Service recommendations: These valves are recommended for high-pressure hydraulic lines, and for high-pressure gas lines.

Construction: The valves are extremely heavy and rugged. The bodies are oval or globular in shape, providing ample flow area around the disc when the valve is open. The valves are constructed so that the disc cannot stick in the open position.

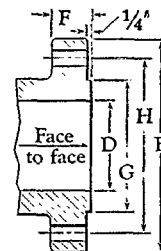
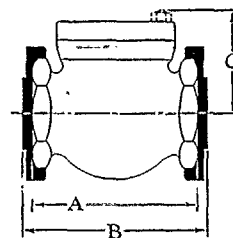
These valves also may be used in a vertical position for upward flow.



No. 820 H, Screwed



No. 821 H, Flanged



List Prices and Dimensions

Size Inches	List Prices, Each		Dimensions, in Inches									
	No. 820 H Screwed	No. 821 H Flanged F. & D.	A	B	C	D	E	F	G	H	No. of Bolts	Dia. of Bolts
2	37.50	37.50	10½	11½	6	2	6½	11¼	3⅝	5	8	⅝
2½	45.00	45.00	12	13	6¾	2½	7½	1⅜	4⅞	5⅞	8	¾
3	60.00	60.00	13½	14	8¼	3	8¾	1½	5	6⅝	8	¾
4	83.00	83.00	15¼	17	9¼	4	10¾	1⅞	6⅜	8½	8	⅞
5	113.00	113.00	17¼	20	10½	5	13	2⅞	7⅝	10½	8	1
6	165.00	165.00	19	22	12	6	14	2¼	8½	11½	12	1
8		285.00		26	15	7⅞	16½	2½	10⅝	13¾	12	1⅞
10		360.00		31	15¾	9¾	20	2⅞	12¾	17	16	1¼
12		525.00		33	17	11¾	22	3	15	19¼	20	1¼

Materials: The body and cap are made of Crane Ferrosteel. The body seat ring is screwed into the body and is made of Crane Hard Metal. Sizes 4-inch and smaller have a solid Crane Hard Metal disc; larger sizes have an iron disc with a large Hard Metal seating face. Crane Hard Metal is a tough, hard, wear-resisting copper-tin bronze.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 800-Pound Hydraulic American Cast Iron Flange Standard (B16b1-1931). The flanges have a ¼-inch male face (large male); the male face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Valves with female, tongue, or groove faces are made to order; see page 561 for dimensions and the Crane Discount Sheet for prices.

Templates for drilling . . . page 552

Drilling: The list prices of flanged valves include facing and drilling to the 800-Pound Hydraulic American Cast Iron Flange Standard. No deduction is made when valves are ordered "faced only".

Shock: On lines subjected to shock, properly designed shock absorbers must be installed to protect the piping and the valves; see page 11.

Face to face: The face to face dimensions of the flanged valves conform to the American Ferrous Flanged Valve Standard, B16.10-1939. This Standard does not include the 5-inch size.

A.P.I. Standard: Flanged valves conform to the American Petroleum Institute (A.P.I.) Standard, No. 5-G-1, September, 1938 for 800-Pound Iron Pipe Line Valves. This Standard does not include the 5-inch size.

Special facings . . . page 561

Thread engagement . . . page 591

Valve Accessories and Parts

For greater convenience, various valve accessories and parts, many of which are used with nearly all Crane Valves, have been grouped together on the following pages, numbers 168 to 178.

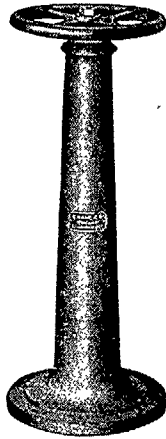
Floor Stands.....	pages 168 and 169
Extension Stems.....	page 169
Indicator Posts.....	page 170
Cylinder Operated Valves.....	page 171
Motor Operated Valves.....	pages 172 and 173
Wheels.....	page 174
Handles.....	page 175
Size of Hole in Wheels and Handles.....	page 175
Chain Wheels.....	page 176
Tee Wrenches for Hub End Iron Body Valves..	page 177
Keys for Lock Shield Valves.....	page 177
Composition Discs.....	page 178

Replacement Parts for Valves

Replacement parts, such as stems, bonnets, discs, packing nuts, etc., for any Crane Valve can be furnished upon receipt of an order. When ordering parts, specify the catalog number and the size of the valve, and give the name of the part required. In addition, since the valve must be clearly identified before a part that will fit correctly can be furnished, indicate how the valve is marked and where the marking appears.

Floor Stands

With or Without Indicator



Floor Stand
Without Indicator

These Floor Stands, when equipped with the proper extension stem, are suitable for operating either rising or non-rising stem valves. The list prices shown below include the Floor Stand with wheel and wheel stem coupling, and in addition, on the Floor Stand with Indicator, the complete indicator parts; they do not include an extension stem or valve coupling.

Extension stems are illustrated on the opposite page.

The 20-inch high Floor Stand is used on valves having an 8-inch or smaller diameter handwheel; the 32-inch, on valves having a larger diameter handwheel.

Prices on extension stems and on valve stem or yoke sleeve couplings are furnished on application. They depend upon the length of the extension stem and upon the size and kind of valve on which the coupling will be used.



Floor Stand
With Indicator

List Prices

Including wheel stem coupling, but no extension stem

Height of Floor Stand		Inches	20	32
Without Indicator	Painted column, japanned wheel	Each	15.00	20.00
	Finished column, japanned wheel	Each	28.00	35.00
	Finished column; rim and hub of wheel finished, spokes japanned	Each	40.00	48.00
With Indicator	Painted column, japanned wheel	Each	22.00	27.00
	Finished column, japanned wheel	Each	35.00	42.00
	Finished column; rim and hub of wheel finished, spokes japanned	Each	47.00	55.00

Directions for Ordering

Floor Stand Only

For Crane Valves, specify:

1. Style (with or without indicator) and finish of Floor Stand, and height
2. Size and catalog number of valve, and whether valve opens by turning to the right or the left

For other than Crane Valves, specify:

3. Style (with or without indicator) and finish of Floor Stand
4. Size, style, and catalog number of valve
5. Manufacturer's name
6. Diameter of handwheel on valve
7. Number of turns to open
8. Whether valve opens by turning to the right or the left

Floor Stand with Extension Stem

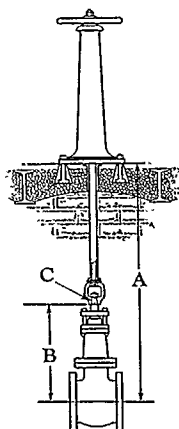
For Crane Valves, specify:

- Information requested when ordering Floor Stand only (1 and 2, above)
9. Dimension A, center of valve port to floor level
 10. Details, description, and proximity of structural members or walls available for support of long extension stems

For other than Crane Valves, specify:

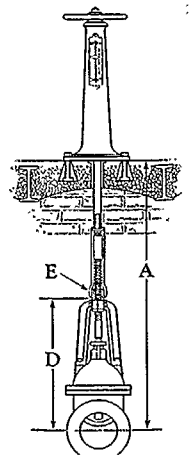
- Information requested in above items 3 to 10 inclusive
11. If non-rising stem gate valve, or globe, angle, or cross valve, include:
 - Dimension B, center of valve to bottom of square on stem
 - Dimension C, size and length of square on stem, and shape (whether straight or tapered)
 12. If outside screw and yoke gate valve, include:
 - Dimension D, center of valve to bottom of hub on handwheel
 - Dimension E, detail dimensions of the part of the yoke sleeve on which the handwheel fits

Floor Stands with Extension Stems are priced on application.



Non-Rising
Stem
Gate Valve

Unless otherwise ordered, extension stems are made of Extra Strong Pipe.

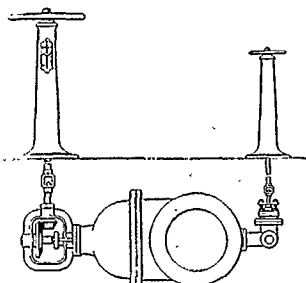


Outside Screw
and Yoke
Gate Valve

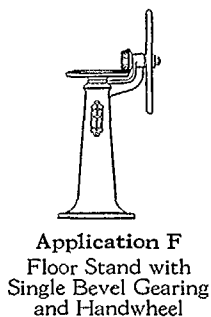
Unusually long extension stems must be properly supported.

Floor Stands

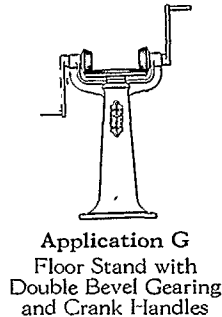
Typical Application and Special Designs



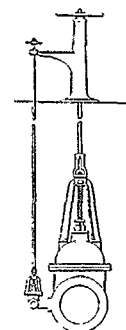
Application E
Floor Stands Applied to
Gate Valve with By-Pass
in Horizontal Position



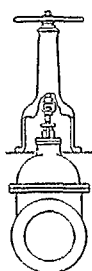
Application F
Floor Stand with
Single Bevel Gearing
and Handwheel



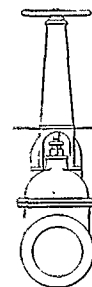
Application G
Floor Stand with
Double Bevel Gearing
and Crank Handles



Application K
Floor Stand with Arm
for Operating By-Pass



Application L
Bell Bottom Floor Stand
Used on Non-Rising Stem
Gate Valve Projecting
Above Floor Line



Application J
Wide Bottom Floor Stand
Used on Rising Stem
Gate Valve Projecting
Above Floor Line

The Floor Stands shown on the opposite page can be used to operate globe, angle, or cross valves or rising or non-rising stem gate valves, either with or without gearing. These meet the requirements of ordinary installations.

In addition, Floor Stands of special designs, a few of which are illustrated on this page, can be made to order for unusual installations. Prices on the special designs, such as those equipped with gears, ball bearings, cranks, motors, arms, or bell or wide bottom, are furnished on application.

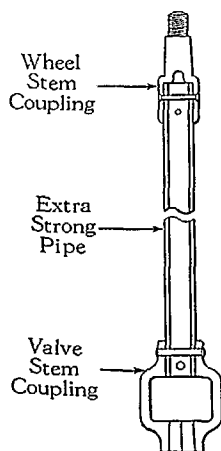
Inquiries and orders should indicate clearly what is wanted.

Extension Stems

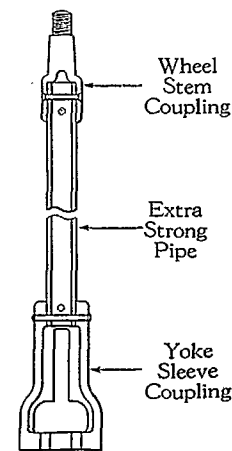
Extension stems are frequently required for valves that are to be operated from a distance. Ordinarily, a Floor Stand is used to support the stem and handwheel, but in many installations the extension stem only is used.

Non-rising stem gate valves and globe, angle, or cross valves are furnished with a square hole wheel stem coupling and valve stem coupling. Outside screw and yoke gate valves have the same square hole wheel stem coupling as non-rising stem gate valves and globe, angle, or cross valves, but have a hexagon hole coupling at the valve. It is designed to absorb the rise of the valve stem, making the extension stem non-rising.

Unless otherwise ordered, extension stems are made of Extra Strong Pipe.



Extension Stem
For Non-Rising Stem
Gate Valves or Globe,
Angle, or Cross Valves



Extension Stem
For Rising Stem
Outside Screw and Yoke
Gate Valves

Inquiries and orders must specify the size and catalog number of the valve, and the length of extension stem (measured from the center of the valve port to the

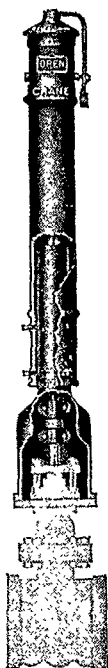
top of the handwheel). Extension stems, especially those that are long, must be rigidly and properly guided with suitable supporting brackets.

Prices on application

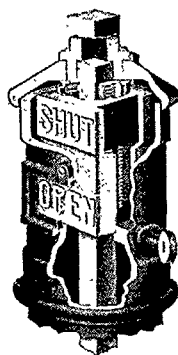
Indicator Posts

Standard Pattern

Underwriters' Pattern

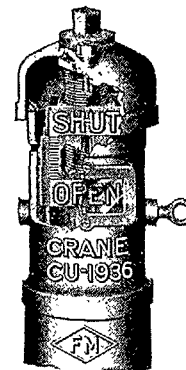


No. 520
Applied to
No. 462
Gate Valve

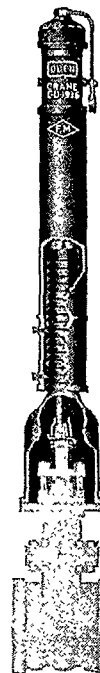


Enlarged
Sectional View
of Head
No. 520 Post

When ordering, specify the catalog number of the Post, the size and catalog number of the valve with which it will be used, and the depth of the trench (distance from ground level to bottom of pipe line).



Enlarged
Sectional View
of Head
No. 510 Post



No. 510
Applied to
No. 462½
Gate Valve

List Prices and Dimensions

Depth of trench	Feet	2 to 6
No. 510 or No. 520, with Wrench	Each	40.00
Extra for each 6 inches over 6-foot trench	Each	2.00
Distance from ground level to top of Post	No. 510	Inches 38
	No. 520	Inches 33¼

Service recommendations: Crane Indicator Posts provide an ideal means for operating iron body non-rising stem gate valves buried underground. They are used principally in factory and mill yards, on valves for fire protection service.

The Standard Pattern, recommended when the Underwriters' Pattern is not required, is suitable for valves sizes 2 to 14-inch inclusive. It is generally used with No. 462 Gate Valves, page 103.

The Underwriters' Pattern is used with No. 462½ Underwriters' Pattern Gate Valves shown on page 104. It conforms to the Underwriters' Specification known as "The National Standard", and is listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago. The Post is marked "CU" and "FM".

Construction: Crane Indicator Posts are sturdily constructed of cast iron. Each Post is furnished with an angle wrench which can be locked or sealed at the side of the Post when not in use. The operating nut is 1¼ inches square.

The word "OPEN" or "SHUT", in large, easily read letters, appears behind the indicator glass when the valve is open or closed, respectively. The lower plate, marked "OPEN", is adjustable, and its position is changed to suit the size of the valve. The indicator opening is fitted with a heavy plate glass ½-inch thick; small openings under the cap ventilate the entire Post and prevent accumulation of moisture on the glass in cold weather.

Attaching Post to valve: These Posts have the standard N.F.P.A. (National Fire Protection Asso-

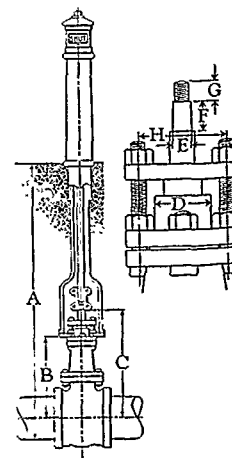
ciation) flange for attachment to the valve; the operating rod has a socket for the valve stem.

When No. 462 Valves are ordered for use with Indicator Post, they are furnished with an indicator post flange cast integral with the bonnet, at no extra charge. When the No. 520 Post is required for valves already installed and not equipped with a flange, a separate Adaptor Plate for the valve is furnished with the Post, at no extra charge.

No. 462½ Gate Valves used with the No. 510 Post are furnished regularly with an indicator post flange cast integral with the bonnet.

Special Indicator Posts: Indicator Posts for other than Crane Valves can be made to order at a special price. When ordering, specify the name of the valve manufacturer, the valve size, whether it opens by turning to the right or the left, the number of turns to open, and give the following dimensions:

- A — Depth of trench
- B — Center of pipe to top of stuffing box flange
- C — Center of pipe to bottom of valve stem square
- D — Diameter of stuffing box
- E — Size of stem square
- F — Height of stem square
- G — Length of stem thread
- H — Stuffing box bolt circle
- Diameter of stuffing box studs
- Number of stuffing box studs



Cylinder Operated Gate, Globe, and Angle Valves For All Pressures and Purposes

When so desired, Crane Gate, Globe, and Angle Valves can be furnished Cylinder Operated. As the name indicates, these valves are actuated by means of a piston and cylinder using water, air, or oil as the operating medium. Control is obtained by simply operating a Four-Way Valve which may be located in any convenient place within reasonable distance from the valve.

Remote control: When remote control is required, connecting piping between the cylinder and the Four-Way Valve must be large enough to compensate for pressure drop and back pressure resulting from cylinder actuating and exhausting operations.

Maintaining disc position: In order to maintain the valve disc in either the open or closed position, the actuating pressure must be retained in the cylinder at all times, with the exception of the following cases:

1. On Globe and Angle Valves when closed, if installed with their cylinder above the valve and the line pressure is on top of the disc.
2. On Gate Valves when fully open, if installed with their stems horizontal or if the stem is hanging down from the disc.

Special equipment: When specifically so ordered, cylinder operated valves can be furnished with special equipment. Depending upon the requirements of individual installations, various kinds of equipment may be necessary; some of these are as follows:

1. Short travel, hand releasing device for emergency freeing of the valve disc after it has been tightly wedged closed by the piston.
2. Limit stops to regulate the amount of valve opening by limiting the disc travel.
3. Auxiliary pressure connections to the cylinder for admission of higher pressures under stress of emergency.

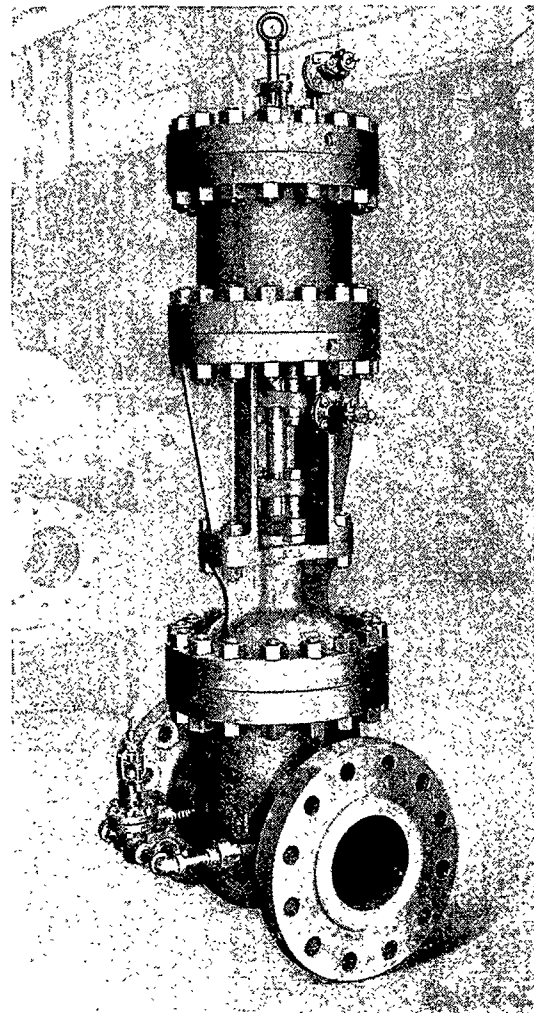
Inquiries and orders must be accompanied by complete specifications and description of the proposed installation.

Information required for inquiries and orders: The following questions must be answered when sending in orders or inquiries for these valves:

1. Are screwed, flanged, or hub end valves wanted?
2. Is a by-pass required?
3. Are the valves to be installed with the stems in horizontal or vertical position?
4. Designate the service for which valve is to be used: Steam, Water, Oil, or Gas, etc.
5. What is the maximum and minimum line pressure?
6. Designate the fluid to be used in the cylinder for the operation of the valve: Air, Hot or Cold Water or Oil, etc.
7. What pressure is available for operating the cylinder? It is recommended that the pressure for actuating the cylinder be as high as possible, thus allowing the use of a minimum diameter cylinder.

Cylinders: The actuating cylinders are made of cast iron or steel with or without brass liners, or of brass pipe, depending upon the size, the operating medium, and the pressure used.

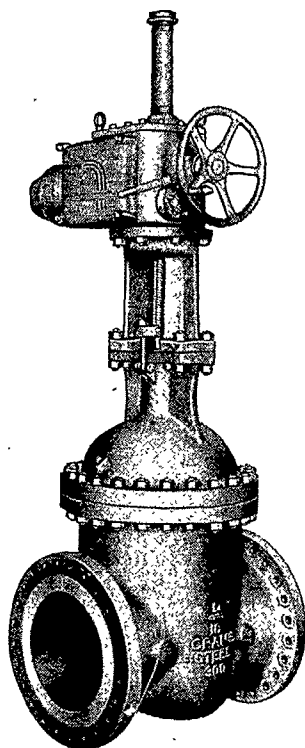
Indicating rod: Unless otherwise specified, these valves will be furnished with a "tail rod" extending through the top cylinder head. This feature provides a visible indication of the position of the valve disc at all times; i.e. whether the valve is operating, fully open, or closed.



Shown in the above photograph is a 10-inch 900-Pound Cast Steel Flanged Gate Valve with a Cast Steel Hydraulic Cylinder. The main valve by-pass and the valved emergency booster connections on the cylinder are special equipment on this particular assembly

Prices and complete description furnished on application.

Electric Motor Operated Valves



The complete Electric Motor Control is comprised of an integrated unit consisting of the motor and gearing with disc travel controls built into weatherproof cast housings, the push button control station with indicating lights, and an enclosed magnetic controller with contactors operable by any number of push button stations.

Unless otherwise specified the magnetic controller will be mounted in a general purpose (NEMA-1) standard sheet steel enclosing case.

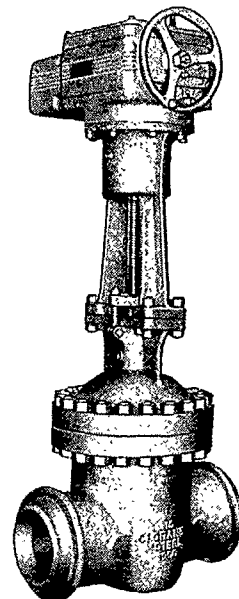
Push button control stations are regularly furnished in surface mounting enclosing cases, non-lock-up, or lock-up weatherproof type. Other types of enclosing cases can be furnished on order.

Motors are regularly supplied for direct or alternating current of standard voltages; for special current characteristics they can also be furnished, made to order as required.

In the normal operation of an Electric Motor Control Unit, pressing the desired button in the control station sets the magnetic controller contactors into action—completes the motor circuit to effect proper movement of valve stem with disc and disc travel devices—or breaks the motor circuit to stop the disc if so desired.

Where automatic valve operation is needed, switches actuated by floats, or by variations in pressure or temperature may be used in lieu of or in conjunction with the customary push button control station.

Electric motor units, made by responsible manufacturers of such units, will be furnished on Crane Valves, when so specified.



13

Crane Air or Gas Motor Valve Operators (Patented)

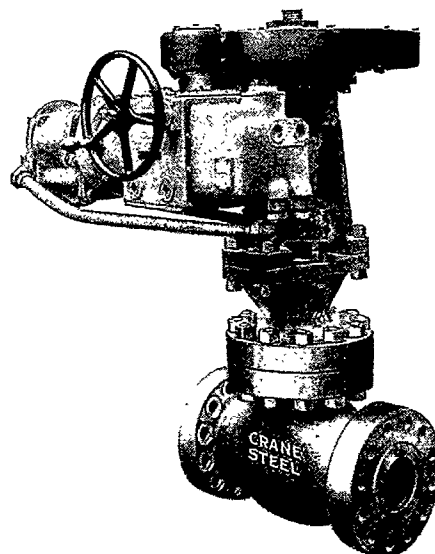
The air or gas motor control consists of a rotary motor, gearing, and disc travel limit valves, all built into weatherproof cast housings. A four-way valve is used for admitting air or gas to the motor for opening or closing the main valve.

Motors are of the reversible rotary type, designed for operation by either air or gas at pressures from 70 to 125 pounds gauge.

These units are particularly advantageous for operating valves in refineries, oil and gas lines, and various process industries where sparks from electric motors and wires will ignite an explosive-laden atmosphere. They will operate even when totally submerged in water or when the temperature surrounding them is high.

Crane Air or Gas Motor Control Units are recommended for continuous operation of valves, a service that may cause overheating of electric motors.

*Prices and complete description furnished on application.
For information required with inquiries or orders, see page 173.*



Motor Operated Valves

Mechanical developments follow one another so rapidly that alertness is necessary to grasp their entire significance. Tasks formerly taking hours or days are now accomplished in seconds or minutes. Time, itself, measured in dollars and cents becomes more and more valuable with the conquest of distance. The mechanical management of time and distance has brought complete safety in operations that formerly were hazardous to life and property. The wide adoption of remote controls exerts a great influence upon the saving of time and the virtual elimination of the distance factor in performance.

Crane Motor Operated Valves faithfully perform a fitting part in the general utility of remote control of flow of liquids and gases. Motor units are furnished with electric motors or with rotary motors actuated by air or gas. Existing hand operated valves can be altered for motor operation by replacing the old yoke and yoke accessories with new equipment suitable for mounting the motor unit.

A thoughtful analysis of improved operations and

economies made possible by the use of Crane Motor Operated Valves will clearly indicate their wide application — in power plants for isolating, sectionalizing, turbine extraction, reheat and circulating water lines — in refineries and gas and oil pipe lines and booster stations — in water works systems for distribution line control, reservoir control and sluices — in processing plants for hazardous locations, for controlling several units simultaneously, for automatic operation by variations in liquid level, pressure and temperature.

Large valves that require much time and effort to open and close, emergency valves that must be operable even under unusual circumstances, valves in remote, inaccessible or dangerous locations can be operated quickly, easily, safely and economically from one or more convenient points of control through the application of Motor Units.

The Crane valve, whether actuated by electric motor or air or gas rotary motor, is designed to effect tight valve closure under specified service conditions and to prevent jamming in the wide open position.

Inquiries and Orders for Motor Operated Valves Should Give the Following Information

Electric Motor

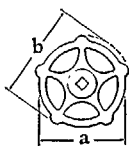
1. Quantity—size—flanged, screwed, or welding ends.
2. Catalog number of regular valve preferred.
3. Rising or non-rising stem.
4. With or without by-pass. If by-pass is wanted, state its location in relation to the valve.
5. Working pressure, maximum differential pressure to open against, and operating temperature.
6. Service—Steam, water, oil, air, gas, etc.
7. Valves used for—Main steam, equalizing, boiler feed, circulating water, etc.
8. Information on any special conditions, such as whether valve must close against full flow, open against full pressure, or if coking is present.
9. Maximum velocity through valve, if obtainable.
10. Voltage — A.C. or D.C.— and phase and cycle if A.C.
11. State whether open-stop-close, close only, or open-only stations are wanted. Also type of enclosure and whether Lock-Up or Non-Lock-Up. Specify number of stations per valve.
12. Approximate maximum temperature at point where valve yoke will be located
13. Position of valve run. Location of handwheel.
14. Position of valve stem — vertical up, vertical down, horizontal, or other position.

Air or Gas Motor

1. Quantity—size—flanged, screwed, or welding ends.
2. Catalog number of regular valve preferred.
3. Rising or non-rising stem.
4. With or without by-pass. If by-pass is wanted, state its location in relation to the valve.
5. Working pressure, maximum differential pressure to open against, and operating temperature.
6. Service—Steam, water, oil, air, gas, etc.
7. Valves used for—Main steam, equalizing, boiler feed, circulating water, oil refinery lines, etc.
8. Information on any special conditions, such as whether valve must close against full flow, open against full pressure, or if coking is present.
9. Maximum velocity through valve, if obtainable.
10. Available air or gas pressure for operating motor (minimum 70 pounds—maximum 125 pounds).
11. State whether valves are to open and close, close only, or open only by means of the air or gas motor.
12. Approximate maximum temperature at point where valve yoke will be located.
13. Position of valve run. Location of handwheel.
14. Position of valve stem — vertical up, vertical down, horizontal, or other position.

Wheels for Valves

Dimensions are given in inches.



Style A Wheel, Malleable Iron
Dished Design, Oval Rim, Square Hole
(Dias. 3, 3½, 4, & 5 are also made with a Threaded Hole)

Used on small size Forged and Cast Steel Globe and Angle Valves (pages 313 to 315). Threaded Hole sizes are for O.S. & Y. Gate Valves (page 299); orders for these four sizes must specify "Square Hole" or "Threaded Hole".

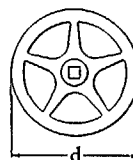
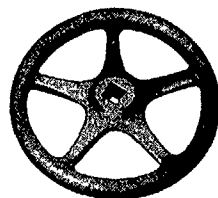


Style C Wheel, Malleable Iron
Non-Heat, Oval Pattern, Square Hole
Patented

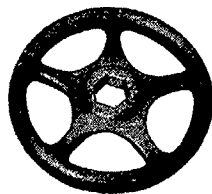
Used on Low Pressure and the smaller sizes of certain Standard Brass Globe, Angle, Cross, and Gate Valves.



Style F Wheel, Malleable Iron
Non-Heat, Round Pattern, Square Hole
Widely used on smaller size Brass, Iron and Steel Valves (Globe, Angle, and Cross, and Non-Rising or Rising Stem but not O.S. & Y. Gate). Larger sizes of such valves are fitted with Style D Wheels.



Style D Wheel, Malleable Iron
Round Pattern, Oval Rim, Square Hole
Used on larger size Brass, Iron, and Steel Valves (Globe, Angle, and Cross, and Non-Rising Stem or Rising Stem but not O.S. & Y. Gate).



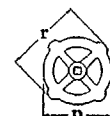
Style E Wheel, Malleable Iron
Round Pattern, Oval Rim, Hexagon Hole
Used on O.S. & Y. Iron and Steel Gate Valves. (Dias. 6 & 7 are also made with a Threaded Hole, for Steel Gate Valves.)



Style L Wheel, Square Socket
Black Moulded Composition
Used on Brass Radiator Valves or on special polished valves.

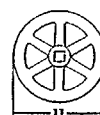
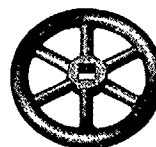


Style M Wheel, Malleable Iron
Round Pattern, Round Rim
Round Threaded Hole
Used only on No. 459 Brass Gate Valves, shown on page 21.



Style N Wheel, Polished Brass
"Navy" Four-Ball Pattern
Square Hole

Used on certain Brass Hose Valves or on special polished valves.



Style U Wheel, Cast Iron
Round Pattern, Round Rim
Square Hole
Used only on No. 453 Brass Hose Gate Valves, shown on page 70.

When ordering a Wheel or Handle, specify the size and catalog number of the valve on which it will be used, or the size and Style of the Wheel or Handle, itself. Valve dimension tables shown throughout this catalog include the wheel or handle size, and the Style can be determined from the valve illustrations, from the size, or from other information shown on this and the opposite page.

Diameters and List Prices

Style A				Style F		Style D			Style E			Style L		Style N		
Size a	b	Price Each		Size f	Price Each	Size d	Price Each		Size e	Price Each		Size h	Price Each	Size n	r	Price Each
		Sq. Hole	Thd. Hole				Iron	Steel		Iron	Steel					
2½	21/16	.12		1¾	.08	3½	.20					1½	.14	1½	1¾	.75
*3	3¼	.16	.24	21/16	.08	4½	.35					2	.15	1¾	2	.75
3½	3¾	.20	.30	29/16	.09	5½	.67					2¼	.16	2	2¾	.85
4	47/16	.30	.40	2¾	.10	6	.75		6	.75		2½	.17	*2½	3	1.00
5	5½	.50	.70	31/16	.12	7	1.00		7	1.00		2¾	.22	3	3½	1.25
				35/16	.16	8	1.30		8	1.30		3	.28	3½	4½	1.75
				41/16	.20	9	1.75		9	1.75				4	45/8	2.25
				4¾	.25	*10	2.15		*10	2.15				5	55/8	3.50
				5¾	.35	12	2.85		12	2.85				6	65/8	5.00
						14	4.00		14	4.00						
						16	4.90		16	4.90						
						18	6.25		18	6.25						
						20	7.25		20	7.25						
						22	10.25		22	10.25						
						24	13.00		24	13.00						
						**27	23.00	32.50	**27	23.00	32.50					
						**30	31.50	42.00	**30	31.50	42.00					
						**36	44.00	55.50	**36	44.00	55.50					
						**42	55.00	75.00	**42	55.00	75.00					

Style C			Style E, Threaded Hole			Style M		Style U	
Size c	g	Price Each	Size	Price Each		Size m	Price Each	Size u	Price Each
1¾	11/8	.08				35/16	.60		
2¼	1½	.08				35/8	.65		
25/8	1¾	.08				37/8	.75		
3	2	.09							
3¾	2¼	.10							
3¾	2½	.12							
4¼	25/8	.16							
4¾	2¾	.20							
5¾	3	.25							

*The Wheels indicated by a single asterisk are made with two sizes of squares or hexagons; orders should specify the size and catalog number of the valve on which the Wheel will be used.

For 1½ & 2" Gate Valves, page 299.

**The 27, 30, 36, and 42-inch Style D and E Wheels have a cast steel for steel valves. Orders for these sizes must specify round rim; they are made of cast iron for iron body valves or of whether iron or steel Wheels are wanted.

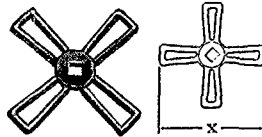
Handles for Valves



Style K Lever Handle
Malleable Iron

Used on smaller size Hydraulic Brass and Steel Globe and Angle Valves.

Dimensions, in Inches



Style X Cross Handle
Malleable Iron

Used on certain sizes of Corrosion-Resistant Globe and Angle Valves (page 446).



Style J Tee Handle, Cast Iron
Used only on No. 50 Brass Hose Valves

List Prices, Handles

Style J		Style K		Style S		Style X	
Size j	Price Each	Size k	Price Each	Size s	Price Each	Size x	Price Each
5 1/8	.15	3 1/8	.09	2 9/16	.10	*3	.08
5 3/4	.25	3 5/16	.10	3 9/16	.12	*3 3/4	.10
6 1/2	.30	3 1/2	.10	4 1/8	.15	*4 3/4	.16
8 1/4	.40	3 7/8	.12	4 3/4	.18	6	.25
		4 1/4	.15	5 3/8	.25	7	.35
		4 5/8	.18	7	.30	*Made with	
		5	.23	2 sizes of squares; specify size wanted.			
		5 3/4	.40				



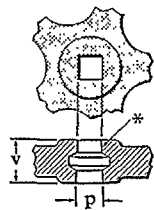
Style S Tee Handle, Malleable Iron

Used on Bar Stock Valves (page 310), on the No. 216 X line of Forged Steel Globe and Angle Valves (page 312), and on small size Corrosion-Resistant Globe and Angle Valves.

Tee Wrenches....page 177
Keys for Lock Shields....page 177

Size of Hole in Wheels and Handles

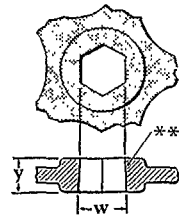
Dimensions, in Inches



Square Hole
Wheel or Handle

The tables shown below specify the size of hole in Crane Square Hole and Hexagon Hole Wheels and Handles. Wheels and Handles having the same size and type of hole, and the same length through hub are, of course, interchangeable. When substituting wheels and handles for those with which the valves are regularly equipped, however, careful consideration must be given to the effect of increased power which may be obtained.

*3/4" total taper per foot



Hexagon Hole
Wheel or Handle

**1" total taper per foot

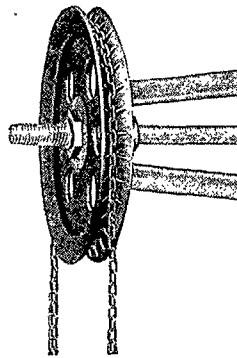
Square Hole		Style A	Style C	Style F	Style N	Style J	Style K	Style S	Style X	Chain Wheel
p	v	Size a	Size c x g	Size f	Size n	Size j	Size k	Size s	Size x	Pitch Dia.
.20	.30		1 3/4 x 1 1/8		1 1/2					
.24	.35	2 1/2	2 1/4 x 1 1/2	1 3/4	1 3/4				3	
.24	.37							2 9/16		
.29	.35		2 5/8 x 1 3/4	2 1/16	2		3 1/8		3	
.29	.44	3								
.32	.40		3 x 2	2 9/16	2 1/2		3 5/16		3 3/4	
.32	.44							3 9/16		
.35	.44		3 3/8 x 2 1/4	2 3/4	2 1/2		3 1/2		3 3/4	2 3/8
.40	.44	3	3 3/4 x 2 1/2	3 1/16	3	5 1/8	3 7/8	4 1/8	4 3/4	2 3/8
.40	.56	3 1/2						4 3/4		3
.42	.44		4 1/4 x 2 5/8	3 5/8	3 1/2		4 1/4		4 3/4	3
.42	.81					5 3/4				
.45	.56		4 3/4 x 2 3/4	4 1/16	4		4 5/8		6	3
.45	.69					6 1/2				
.53	.62	4, 5	5 3/4 x 3	4 3/4, 5 3/8	5		5	5 3/8, 7	7	4
.56	.75					8 1/4				
.56	.87				6		5 3/4			5

Square Hole		Style D	Chain Wheel	Square Hole		Style D	Chain Wheel	Hexagon Hole		Style E	Chain Wheel	Hexagon Hole		Style E	Chain Wheel
p	v	Size d	Wheel	p	v	Size d	Wheel	w	y	Size e	Wheel	w	y	Size e	Wheel
.35	.44	3 1/2	2 3/8	1.00	1.62	14	14	1.00	.69	6		2.41	1.31	18	18
.37	.62	4 1/2	4	1.13	1.75	16	14	1.00	.69	7	7 1/2	2.78	1.31	20	18
.44	1.00	5 1/2	4	1.25	1.87	18	18	1.18	.75	8	7 1/2	3.30	1.50	22	18
.56	.87	6	5	1.31	2.12	20	18	1.37	.87	9	7 1/2	3.50	1.62	24	24
.63	1.00	7	5	1.44	2.37	22	18	1.56	.87	10	10	3.57	1.69	27	24
.69	1.06	8	7 1/2	1.50	2.44	24	24	1.69	.87	10	10	4.07	1.75	30	30
.75	1.19	9	7 1/2	1.75	2.50	27	24	1.88	1.00	12	10	4.61	2.19	36	30
.81	1.25	10	10	1.87	2.75	30	30	2.08	1.06	14	14	5.22	2.75	42	
.87	1.37	10	10	2.00	3.25	36	30	2.33	1.19	16	14				
.94	1.50	12	10	2.50	3.50	42									

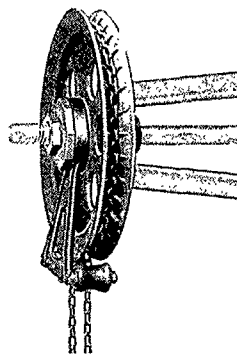
Chain Wheels....page 176

Chain Wheels

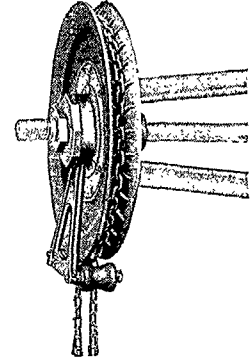
For Brass, Iron, and Steel Valves



Chain Wheel
With Chain



Chain Wheel
With Guide and Chain



Hammer Blow Chain Wheel
With Guide and Chain
(Prices on Application)

Illustrations show Chain Wheels as applied Rising Stem Gate Valves
(Applications on Non-Rising Stem Gate Valves and on
Globe and Angle Valves — not illustrated — are similar.)

Pitch Diameter of Chain Wheel Inches	List Prices, Each		Chain Wheels are applicable to valves having the following style and size of Wheel or Handle					
	Chain Wheels only for Rising or Non-Rising Stem Valves	Chain Wheels and Guides for Rising or Non-Rising Stem Valves	Style A Wheel Size Inches	Style D Wheel Size Inches	Style E Wheel Size Inches	Style F Wheel Size Inches	Style K Handle Size Inches	Style S Handle Size Inches
2 $\frac{3}{8}$	2.35	9.85	3	3 $\frac{1}{2}$		2 $\frac{3}{4}$, 3 $\frac{1}{16}$	3 $\frac{1}{2}$, 3 $\frac{7}{8}$	4 $\frac{1}{8}$
3	2.50	10.00	3 $\frac{1}{2}$			3 $\frac{3}{8}$, 4 $\frac{1}{16}$	4 $\frac{1}{4}$, 4 $\frac{5}{8}$	4 $\frac{3}{4}$
4	2.65	10.15	4, 5	4 $\frac{1}{2}$, 5 $\frac{1}{2}$		4 $\frac{3}{4}$, 5 $\frac{3}{8}$	5	5 $\frac{3}{8}$, 7
5	3.00	11.00		6, 7			5 $\frac{3}{4}$	
7 $\frac{1}{2}$	4.30	20.00		8, 9	7, 8, 9			
10	6.25	24.00		10, 12	10, 12			
14	9.00	29.00		14, 16	14, 16			
18	13.00	35.00		18, 20, 22	18, 20, 22			
24	23.00	50.00		24, 27	24, 27			
30	40.00	80.00		30, 36	30, 36			

List price of Chain for Chain Wheels

.20 per foot

List price for connecting ends of Chain

.30 per Chain

Chain Wheels without guides will be furnished, unless ordered "With Guide".

For convenience in operating valves located above a normal reach from floor levels, Crane Chain Wheels are ideal. They are made from high quality cast iron, of unusually rugged and serviceable construction, and are designed to provide a positive grip on the chain under the most severe operation.

Guides: Guides for Crane Chain Wheels, for sizes of 7 $\frac{1}{2}$ -inch pitch diameter and larger, are regularly equipped with rollers, as illustrated; Guides for smaller wheels have plain loops. Crane Guides hold the chain in close contact with a large portion of the circumference of the wheel, preventing slipping or jumping of the chain.

Hammer Blow Chain Wheels: When Chain Wheels are desired for operating large size or high pressure valves, additional power is usually necessary for the first effort in unseating the disc, and in the final movement to effect a tight seating. For conditions such as these, the Crane Hammer Blow Chain

Wheel is recommended. Its design embodies a "lost motion", wherein the wheel turns freely through a large angle, building up momentum until the heavy operating lugs engage. The resulting "hammer blow" acts upon the valve stem, facilitating opening and closing of the valve. The Hammer Blow Chain Wheels are available in 7 $\frac{1}{2}$ -inch pitch diameter and larger; prices are furnished on application.

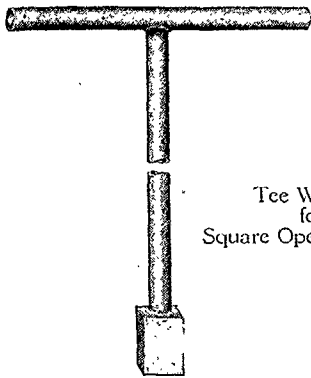
Ordering: When ordering Chain Wheels separately, specify the pitch diameter, the size and catalog number of the valve on which it is to be used, and also advise if Chain Guide is desired.

When Chain for Chain Wheels is ordered separately, orders must specify the pitch diameter of the Chain Wheel for which the Chain is required.

When a valve is ordered with Chain Wheel or Chain Wheel and Guide, no extra charge is made for the labor to mount it on the valve, but no allowance is made for the regular valve wheel or handle.

For size of hole in Chain Wheels, Wheels, or Handles, see page 175.

Tee Wrenches



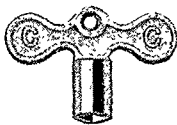
Tee Wrench
for
Square Operating Nut

Tee Wrenches, frequently referred to as Tee-Handle Socket Wrenches, are used to operate all types of gate valves or other equipment that are regularly fitted with square operating nuts.

These wrenches, made of steel pipe and tubing and of welded construction, are furnished with nut sockets for either 2-inch or 3-inch square operating nuts. The nut sizes conform to the dimensions of the American Water Works Association. Lengths ranging from five to nine feet are regularly made; other lengths are made to order.

Prices and dimensions on application.

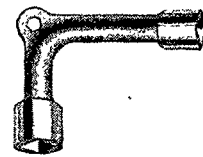
Keys for Lock Shield



T-Shape Key
Brass, Not Plated
No. 200 and No. 201

List Prices

No. 198 Key	Each	.70
No. 199 Key	Each	1.00
No. 200 Key	Each	.25
No. 201 Key	Each	.20



L-Shape Key
Malleable Iron, Nickel-Plated
No. 198 and No. 199

Keys Used with Lock Shield Valves

Size of Valve	No. 67 G or No. 145 G Valves	No. 112 or No. 113 Valves	No. 174 Valves	No. 226 or No. 227 Valves	No. 455 Valves	No. 1210 or No. 1211 Valves	No. 1213 Valves	No. 4270 Valves	No. 1-B or No. 2B Valves	No. 438 Valves	No. 440 Valves
Inches	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.	use Key No.
1/4										200	200
3/8						201		200	200	200	200
1/2					200	200	200	198	200	200	
3/4	198	200	200	200	198	198	198	198 or 199	198	198	198
1	198 or 199	198		198							
1 1/4					198 or 199		199		199	199	199
1 1/2	199		198								
2		198 or 199									

The photograph at the right shows a high pressure steam control station using Crane Steel Gate Valves. The by-pass on the larger size valves exemplifies good piping practice



By-Passes and Gearing

In addition to the valve accessories shown in this section, Crane Co. also regularly supplies by-passes, gears, grease cases, etc. for many Crane Valves. For complete data, see the pages referred to below:

By-Passes for:

Iron Wedge Gate Valves.....page 114
Iron Double Disc Gate Valves.....page 138
Steel Wedge Gate Valves.....page 306

Gearing for:

Iron Wedge Gate Valves.....page 115
Iron Double Disc Gate Valves.....page 139
Steel Wedge Gate Valves.....page 307
Steel Globe and Angle Valves.....page 326

Composition Discs



No. 1 Steam Disc
No. 2 Hot Water Disc
No. 3 Cold Water Disc
*No. 6 Gasoline Disc



No. 4
Cranite Disc



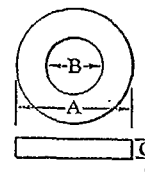
*No. 5
Cranoil Disc



Low Pressure
No. 7 Steam Disc
No. 8 Hot Water Disc



Copper Disc
For prices,
see page 37.



(*No. 5 and No. 6 Discs always are furnished complete with disc holder.)

Size Inches	List Prices, Each			Approximate Dimensions In Inches					
	No. 1 Steam, No. 2 Hot Water, or No. 3 Cold Water Discs	No. 4 Cranite Discs	No. 7 Steam or No. 8 Hot Water Low Pressure Discs	No. 1, No. 2, No. 3, No. 4, or Copper Discs			No. 7 or No. 8 Low Pressure Discs		
				A	B	C	A	B	C
1/8	.06	.15	.05	21/32	1/4	7/32	19/32	3/16	1/8
1/4	.06	.15	.05	21/32	1/4	7/32	19/32	3/16	1/8
3/8	.08	.20	.06	3/4	1/4	7/32	21/32	3/16	1/8
1/2	.08	.20	.06	13/16	1/4	1/4	3/4	9/32	7/32
3/4	.10	.25	.08	11/16	9/8	1/4	1	13/32	7/32
1	.12	.30	.10	13/8	9/16	1/4	1 1/4	5/8	1/4
1 1/4	.18	.40	.14	1 5/8	25/32	11/32	1 1/2	23/32	1/4
1 1/2	.25	.60	.18	2	1 1/2	11/32	1 13/16	1	9/32
2	.36	.90	.28	2 9/16	1 1/2	11/32	2 9/32	1 1/4	5/16
2 1/2	.60	1.50		3 3/16	1 31/32	15/32			
3	1.00	2.50		3 5/16	2 13/32	1/2			
3 1/2	1.25			4 3/8	2 25/32	9/16			
4	1.65			4 7/8	3 1/32	19/32			
5	2.25			6 1/16	3 31/32	19/32			
6	2.75			7 1/16	4 3/4	19/32			
8	4.00			9 11/32	7 1/8	19/32			
10	6.00			11 3/16	9 1/32	5/8			
12	9.00			13 3/16	11	5/8			

Crane Composition Discs are the result of years of constant study, research, and test. They are made from specially selected materials, and are of unusually fine quality. Each type is ideally suited for the particular service for which it is recommended.

No. 1 Steam Discs: No. 1 Steam Discs are made of high quality materials, properly compounded to provide satisfactory and lasting service.

For 150 pounds saturated steam
300 pounds hot water, 300° F.

No. 2 Hot Water Discs: No. 2 Discs are made of a medium-hard composition that gives excellent results on hot water, oil, gas, or gasoline lines.

For 500 pounds hot water, 225° F.
400 pounds oil, gas, or gasoline, 100° F.

No. 3 Cold Water Discs: No. 3 Cold Water Discs are made of a soft, tough rubber compound that is especially suitable for cold water or air service.

For 600 pounds cold water or air, 100° F.

No. 4 Cranite Discs: Cranite Discs consist principally of long fibre asbestos and a binder, molded and vulcanized under high compressive loads. They give unusually satisfactory results on high pressure-temperature lines and on services that are too severe for ordinary composition discs.

For 300 pounds steam, 550° F.
600 pounds hot water, 150 to 450° F.

No. 5 Cranoil Discs: Cranoil Discs are a compounded phenol formaldehyde resinoid. When furnished, they are cemented into the disc holder of the valve, and have a specially machined face to fit a specially machined seat. They are recommended for oils, gasoline, air, and gases at temperatures up to 250° F., especially on services where valves with an ordinary metal or composition disc cannot be made tight. See page 32.

No. 6 Gasoline Discs: No. 6 Discs are a specially prepared compound that is completely resistant to gasoline. They are soft enough to make a tight seat on suction lines and on gravity pressures up to 15 pounds. They are recommended for use in check and foot valves only (shown on pages 53 and 157), and always are furnished complete with disc holder.

Low Pressure Discs: The No. 7 Steam Discs and No. 8 Hot Water Discs are not interchangeable with other Crane Discs; they are slightly smaller in size, being used only in valves for low pressure service.

For — No. 7, 100 pounds saturated steam
— No. 8, 125 pounds water, 200° F.
Domestic gas service

Copper Discs: Copper Discs are preferred by some engineers for special services. They are furnished regularly only in the No. 213 and No. 215 Valves shown on page 37.

Malleable Iron Screwed Fittings

Standard Fittings.....	pages 180 to 186
Circulating Boiler Fittings.....	page 187
Air-Tested Standard Fittings.....	page 188
Standard Refinery Oil Fittings.....	page 189
300-Pound Fittings.....	pages 190 and 191
Heavy Fittings.....	page 192
A.A.R. Fittings.....	page 193
Hydraulic Fittings.....	page 194

The Crane line of Malleable Iron Fittings includes fittings for steam working pressures up to 300 pounds and for water, oil, or gas working pressures up to 2000 pounds, depending upon size. The user is afforded a wide variety of types and an unusually liberal assortment of straight and reducing sizes.

Crane Malleable Iron is characterized by pressure tightness, stiffness, and toughness, the latter property being especially valuable in pipe fittings. It has a tensile strength of from 40,000 to 50,000 pounds per square inch. Uniformity and superior quality are assured through the application of improved methods in furnace practice, casting, and annealing.

Although differing in their weight and proportions, the various lines are alike in that no detail of manufacture is overlooked to provide fittings of exceptionally high quality. Except for Plain Standard Fittings, the pipe ends are reinforced with bands. Tough, close-grained iron, threads accurately cut to gauge and in true alignment, openings chamfered to permit easy entrance of the pipe,—these and other features contribute to making Crane fittings uniformly satisfactory.

14

* * * * *

The list at the top of this page does not include all the Malleable Iron Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalog:

Bushings.....	page 226
Plugs.....	page 228
Faced Couplings and Locknuts.....	page 232
One-Strap and Two-Strap Clamps.....	page 233
Screwed Unions and Union Fittings.....	pages 238 to 246
Flange Unions.....	pages 250 to 252
Railing Fittings.....	pages 268 to 272
Floor Flanges.....	page 290
Companion Flanges.....	page 292

How to read reducing fittings.....page 644

Standard Malleable Iron Fittings

WORKING PRESSURES, BANDED FITTINGS

150 pounds steam
300 pounds cold water, oil, or gas, non-shock

The Crane line of Standard Malleable Iron Fittings illustrated on pages 181 to 186 is unusually complete. It includes a great variety of types and a large assortment of reducing sizes. It affords the user a selection sufficient for almost any piping installation within its pressure and size range.

Rugged construction: The fittings are well proportioned and of good weight. Their strength is very high, providing a very liberal factor of safety over the recommended working pressures.

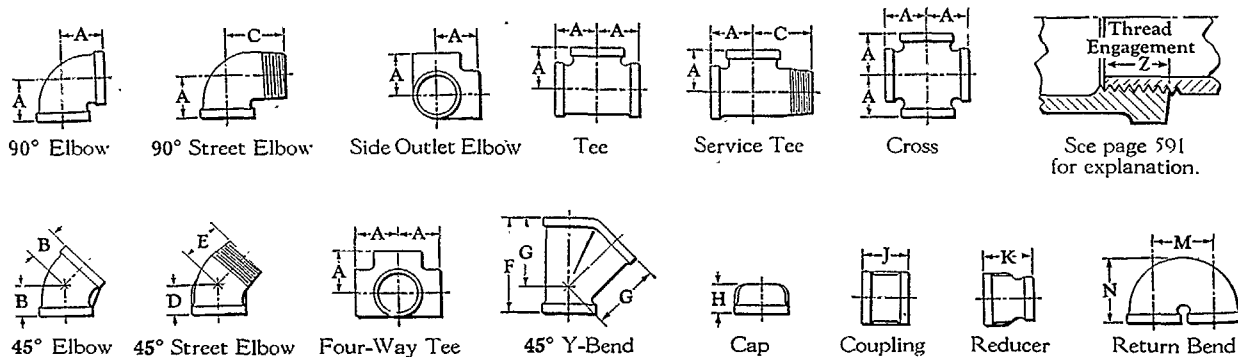
Threading: All openings are accurately threaded to gauge, and in true alignment. Each opening is chamfered slightly, to permit easy entrance of the pipe.

Plain fittings: Plain fittings are satisfactory for low pressure gas and water lines, for house plumbing, or for railings.

Air-tested fittings: Crane Air-Tested Standard Malleable Iron Fittings are suitable for air brake and other compressed air lines. A liberal assortment of types and sizes is carried in stock. These fittings are shown on page 188.

Dimensions: The table below gives the dimensions of the most currently used straight size fittings and of reducers. Plain fittings have the same center to end dimensions as the corresponding size of banded fitting. Dimensions of other types and of reducing sizes will be furnished on request.

Dimensions, in Inches



Size	A	B	C	D	E	F	G	H	J	K	Z	Return Bends					
												Size	M	N	Size	M	N
1/8	11/16	1/2	1	11/16	13/16			9/16	15/16		1/4	Close Pattern			Open Pattern		
1/4	13/16	3/4	1 1/16	5/8	15/16			5/8	1 1/16	1	3/8	1 1/2	1	1 3/4	1 1/2	1 7/8	5/8
3/8	15/16	13/16	1 1/16	11/16	1 1/16	2 1/8	1 7/16	3/4	1 3/16	1 1/8	3/8	3/4	1 1/4	2 3/16	3/4	2	2 1/4
1/2	1 1/8	7/8	1 5/8	1 3/16	1 3/16	2 7/16	1 11/16	7/8	1 5/16	1 1/4	1/2	1	1 1/2	2 1/2	1	2 1/2	2 5/8
3/4	1 5/16	1	1 7/8	1 5/16	1 5/16	2 13/16	2 1/16	1 1/16	1 1/2	1 7/16	9/16	1 1/4	1 3/4	2 13/16	1 1/4	3	3 3/16
1	1 1/2	1 1/8	2 1/8	1 1/16	1 1/2	3 3/8	2 7/16	1 3/16	1 11/16	1 11/16	1 1/16	1 1/4	1 3/4	2 15/16	1 1/4	3 1/2	3 5/8
1 1/4	1 3/4	1 5/16	2 7/16	1 1/4	1 11/16	4 1/16	2 15/16	1 1/4	1 15/16	2 1/16	1 1/16	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
1 1/2	1 5/16	1 7/16	2 11/16	1 5/8	1 7/8	4 1/2	3 5/16	1 5/16	2 7/8	2 5/16	1 1/16	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
2	2 1/4	1 11/16	3 3/4	1 11/16	2 1/4	5 7/16	4	1 7/16	2 1/2	2 13/16	3/4	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
2 1/2	2 11/16	1 15/16	3 13/16	1 7/8	2 9/16	6 1/4	4 11/16	1 5/8	2 7/8	3 1/4	1 5/16	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
3	3 1/8	2 3/16	4 1/2	2 1/8	3	7 1/4	5 9/16	1 3/4	3 3/16	3 11/16	1	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
3 1/2	3 7/16	2 5/8	5 1/8	2 3/8	3 3/8			1 15/16	3 7/16	4	1 1/16	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
4	3 3/4	2 5/8	5 11/16	2 1/2	3 3/4	8 7/8	6 15/16	2 1/16	3 11/16	4 5/8	1 1/8	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
5	4 1/2	3 1/16	6 7/8					2 5/16	4 1/4	3 3/8	1 1/4	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2
6	5 1/8	3 7/16	8					2 9/16	4 3/4	4 3/8	1 5/16	1 1/2	1 3/4	2 3/16	3 3/16	1 1/2	3 1/2

Standard Malleable Iron Fittings

List Prices, Each



90° Elbows, Banded Right Hand			
Size Inches	Black Each	Galv. Each	
1/8	.06	.08	
1/4	.06	.08	
3/8	.06	.08	
1/2	.07	.09	
3/4	.10	.13	
1	.13	.17	
1 1/4	.20	.26	
1 1/2	.25	.33	
2	.40	.52	
2 1/2	.72	.95	
3	1.00	1.30	
3 1/2	1.50	1.95	
4	1.80	2.35	
5	3.25	4.25	
6	4.65	6.05	
1/4 x 1/8	*.07	*.09	
3/8 x 1/4	.07	.09	
3/8 x 1/8	*.07	*.09	
1/2 x 3/8	.08	.10	
1/2 x 1/4	.08	.10	
3/4 x 1/2	.11	.14	
3/4 x 3/8	.11	.14	
3/4 x 1/4	*.11	*.14	
1 x 3/4	.14	.18	
1 x 1/2	.14	.18	
1 x 3/8	.14	.18	
1 1/4 x 1	.22	.29	
1 1/4 x 3/4	.22	.29	
1 1/4 x 1/2	.22	.29	
1 1/2 x 1 1/4	.28	.36	
1 1/2 x 1	.28	.36	
1 1/2 x 3/4	.28	.36	
2 x 1 1/2	.44	.57	
2 x 1 1/4	.44	.57	
2 x 1	.44	.57	
2 x 3/4	*.44	*.57	
2 1/2 x 2	.80	1.05	
2 1/2 x 1 1/2	.80	1.05	
3 x 2 1/2	1.10	1.45	
3 x 2	1.10	1.45	
3 x 1	*1.10	*1.45	
3 1/2 x 3	1.65	2.15	
4 x 3 1/2	*2.00	*2.60	
4 x 3	2.00	2.60	
4 x 2	*2.00	*2.60	
4 x 1 1/2	*2.00	*2.60	
6 x 4	*5.15	*6.70	
6 x 2 1/2	*5.15	*6.70	



90° Elbows, Banded Right and Left			
Size Inches	Black Each	Galv. Each	
1/4	.07	.09	
3/8	.07	.09	
1/2	.08	.10	
3/4	.12	.16	
1	.15	.20	
1 1/4	.23	.30	
1 1/2	.29	.38	
2	.46	.60	



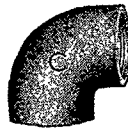
45° Elbows Banded			
Size Inches	Black Each	Galv. Each	
1/8	.07	.09	
1/4	.07	.09	
3/8	.07	.09	
1/2	.09	.12	
3/4	.12	.16	
1	.16	.21	
1 1/4	.24	.31	
1 1/2	.30	.39	
2	.48	.62	
2 1/2	.86	1.10	
3	1.20	1.55	
3 1/2	1.80	2.35	
4	2.20	2.85	
5	3.90	5.10	
6	5.60	7.30	



90° Street Elbows Banded			
Size Inches	Black Each	Galv. Each	
1/8	.07	.09	
1/4	.07	.09	
3/8	.07	.09	
1/2	.08	.10	
3/4	.12	.16	
1	.15	.20	
1 1/4	.23	.30	
1 1/2	.29	.38	
2	.46	.60	
2 1/2	.83	1.10	
3	1.15	1.50	
3 1/2	*1.80	*2.35	
4	2.10	2.75	
5	*3.75	*4.90	
6	*5.35	*6.95	



45° Street Elbows Banded			
Size Inches	Black Each	Galv. Each	
1/8	*.08	*.10	
1/4	*.08	*.10	
3/8	.08	.10	
1/2	.10	.13	
3/4	.14	.18	
1	.18	.23	
1 1/4	.28	.36	
1 1/2	.35	.46	
2	.55	.72	
2 1/2	*1.00	*1.30	
3	*1.40	*1.85	
4	*2.55	*3.30	



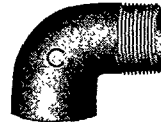
90° Elbows Plain			
Size Inches	Black Each	Galv. Each	
1/8	.06	.08	
1/4	.06	.08	
3/8	.06	.08	
1/2	.07	.09	
3/4	.10	.13	
1	.13	.17	
1 1/4	.20	.26	
1 1/2	.25	.33	
2	.40	.52	
1/4 x 1/8	.07	.09	
3/8 x 1/4	.07	.09	
3/8 x 1/8	.07	.09	
1/2 x 3/8	.08	.10	
1/2 x 1/4	.08	.10	
1/2 x 1/8	*.08	*.10	
3/4 x 1/2	.11	.14	
3/4 x 3/8	.11	.14	
1 x 3/4	.14	.18	
1 x 1/2	.14	.18	
1 x 3/8	.14	.18	
1 1/4 x 1	.22	.29	
1 1/2 x 1 1/4	.28	.36	
1 1/2 x 1	.28	.36	
1 1/2 x 3/4	.28	.36	
2 x 1 1/2	.44	.57	
2 x 1 1/4	.44	.57	
2 x 1	.44	.57	
2 x 3/4	*.44	*.57	
2 1/2 x 2	.80	1.05	
2 1/2 x 1 1/2	.80	1.05	
3 x 2 1/2	1.10	1.45	
3 x 2	1.10	1.45	
3 x 1	*1.10	*1.45	
3 1/2 x 3	1.65	2.15	
4 x 3 1/2	*2.00	*2.60	
4 x 3	2.00	2.60	
4 x 2	*2.00	*2.60	
4 x 1 1/2	*2.00	*2.60	
6 x 4	*5.15	*6.70	
6 x 2 1/2	*5.15	*6.70	



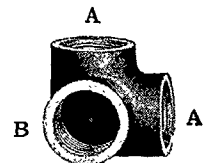
45° Elbows Plain			
Size Inches	Black Each	Galv. Each	
1/4	*.07	*.09	
3/8	*.07	*.09	
1/2	*.09	*.12	
3/4	*.12	*.16	
1	*.16	*.21	
1 1/4	*.24	*.31	
1 1/2	*.30	*.39	
2	*.48	*.62	



60° Elbows Plain			
Size Inches	Black Each	Galv. Each	
1/4	.31	.40	
1 1/2	.40	.52	
2	*.62	*.80	



90° Street Elbows Plain			
Size Inches	Black Each	Galv. Each	
1/8	*.07	*.09	
1/4	*.07	*.09	
3/8	*.07	*.09	
1/2	*.08	*.10	
3/4	*.12	*.16	
1	*.15	*.20	



Side Outlet Elbows Plain			
Size Inches	Black Each	Galv. Each	
1/4	*.12	*.16	
3/8	.12	.16	
1/2	.14	.18	
3/4	.20	.26	
1	.26	.34	
1 1/4	.40	.52	
1 1/2	.50	.65	
2	.80	1.05	
A B			
3/8 x 1/4	*.14	*.18	
1/2 x 3/8	*.16	*.21	
3/4 x 1/2	*.22	*.29	
3/4 x 3/8	*.22	*.29	
1 x 3/4	*.28	*.36	
1 1/4 x 1	*.44	*.57	

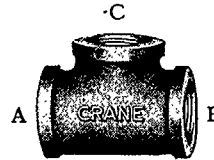
Non-Standard sizes: Sizes indicated with an asterisk () are "Non-Standard" and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

Larger sizes: For 90° and 45° Elbows larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 189.

Standard Malleable Iron Fittings

List Prices, Each



Tees, Banded											
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1/8	.08	.10	A B C			A B C			A B C		
1/4	.08	.10	1 x 1 x 3/4	.19	.25	1 1/2 x 1 x 1	.37	.48	2 1/2 x 2 x 1 1/2	*1.00	*1.30
3/8	.08	.10	1 x 1 x 1 1/2	.19	.25	1 1/2 x 1 x 3/4	.37	.48	2 1/2 x 1 1/2 x 2 1/2	1.00	1.30
1/2	.10	.13	1 x 1 x 3/8	.19	.25	1 1/2 x 3/4 x 1 1/2	.37	.48	2 1/2 x 1 1/2 x 2	*1.00	*1.30
3/4	.13	.17	1 x 1 x 1 1/4	.19	.25	1 1/2 x 3/4 x 1 1/4 *	.37	*.48	2 1/2 x 1 1/2 x 1 1/2	*1.00	*1.30
1	.17	.22	1 x 3/4 x 1	.19	.25	1 1/2 x 3/4 x 1	*.37	*.48	2 1/2 x 1 1/4 x 1 1/4	*1.00	*1.30
1 1/4	.26	.34	1 x 3/4 x 3/4	.19	.25	1 1/2 x 3/4 x 3/4	.37	.48	2 x 2 x 2 1/2	1.00	1.30
1 1/2	.33	.43	1 x 3/4 x 1 1/2	.19	.25	1 1/2 x 1 1/2 x 1 1/2	.37	.48	3 x 3 x 2 1/2	1.45	1.90
2	.52	.68	1 x 3/4 x 3/8	.19	.25	1 1/2 x 3/8 x 1 1/2 *	.37	*.48	3 x 3 x 2	1.45	1.90
2 1/2	.90	1.20	1 x 1/2 x 1	.19	.25	1 1/4 x 1 1/4 x 1 1/2	.37	.48	3 x 3 x 1 1/2	1.45	1.90
3	1.30	1.70	1 x 1/2 x 3/4	.19	.25	1 1/4 x 1 x 1 1/2 *	.37	*.48	3 x 3 x 1 1/4	1.45	1.90
3 1/2	2.00	2.60	1 x 1/2 x 1 1/2	.19	.25	1 x 1 x 1 1/2	.37	.48	3 x 3 x 1	1.45	1.90
4	2.40	3.10	1 x 3/8 x 1	.19	.25	2 x 2 x 1 1/2	.57	.75	3 x 3 x 3/4	*1.45	*1.90
5	4.25	5.55	3/4 x 3/4 x 1	.19	.25	2 x 2 x 1 1/4	.57	.75	3 x 2 1/2 x 3	1.45	1.90
6	6.00	7.80	3/4 x 1/2 x 1	.19	.25	2 x 2 x 1	.57	.75	3 x 2 1/2 x 2 1/2	*1.45	*1.90
A B C			1 1/2 x 1/2 x 1 *	.19	*.25	2 x 2 x 3/4	.57	.75	3 x 2 1/2 x 2	*1.45	*1.90
1/4 x 1/4 x 1/8 *	.09	*.12	1 1/4 x 1 1/4 x 1	.29	.38	2 x 2 x 1/2	.57	.75	3 x 2 x 3	1.45	1.90
1/8 x 1/8 x 1/4 *	.09	*.12	1 1/4 x 1 1/4 x 3/4	.29	.38	2 x 2 x 3/8	.57	.75	3 x 2 x 2 1/2	*1.45	*1.90
3/8 x 3/8 x 1/4	.09	.12	1 1/4 x 1 1/4 x 1/2	.29	.38	2 x 1 1/2 x 2	.57	.75	3 x 2 x 2	1.45	1.90
3/8 x 3/8 x 1/8 *	.09	*.12	1 1/4 x 1 1/4 x 3/8	.29	.38	2 x 1 1/2 x 1 1/2	.57	.75	3 x 1 x 3	*1.45	*1.90
3/8 x 1/4 x 3/8 *	.09	*.12	1 1/4 x 1 x 1 1/4	.29	.38	2 x 1 1/2 x 1 1/4	.57	.75	2 1/2 x 2 1/2 x 3	1.45	1.90
3/8 x 1/4 x 1/4 *	.09	*.12	1 1/4 x 1 x 1	.29	.38	2 x 1 1/2 x 1	.57	.75	2 x 2 x 3	*1.45	*1.90
1/4 x 1/4 x 3/8	.09	.12	1 1/4 x 1 x 3/4	.29	.38	2 x 1 1/4 x 2	.57	.75	3 1/2 x 3 1/2 x 3	2.20	2.85
1/2 x 1/2 x 3/8	.11	.14	1 1/4 x 1 x 1 1/2	.29	.38	2 x 1 1/4 x 1 1/2	.57	.75	3 1/2 x 3 1/2 x 2 1/2	2.20	2.85
1/2 x 1/2 x 1/4	.11	.14	1 1/4 x 3/4 x 1 1/4	.29	.38	2 x 1 1/4 x 1 1/4	.57	.75	4 x 4 x 3 1/2	*2.65	*3.45
1/2 x 1/2 x 1/8 *	.11	*.14	1 1/4 x 3/4 x 1	.29	.38	2 x 1 1/4 x 1/2 *	.57	*.75	4 x 4 x 3	2.65	3.45
1/2 x 3/8 x 1/2	.11	.14	1 1/4 x 3/4 x 3/4	.29	.38	2 x 1 x 2	.57	.75	4 x 4 x 2 1/2	2.65	3.45
1/2 x 3/8 x 3/8	.11	.14	1 1/4 x 1/2 x 1 1/4	.29	.38	2 x 1 x 1 1/2 *	.57	*.75	4 x 4 x 2	2.65	3.45
1/2 x 3/8 x 1/4 *	.11	*.14	1 1/4 x 1/2 x 1 *	.29	*.38	2 x 1 x 1 1/4 *	.57	*.75	4 x 4 x 1 1/2	2.65	3.45
1/2 x 3/8 x 1/2	.11	.14	1 1/4 x 3/8 x 1 1/4	.29	.38	2 x 1 x 1	*.57	*.75	4 x 4 x 1 1/4	*2.65	*3.45
1/2 x 1/4 x 1/4 *	.11	*.14	1 x 1 x 1 1/4	.29	.38	2 x 3/4 x 2	.57	.75	4 x 4 x 1	*2.65	*3.45
3/8 x 3/8 x 1/2	.11	.14	1 x 3/4 x 1 1/4 *	.29	*.38	2 x 1/2 x 2	*.57	*.75	4 x 3 x 4	*2.65	*3.45
3/4 x 3/4 x 1/2	.15	.20	3/4 x 3/4 x 1 1/4 *	.29	*.38	2 x 3/8 x 2	*.57	*.75	4 x 3 x 3	*2.65	*3.45
3/4 x 3/4 x 3/8	.15	.20	1 1/2 x 1 1/2 x 1 1/4	.37	.48	1 1/2 x 1 1/2 x 2	.57	.75	3 x 3 x 4	*2.65	*3.45
3/4 x 3/4 x 1/4	.15	.20	1 1/2 x 1 1/2 x 1	.37	.48	1 1/2 x 1 1/4 x 2	*.57	*.75	5 x 5 x 4	*4.70	*6.10
3/4 x 1/2 x 3/4	.15	.20	1 1/2 x 1 1/2 x 3/4	.37	.48	1 1/4 x 1 1/4 x 2	.57	.75	5 x 5 x 3	4.70	6.10
3/4 x 1/2 x 1/2	.15	.20	1 1/2 x 1 1/2 x 1/2	.37	.48	1 x 1 x 2	*.57	*.75	5 x 5 x 2	*4.70	*6.10
3/4 x 1/2 x 3/8	.15	.20	1 1/2 x 1 1/2 x 3/8	.37	.48	3/4 x 3/4 x 2	*.57	*.75	6 x 6 x 4	6.60	8.60
3/4 x 3/8 x 3/4	.15	.20	1 1/2 x 1 1/4 x 1 1/2	.37	.48	2 1/2 x 2 1/2 x 2	1.00	1.30	6 x 6 x 3	6.60	8.60
3/4 x 3/8 x 1/2	.15	.20	1 1/2 x 1 1/4 x 1 1/4	.37	.48	2 1/2 x 2 1/2 x 1 1/2	1.00	1.30	6 x 6 x 2 1/2	6.60	8.60
3/4 x 3/8 x 3/8	.15	.20	1 1/2 x 1 1/4 x 1	.37	.48	2 1/2 x 2 1/2 x 1 1/4	1.00	1.30	6 x 6 x 2	6.60	8.60
3/4 x 1/4 x 3/4 *	.15	*.20	1 1/2 x 1 1/4 x 3/4	.37	.48	2 1/2 x 2 1/2 x 1	1.00	1.30	6 x 4 x 6	*6.60	*8.60
1/2 x 1/2 x 3/4	.15	.20	1 1/2 x 1 1/4 x 1/2 *	.37	*.48	2 1/2 x 2 1/2 x 3/4	1.00	1.30			
1/2 x 3/8 x 3/4	.15	.20	1 1/2 x 1 x 1 1/2	.37	.48	2 1/2 x 2 x 2 1/2	1.00	1.30			
3/8 x 3/8 x 3/4	.15	.20	1 1/2 x 1 x 1 1/4	.37	.48	2 1/2 x 2 x 2	1.00	1.30			

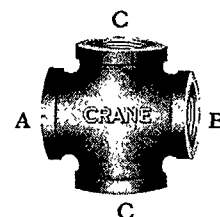
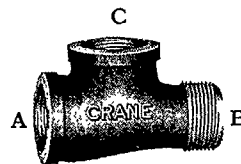
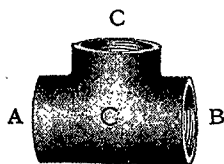
Non-Standard sizes: Sizes indicated with an asterisk () are "Non-Standard" and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

Larger sizes: For sizes larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 189.

Standard Malleable Iron Fittings

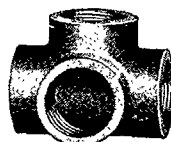
List Prices, Each



Tees Plain					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1/8	.08	.10	A B C		
1/4	.08	.10	1 x 1 x 3/4	.19	.25
3/8	.08	.10	1 x 1 x 1/2	.19	.25
1/2	.10	.13	1 x 1 x 3/8	.19	.25
3/4	.13	.17	1 x 1 x 1/4	.19	.25
1	.17	.22	1 x 3/4 x 1	.19	.25
1 1/4	.26	.34	1 x 3/4 x 3/4	.19	.25
1 1/2	.33	.43	1 x 3/4 x 1/2	.19	.25
2	.52	.68	1 x 3/4 x 3/8	.19	.25
1/4 x 1/4 x 1/8	.09	.12	1 x 1/2 x 1	.19	.25
1/8 x 1/8 x 1/4	*.09	*.12	1 x 1/2 x 3/4	.19	.25
3/8 x 3/8 x 1/4	.09	.12	1 x 1/2 x 1/2	.19	.25
3/8 x 3/8 x 1/8	.09	.12	1 x 1/2 x 3/8	*.19	*.25
3/8 x 1/4 x 3/8	*.09	*.12	1 x 3/8 x 1	.19	.25
3/8 x 1/4 x 1/4	*.09	*.12	1 x 3/8 x 3/4	*.19	*.25
1/4 x 1/4 x 3/8	.09	.12	1 x 3/8 x 1/2	*.19	*.25
1/2 x 1/2 x 3/8	.11	.14	3/4 x 3/4 x 1	.19	.25
1/2 x 1/2 x 1/4	.11	.14	3/4 x 3/4 x 1/2	.19	.25
1/2 x 3/8 x 1/2	.11	.14	3/4 x 3/8 x 1	*.19	*.25
1/2 x 3/8 x 3/8	.11	.14	1 1/4 x 1 1/4 x 1	.29	.38
1 1/2 x 3/8 x 1/4	*.11	*.14	1 1/4 x 1 1/4 x 3/4	.29	.38
1 1/2 x 1/4 x 1/2	.11	.14	1 1/4 x 1 1/4 x 1/2	.29	.38
3/8 x 3/8 x 1/2	.11	.14	1 1/4 x 1 x 1 1/4	.29	.38
3/4 x 3/4 x 1/2	.15	.20	1 1/4 x 1 x 1	.29	.38
3/4 x 3/4 x 3/8	.15	.20	1 1/4 x 1 x 3/8	*.29	*.38
3/4 x 3/4 x 1/4	.15	.20	1 1/4 x 3/8 x 1 1/4	*.29	*.38
3/4 x 1/2 x 3/4	.15	.20	1 x 1 x 1 1/4	.29	.38
3/4 x 1/2 x 1/2	.15	.20	1 1/2 x 1 1/2 x 1 1/4	.37	.48
3/4 x 1/2 x 3/8	.15	.20	1 1/2 x 1 1/2 x 1	.37	.48
3/4 x 3/8 x 1/4	*.15	*.20	1 1/2 x 1 1/2 x 3/4	.37	.48
3/4 x 3/8 x 3/4	.15	.20	1 1/2 x 1 1/4 x 1 1/2	.37	.48
3/4 x 3/8 x 1/2	.15	.20	2 x 2 x 1 1/2	.57	.75
3/4 x 3/8 x 3/8	.15	.20	2 x 2 x 1 1/4	.57	.75
3/4 x 1/4 x 3/4	*.15	*.20	2 x 2 x 1	.57	.75
1 1/2 x 1/2 x 3/4	.15	.20	2 x 2 x 3/4	.57	.75
1 1/2 x 3/8 x 3/4	.15	.20	2 x 1 1/2 x 2	.57	.75
3/8 x 3/8 x 3/4	.15	.20	2 x 1 1/2 x 1 1/2	.57	.75
			1 1/2 x 1 1/2 x 2	.57	.75

Service Tees Banded		
Size Inches	Black Each	Galv. Each
1/4	*.09	.12
3/8	.09	.12
1/2	.12	.16
3/4	.15	.20
1	.20	.26
1 1/4	.30	.39
1 1/2	.38	.50
2	.60	.78
2 1/2	*1.05	*1.37
3	*1.50	*1.95
4	*2.75	*3.60
A B C		
3/8 x 3/8 x 1/2	*.13	*.17
3/4 x 1/2 x 3/4	*.17	*.22
1 x 1 x 3/4	.22	.29
1 x 3/4 x 1	*.22	*.29
1 x 1/2 x 1	*.22	*.29
3/4 x 3/4 x 1	*.22	*.29
1 1/4 x 1 x 1 1/4	.33	.43
1 1/4 x 1 x 1	*.33	*.43
1 1/4 x 3/4 x 1 1/4	.33	.43
1 x 1 x 1 1/4	*.33	*.43
1 1/2 x 1 1/4 x 1 1/2	.42	.55
1 1/2 x 1 x 1 1/2	*.42	*.55
1 1/2 x 3/4 x 1 1/2	*.42	*.55
2 x 2 x 1	*.66	.86
2 x 1 1/2 x 2	.66	.86
2 x 1 1/4 x 2	*.66	.86
2 x 1 x 2	*.66	.86
2 x 3/4 x 2	*.66	.86
2 1/2 x 2 x 2 1/2	*1.15	*1.50
3 x 2 1/2 x 3	*1.65	*2.15
3 x 3 x 4	*3.05	*3.95

Crosses, Banded		
Size Inches	Black Each	Galv. Each
1/8	*.11	*.14
1/4	.11	.14
3/8	.11	.14
1/2	.13	.17
3/4	.18	.23
1	.23	.30
1 1/4	.35	.46
1 1/2	.44	.57
2	.70	.90
2 1/2	1.25	1.65
3	1.75	2.30
3 1/2	2.65	3.45
4	3.15	4.10
5	5.70	7.40
6	8.15	10.60
A B C		
1/4 x 1/4 x 1/8	*.12	*.16
3/8 x 3/8 x 1/4	*.12	*.16
1/2 x 1/2 x 3/8	.14	.18
1/2 x 1/2 x 1/4	*.14	*.18
3/4 x 3/4 x 1/2	.20	.26
3/4 x 3/4 x 3/8	.20	.26
1 x 1 x 3/4	.25	.33
1 x 1 x 1/2	.25	.33
1 x 1 x 3/8	.25	.33
1 1/4 x 1 1/4 x 1	.38	.50
1 1/4 x 1 1/4 x 3/4	.38	.50
1 1/4 x 1 1/4 x 1/2	.38	.50
1 1/4 x 1 1/4 x 3/8	*.38	*.50
1 1/4 x 1 x 1	*.38	*.50
1 1/4 x 1 x 3/4	*.38	*.50
1 1/2 x 1 1/2 x 1 1/4	.48	.62
1 1/2 x 1 1/2 x 1	.48	.62
1 1/2 x 1 1/2 x 3/4	.48	.62
1 1/2 x 1 1/2 x 1/2	*.48	*.62
1 1/2 x 1 1/4 x 1 1/4	*.48	*.62
2 x 2 x 1 1/2	.77	1.00
2 x 2 x 1 1/4	.77	1.00
2 x 2 x 1	.77	1.00
2 x 2 x 3/4	.77	1.00
2 x 2 x 1/2	*.77	*1.00
2 x 1 1/4 x 1 1/4	*.77	*1.00
2 1/2 x 2 1/2 x 2	1.40	1.85
2 1/2 x 2 1/2 x 1 1/2	*1.40	*1.85
2 1/2 x 2 1/2 x 1	*1.40	*1.85
3 x 3 x 2 1/2	*1.95	*2.55
3 x 3 x 2	1.95	2.55
3 x 3 x 1	*1.95	*2.55
4 x 4 x 3	*3.45	*4.50
4 x 4 x 2	3.45	4.50
6 x 6 x 4	*9.00	*11.70
6 x 6 x 3	*9.00	*11.70
6 x 6 x 2	*9.00	*11.70



Four-Way Tees Plain		
Size Inches	Black Each	Galv. Each
1/4	*.16	*.21
3/8	.16	.21
1/2	.20	.26
3/4	.26	.34
1	.34	.44
1 1/4	.52	.68
1 1/2	.66	.86
2	1.05	1.35

Non-Standard sizes: Sizes indicated with an asterisk () are "Non-Standard" and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

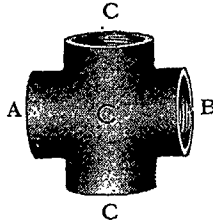
Larger size Crosses: For Crosses larger than 6-inch, Crane Standard Malleable Iron Refinery Oil Fittings are recommended. See page 189.

Description....page 180 Dimensions....page 180

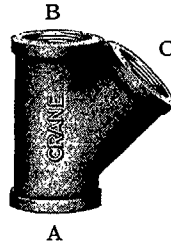
Working pressures....page 180

Standard Malleable Iron Fittings

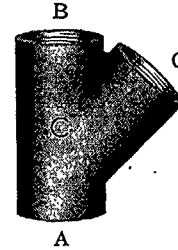
List Prices, Each



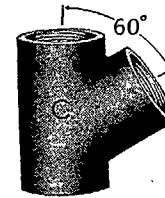
Crosses Plain			
Size Inches	Black Each	Galv. Each	
1/4	.11	.14	
3/8	.11	.14	
1/2	.13	.17	
3/4	.18	.23	
1	.23	.30	
1 1/4	.35	.46	
1 1/2	.44	.57	
2	.70	.90	
A B C			
3/8 x 3/8 x 1/4	*.12	*.16	
1/2 x 1/2 x 3/8	.14	.18	
1/2 x 1/2 x 1/4	*.14	*.18	
1/2 x 3/8 x 3/8	*.14	*.18	
3/4 x 3/4 x 1/2	.20	.26	
3/4 x 3/4 x 3/8	.20	.26	
3/4 x 1/2 x 1/2	*.20	*.26	
3/4 x 1/2 x 3/8	*.20	*.26	
3/4 x 3/8 x 1/2	*.20	*.26	
1 x 1 x 3/4	.25	.33	
1 x 1 x 1/2	.25	.33	
1 x 1 x 3/8	.25	.33	
1 x 3/4 x 3/4	*.25	*.33	
1 x 3/4 x 1/2	*.25	*.33	
1 x 3/4 x 3/8	*.25	*.33	
1 x 1/2 x 3/8	*.25	*.33	
1 1/4 x 1 1/4 x 1	.38	.50	
1 1/4 x 1 1/4 x 3/4	.38	.50	
1 1/2 x 1 1/2 x 1 1/4	.48	.62	
1 1/2 x 1 1/2 x 1	.48	.62	
2 x 2 x 1 1/2	.77	1.00	
2 x 2 x 1 1/4	.77	1.00	
2 x 2 x 1	.77	1.00	



45° Y-Bends Banded			
Size Inches	Black Each	Galv. Each	
3/8	*.10	*.13	
1/2	.14	.18	
3/4	.18	.23	
1	.25	.33	
1 1/4	.40	.52	
1 1/2	.57	.75	
2	.85	1.10	
2 1/2	1.55	2.00	
3	2.80	3.65	
4	4.80	6.25	
A B C			
1 x 1 x 3/4	*.28	*.36	
1 1/4 x 1 1/4 x 1	*.44	*.57	
1 1/4 x 1 1/4 x 3/4	*.44	*.57	
1 1/2 x 1 1/2 x 1 1/4	*.63	*.82	
1 1/2 x 1 1/2 x 1	*.63	*.82	
1 1/2 x 1 1/4 x 1 1/2	*.63	*.82	
1 1/2 x 1 1/4 x 1 1/4	*.63	*.82	
2 x 2 x 1 1/2	*.95	*1.25	
2 x 2 x 1 1/4	*.95	*1.25	
2 x 2 x 1	*.95	*1.25	
2 x 1 1/2 x 2	*.95	*1.25	
2 x 1 1/2 x 1 1/2	*.95	*1.25	
2 x 1 1/2 x 1 1/4	*.95	*1.25	
2 x 1 1/4 x 2	*.95	*1.25	
2 x 1 1/4 x 1 1/2	*.95	*1.25	
2 x 1 1/4 x 1 1/4	*.95	*1.25	
2 1/2 x 2 1/2 x 2	*1.70	*2.20	
2 1/2 x 1 1/2 x 1 1/2	*1.70	*2.20	
3 x 3 x 2 1/2	*3.10	*4.05	
3 x 2 1/2 x 2 1/2	*3.10	*4.05	
5 x 5 x 2	*9.00	*11.70	
6 x 6 x 2	*13.00	*16.90	



45° Y-Bends Plain			
Size Inches	Black Each	Galv. Each	
1 1/4	*.40	*.52	
1 1/2	*.57	*.75	
2	.85	1.10	
A B C			
1 1/2 x 1 1/2 x 1 1/4	*.63	*.82	
2 x 2 x 1 1/2	.95	1.25	
2 x 1 1/2 x 2	.95	1.25	
2 x 1 1/2 x 1 1/2	.95	1.25	



60° Y-Bends Plain			
Size Inches	Black Each	Galv. Each	
2	*1.00	*1.30	



Reducers Plain			
Size Inches	Black Each	Galv. Each	
1/4 x 1/8	.05	.07	
3/8 x 1/4	.05	.07	
3/8 x 1/8	.05	.07	
1/2 x 3/8	.06	.08	
1/2 x 1/4	.06	.08	
1/2 x 1/8	*.06	*.08	
3/4 x 1/2	.09	.12	
3/4 x 3/8	.09	.12	
3/4 x 1/4	.09	.12	
1 x 3/4	.12	.16	
1 x 1/2	.12	.16	
1 x 3/8	.12	.16	
1 x 1/4	.12	.16	
1 1/4 x 1	.15	.20	
1 1/2 x 1 1/4	.18	.23	



Reducers Banded			
Size Inches	Black Each	Galv. Each	
1/4 x 1/8	*.05	*.07	
3/8 x 1/4	.05	.07	
3/8 x 1/8	*.05	*.07	
1/2 x 3/8	.06	.08	
1/2 x 1/4	.06	.08	
3/4 x 1/2	.09	.12	
3/4 x 3/8	.09	.12	
3/4 x 1/4	.09	.12	
3/4 x 1/8	*.09	*.12	
1 x 3/4	.12	.16	
1 x 1/2	.12	.16	
1 x 3/8	.12	.16	
1 x 1/4	.12	.16	
1 1/4 x 1	.15	.20	
1 1/4 x 3/4	.15	.20	
1 1/4 x 1/2	.15	.20	
1 1/4 x 3/8	.15	.20	
1 1/4 x 1/4	*.15	*.20	
1 1/2 x 1 1/4	.18	.23	
1 1/2 x 1	.18	.23	
1 1/2 x 3/4	.18	.23	
1 1/2 x 1/2	.18	.23	
1 1/2 x 3/8	*.18	*.23	
1 1/2 x 1/4	*.18	*.23	
2 x 1 1/2	.28	.36	
2 x 1 1/4	.28	.36	
2 x 1	.28	.36	
2 x 3/4	.28	.36	
2 x 1/2	.28	.36	
2 x 3/8	.28	.36	
2 x 1/4	*.28	*.36	
2 1/2 x 2	.50	.65	
2 1/2 x 1 1/2	.50	.65	
2 1/2 x 1 1/4	.50	.65	
2 1/2 x 1	.50	.65	
3 x 2 1/2	.75	1.00	
3 x 2	.75	1.00	
3 x 1 1/2	.75	1.00	
3 x 1 1/4	.75	1.00	
3 x 1	.75	1.00	
3 x 3/4	*.75	*1.00	
3 1/2 x 3	1.10	1.45	
3 1/2 x 2 1/2	1.10	1.45	
3 1/2 x 2	1.10	1.45	
4 x 3 1/2	1.40	1.85	
4 x 3	1.40	1.85	
4 x 2 1/2	1.40	1.85	
4 x 2	1.40	1.85	
4 x 1 1/2	*1.40	*1.85	
4 x 1 1/4	*1.40	*1.85	
4 x 1	*1.40	*1.85	
5 x 4	*2.50	*3.25	
5 x 3	*2.50	*3.25	
5 x 2	*2.50	*3.25	
6 x 5	*3.60	*4.70	
6 x 4	*3.60	*4.70	
6 x 3	*3.60	*4.70	
6 x 2	*3.60	*4.70	

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Sizes not listed are special. Prices on application.

Standard Malleable Iron Fittings

List Prices, Each



Couplings, Banded Right Hand		
Size Inches	Black Each	Galv. Each
1/8	* .05	* .07
1/4	* .05	* .07
3/8	* .05	* .07
1/2	* .06	* .08
3/4	* .09	* .12
1	* .12	* .16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44
2 1/2	.60	.78
3	.85	1.10
3 1/2	1.25	1.60
4	1.50	1.95
5	*2.00	*2.60
6	*3.05	*3.95



Couplings, Banded Right and Left		
Size Inches	Black Each	Galv. Each
1/8	* .05	* .07
1/4	* .05	* .07
3/8	* .05	* .07
1/2	* .06	* .08
3/4	* .09	* .12
1	* .12	* .16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44
2 1/2	.60	.78
3	* .85	*1.10



Couplings, Plain Right Hand		
Size Inches	Black Each	Galv. Each
1/8	.05	.07
1/4	.05	.07
3/8	.05	.07
1/2	.06	.08
3/4	.09	.12
1	.12	.16
1 1/4	.16	.21
1 1/2	.21	.27
2	.34	.44



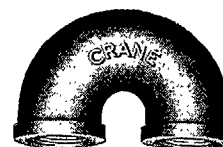
Caps Banded		
Size Inches	Black Each	Galv. Each
1/4	* .04	* .05
3/8	* .04	* .05
1/2	* .05	* .07
3/4	* .08	* .10
1	* .10	* .13
1 1/4	.13	.17
1 1/2	.18	.23
2	.25	.33
2 1/2	.40	.52
3	.60	.78
3 1/2	.80	1.05
4	1.10	1.45
5	1.80	2.35
6	2.70	3.50



Caps Plain		
Size Inches	Black Each	Galv. Each
1/8	.04	.05
1/4	.04	.05
3/8	.04	.05
1/2	.05	.07
3/4	.08	.10
1	.10	.13
Sizes 1/8, 1/4, and 3/8-inch are made of steel.		



Locknuts Hexagonal		
Size Inches	Black Each	Galv. Each
1/8	.02 1/2	.03 1/2
1/4	.02 1/2	.03 1/2
3/8	.02 1/2	.03 1/2
1/2	.03	.04
3/4	.04	.05
1	.06	.08
1 1/4	.08	.10
1 1/2	.10	.13
2	.12	.16
2 1/2	.30	.39
3	.38	.50
3 1/2	.43	.56
4	.48	.62
4" size is octagonal. For sizes 5 to 12", use Cast Iron; page 201.		



Return Bends Banded					
Size Inches	Center to Center Inches	Right Hand		Right & Left	
		Black Each	Galv. Each	Black Each	Galv. Each
Close Pattern					
1/2	1	.16	.21	.18	.23
3/4	1 1/4	.18	.23	.21	.27
1	1 1/2	.24	.31	.28	.36
1 1/4	1 3/4	.36	.47	.42	.55
1 1/2	2 3/16	.49	.64	.56	.73
2	2 5/8	.80	1.05	.92	1.20
Medium Pattern					
1/2	1 1/4	.17	.22	.19	.25
3/4	1 1/2	.20	.26	.23	.30
1	1 7/8	.26	.34	.30	.39
1 1/4	2 1/4	.40	.52	.46	.60
1 1/2	2 1/2	.55	.72	.63	.82
2	3	.88	1.15	1.00	1.30
Open Pattern					
1/2	1 1/2	.19	.25	.22	.29
3/4	2	.22	.29	.26	.34
1	2 1/2	.29	.38	.34	.44
1 1/4	3	.44	.57	.51	.66
1 1/2	3 1/2	.62	.80	.70	.90
2	4	1.00	1.30	1.15	1.50
2 1/2	4 1/2	1.45	1.90	1.65	2.15
3	5	2.15	2.80	2.45	3.20
4	6	5.80	7.55		
Special Wide Pattern					
3/8	1 1/2	* .25	* .30		
3/4	4	* 1.00	* 1.35		
3/4	6	* 1.25	* 1.65		
1	6	* 1.25	* 1.70		
1 1/4	6	* 1.25	* 1.70		
1 1/2	6	* 2.00	* 2.75		
2	5	* 3.00	* 4.00		
2	6	* 4.00	* 5.00		
3	7 1/2	* 5.00	* 6.50		
3	8	* 5.00	* 6.50		
6	12	*16.00	*21.00		
Close Pattern Return Bends can not be used to make up parallel coils. The center to center dimension is so close that the bands of adjacent bends will not clear each other.					

Non-Standard sizes: Sizes indicated with an asterisk () are "Non-Standard" and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

Sizes not listed are special. Prices on application.

Description.....page 180
Dimensions.....page 180
Working pressures....page 180

Standard Malleable Iron Fittings

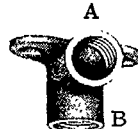
List Prices, Each



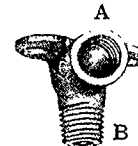
Extension Pieces Plain		
Size Inches	Black Each	Galv. Each
3/8	.05	.07
1/2	.07	.09
3/4	.11	.14
1	.16	.21
1 1/4	.18	.23
1 1/2	.23	.30
2	.33	.43
A B		
1/2 x 3/8	*.07	*.09
3/4 x 1/2	*.11	*.14



Waste Nuts		
Size In.	Black Each	Galv. Each
1/8	*.04	*.05
1/4	.04	.05
3/8	.04	.05
1/2	.04	.05
3/4	.05	.07
1	.06	.08
1 1/4	.11	.14
1 1/2	.25	.33
2	.41	.53



Drop Elbows, Plain Female		
Size Inches	Black Each	Galv. Each
1/4	.08	.11
3/8	.08	.11
1/2	.12	.16
3/4	.18	.23
A B		
3/8 x 1/4	*.09	*.12
3/4 x 1/2	*.20	*.26



Drop Elbows, Plain Male and Female Short Drop		
Size Inches	Black Each	Galv. Each
3/8	.08	.11
1/2	*.12	*.16
A B		
1/4 x 3/8	*.09	*.12
1/2 x 3/8	*.13	*.17



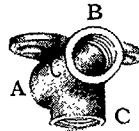
Drop Elbows, Plain Male and Female Long Drop		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
1/2	.15	.20
A B		
1/4 x 3/8	*.11	*.14
1/2 x 3/8	*.17	*.22



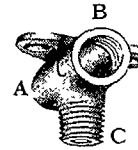
Chandelier Hooks Female	
Size Inches	Black Each
3/8	.07
1/2	.09



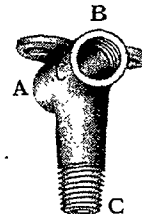
Chandelier Hooks Male	
Size Inches	Black Each
3/8	.07
1/2	.09



Drop Tees, Plain Female		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
1/2	.15	.20
3/4	.22	.28
A B C		
3/8 x 3/8 x 1/4	*.11	*.14
1/2 x 1/2 x 3/8	.17	.22
1/2 x 3/8 x 3/8	*.17	*.22
3/4 x 3/4 x 1/2	.24	.31
3/4 x 3/4 x 3/8	*.24	*.31
3/4 x 3/4 x 1/4	*.24	*.31
3/4 x 1/2 x 3/8	*.24	*.31
1 x 1 x 3/8	*.32	*.42



Drop Tees, Plain Male and Female Short Drop		
Size Inches	Black Each	Galv. Each
3/8	.10	.13
A B C		
1/4 x 1/4 x 3/8	*.11	*.14
3/8 x 1/4 x 3/8	*.11	*.14
1/2 x 1/2 x 3/8	*.17	*.22
1/2 x 3/8 x 3/8	*.17	*.22
3/4 x 3/4 x 1/2	*.24	*.31
3/4 x 1/2 x 3/8	*.24	*.31
1 x 1 x 3/8	*.32	*.42



Drop Tees, Plain Male and Female Long Drop		
Size Inches	Black Each	Galv. Each
3/8	*.12	*.16
A B C		
3/4 x 3/4 x 1/2	*.29	*.38
1 x 1 x 1/2	*.40	*.52
1 1/4 x 1 1/4 x 1/2	*.65	*.85



Chandelier Loops Male	
Size Inches	Black Each
3/8	.07
1/2	.09



Wall Plates	
Size Inches	Black Each
3/8	.14
1/2	.18
3/4	*.28



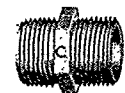
Crossovers Banded		
Size Inches	Black Each	Galv. Each
1/2	.20	.25
3/4	.30	.40
1	.45	.60



Crossover Tees Banded	
Size Inches	Galv. Each
1/2	.38
3/4	.56



Wash Tray Tees Plain	
Size Inches	Galv. Each
1/2	.20
3/4	.30
A B C	
3/4 x 3/4 x 1/2	.30



Hexagon Nipples Right and Left	
Size Inches	Black Each
1/4	.20
3/8	.20
1/2	.20
3/4	.25
1	.30
1 1/4	.40
1 1/2	.50
2	.70
2 1/2	1.10
3	1.50
3 1/2	1.90
4	2.40



Offsets Banded			
Size Inches	Offset Inches	Black Each	Galv. Each
3/4	1 1/2	.20	.26
1	1 1/2	.30	.39
1 1/4	2	.50	.65

Non-Standard sizes: Sizes indicated with an asterisk () are "Non-Standard" and are sold at an advance in price over "Standard" sizes. See the Crane Discount Sheet for prices.

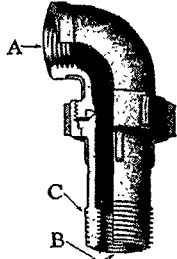
Sizes not listed are special. Prices on application.

Description... page 180 Working pressures... page 180

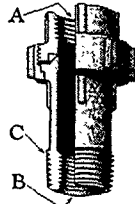
Circulating Boiler Fittings

Malleable Iron—Galvanized

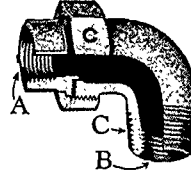
WORKING PRESSURE
150 pounds water, 200° F.



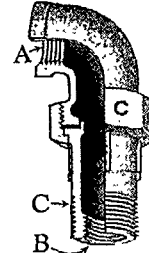
No. 586 1/2
Elbow, with
Ground Joint Union



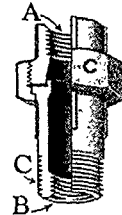
No. 589 1/2
Coupling, with
Ground Joint Union



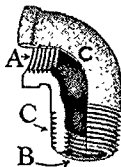
No. 585
Old Style Elbow
With Gasket Union



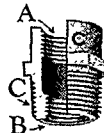
No. 586
New Style Elbow
With Gasket Union



No. 589
Coupling
With Gasket Union



No. 587
Elbow

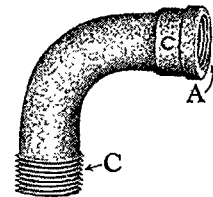


No. 588
Coupling

No. 586 1/2 Elbows and No. 589 1/2 Couplings have a brass to iron ground joint seat.

No. 585 and No. 586 Elbows and No. 589 Couplings are furnished with a rubber gasket.

When ordering Circulating Boiler Fittings, be sure to specify the correct size; refer to illustrations.



No. 587 1/2
Long Turn Elbow

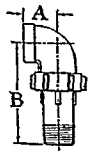
List Prices

Size	Inches		A	B	C	A	B	C	A	B	C	A	B	C	A	C
			1/2 x 1/2 x 3/4	3/4 x 1/2 x 3/4	3/4 x 1/2 x 3/4	1/2 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 3/4 x 1	3/4 x 3/4 x 1	3/4 x 1	3/4 x 1	3/4 x 1	3/4 x 1	3/4 x 1
Ground Joint Union Type	No. 586 1/2, Elbows	Each						.60		.75	.75					
	No. 589 1/2, Couplings	Each						.60		.75	.75					
Gasket Union Type	No. 585, Elbows	Each		.60		.75		.60		.75	.75					
	No. 586, Elbows	Each					.60		.75	.75						
	No. 589, Couplings	Each					.60		.75	.75						
Without Union	No. 587, Elbows	Each					.40		.40	.40						
	No. 587 1/2, Elbows	Each													.58	
	No. 588, Couplings	Each					.40		.40	.40						

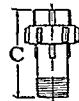
With the exception of the Long Turn Elbow, Crane Circulating Boiler Fittings are especially designed for tanks or receivers that utilize an internal pipe. The connection for cold water into a range boiler or hot water tank is a common example. The internal pipe is screwed into the female opening at the male end of the fitting, and the male end is then screwed into the tank. The cold water supply is then connected to the female opening of the fitting on the outside of the tank.

The No. 587 1/2 Long Turn Elbow is especially useful for making a connection through an insulating jacket on a tank. The long turn provides ample clearance for the insulation.

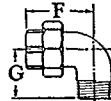
Crane Circulating Boiler Fittings with Ground Joint Unions are exceptionally strong, rugged, and durable. The rings, thread-pieces, and elbows are interchangeable with the like parts of the 150-Pound Malleable Iron Unions shown on page 238.



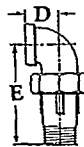
No. 586 1/2



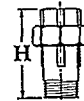
No. 589 1/2



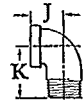
No. 585



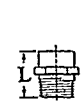
No. 586



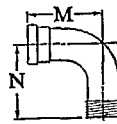
No. 589



No. 587



No. 588



No. 587 1/2

Dimensions, in Inches

Size	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
	1/2 x 1/2 x 3/4	3/4 x 1/2 x 3/4	3/4 x 1/2 x 3/4	1/2 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	1/2 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1
A				1 1/8	1 5/16	1 5/16									
B				3 13/16	3 15/16	3 15/16									
C				3 3/8	3 3/8	3 3/8									
D				1 1/8	1 5/16	1 5/16									
E				3 13/16	3 15/16	3 15/16									
F	2 3/16		2 1/2	2 5/16	2 3/4	2 3/4									
G	1 13/16		2	1 1/8	1 15/16	1 15/16									
H				3 3/8	3 7/16	3 7/16									

Dimensions, in Inches

Size	A	B	C	A	B	C	A	B	C	A	C
	1/2 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 1/2 x 1	3/4 x 3/4 x 1	3/4 x 3/4 x 1	3/4 x 3/4 x 1					
J	1 1/8	1 5/16	1 5/16								
K	1 13/16	2	2								
L	1 13/16	1 13/16	1 13/16								
M										3	
N										3	

Extra Gaskets... page 571

Standard Malleable Iron Fittings Air-Tested

For air brake and other compressed air service



90° Elbow



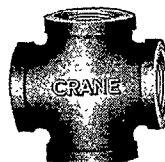
45° Elbow



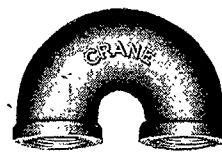
90° Street Elbow



Tee



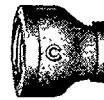
Cross



Return Bend



Coupling



Reducer

14

Any of the Standard Malleable Iron Fittings shown on pages 181 to 185 can be furnished air-tested, to order. The list prices of Air-Tested Fittings are the same as for untested, but the Air-Tested are sold at an advance in price. See the Crane Discount Sheet for prices.

Air-Tested Fittings are admirably suited for air brake and other compressed air lines. They are given an air-under-water test.

Banded 90° Elbows, 90° Street Elbows, and Tees, Black and Galvanized, sizes $\frac{1}{4}$ to 2-inch, are carried in stock, but other types and sizes can be furnished to order at short notice.

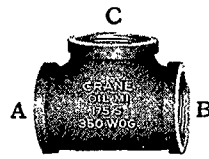
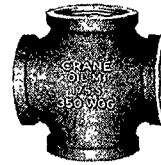
Standard Malleable Iron Refinery Oil Fittings

WORKING PRESSURES

175 pounds steam

200 pounds hot oil, 350° F.

350 pounds cold water, oil, or gas, non-shock

No. 760
90° ElbowNo. 762
45° ElbowNo. 764
TeeNo. 766
CrossNo. 768
90° Street Elbow

List Prices, Black

Size	Inches	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	6	8	10	12	*5 3/16	*6 5/8
No. 760, 90° Elbows	Each	.40	.55	.70	.90	1.50	2.40	3.25	4.25	11.00	21.00	37.00	60.00	8.00	19.00
No. 762, 45° Elbows	Each	.50	.65	.85	1.10	1.85	2.85	4.00	5.00	12.75	26.00				
No. 764, Tees	Each	.60	.80	1.05	1.35	2.25	3.60	5.00	6.50	16.50	32.00	55.00	90.00	12.00	28.50
No. 766, Crosses	Each				2.70	4.50	7.20	10.00	13.00	33.00	63.00				
No. 768, 90° Street Elbows	Each				1.25	2.10	3.10		5.60						

Reducing Fittings: No. 764 Reducing Tees are carried in stock in the sizes shown in the table below; stock reducing sizes will be furnished at the same prices as straight size Tees. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as straight size Tees, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 90° Elbows, 45° Elbows, Crosses, and 90° Street Elbows can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

90° Street Elbows can be furnished reducing on the female end only.

Reducing fittings that require a new pattern are entirely special. Prices on application.

Rugged construction: Crane Standard Malleable

Iron Refinery Oil Fittings are heavier than commercial standard malleable iron fittings but are not as heavy as the 300-Pound shown on page 190.

Service recommendations: These fittings have long threads and are particularly adapted for making tight joints on oil lines, gasoline lines, vapor lines, and natural gas lines. They also give excellent service when used on steam, water, gas, and air lines.

***Casing sizes:** Orders must specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

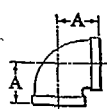
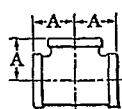
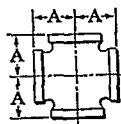
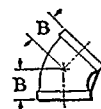
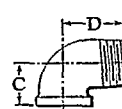
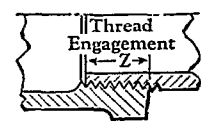
No. 764 Reducing Tees Carried in Stock

A	B	C	A	B	C	A	B	C	A	B	C
1	x 1	x 3/4	2 1/2	x 2 1/2	x 2	4	x 4	x 3	8	x 8	x 6
1 1/4	x 1 1/4	x 1	2 1/2	x 2 1/2	x 1 1/2	4	x 4	x 2	8	x 8	x 4
1 1/2	x 1 1/2	x 1	3	x 3	x 2 1/2	6	x 6	x 4	8	x 8	x 3
2	x 2	x 1 1/2	3	x 3	x 2	6	x 6	x 3			
2	x 2	x 1	3	x 3	x 1 1/2	6	x 6	x 2			

14

Dimensions, in Inches

Dimensions apply only to straight sizes; dimensions of Reducing Tees will be furnished on request.

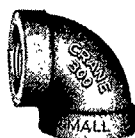
No. 760
90° ElbowNo. 764
TeeNo. 766
CrossNo. 762
45° ElbowNo. 768
90° Street ElbowSee page 591 for
explanation.

Size	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	6	8	10	12	*5 3/16	*6 5/8
A—Center to end	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/8	4 1/2	6 1/4	7 3/4	9 1/4	11 1/2	5 1/2	**6 7/8
B—Center to end, 45° Elbows	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 5/8	2 13/16	3 1/2	4 5/16				
C—Center to end, Street Elbows				2 7/16	3	3 1/2		4 1/2						
D—Center to end, Street Elbows				3 3/16	3 7/8	4 9/16		5 11/16						
Z—Thread Engagement	1 1/16	1 1/16	1 1/16	3/4	1 5/16	1	1 1/16	1 1/8	1 5/16	1 7/16	1 5/8	1 3/4		

**When 6 5/8-inch fittings are threaded for 6 5/8-inch A. P. I. Casing, dimension "A" will be 6 3/4 inches.

*These are
casing sizes.

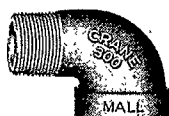
300-Pound Malleable Iron Fittings



No. 260 E
90° Elbow



No. 262 E
45° Elbow



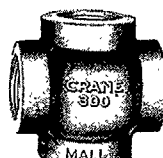
No. 268 E
90° Street Elbow



No. 264 E
Tee



No. 262 1/2 E
45° Street Elbow



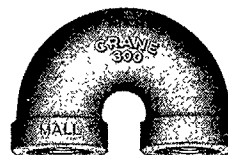
No. 266 E
Cross



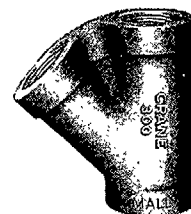
No. 279 E
Coupling



No. 278 E
Cap



No. 272 E
Return Bend



No. 276 E
45° Y-Bend



No. 1564
Return Bend
with 1/2-inch Back
Outlet

WORKING PRESSURES

300 pounds steam or oil, 550° F. — 300 pounds ammonia
 1/4 to 1-inch — *2000 pounds cold water, oil, or gas, non-shock
 1 1/4 to 2-inch — *1500 pounds cold water, oil, or gas, non-shock
 2 1/2 and 3-inch — *1000 pounds cold water, oil, or gas, non-shock
 300-pound air-under-water test

List Prices, Black

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	
No. 260 E, 90° Elbows	Each	.25	.25	.30	.35	.40	.55	.70	.90	1.50	2.40	
No. 262 E, 45° Elbows	Each	.30	.30	.35	.42	.50	.65	.85	1.10	1.85	2.85	
No. 262 1/2 E, 45° Street Elbows	Each	.38	.38	.50	.56	.63	.88	1.12	1.55			
No. 264 E, Tees	Each	.40	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60	
No. 266 E, Crosses	Each	.80	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20	
No. 267 E, Reducers	Each		.25	.28	.30	.40	.45	.55	.70	1.30	2.25	
No. 268 E, 90° Street Elbows	Each	.30	.30	.40	.45	.50	.70	.90	1.25	2.10	3.10	
No. 276 E, 45° Y-Bends	Each			.95	1.05	1.25	1.70	2.20	2.85	4.75	7.55	
No. 278 E, Caps	Each	.17	.17	.19	.23	.29	.38	.50	.65	1.00	1.35	
No. 279 E, Couplings	Each	.14	.14	.14	.20	.26	.34	.42	.56	.80	1.20	

For
sizes
3 1/2-inch
and
larger,
see
page
192.

List Prices, Return Bends, Black

Size	Inches	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	
Center to center	Inches	1 3/4	2 1/2	3	2 1/4	2 1/2	3	3 1/2	4	6	2 1/2	
No. 272 E, Return Bends	Each	.60	.75	.85	.90	.95	1.00	1.15	1.20	1.55	1.05	
No. 1564, Return Bends, with 1/2-inch Back Outlet	Each									1.90		
Size	Inches	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	
Center to center	Inches	3	3 1/2	6	8	3	3 1/2	4	4 5/8	6	8	
No. 272 E, Return Bends	Each	1.15	1.25	1.75	2.00	1.25	1.30	1.90	2.25	3.25	3.50	
No. 1564, Return Bends, with 1/2-inch Back Outlet	Each						2.15	2.25				

Reducing fittings: Reducing fittings are carried in stock in the sizes and types shown in the table on the opposite page. These sizes are furnished at the same prices as straight sizes.

Reducing sizes not carried in stock, and reducing 45° Elbows, 45° and 90° Street Elbows, Crosses, and 45° Y-Bends can be made to order by bushing in the sand. When so bushed, non-stock sizes use the same list prices as straight size fittings, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° and 90° Street Elbows can be furnished reduced on the female end only.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

***Working pressures:** The working pressures given above for cold service, do not apply to Street Elbows

or to 45° Y-Bends; these are recommended for only 500 pounds cold water, oil, or gas, non-shock.

Rugged construction: These fittings are exceptionally tough, strong, and rugged. They are far superior to so-called heavy malleable fittings made from standard cast iron patterns. They have long threads, accurately cut to gauge.

Service recommendations: The fittings are especially suitable for severe service; they will withstand rough usage, piping strains, vibration, and expansion and contraction.

Ammonia service: The openings of these fittings have a machined chamfer to permit soldering, in order that they may be used for ammonia service.

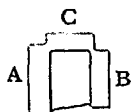
Galvanized fittings: Galvanized fittings are made to order only. Prices are 50% higher than the list prices shown above for black fittings.

300-Pound Malleable Iron Fittings

Reducing Fittings Carried in Stock



No. 260 E
90° Elbow



No. 264 E
Tee



No. 267 E
Reducer

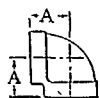
Reducing 90° Elbows, Tees, and Reducers are carried in stock in the sizes shown in the table below. These sizes are furnished at the same prices as straight sizes.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.

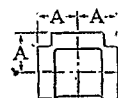
No. 260 E, 90° Elbows			No. 264 E, Tees									No. 267 E, Reducers					
			A	B	C	A	B	C	A	B	C						
3/8 x 1/4	2 x 1 1/2		3/8 x 3/8 x 1/4	1 x 1 x 3/4	1 1/4 x 3/8 x 1 1/4	1 1/4 x 3/8 x 1 1/4	2 x 2 x 1 1/2	2 x 2 x 1 1/2	3/8 x 1/4	1 1/4 x 1	2 x 1 1/2	3/8 x 1/4	1 1/4 x 1	2 x 1 1/2			
1/2 x 3/8	2 x 1 1/4		1/4 x 1/4 x 3/8	1 x 1 x 1 1/2	1 1/4 x 1 x 1 1/4	1 1/4 x 1 x 1 1/4	2 x 2 x 3/8	2 x 2 x 3/8	1/2 x 1/4	1 1/4 x 1/2	2 x 1	1/2 x 3/8	1 1/4 x 1/2	2 x 1			
3/4 x 1/2	2 x 3/4		1/2 x 1/2 x 3/8	1 x 1 x 3/4	1 1/4 x 1 x 3/4	1 1/4 x 1 x 3/4	2 x 2 x 1 1/4	2 x 2 x 1 1/4	3/4 x 3/4	1 1/4 x 1 1/4	2 x 1 1/2	3/4 x 1/2	1 1/4 x 3/8	2 x 3/4			
1 x 3/4	2 x 1/2		1/2 x 1/2 x 1/4	1 x 1 x 1	1 1/4 x 1 x 1	1 1/4 x 1 x 1	2 x 1 1/2 x 2	2 x 1 1/2 x 2	1 x 1/2	1 1/4 x 1 1/4	2 x 1	3/4 x 3/8	1 1/4 x 1/4	2 x 1/2			
1 1/4 x 1	2 1/2 x 2		1/2 x 3/8 x 1/2	1 x 3/4 x 1	1 1/4 x 3/4 x 1	1 1/4 x 3/4 x 1	2 x 1 1/2 x 2	2 x 1 1/2 x 2	1 1/2 x 1 1/2	1 1/4 x 1 1/4	2 x 1 1/2	3/4 x 1/4	1 1/2 x 1 1/4	2 x 3/8			
1 1/4 x 3/4	2 1/2 x 1 1/2		1/2 x 1/4 x 1/2	1 x 3/4 x 3/4	1 1/4 x 3/4 x 3/4	1 1/4 x 3/4 x 3/4	2 x 1 1/2 x 2	2 x 1 1/2 x 2	1 1/2 x 1 1/2	1 1/4 x 1 1/4	2 x 1 1/2	1 x 3/4	1 1/2 x 3/4	2 x 1/4			
1 1/4 x 1/2	3 x 2 1/2		3/8 x 3/8 x 1/2	1 x 1/2 x 1	1 1/4 x 1/2 x 1	1 1/4 x 1/2 x 1	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 3/8	1 1/4 x 1 1/4	2 1/2	1 x 1/2	1 1/2 x 1/2	2 1/2 x 1 1/2			
1 1/2 x 1 1/4			3/4 x 3/4 x 1/2	1 1/4 x 1/2 x 1	1 1/4 x 1/2 x 1	1 1/4 x 1/2 x 1	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 1 1/4	1 1/4 x 1 1/4	2 1/2	1 x 3/8	1 1/2 x 3/8	2 1/2 x 1 1/4			
1 1/2 x 1			3/4 x 3/4 x 3/4	1 1/4 x 1 1/4 x 1	1 1/4 x 1 1/4 x 1	1 1/4 x 1 1/4 x 1	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 1 1/2	1 1/4 x 1 1/4	2 1/2	1 x 1/4	1 1/2 x 1/4	2 1/2 x 1			
			3/4 x 1/2 x 1/2	1 1/4 x 1 1/4 x 3/4	1 1/4 x 1 1/4 x 3/4	1 1/4 x 1 1/4 x 3/4	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 3/4	1 1/4 x 1 1/4	2 1/2			3 x 2 1/2			
			3/4 x 1/2 x 3/4	1 1/4 x 1 1/4 x 1/2	1 1/4 x 1 1/4 x 1/2	1 1/4 x 1 1/4 x 1/2	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 1 1/4	1 1/4 x 1 1/4	2 1/2			3 x 1 1/2			
			3/4 x 1/4 x 3/4	1 1/4 x 1 1/4 x 3/8	1 1/4 x 1 1/4 x 3/8	1 1/4 x 1 1/4 x 3/8	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 1 1/2	1 1/4 x 1 1/4	2 1/2			3 x 1 1/4			
			1/2 x 1/2 x 3/4	1 1/4 x 1 x 1 1/4	1 1/4 x 1 x 1 1/4	1 1/4 x 1 x 1 1/4	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 1 1/2	1 1/4 x 1 1/4	2 1/2			3 x 1			
			1/2 x 1/2 x 3/8	1 1/4 x 3/4 x 1 1/4	1 1/4 x 3/4 x 1 1/4	1 1/4 x 3/4 x 1 1/4	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 3/4	1 1/4 x 1 1/4	2 1/2						
			3/8 x 3/8 x 3/4	1 1/4 x 1/2 x 1 1/4	1 1/4 x 1/2 x 1 1/4	1 1/4 x 1/2 x 1 1/4	2 1/2 x 2 1/2	2 1/2 x 2 1/2	1 1/2 x 3/4	1 1/4 x 1 1/4	2 1/2						

Dimensions, in Inches

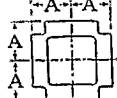
Dimensions of straight sizes, and of Reducers, are shown in the table below. Dimensions of reducing 90° Elbows and Tees will be furnished on request.



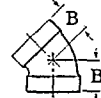
No. 260 E
90° Elbow



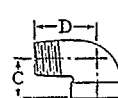
No. 264 E
Tee



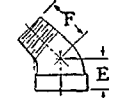
No. 266 E
Cross



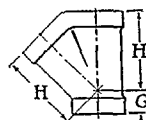
No. 262 E
45° Elbow



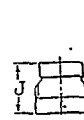
No. 268 E
90° Street Elbow



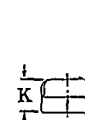
No. 262 1/2 E
45° Street Elbow



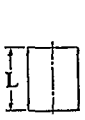
No. 276 E
45° Y-Bend



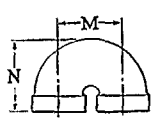
No. 267 E
Reducer



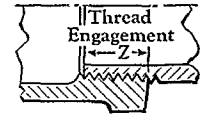
No. 278 E
Cap



No. 279 E
Coupling



No. 272 E
Return Bend



See page 591
for explanation.

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A—Center to end	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 5/16	3 3/8
B—Center to end, 45° Elbows	13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2
C—Center to end, 90° Street Elbows	13/16	15/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 5/16	3 3/8
D—Center to end, 90° Street Elbows	17/16	1 5/8	2	2 3/16	2 9/16	2 7/8	3 1/8	3 11/16	4 1/2	5 1/8
E—Center to end, 45° Street Elbows	3/4	13/16	1	1 1/8	1 5/16	1 1/2	1 11/16	2		
F—Center to end, 45° Street Elbows	1 1/8	1 1/4	1 3/8	1 9/16	1 13/16	2 1/8	2 5/16	2 11/16		
G—Center to end, 45° Y-Bends			3/4	7/8	1	1 1/16	1 1/4	1 9/16	1 3/4	2
H—Center to end, 45° Y-Bends			2	2 3/8	3 1/4	3 13/16	4 1/2	5 3/16	6 1/8	6 7/8
J—End to end, Reducers		1 7/16	1 11/16	1 3/4	2	2 3/8	2 11/16	3 3/16	3 11/16	4 1/16
K—Height, Caps	25/32	7/8	1 1/16	1 1/4	1 3/8	1 1/2	1 11/16	1 13/16	2 1/8	2 1/4
L—End to end, Couplings	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	3 5/8	4 1/8	4 3/8	4 7/8
Z—Thread Engagement	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1

No. 272 E, Return Bends

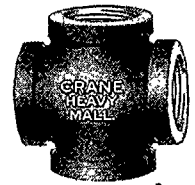
Size	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2
M—Center to center	1 3/4	2 1/2	3	2 1/4	2 1/2	3	3 1/2	4	6	2 1/2	3	3 1/2	6	8	3	3 1/2	4	4 5/8	6	8
N—Height	2 7/8	3 1/4	3 1/2	3 9/16	3 11/16	3 15/16	4 3/16	4 7/16	5	3 3/8	4 3/16	3 15/16	5 11/16	6 11/16	4 5/8	4 7/8	5 1/8	5 7/16	6 1/8	7 1/8

Heavy Malleable Iron Fittings



No. 260 E
90° Elbow

WORKING PRESSURES
 $3\frac{1}{2}$ to 6-inch — 300 pounds steam or oil, 550° F.
 8 to 12-inch — 250 pounds steam or oil, 550° F.
 $3\frac{1}{2}$ and 4-inch — †1000 pounds cold water, oil, or gas, non-shock
 5 to 10-inch — 800 pounds cold water, oil, or gas, non-shock
 12-inch — 600 pounds cold water, oil, or gas, non-shock
 14 and 16" fittings are used with O.D. pipe on vapor lines.



No. 266 E
Cross

Galvanized fittings:
Galvanized fittings are
made to order only.
Prices are 50% higher
than the list prices for
black fittings.



No. 262 E
45° Elbow



No. 264 E
Tee



No. 268 E
90° Street Elbow



No. 267 E
Reducer

****Casing sizes:** Orders
for casing fittings must
specify the outside
diameter of the casing,
the number of threads
per inch, and the style
of casing.

List Prices, Black

Size	Inches		$3\frac{1}{2}$	4	5	6	8	10	12	14	16	** $5\frac{3}{16}$	** $6\frac{5}{8}$
No. 260 E, 90° Elbows	Each	For sizes $\frac{1}{4}$ to 3-inch, see page 190.	3.25	4.25	6.50	11.00	21.00	37.00	60.00	105.00	160.00	8.00	19.00
No. 262 E, 45° Elbows	Each		4.00	5.00	7.50	12.75	26.00	45.00	72.00				
No. 264 E, Tees	Each		5.00	6.50	9.75	16.50	32.00	55.00	90.00	158.00	240.00	12.00	28.50
No. 266 E, Crosses	Each		10.00	13.00	19.50	33.00							
No. 267 E, Reducers	Each		3.25	4.25		9.00	16.00	23.00	39.00				
No. 268 E, 90° Street Elbows	Each		4.25	5.60									

Reducing fittings: Reducing fittings are carried in stock as shown in the table at the right; these are the same price as straight sizes. Reducing sizes not carried in stock and other types of reducing fittings can be made to order by bushing in the sand. Such fittings use the same list prices as straight sizes but are sold at an advance in price; see the Crane Discount Sheet.

Reducing 90° Street Elbows are reduced on the female end only. Reducing fittings requiring a new pattern are entirely special. Prices on application.

†Street Elbows: 90° Street Elbows are recommended for only 500 pounds cold water, oil, or gas.

Service recommendations: Crane Heavy Malleable Fittings are admirably suited for use on high pressure cold water, oil, and gas lines, non-shock. They will give much better satisfaction than extremely heavy cast iron fittings.

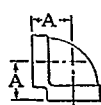
Construction: These fittings are far superior to so-called heavy malleable fittings made from standard cast iron patterns. An excellent grade of

malleable iron makes them exceptionally tough, strong, and rugged. The ends are reinforced with heavy bands. The threads are long and accurately cut.

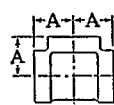
Reducing Fittings Carried in Stock

No. 260 E 90° Elbows	No. 267 E Reducers (Continued)	No. 264 E, Tees		
		A	B	C
4 x 3	6 x 5	4 x 4 x 3	8 x 8 x 6	
4 x 2	6 x 4	4 x 4 x 2 $\frac{1}{2}$	8 x 8 x 4	
6 x 4	6 x 3	4 x 4 x 2	8 x 8 x 3	
8 x 6	6 x 2 $\frac{1}{2}$	4 x 4 x 1 $\frac{1}{2}$	8 x 8 x 2 $\frac{1}{2}$	
10 x 8	6 x 2	4 x 4 x 1 $\frac{1}{4}$	8 x 8 x 2	
12 x 10	6 x 1 $\frac{1}{2}$	4 x 4 x 1	8 x 6 x 8	
	6 x 1	4 x 4 x $\frac{3}{4}$	10 x 10 x 8	
No. 267 E Reducers	8 x 6	4 x 3 x 4	10 x 10 x 6	
$3\frac{1}{2}$ x 3	8 x 5	4 x 2 x 4	10 x 10 x 4	
$3\frac{1}{2}$ x 2	8 x 4	4 x 1 x 4	10 x 10 x 3	
4 x 3	8 x 3	5 x 5 x 4	10 x 8 x 10	
4 x 2 $\frac{1}{2}$	8 x 2 $\frac{1}{2}$	6 x 6 x 4	10 x 6 x 10	
4 x 2	8 x 2	6 x 6 x 3	12 x 12 x 10	
4 x 1 $\frac{1}{2}$	10 x 8	6 x 6 x 2	12 x 12 x 8	
4 x 1 $\frac{1}{4}$	10 x 6	6 x 4 x 6	12 x 12 x 6	
4 x 1	12 x 10	6 x 3 x 6	12 x 10 x 12	
	12 x 8		12 x 8 x 12	
			12 x 6 x 12	

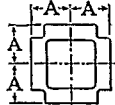
Dimensions, in Inches



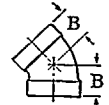
No. 260 E
90° Elbow



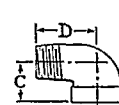
No. 264 E
Tee



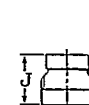
No. 266 E
Cross



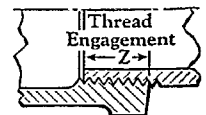
No. 262 E
45° Elbow



No. 268 E
90° Street Elbow



No. 267 E
Reducer



See page 591
for explanation.

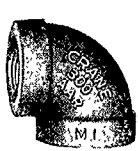
Size	$3\frac{1}{2}$	4	5	6	8	10	12	14	16	** $5\frac{3}{16}$	** $6\frac{5}{8}$
A	$4\frac{1}{8}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{4}$	$7\frac{3}{4}$	$9\frac{1}{4}$	$11\frac{1}{2}$	$12\frac{1}{4}$	$13\frac{3}{4}$	$5\frac{1}{2}$	** $6\frac{7}{8}$
B	$2\frac{5}{8}$	$2\frac{13}{16}$	$3\frac{3}{16}$	$3\frac{1}{2}$	$4\frac{5}{16}$	$5\frac{3}{16}$	6				
C	$4\frac{1}{8}$	$4\frac{1}{2}$									
D	$5\frac{13}{16}$	$6\frac{3}{8}$									
J	$4\frac{9}{16}$	$4\frac{3}{8}$		$5\frac{1}{4}$	$6\frac{1}{4}$	$7\frac{1}{8}$	8				
Z	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{5}{16}$	$1\frac{7}{16}$	$1\frac{1}{2}$	$1\frac{3}{4}$				

*These
are
casing
sizes.

Dimensions of straight sizes, and of Reducers, are shown in the table to the left. Dimensions of Reducing 90° Elbows and Tees will be furnished on request.

**When $6\frac{5}{8}$ -inch fittings are threaded for $6\frac{5}{8}$ -inch A. P. I. Casing, dimension "A" will be $6\frac{1}{4}$ inches.

A. A. R. Malleable Iron Fittings



No. 260 E
90° Elbow



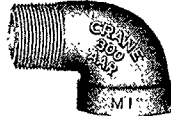
No. 262 E
45° Elbow

WORKING PRESSURE
300 pounds steam

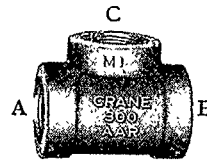
TEST PRESSURE
300 pounds air under water



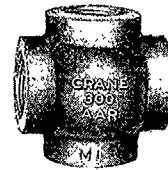
No. 262 1/2 E
45° Street Elbow



No. 268 E
90° Street Elbow



No. 264 E Tee



No. 266 E Cross



No. 267 E
Reducer



No. 279 E
Coupling



No. 278 E
Cap

Galvanized fittings: Galvanized fittings are made to order only. Prices are 50% higher than the list prices shown below for black fittings.

List Prices, Black

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 260 E, 90° Elbows	Each	.25	.25	.30	.35	.40	.55	.70	.90	1.50	2.40
No. 262 E, 45° Elbows	Each	.30	.30	.35	.42	.50	.65	.85	1.10	1.85	2.85
No. 262 1/2 E, 45° Street Elbows	Each			.50	.56	.63	.88	1.12	1.55		
No. 264 E, Tees	Each	.40	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60
No. 266 E, Crosses	Each	.80	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20
No. 267 E, Reducers	Each		.25	.28	.30	.40	.45	.55	.70	1.30	2.25
No. 268 E, 90° Street Elbows	Each			.40	.45	.50	.70	.90	1.25	2.10	3.10
No. 278 E, Caps	Each	.17	.17	.19	.23	.29	.38	.50	.65	1.00	1.35
No. 279 E, Couplings	Each	.14	.14	.14	.20	.26	.34	.42	.56	.80	1.20

Association of American Railroads: Crane A.A.R. Malleable Iron Fittings conform to the specifications and recommended practice of the Association of American Railroads (A.A.R.) for 300-Pound screwed pipe fittings.

Rugged construction: These fittings are exceptionally strong, tough, and rugged. They are especially suitable for severe service and will withstand rough usage, piping strains, and vibration.

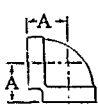
Additional types and sizes: Other types and sizes of 300-Pound Malleable Iron Fittings, not included in the A.A.R. Specifications, are shown on pages 190 and 191.

Reducing sizes: A.A.R. Reducing 90° Elbows, Reducing Tees, and Reducers are carried in stock in the sizes shown in the table to the right. These are furnished at the same price as straight size fittings.

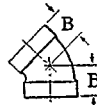
Reducing Fittings Carried in Stock

No. 260 E 90° Elbows	No. 264 E Tees						No. 267 E Reducers		
	A	B	C	A	B	C			
1/2 x 3/8	1/2 x 1/2 x 3/8	2 x 2 x 1 1/2	3/8 x 1/4	1 1/2 x 1 1/4					
3/4 x 1/2	1/2 x 3/8 x 1/2	2 x 2 x 1 1/4	1/2 x 3/8	1 1/2 x 1					
1 x 3/4	3/4 x 3/4 x 1/2	2 x 2 x 1	3/4 x 1/2	1 1/2 x 3/4					
1 1/4 x 1	3/4 x 1/2 x 3/4	2 x 2 x 3/4	1 x 3/4	1 1/2 x 1/2					
1 1/2 x 1 1/4	1 x 1 x 3/4	2 x 1 1/2 x 2	1 x 1/2	2 x 1 1/2					
2 x 1 1/2	1 x 1 x 1/2	2 1/2 x 2 1/2 x 2	1 1/4 x 1	2 x 1					
2 1/2 x 2	1 x 1 x 3/8	2 1/2 x 2 1/2 x 1 1/2	1 1/4 x 3/4	2 x 1/2					
3 x 2 1/2	1 x 3/4 x 1	2 1/2 x 2 x 2 1/2	1 1/4 x 1/2	2 1/2 x 2					
	1 1/4 x 1 1/4 x 1								
	1 1/4 x 1 1/4 x 3/4	3 x 3 x 2 1/2							
	1 1/4 x 1 1/4 x 1/2	3 x 3 x 2							
	1 1/4 x 1 x 1 1/4	3 x 2 1/2 x 3							
	1 1/2 x 1 1/2 x 1 1/4								
	1 1/2 x 1 1/2 x 1								
	1 1/2 x 1 1/2 x 3/4								
	1 1/2 x 1 1/2 x 1/2								
	1 1/2 x 1 1/4 x 1 1/2								

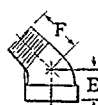
Dimensions, in Inches



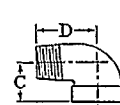
No. 260 E
90° Elbow



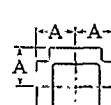
No. 262 E
45° Elbow



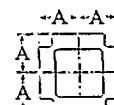
No. 262 1/2 E
45° Street Elbow



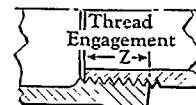
No. 268 E
90° Street Elbow



No. 264 E
Tee



No. 266 E
Cross



See page 591
for explanation.



No. 267 E
Reducer



No. 278 E
Cap



No. 279 E
Coupling

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 15/16	3 3/8
B	13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2
C			1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 15/16	3 3/8
D			2	2 3/16	2 9/16	2 7/8	3 1/8	3 11/16	4 1/2	5 1/8
E			1	1 1/8	1 5/16	1 1/2	1 11/16	2		
F			1 3/8	1 9/16	1 13/16	2 1/8	2 5/16	2 11/16		
J		1 7/16	1 11/16	1 3/4	2	2 3/8	2 11/16	3 3/16	3 11/16	4 1/16
K	25/32	7/8	1 1/16	1 1/4	1 3/8	1 1/2	1 11/16	1 13/16	2 1/8	2 1/4
L	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	3 1/8	3 5/8	4 1/8	4 5/8
Z	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1

Dimensions of straight sizes and of Reducers are shown in the table. Dimensions of reducing sizes on request.

A.A.R. Unions.....pages 242 to 244
A.A.R. Valves.....pages 42 to 45

Hydraulic Malleable Iron Fittings

WORKING PRESSURES

$\frac{1}{4}$ to 1-inch—2000 pounds cold water, oil, or gas, non-shock
 $1\frac{1}{4}$ to 2-inch—1500 pounds cold water, oil, or gas, non-shock
 $2\frac{1}{2}$ to 4-inch—1000 pounds cold water, oil, or gas, non-shock
 5 and 6-inch—800 pounds cold water, oil, or gas, non-shock



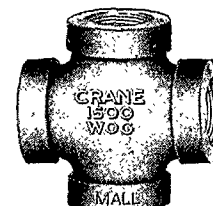
No. 260 H
90° Elbow



No. 263 H
90° Long Sweep Elbow



No. 264 H
Tee



No. 266 H
Cross

List Prices, Black

Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
No. 260 H, 90° Elbows	Each	.25	.25	.30	.35	.40	.55	.70	.90	1.50	2.40	3.25	4.25	6.50	11.00
No. 263 H, 90° Long Sweep Elbows	Each					.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50
No. 264 H, Tees	Each	.40	.40	.45	.50	.60	.80	1.05	1.35	2.25	3.60	5.00	6.50	9.75	16.50
No. 266 H, Crosses	Each	.80	.80	.90	1.00	1.20	1.60	2.10	2.70	4.50	7.20	10.00	13.00		

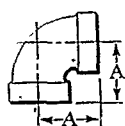
Service recommendations: These fittings are recommended especially for hydraulic pumping installations. In addition to being strong and rugged, they have a longer sweep than is usual with heavy malleable iron fittings.

Additional types and sizes: For reducing fittings,

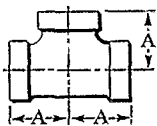
and for types and sizes not listed above, we recommend the use of Crane 300-Pound or Crane Heavy Malleable Iron Fittings, shown on pages 190 to 192.

Galvanized fittings: These fittings can be furnished galvanized, to order, at an advance of 50% over the list prices of black fittings.

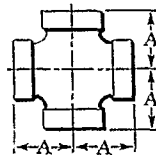
Dimensions, in Inches



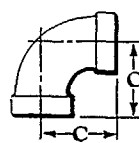
No. 260 H
90° Elbow



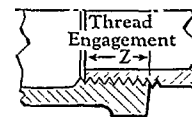
No. 264 H
Tee



No. 266 H
Cross



No. 263 H
90° Long Sweep Elbow



See page 591
for explanation.

Size	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6
A	$1\frac{1}{16}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$	$4\frac{1}{8}$	$4\frac{5}{8}$	$5\frac{1}{8}$	$6\frac{1}{4}$	$7\frac{1}{4}$
C					$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{3}{4}$	$5\frac{1}{2}$	$6\frac{1}{4}$	7	$8\frac{1}{2}$	$9\frac{1}{2}$
Z	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{9}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$\frac{3}{4}$	$1\frac{5}{16}$	1	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{5}{16}$

Other Fittings

Pages 180 to 194 do not show all the Malleable Iron Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalog:

Bushings.....	page 226
Plugs.....	page 228
Faced Couplings and Locknuts.....	page 232
One-Strap and Two-Strap Clamps.....	page 233
Screwed Unions & Union Fittings.....	pages 238 to 246
Flange Unions.....	pages 250 to 252
Railing Fittings.....	pages 268 to 272
Floor Flanges.....	page 290
Companion Flanges.....	page 292

Other fittings frequently used in installations of Malleable Iron Fittings or in installations beyond the pressure-temperature range of malleable iron, are shown on the following pages:

Steel Bushings.....	page 227
Steel Plugs.....	page 228
Wrought Couplings.....	page 229
Wrought Steel Nipples.....	pages 230 and 231
Steel Unions and Union Fittings.....	pages 247 and 248
Steel Flange Unions.....	pages 252 and 253
Forged Steel Fittings.....	pages 338 to 340
Cast Steel Fittings.....	page 341

Cast Iron Screwed Fittings Sprinkler Fittings

Standard Fittings.....	pages 197 to 203
Standard Fittings with Casing Threads.....	page 203
Long Sweep Fittings.....	pages 204 and 205
Sprinkler Fittings.....	pages 206 to 209
175-Pound Fittings.....	pages 210 and 211
250-Pound Fittings.....	pages 212 and 213

The Crane line of Cast Iron Screwed Fittings includes fittings for steam working pressures up to 250 pounds and for water, oil, or gas working pressures up to 400 pounds. In addition, it includes Drainage Fittings; see pages 215 to 224.

The uniformly superior quality that characterizes all Crane products is maintained in this line.

* * * * *

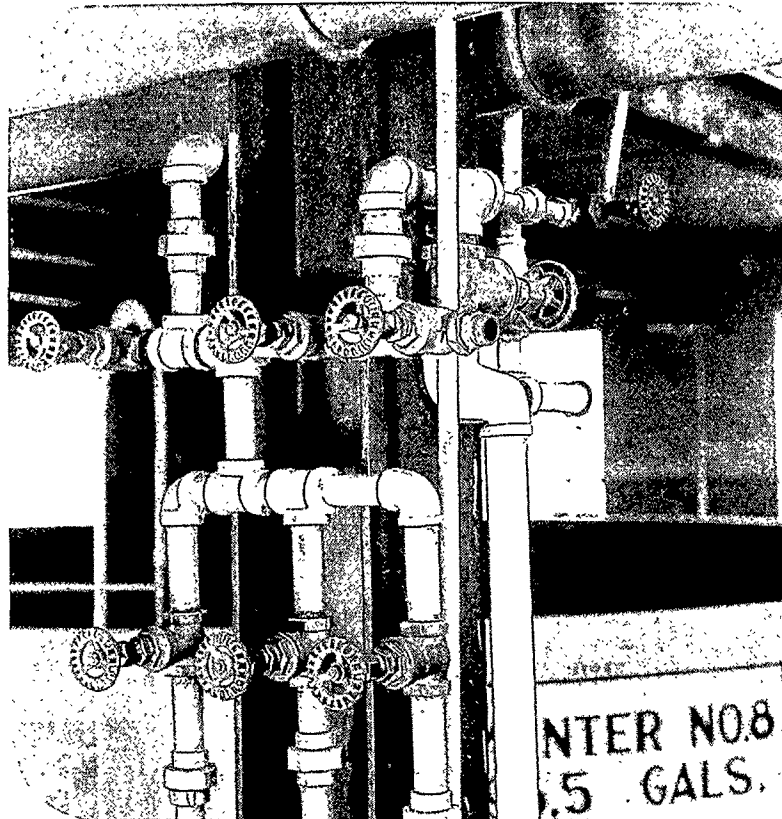
15

The list at the top of this page does not include all the Cast Iron Screwed Fittings manufactured by Crane Co. For greater convenience, the following fittings are shown in other sections of this catalog:

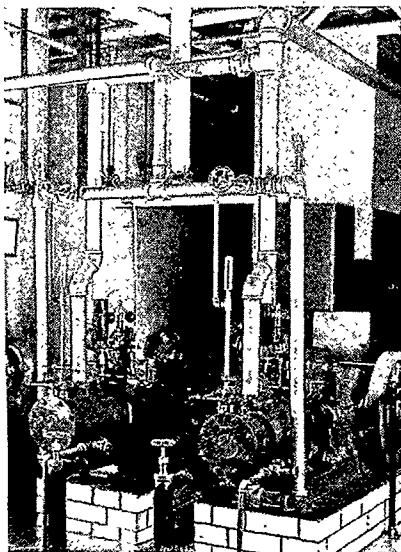
Bushings.....	page 226
Plugs.....	page 228
Flange Unions.....	pages 249 and 252
Common Flanges.....	page 290
Floor Flanges.....	page 290
Companion Flanges.....	pages 291 to 295

<i>Drainage Fittings.....</i>	<i>pages 215 to 224</i>
<i>Wrought Couplings.....</i>	<i>page 229</i>
<i>Wrought Steel Nipples.....</i>	<i>pages 230 and 231</i>
<i>Unions and Union Fittings.....</i>	<i>pages 238 to 248</i>

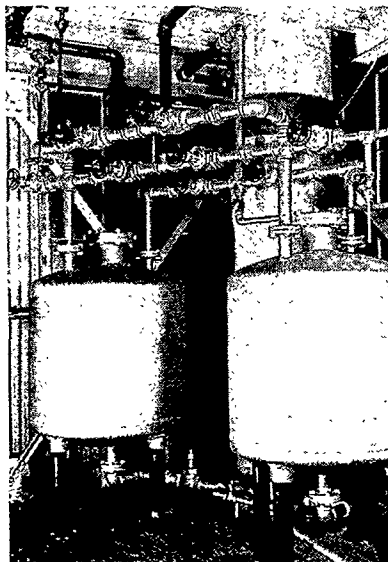
<i>Malleable Iron Fittings.....</i>	<i>pages 179 to 194</i>
<i>Forged Steel Fittings.....</i>	<i>pages 338 to 340</i>
<i>Cast Steel Fittings.....</i>	<i>page 341</i>
<i>How to read reducing fittings.....</i>	<i>page 644</i>



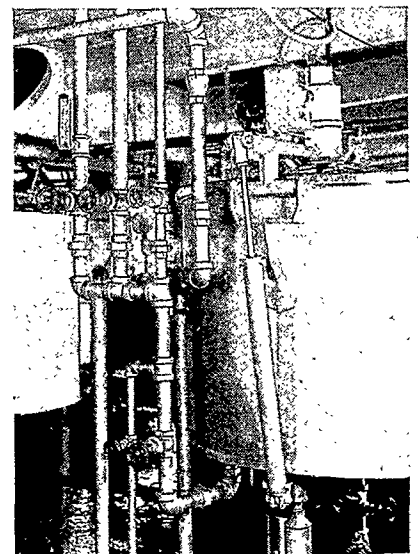
Cast iron fittings, malleable iron unions, and brass gate valves make up the Crane equipment in water and air lines for cleaning fermenting tanks in this distillery.



Steam-driven horizontal pumps in the heating system of large office building; all piping equipment is Crane.



Valves, fittings, and piping are Crane in this chemical plant processing hookup.



Starter tanks in food plant with Crane brass gate, globe, and vertical check valves, and Crane cast iron fittings.

Standard Cast Iron Fittings

WORKING PRESSURES

125 pounds steam

175 pounds cold water, oil, or gas, non-shock

The Crane line of Standard Cast Iron Screwed Fittings, illustrated on pages 198 to 202 inclusive, consists of a wide variety of types of fittings, made in a large range of straight and reducing sizes. It meets the requirements of nearly every piping installation using this class of material.

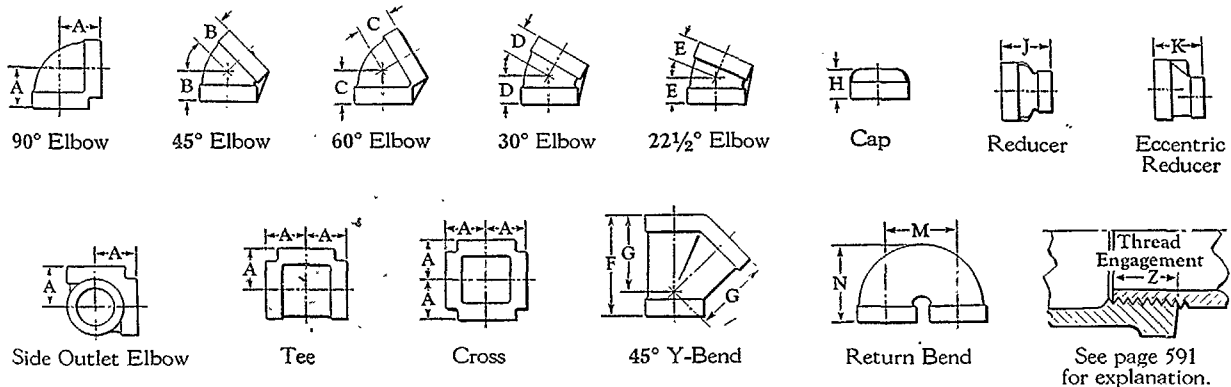
Rugged construction: The fittings are sturdy, rugged, and well proportioned. Heavy metal sections, amply reinforced at points subjected to greatest stress, assure a high factor of safety over the recommended working pressures.

Threading: All openings are carefully and accurately threaded to gauge and are in true alignment. To permit easy entrance of pipe, each opening is slightly chamfered.

Sprinkler service; Underwriters' approved: Crane Standard Cast Iron Screwed Fittings are listed as approved and inspected by the Underwriters' Laboratories, Chicago, for sprinkler service.

Dimensions: The table of dimensions shown below covers the most current straight size fittings, and reducers. Dimensions of other types of fittings and of reducing sizes will be furnished upon request.

Dimensions, in Inches



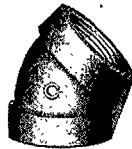
Size	A	B	C	D	E	F	G	J	K	H	Z	Return Bends					
1/4	13/16	3/4									3/8	Size	M	N	Size	M	N
3/8	15/16	13/16									1/2	Close Pattern			Open Pattern		
1/2	1 1/8	7/8	1	1 1/16	1 1/16	3/4	2 1/2	1 7/8			1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
3/4	1 5/16	1	1 1/16	1 5/16	7/8	3	2 1/4	1 1/2			9/16	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
1	1 1/2	1 1/8	1 1/4	1	1	3 1/2	2 3/4	1 1/8			1 1/16	1	1 3/4	2 3/8	1 1/4	3	3 3/32
1 1/4	1 3/4	1 5/16	1 7/16	1 3/16	1 1/8	4 1/4	3 1/4	2 1/8	2 1/8		1 1/16	1 1/4	2 1/4	2 29/32	1 1/2	3 1/2	3 3/4
1 1/2	1 15/16	1 7/16	1 5/8	1 5/16	1 1/4	4 7/8	3 13/16	2 1/4	2 1/4		1 1/16	1 1/2	2 1/2	3 1/4	2	4 1/2	4 19/32
2	2 1/4	1 11/16	1 7/8	1 3/4	1 7/16	5 3/4	4 1/2	2 7/16	2 7/16		3/4	2	3 1/4	3 31/32	2 1/2	5 1/2	5 7/16
2 1/2	2 11/16	1 15/16	2 3/16	1 13/16	1 9/16	6 3/4	5 3/16	2 5/8	2 11/16		1 5/16	2 1/2	3 3/4	4 9/16	3	6 1/2	6 5/16
3	3 3/8	2 3/16	2 1/2	1 13/16	1 3/4	7 7/8	6 1/8	2 7/8	2 15/16		1	3	4 1/4	5 3/16	4	7 1/2	7 9/16
3 1/2	3 7/16	2 3/8				8 7/8	6 7/8	3 1/8	3 1/8		1 1/16	4	6	6 13/16		1 1/2	4 7/8
4	3 3/4	2 5/8	3	2 3/8	2 1/16	9 3/4	7 5/8	3 3/8	3 3/8		2 1/16					1 1/2	6
5	4 1/2	3 1/16	3 1/2	2 5/8	2 1/4	11 5/8	9 1/4	3 7/8	3 7/8		1 1/4					1 1/2	8
6	5 1/8	3 7/16	4 1/16	2 7/8	2 7/16	13 7/16	10 3/4	4 3/8	4 3/8		2 5/8					2	4 7/8
8	6 9/16	4 1/4				16 15/16	13 5/8	5 1/4	5 1/4		3 1/8					2	6
10	8 1/16	5 3/16				20 11/16	16 3/4	6 3/16			3 5/8					2	7
12	9 1/2	6				24 1/8	19 5/8	7 1/8			4 1/4					2	8
											1 3/4					4	11

* 1 x 1/2-inch Reducers are 1 11/16 inches end to end.

Standard Cast Iron Fittings



90° Elbow



45° Elbow



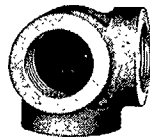
60° Elbow



30° Elbow



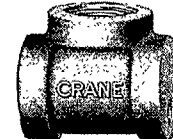
22½° Elbow



Side Outlet Elbow



Tee

Eccentric Reducing Tees
Prices on application

List Prices

Size	Inches																				1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
90° Elbows Straight	Right Hand	Black	Each	.05	.05	.06	.08	.10	1/2	.16	.20	.28	.50	.75	1.05	1.20	2.00	2.75	6.75	13.50	20.00																
		Galv.	Each	.10	.10	.12	.16	.21		.32	.40	.56	1.00	1.50	2.10	2.40	4.00	5.50	13.50	27.00	40.00																
	Right & Left	Black	Each	.06	.06	.07	.09	.12	.18	.23	.32	.60	.85																								
		Galv.	Each	.12	.12	.14	.18	.24	.36	.46	.64	1.20	1.70																								
90° Elbows *Reducing	Pitched	Black	Each			.08	.10	.13	.20	.25	.35	.65	1.00	1.30	1.50																						
		Galv.	Each			.16	.20	.26	.40	.50	.70	1.30	2.00	2.60	3.00																						
	Right Hand	Black	Each		.06	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.30	3.15	7.75	15.50	23.00																	
		Galv.	Each		.12	.14	.18	.24	.36	.46	.64	1.20	1.70	2.40	2.80	4.60	6.30	15.50	31.00	46.00																	
45° Elbows	Pitched	Black	Each				.10	.13	.20	.25	.35	.65	1.00	1.30																							
		Galv.	Each				.20	.26	.40	.50	.70	1.30	2.00	2.60																							
		Black	Each	.06	.06	.07	.10	.12	.19	.24	.34	.60	.90	1.25	1.45	2.50	3.45	8.50	17.00	25.00																	
		Galv.	Each	.12	.12	.14	.20	.24	.38	.48	.68	1.20	1.80	2.50	2.90	5.00	6.90	17.00	34.00	50.00																	
60° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00																				
	Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00																					
30° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00																				
	Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00																					
22 1/2° Elbows		Black	Each			.25	.30	.35	.45	.50	.60	1.10	1.65		2.75	5.00	7.00																				
	Galv.	Each			.50	.60	.70	.90	1.00	1.20	2.20	3.30		5.50	10.00	14.00																					
Side Outlet Elbows		Black	Each					.30	.48	.60	.84	1.50	2.25		3.60																						
	Galv.	Each						.60	.96	1.20	1.68	3.00	4.50		7.20																						
Tees, Straight		Black	Each	.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	3.00	4.00	9.75	19.50	29.00																	
	Galv.	Each	.16	.16	.18	.24	.30	.46	.58	.82	1.46	2.20	3.00	3.50	6.00	8.00	19.50	39.00	58.00																		
*Tees, Reducing		Black	Each	.09	.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	3.50	4.60	11.25	22.50	33.50																		
	Galv.	Each	.18	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	7.00	9.20	22.50	45.00	67.00																			

15

*Reducing fittings: List prices of reducing 90° Elbows and Tees apply to reducing sizes carried in stock, shown in the tables at the right and on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows, 60° Elbows, 30° Elbows, 22½° Elbows, and Side Outlet Elbows can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Right & Left Elbows: Right and Left 90° Elbows have ribs cast on the left hand end.

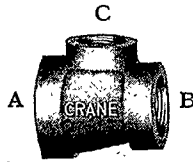
Pitched Elbows: Pitched ¼-inch per foot.

Eccentric Tees: Eccentric Tees are made to order only; prices on application. Orders should be accompanied by a sketch showing the position and size of all openings.

Reducing Elbows Carried in Stock

90° Elbows			90° Elbows Pitched	
3/8 x 1/4	2 x 1 1/2	4 x 3 1/2	3/4 x 1/2	
1/2 x 3/8	2 x 1 1/4	4 x 3	1 x 3/4	
1/2 x 1/4	2 x 1	4 x 2 1/2	1 1/4 x 1	
3/4 x 1/2	2 x 3/4	4 x 2	1 1/2 x 1 1/4	
3/4 x 3/8	2 x 1/2	4 x 1 1/2	1 1/2 x 1	
3/4 x 1/4	2 1/2 x 2	5 x 4	2 x 1 1/2	
1 x 3/4	2 1/2 x 1 1/2	5 x 3 1/2	2 1/2 x 2	
1 x 1/2	2 1/2 x 1 1/4	5 x 3	3 x 2 1/2	
1 x 3/8	2 1/2 x 1	5 x 2 1/2	3 1/2 x 3	
1 1/4 x 1	2 1/2 x 3/4	6 x 5		
1 1/4 x 3/4	3 x 2 1/2	6 x 4		
1 1/4 x 1/2	3 x 2	6 x 3 1/2		
1 1/4 x 3/8	3 x 1 1/2	6 x 3		
1 1/2 x 1 1/4	3 x 1 1/4	6 x 2 1/2		
1 1/2 x 1	3 x 1	6 x 2		
1 1/2 x 3/4	3 1/2 x 3	8 x 6		
1 1/2 x 1/2	3 1/2 x 2 1/2	8 x 3		
	3 1/2 x 2	10 x 8		
	3 1/2 x 1 1/2	12 x 10		
	3 1/2 x 1 1/4	12 x 8		

Standard Cast Iron Fittings



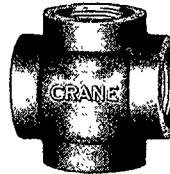
Reducing Tees Carried in Stock

Reducing Tees are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for Reducing Tees.

For prices of Reducing Tees not carried in stock, see the footnotes on the preceding page.

[illegible]

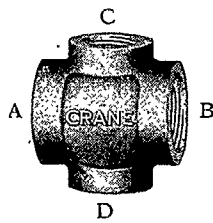
Standard Cast Iron Fittings



Cross

List Prices

Size			Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Crosses	Straight	Black	Each	.15	.15	.16	.22	.27	.42	.53	.75	1.30	2.00	2.70	3.15	5.50	7.25	17.50	35.00	52.50
		Galv.	Each	.30	.30	.32	.44	.54	.84	1.06	1.50	2.60	4.00	5.40	6.30	11.00	14.50	35.00	70.00	105.00
	*Reducing	Black	Each			.18	.25	.30	.46	.60	.83	1.45	2.20	3.00	3.50	6.00	8.00	19.25	38.50	58.00
		Galv.	Each			.36	.50	.60	.92	1.20	1.66	2.90	4.40	6.00	7.00	12.00	16.00	38.50	77.00	116.00



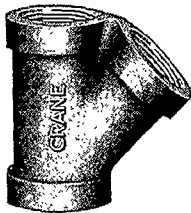
***Reducing Crosses:** List prices of Reducing Crosses apply to reducing sizes carried in stock, shown in the table below. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing sizes that require making a new pattern are entirely special. Prices on application.

Reducing Crosses Carried in Stock

[illegible]

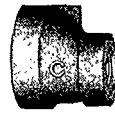
Standard Cast Iron Fittings



45° Y-Bend



Reducer



Eccentric Reducer



Cap



Locknut

List Prices

Size	Inches																1½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
45° Y-Bends	Black	Each	.20	.28	.34	.54	.66	.94	1.66	2.50	3.50	4.00	7.00	9.20	22.50	45.00	67.00														
	Galv.	Each	.40	.56	.68	1.08	1.32	1.88	3.32	5.00	7.00	8.00	14.00	18.40	45.00	90.00	134.00														
*Reducers	Black	Each		.10	.16	.22	.28	.43	.60	.80	1.00	1.35	2.00	2.70	6.75	10.00	15.00														
	Galv.	Each		.20	.32	.44	.56	.86	1.20	1.60	2.00	2.70	4.00	5.40	13.50	20.00	30.00														
Eccentric	Black	Each				.55	.72	1.00	1.50	2.40	3.00	4.00	6.00	8.00	11.00																
*Reducers	Galv.	Each				1.10	1.44	2.00	3.00	4.80	6.00	8.00	12.00	16.00	22.00																
Caps	Black	Each	For ¼ to 3½-inch, use Malleable Iron.										.87	1.20	1.55	2.85	5.50	7.00													
	Galv.	Each	See page 185										1.74	2.40	3.10	5.70	11.00	14.00													
Locknuts	Black	Each	For ¼ to 2-inch, use Malleable								.27	.34	.47	.64	.90	1.30	2.35	3.00	4.00												
	Galv.	Each	Iron. See page 185								.54	.68	.94	1.28	1.80	2.60	4.70	6.00	8.00												

*Reducing fittings: List prices of Reducers and Eccentric Reducers apply to sizes carried in stock, shown in the table below. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

15

Reducers Carried in Stock

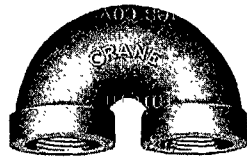
Reducers				Eccentric Reducers			
3/4 x 1/2	3 x 2 1/2	5 x 4	8 x 6	1 1/4 x 1	3 x 2 1/2	4 x 3 1/2	6 x 5
1 x 3/4	3 x 2	5 x 3 1/2	8 x 4	1 1/4 x 3/4	3 x 2	4 x 3	6 x 4
1 x 1/2	3 x 1 1/2	5 x 3	10 x 8	1 1/2 x 1 1/4	3 x 1 1/2	4 x 2 1/2	6 x 3 1/2
1 1/4 x 1	3 x 1 1/4	5 x 2 1/2	10 x 6	1 1/2 x 1	3 x 1 1/4	4 x 2	6 x 3
1 1/2 x 1 1/4	3 x 1	5 x 2	12 x 10	1 1/2 x 3/4	3 x 1	4 x 1 1/2	6 x 2 1/2
2 x 1 1/2	3 1/2 x 3	6 x 5	12 x 8	2 x 1 1/2	3 1/2 x 3	4 x 1 1/4	6 x 2
2 x 1 1/4	3 1/2 x 2 1/2	6 x 4		2 x 1 1/4	3 1/2 x 2 1/2	4 x 1	8 x 6
2 x 1	3 1/2 x 2	6 x 3 1/2		2 x 1	3 1/2 x 2	5 x 4	8 x 5
2 1/2 x 2	4 x 3 1/2	6 x 3		2 x 3/4	3 1/2 x 1 1/2	5 x 3 1/2	
2 1/2 x 1 1/2	4 x 3	6 x 2 1/2		2 1/2 x 1 1/2	3 1/2 x 1 1/4	5 x 3	
2 1/2 x 1 1/4	4 x 2 1/2	6 x 2		2 1/2 x 1 1/4	3 1/2 x 1	5 x 2 1/2	
2 1/2 x 1	4 x 2			2 1/2 x 1		5 x 2	
2 1/2 x 3/4	4 x 1 1/2						

Description....page 197

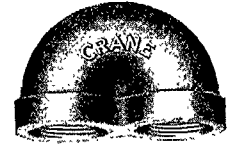
Dimensions....page 197

Working pressures....page 197

Standard Cast Iron Return Bends

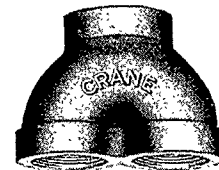


Return Bends							
Size Inches	Center to Center Inches	Right Hand		Right & Left		Left Hand	
		Black Each	Galv. Each	Black Each	Galv. Each	Black Each	Galv. Each
Close Pattern							
1/2	1 1/4	.18	.36	.21	.42	.21	.42
3/4	1 1/2	.20	.40	.23	.46	.23	.46
1	1 3/4	.22	.44	.26	.52	.26	.52
1 1/4	2 1/4	.28	.56	.33	.66	.33	.66
1 1/2	2 1/2	.40	.80	.46	.92	.46	.92
2	3 1/4	.57	1.14	.66	1.32	.66	1.32
2 1/2	3 3/4	1.20	2.40	1.40	2.80	1.40	2.80
3	4 1/4	1.70	3.40	1.95	3.90	1.95	3.90
4	6	5.00	10.00	5.25	10.50	5.25	10.50
Open Pattern							
3/4	1 7/8	.26	.52	.30	.60		
1	2 1/2	.30	.60	.35	.70		
1 1/4	3	.40	.80	.46	.92		
1 1/2	3 1/2	.55	1.10	.64	1.28		
2	4 1/2	.80	1.60	.92	1.84		
2 1/2	5 1/2	1.35	2.70	1.55	3.10		
3	6 1/2	2.20	4.40	2.50	5.00		
4	7 1/2	6.50	10.00	7.00	14.00		
Special Wide Pattern							
1	3	.45	.80				
1	4	.50	.90				
1	5	.60	1.10				
1	6	.75	1.30				
1	8	1.00	1.60				
1 1/4	4	1.00	1.75				
1 1/4	6	1.25	2.00				
1 1/4	8	Use 250-Pound, page 212.					
1 1/2	4 7/8	1.30	2.30				
1 1/2	6	1.60	2.60				
1 1/2	8	2.00	3.25				
2	4 7/8	1.75	3.00				
2	6	2.00	3.25				
2	7	3.00	4.50				
2	8	3.50	5.00				
4	11	7.50	11.00				
Close Pattern Return Bends can not be used to make up parallel coils. The center to center dimension is so close that the bands of adjacent bends will not clear each other.							



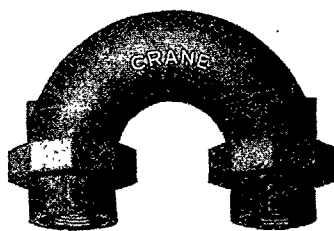
Close Pattern Pitched Return Bends				
Size Inches	Center to Center Inches	Length of pipe in coil Feet	Right Hand	
			Black Each	Galv. Each
1	1 3/4	3	.26	.52
1	1 3/4	4	.26	.52
1	1 3/4	5	.26	.52
1	1 3/4	6	.26	.52
1	1 3/4	8	.26	.52
1 1/4	2 1/4	4	.33	.66
1 1/4	2 1/4	5	.33	.66
1 1/4	2 1/4	6	.33	.66

Pitched Return Bends are marked with the length of coil. 1-inch Return Bends for coils longer than 8 feet are not pitched. Right and Left Pitched Return Bends are made to order.



Back Outlet Return Bends						
Size Inches	Center to Center Inches	Size of Back Outlet Inches	Right Hand		Right & Left	
			Black Each	Galv. Each	Black Each	Galv. Each
3/4	1 7/8	3/4	.38	.76	.42	.84
1	2 1/4	1	.42	.84	.48	.96
1	4	1 1/4	*	*	*	*
1 1/4	2 1/4	1 1/4	.60	1.20	.70	1.40
1 1/4	3 1/4	1 1/2	*	*	*	*
1 1/2	2 1/2	1 1/2	.80	1.60	.95	1.90
1 1/2	4	1 1/2	*	*	*	*
2	3 1/4	2	1.15	2.30	1.30	2.60
2	4	1 1/2	*	*	*	*
2 1/2	3 3/4	2 1/2	2.00	4.00	2.30	4.60
3	4 1/4	3	3.00	6.00	3.50	7.00

*Prices on application.
The back outlet of Right and Left Return Bends is threaded right hand.



Return Bend with
Union Ends

Return Bends with Union Ends		
Size Inches	Center to Center Inches	Black Each
1 1/4	4 5/8	1.60
2	6	3.00
3	8	*

*Price on application.
These Return Bends are equipped with No. 1218 Gasket Type 2/3 Unions and rubber gaskets. See page 239.

Description page 197

Dimensions page 197

Working pressures page 197

Standard Cast Iron Fittings With Casing Threads

WORKING PRESSURE
175 pounds cold water, oil, or gas, non-shock

Orders for fittings with casing threads should specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

List Prices, Black

Size	Inches		2, 2 $\frac{1}{4}$ 2 $\frac{1}{2}$ 2 $\frac{3}{4}$, 3	3 $\frac{1}{4}$	3 $\frac{1}{2}$ 3 $\frac{3}{4}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$	4 $\frac{3}{4}$	5
90° Elbows	Straight	Each	1.10	1.35	1.80	2.50	2.50	3.00	3.00	3.50
	Reducing	Each	1.40	1.75	2.25	3.00	3.00	3.75	3.75	4.35
45° Elbows	Straight	Each	1.60	2.00	2.70	3.75	3.75	4.00	4.00	4.50
	Reducing	Each	1.50	2.00	2.50	3.50	3.50	4.00	4.25	5.00
Tees	Straight	Each	1.85	2.50	3.00	4.35	4.35	5.00	5.25	6.25
	Reducing	Each	2.20	2.70	3.50	5.00	5.00	5.70	6.00	7.00
Crosses	Straight	Each	2.75	3.30	4.35	6.25	6.25	7.00	7.50	8.75
	Reducing	Each	.50	.75	.85	1.35	1.35	1.75	1.75	2.00
Plugs		Each	.60	.80	1.00	1.50	1.50	1.85	1.85	2.00
Bushings		Each	2.25	2.75	3.15	4.50	4.50	5.00	5.00	5.50
Flange Unions		Each	.50	.70	.95	1.25	1.25	1.35	1.35	1.50
Locknuts	Close	Each	3.00	4.00	5.00	6.00	6.50			
	Open	Each	3.75	4.50	5.75	8.00	8.00			
Return Bends		Each	1.20	1.50	2.00	2.75	2.75	3.00	3.00	3.50
Reducers		Each	.80	1.10	1.30	1.60	1.60	2.00	2.00	2.15
Caps		Each	3.25	4.50	6.00	8.00	8.00	9.00	9.00	10.00
45° Y-Bends		Each								

Size	Inches		5 $\frac{3}{16}$ 5 $\frac{7}{8}$	6 $\frac{1}{4}$ 6 $\frac{3}{8}$	7 $\frac{5}{8}$	8 $\frac{1}{4}$ 8 $\frac{5}{8}$	9 $\frac{5}{8}$	10 $\frac{5}{8}$	11 $\frac{5}{8}$	12 $\frac{1}{2}$
90° Elbows	Straight	Each	4.00	7.00	10.00	13.00	20.00	28.00	35.00	45.00
	Reducing	Each	5.00	8.75	12.50	16.00	25.00	35.00	45.00	60.00
45° Elbows	Straight	Each	5.50	9.00	13.00	16.00	25.00	35.00	45.00	60.00
	Reducing	Each	5.50	10.00	15.00	20.00	25.00	32.00	40.00	50.00
Tees	Straight	Each	6.75	12.50	18.75	25.00	30.00	35.00	50.00	70.00
	Reducing	Each	7.80	14.00	20.00	26.00	40.00	55.00	70.00	90.00
Crosses	Straight	Each	9.70	17.50	25.00	32.00	50.00	70.00	90.00	115.00
	Reducing	Each	2.40	3.75	5.50	6.50	7.50	9.00	11.00	14.00
Plugs		Each	2.50	3.75	5.50	6.50	7.50	9.00	14.00	20.00
Bushings		Each	6.50	8.00	10.00	12.00	15.00	28.00	35.00	45.00
Flange Unions		Each	1.90	2.50	3.50	4.00	4.50	6.25	12.50	20.00
Locknuts		Each	4.00	8.00	10.00	12.00	15.00	22.00	30.00	40.00
Reducers		Each	2.35	4.00	4.35	6.00	7.25	8.50	16.00	20.00
Caps		Each	12.00	17.00	25.00	35.00	45.00	50.00	65.00	85.00
45° Y-Bends		Each								

Fittings with iron pipe and casing threads: For Standard Cast Iron Casing Fittings with one or more openings tapped with regular iron pipe thread, add 25 per cent to the list prices shown above.

Galvanized fittings: Galvanized Standard Cast Iron Casing Fittings can be furnished at double the list prices shown above.

Other Crane products with casing threads: For cast iron casing fittings not listed above and for valves or cocks—brass, iron, or steel—with casing or special thread, see the Crane Discount Sheet for prices.

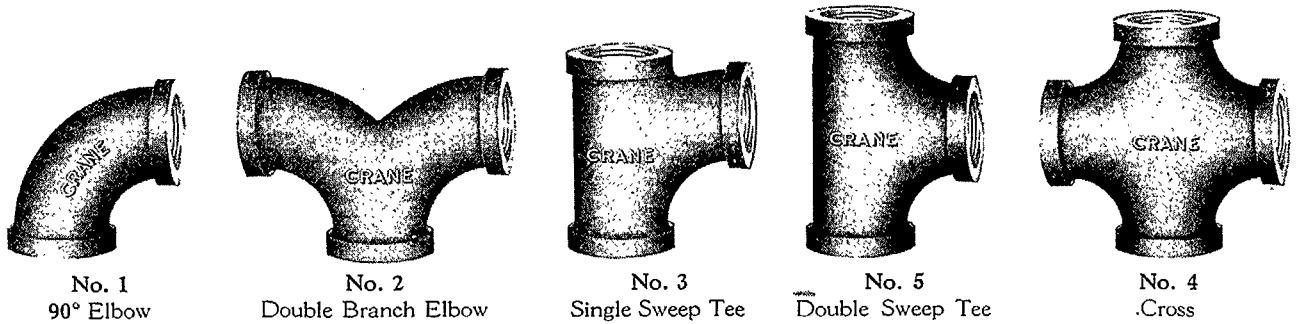
Orders should specify outside diameter of casing, number of threads per inch, and style of casing.

Long Sweep Cast Iron Fittings

WORKING PRESSURES

125 pounds steam

150 pounds cold water, oil, or gas, non-shock



List Prices, Black

Size	Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
No. 1, 90° Elbows	Straight Each	.26	.32	.40	.55	.80	1.20	2.25	3.25	3.50	6.50	8.75	17.00	30.00	40.00
	*Reducing Each	.40	.48	.60	.83	1.20	1.80	3.38	4.88	5.25	9.75	13.13	25.50	45.00	60.00
No. 2, Double Branch Elbows	Straight Each	.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50	34.00	60.00	80.00	120.00
	*Reducing Each	.96	1.20	1.65	2.40	3.60	6.75	9.75	10.50	19.50	26.25	51.00	90.00	120.00	180.00
No. 3, Single Sweep Tees	Straight Each	.40	.48	.60	.82	1.20	1.80	3.40	4.90	5.25	9.75	13.25	25.50	45.00	60.00
	*Reducing Each	.72	.90	1.23	1.80	2.70	5.10	7.35	7.88	14.63	19.88	38.25	67.50	90.00	120.00
No. 5, Double Sweep Tees	Straight Each	.52	.64	.80	1.10	1.60	2.40	4.50	6.50	7.00	13.00	17.50	34.00	60.00	80.00
	*Reducing Each	.96	1.20	1.65	2.40	3.60	6.75	9.75	10.50	19.50	26.25	51.00	90.00	120.00	180.00
No. 4, Crosses	Straight Each	.85	1.10	1.50	2.15	3.20	6.00	8.75	9.50	17.50	24.00	45.00	80.00	107.00	140.00
	*Reducing Each		1.65	2.25	3.23	4.80	9.00	13.13	14.25	26.25	36.00	67.50	120.00	160.50	210.00

***Reducing fittings:** List prices of reducing Double Branch Elbows, Single Sweep Tees, Double Sweep Tees, and Crosses apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

No. 1 Reducing 90° Elbows are made to order only. Reducing list prices apply to any reduction when bushed in the sand from straight sizes.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

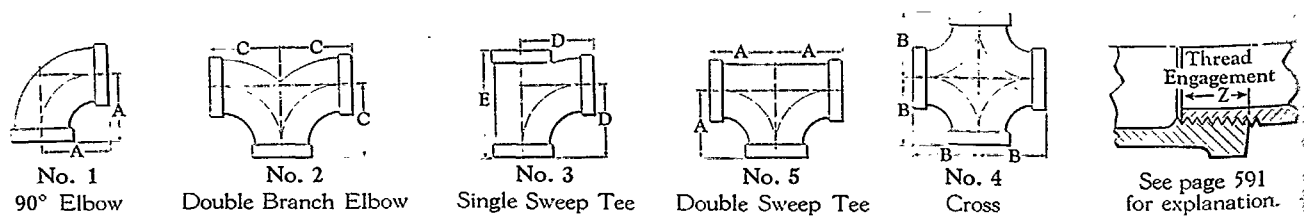
Galvanized fittings: These fittings can be furnished galvanized, at double the above list prices.

American Standard Sprinkler Fittings: American Standard Sprinkler Fittings for use in fire protection installations are shown on pages 206 to 208.

Dimensions: The dimensions of straight size fittings are shown in the table below. Dimensions of reducing sizes will be furnished on request.

15

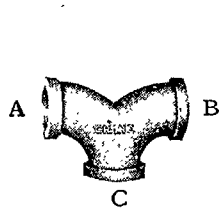
Dimensions, in Inches



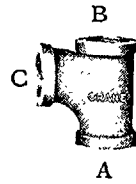
Size	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
A	2	2 1/2	3	3 1/2	4	4 1/2	5	5 3/4	6 1/2	7 1/2	9	11 3/4	14 1/2	17
B		2 1/2	3	3 1/2	4	4 1/2	5	5 3/4	6 1/2	7 1/2	9	11 3/4	14 1/2	17
C		2 1/2	3	3 1/2	4	5 1/4	6	6 5/8	6 1/2	9	10 5/8	11 3/4	14 1/2	17
D	2	2 1/2	3	3 1/2	4	4 3/4	5 1/2	5 13/16	7	8 1/2	9 1/4	11 3/4	14 1/2	17
E	3	3 7/8	4 1/2	5 1/4	6 1/8	7	8 1/8	8 13/16	10 1/2	12 1/4	14 1/4	17 3/8	21 1/8	24 3/4
Z	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16	1 5/8	1 3/4

Long Sweep Cast Iron Fittings

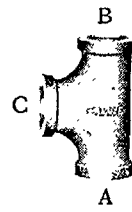
Reducing Fittings Carried in Stock



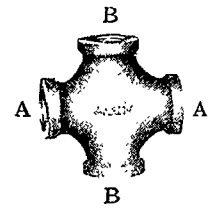
No. 2
Double Branch Elbow



No. 3
Single Sweep Tee



No. 5
Double Sweep Tee



No. 4
Cross

Reducing Double Branch Elbows, Single Sweep Tees, Double Sweep Tees, and Crosses are carried in stock in the sizes shown below. These are sold

at regular prices for reducing fittings.

For prices of non-stock reducing sizes, see the footnotes on the preceding page.

No. 2 Double Branch Elbows			No. 3 Single Sweep Tees			No. 5 Double Sweep Tees			No. 4 Crosses	
A	B	C	A	B	C	A	B	C	A	B
$\frac{3}{4}$ x $\frac{3}{4}$ x 1			1 x 1 x $\frac{3}{4}$			2 x 2 x 1			$2\frac{1}{2}$ x $1\frac{1}{2}$	
$\frac{3}{4}$ x $\frac{3}{4}$ x $1\frac{1}{4}$			1 x $\frac{3}{4}$ x $\frac{3}{4}$			2 x $1\frac{1}{2}$ x $1\frac{1}{2}$			3 x $1\frac{1}{2}$	
1 x 1 x $1\frac{1}{4}$						2 x $1\frac{1}{2}$ x 1			4 x $2\frac{1}{2}$	
$1\frac{1}{4}$ x $1\frac{1}{4}$ x $1\frac{1}{2}$			$1\frac{1}{4}$ x $1\frac{1}{4}$ x 1			$2\frac{1}{2}$ x $2\frac{1}{2}$ x 2			5 x 4	
$1\frac{1}{2}$ x $1\frac{1}{2}$ x 2			$1\frac{1}{4}$ x $1\frac{1}{4}$ x $\frac{3}{4}$			$2\frac{1}{2}$ x $2\frac{1}{2}$ x $1\frac{1}{2}$			5 x 3	
2 x 2 x $2\frac{1}{2}$			$1\frac{1}{4}$ x 1 x $\frac{3}{4}$			$2\frac{1}{2}$ x 2 x $2\frac{1}{2}$			6 x 4	
$2\frac{1}{2}$ x $2\frac{1}{2}$ x 3			$1\frac{1}{4}$ x $\frac{3}{4}$ x $1\frac{1}{4}$			$2\frac{1}{2}$ x 2 x 2			8 x 6	
2 x 2 x 3			$1\frac{1}{2}$ x $1\frac{1}{2}$ x $1\frac{1}{4}$			$2\frac{1}{2}$ x 2 x $1\frac{1}{2}$			8 x 4	
3 x 3 x 4			$1\frac{1}{2}$ x $1\frac{1}{2}$ x $\frac{3}{4}$			2 x 2 x $2\frac{1}{2}$				
$2\frac{1}{2}$ x $2\frac{1}{2}$ x 4			$1\frac{1}{2}$ x $1\frac{1}{4}$ x $1\frac{1}{4}$			3 x 3 x $2\frac{1}{2}$				
4 x 4 x 5			$1\frac{1}{2}$ x $1\frac{1}{4}$ x 1			3 x 3 x 2				
5 x 5 x 6			$1\frac{1}{2}$ x $1\frac{1}{4}$ x $\frac{3}{4}$			3 x 3 x $1\frac{1}{2}$				
			2 x 2 x $1\frac{1}{2}$			3 x 3 x 1				
			2 x 2 x $1\frac{1}{4}$			3 x $2\frac{1}{2}$ x 3				
			2 x 2 x 1			3 x $2\frac{1}{2}$ x $2\frac{1}{2}$				
			2 x $1\frac{1}{2}$ x $1\frac{1}{2}$			3 x $2\frac{1}{2}$ x 2				
			2 x $1\frac{1}{2}$ x 1			3 x 2 x 3				
			$2\frac{1}{2}$ x $2\frac{1}{2}$ x 2			3 x 2 x $2\frac{1}{2}$				
			$2\frac{1}{2}$ x $2\frac{1}{2}$ x $1\frac{1}{2}$			$2\frac{1}{2}$ x $2\frac{1}{2}$ x 3				
			$2\frac{1}{2}$ x $2\frac{1}{2}$ x $1\frac{1}{4}$			$2\frac{1}{2}$ x 2 x 3				
			$2\frac{1}{2}$ x 2 x 2			$3\frac{1}{2}$ x $3\frac{1}{2}$ x 3				
			$2\frac{1}{2}$ x 2 x $1\frac{1}{2}$			$3\frac{1}{2}$ x $3\frac{1}{2}$ x $2\frac{1}{2}$				
			$2\frac{1}{2}$ x 2 x 1			$3\frac{1}{2}$ x 3 x $3\frac{1}{2}$				
			$2\frac{1}{2}$ x 2 x 1			$3\frac{1}{2}$ x 3 x 3				
			3 x 3 x $2\frac{1}{2}$			$3\frac{1}{2}$ x 3 x $2\frac{1}{2}$				
			3 x 3 x 2			$3\frac{1}{2}$ x 3 x 2				
			3 x 3 x $1\frac{1}{2}$			$3\frac{1}{2}$ x $2\frac{1}{2}$ x $3\frac{1}{2}$				
			3 x 3 x $1\frac{1}{4}$			$3\frac{1}{2}$ x $2\frac{1}{2}$ x 3				
			3 x 3 x 1			$3\frac{1}{2}$ x $2\frac{1}{2}$ x $2\frac{1}{2}$				
			3 x $2\frac{1}{2}$ x 2			$3\frac{1}{2}$ x $2\frac{1}{2}$ x $2\frac{1}{2}$				
			3 x $2\frac{1}{2}$ x $1\frac{1}{2}$			$3\frac{1}{2}$ x 2 x $3\frac{1}{2}$				
			$3\frac{1}{2}$ x $3\frac{1}{2}$ x 2			$3\frac{1}{2}$ x 2 x 3				
			$3\frac{1}{2}$ x $3\frac{1}{2}$ x $1\frac{1}{2}$			3 x 3 x $3\frac{1}{2}$				
			$3\frac{1}{2}$ x $3\frac{1}{2}$ x $1\frac{1}{4}$			3 x $2\frac{1}{2}$ x $3\frac{1}{2}$				
			$3\frac{1}{2}$ x 3 x 2			3 x 2 x $3\frac{1}{2}$				
			$3\frac{1}{2}$ x 3 x $1\frac{1}{2}$			$2\frac{1}{2}$ x $2\frac{1}{2}$ x $3\frac{1}{2}$				
			4 x 4 x 3			4 x 4 x $3\frac{1}{2}$				
			4 x 4 x $2\frac{1}{2}$			4 x 4 x 3				
			4 x 4 x 2			4 x 4 x $2\frac{1}{2}$				
			4 x 4 x $1\frac{1}{2}$			4 x $3\frac{1}{2}$ x 4				
			4 x 4 x $1\frac{1}{4}$			4 x $3\frac{1}{2}$ x $3\frac{1}{2}$				
			4 x $3\frac{1}{2}$ x $1\frac{1}{2}$			4 x $3\frac{1}{2}$ x 3				
			4 x 3 x 3			4 x $3\frac{1}{2}$ x $2\frac{1}{2}$				
			5 x 5 x 3			4 x 3 x 4				
			5 x 5 x 2			4 x 3 x $3\frac{1}{2}$				
			6 x 6 x 4			4 x 3 x 3				
			6 x 6 x 3			4 x 3 x $2\frac{1}{2}$				
			6 x 6 x $2\frac{1}{2}$			4 x $2\frac{1}{2}$ x 4				
			6 x 6 x 2			4 x $2\frac{1}{2}$ x $3\frac{1}{2}$				
			8 x 8 x 4			$3\frac{1}{2}$ x $3\frac{1}{2}$ x 4				
						$3\frac{1}{2}$ x 3 x 4				

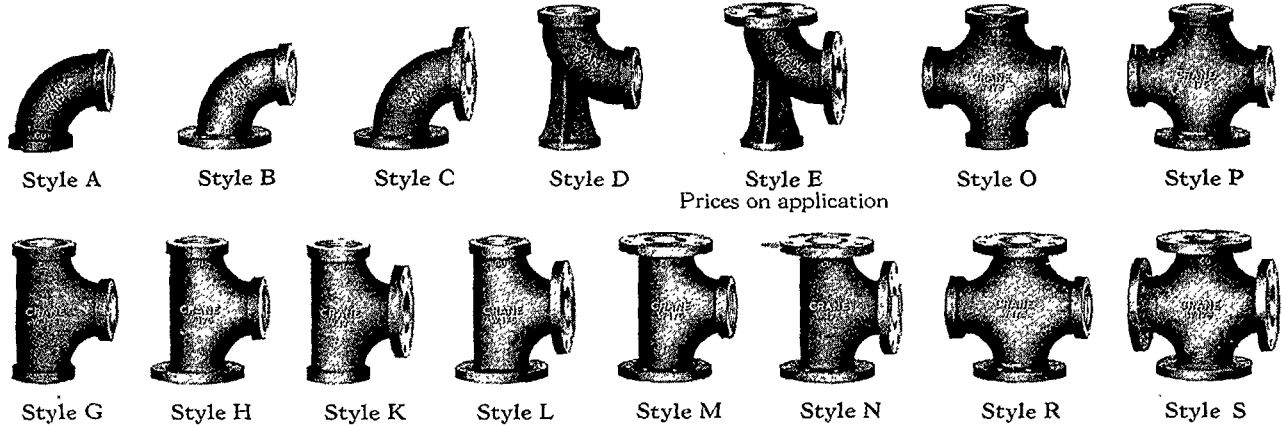
Use reducing
list price
corresponding
to largest
opening.

American Standard Cast Iron Sprinkler Fittings

WORKING PRESSURES

175-Pound — 175 pounds cold water, non-shock

250-Pound — 250 pounds cold water, non-shock



List Prices, Black, Each

SizeInches			175-Pound							250-Pound					
			2½	3	3½	4	5	6	8	2½	3	3½	4	5	6
90° Elbows	Style A	Straight	1.20	2.25	3.25	3.50	6.50	8.75	17.00	2.40	4.50	6.50	7.00	13.00	17.50
	Style B	Straight	5.50	6.00	6.50	7.50	10.00	14.00	30.00	11.00	12.00	13.00	15.00	20.00	28.00
	Style C	Straight	6.75	7.50	8.50	10.00	12.50	17.50	35.00	13.50	15.00	17.00	20.00	25.00	35.00
	Style D	Straight		8.00		11.00	15.00	18.00	32.00						
Tees	Style G	Straight	2.40	4.50	6.50	7.00	13.00	17.50		4.80	9.00	13.00	14.00	26.00	35.00
		*Reducing	3.60	6.75	9.75	10.50	19.50	26.25							
	Style H	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing	9.00	10.00	11.00	12.00	15.00	22.00							
	Style K	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing	9.00	10.00	11.00	12.00	15.00	22.00							
	Style L	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
		*Reducing			11.00	12.00	15.00	22.00							
	Style M	Straight	9.00	10.00	11.00	12.00	15.00	22.00		18.00	20.00	22.00	24.00	30.00	44.00
	Style N	Straight	10.00	11.50	13.00	15.00	18.00	26.00		20.00	23.00	26.00	30.00	36.00	52.00
*Reducing						18.00	26.00								
Crosses	Style O	Straight	3.20	6.00	8.75	9.50	17.50	24.00		6.40	12.00	17.50	19.00	35.00	48.00
		*Reducing					26.25	36.00							
	Style P	Straight	12.50	13.50	15.00	17.00	22.00	30.00		25.00	27.00	30.00	34.00	44.00	60.00
		*Reducing	12.50	13.50	15.00	17.00	22.00	30.00							
	Style R	Straight	12.50	13.50	15.00	17.00	22.00	30.00		25.00	27.00	30.00	34.00	44.00	60.00
	Style S	Straight	13.50	15.00	17.00	20.00	25.00	35.00		27.00	30.00	34.00	40.00	50.00	70.00

15

American Standard: These fittings conform to the American Standard for Cast Iron Long Turn Sprinkler Fittings (B16g-1929) and Addenda B16g1-1937, except that the Crane line includes 8-inch Screwed Elbows and many Reducing Tees and Crosses, not defined by the Standard.

Underwriters' inspection: These fittings are listed as approved and inspected by the Associated Factory Mutual Fire Insurance Companies, Boston, and the Underwriters' Laboratories, Chicago.

Flange dimensions and facing: The dimensions and drilling of the flanges on 175-Pound Fittings conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced, with a smooth finish.

The dimensions and drilling of the flanges on 250-Pound Fittings conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). The flanges have a raised face 1/16-inch high. The raised

face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices of fittings with flanges include facing and drilling to the American Standard. No deduction is made if fittings are ordered faced only.

***Reducing sizes:** "Reducing" list prices apply to sizes carried in stock, shown on the opposite page. Other reductions can be made to order; prices on application.

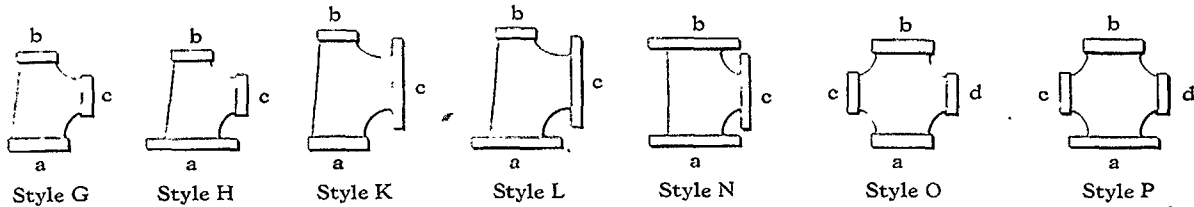
Other fittings: Standard Cast Iron Fittings (see page 197) and 2-inch and smaller 250-Pound Cast Iron Fittings (page 212) are permitted by Underwriters' Specifications.

Galvanized fittings: Galvanized fittings can be made to order, at the following advances over the list prices of black:

175-Pound — 100% advance over Black
250-Pound — 50% advance over Black

American Standard Cast Iron Sprinkler Fittings

175-Pound Reducing Fittings Carried in Stock



175-Pound Reducing Tees and Crosses are carried in stock in the sizes and types shown below. These are sold at the regular prices for Reducing Fittings.

Reducing sizes not carried in stock can be made to order. Prices on application.

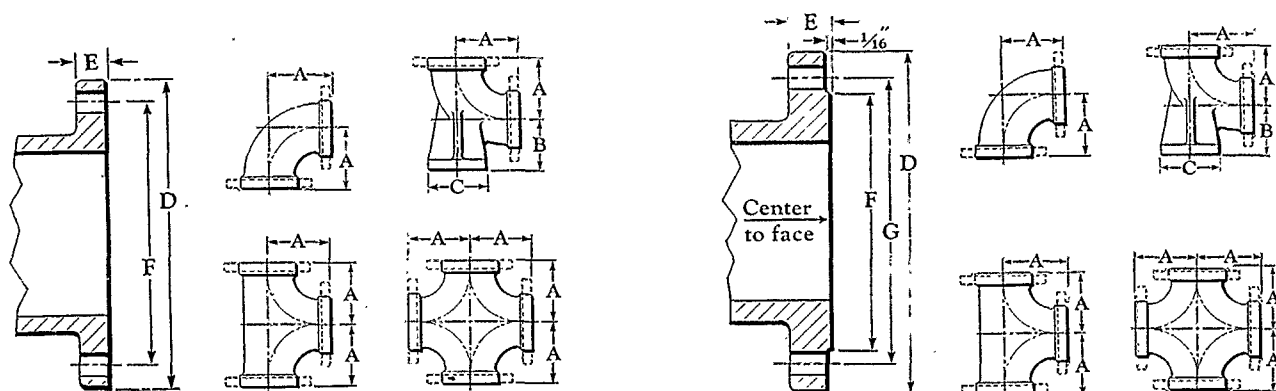
Tees				Crosses								
Size			Style	Size			Style	Size				Style
a	b	c		a	b	c		a	b	c	d	
2 1/2 x 2 1/2 x 2	G		4 x 3 1/2 x 3	G, H	5 x 2 1/2 x 4	G		2 1/2 x 2 1/2 x 2 1/2 x 2 1/2				P
2 1/2 x 2 x 2 1/2	G, H, K		4 x 3 1/2 x 2 1/2	G, H	4 x 4 x 5	G, K		3 x 3 x 3 x 3 x 2 1/2				P
2 x 2 x 2 1/2	G, K		4 x 3 x 4	G, H, K, L	4 x 3 1/2 x 5	G, K		3 x 3 x 2 1/2 x 2 1/2				P
3 x 3 x 2 1/2	G, H		4 x 3 x 3 1/2	G, H	4 x 3 x 5	G, K		3 1/2 x 3 1/2 x 3 1/2 x 3				P
3 x 2 1/2 x 3	G, H, K		4 x 3 x 3	G, H	4 x 2 1/2 x 5	G		3 1/2 x 3 1/2 x 3 1/2 x 2 1/2				P
3 x 2 1/2 x 2 1/2	G, H, K		4 x 3 x 2 1/2	G, G	3 1/2 x 3 1/2 x 5	G, K		3 1/2 x 3 1/2 x 3 x 3				P
3 x 2 x 3	G, K		4 x 2 1/2 x 4	G, G, H, K	3 1/2 x 3 x 5	G, K		3 1/2 x 3 1/2 x 3 x 2 1/2				P
3 x 2 x 2 1/2	G, G		4 x 2 1/2 x 3 1/2	G, G, H				3 1/2 x 3 1/2 x 2 1/2 x 2 1/2				P
2 1/2 x 2 1/2 x 3	G, K		3 1/2 x 3 1/2 x 4	G, K, K	6 x 6 x 5	G, H, L, N		3 1/2 x 2 1/2 x 2 1/2 x 2 1/2				P
2 1/2 x 2 x 3	G, K		3 1/2 x 3 x 4	G, K, K	6 x 6 x 4	G, H, L, N						
			3 1/2 x 2 x 4	G, K, K	6 x 6 x 3 1/2	G, H		4 x 4 x 4 x 3 1/2				P
			3 1/2 x 3 x 4	G, K, K	6 x 6 x 3	G, H		4 x 4 x 4 x 3				P
			3 x 2 1/2 x 4	G, K	6 x 5 x 6	G, H, K, L		4 x 4 x 3 1/2 x 3 1/2				P
					6 x 5 x 5	G, H		4 x 4 x 3 1/2 x 3				P
3 1/2 x 3 1/2 x 3	G, H, L		5 x 5 x 4	G, H, L, N	6 x 5 x 4	G, G, H		4 x 4 x 3 1/2 x 2 1/2				P
3 1/2 x 3 1/2 x 2 1/2	G, H, K		5 x 5 x 3 1/2	G, G, H	6 x 5 x 3 1/2	G, G, H		4 x 4 x 3 x 3				P
3 1/2 x 3 x 3 1/2	G, H, K		5 x 5 x 3	G, G, H	6 x 5 x 3	G, G, H		4 x 4 x 3 x 2 1/2				P
3 1/2 x 3 x 3	G, H, K		5 x 5 x 2 1/2	G, G, H	6 x 4 x 6	G, H, K, L		4 x 4 x 3 x 2 1/2				P
3 1/2 x 3 x 2 1/2	G, H, K		5 x 4 x 5	G, G, H, K, L	6 x 4 x 5	G, G, H		4 x 3 x 2 1/2 x 2 1/2				P
3 1/2 x 2 1/2 x 3 1/2	G, H		5 x 4 x 4	G, G, H	6 x 4 x 4	G, G, H		4 x 2 1/2 x 2 1/2 x 2 1/2				P
3 1/2 x 2 1/2 x 2 1/2	G, G		5 x 4 x 3 1/2	G, G, H	6 x 3 1/2 x 5	G, G, H, K						
3 1/2 x 2 x 3 1/2	G, G		5 x 4 x 3	G, G, H	6 x 3 1/2 x 6	G, G, H, K		5 x 5 x 5 x 4				P
3 1/2 x 2 x 3	G, K		5 x 4 x 2 1/2	G, G	6 x 3 x 6	G, G, H, K		5 x 5 x 5 x 3				P
3 x 3 x 3 1/2	G, K, K		5 x 3 1/2 x 5	G, G, H, K, L	5 x 5 x 6	G, K, K		5 x 5 x 4 x 4				O, P
3 x 3 x 3	G, K, K		5 x 3 1/2 x 4	G, G, H	5 x 4 x 6	G, K, K		5 x 5 x 4 x 3				P
3 x 2 x 3 1/2	G, K		5 x 3 1/2 x 3 1/2	G, G, H, K	5 x 3 1/2 x 6	G, K, K		5 x 5 x 4 x 2 1/2				P
2 1/2 x 2 1/2 x 3 1/2	G, K		5 x 3 x 5	G, G, H, K	5 x 3 x 6	G, K, K		5 x 5 x 3 1/2 x 3 1/2				P
			5 x 3 x 4	G, G, H	4 x 4 x 6	G, K		5 x 5 x 3 1/2 x 3				P
			5 x 3 x 3 1/2	G, G	4 x 3 1/2 x 6			5 x 4 x 3 x 3				P
			5 x 2 1/2 x 5	G, H				5 x 3 x 2 1/2 x 2 1/2				P

American Standard Cast Iron Sprinkler Fittings

Dimensions, in Inches

175-Pound Fittings

250-Pound Fittings



Dimensions shown in the table below apply to straight sizes only.
Dimensions of reducing sizes will be furnished on request.

Size	175-Pound								250-Pound								
	A	B	C	D	E	F	No. of bolts	Dia. of bolts	A	B	C	D	E	F	G	No. of bolts	Dia. of bolts
2½	4½	4½	4½	7	11½ ₁₆	5½	4	⅝	5¼	4¾	6½	7½	1	415½ ₁₆	5⅞	8	¾
3	5	4⅞	5	7½	¾	6	4	⅝	5¾	5¼	6½	8¼	1⅞	511½ ₁₆	6⅝	8	¾
3½	5¾	5¼	5	8½	13½ ₁₆	7	8	⅝	6½	5⅝	6½	9	13½ ₁₆	65½ ₁₆	7¼	8	¾
4	6½	5½	6	9	15½ ₁₆	7½	8	⅝	7¼	6	6½	10	1¼	615½ ₁₆	7⅞	8	¾
5	7½	6¼	7	10	15½ ₁₆	8½	8	¾	8¾	6¾	7½	11	1⅜	85½ ₁₆	9¼	8	¾
6	9	7	7	11	1	9½	8	¾	9⅞	7½	7½	12½	17½ ₁₆	911½ ₁₆	10⅝	12	¾
8	9	8⅜	9	13½	1⅞	11¾	8	¾	10	9	10	15	1⅝	1115½ ₁₆	13	12	⅞

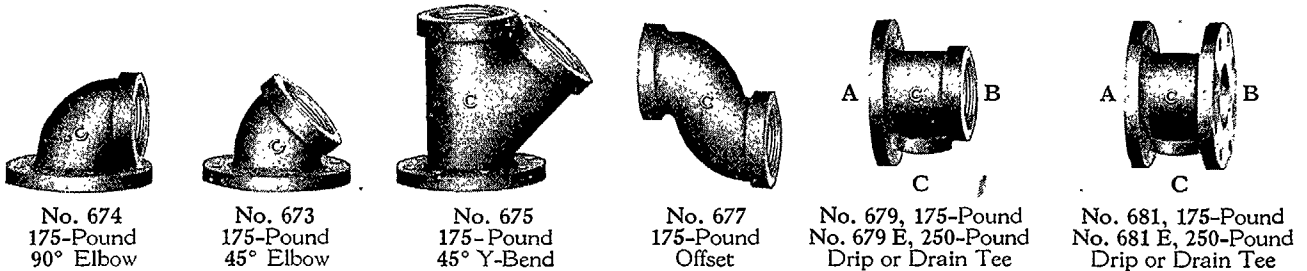
Thread Engagement....page 591

Templates for drilling....pages 551 and 552

Cast Iron Sprinkler Fittings

WORKING PRESSURES

175-Pound — 125 pounds steam
 — 175 pounds cold water, non-shock
 250-Pound — 250 pounds cold water, non-shock



List Prices, Black

Size	Inches	2 1/2	3	3 1/2	4	5	6	8
175-Pound	No. 673, 45° Elbows	Each	1.70	2.15	2.80	3.25	4.55	12.30
	No. 674, 90° Elbows	Each	1.60	2.00	2.60	3.00	4.05	10.55
	No. 675, 45° Y-Bends	Each	2.76	3.75	5.05	5.80	9.05	26.30
	No. 677, Offsets	With 4-inch offset	Each	3.00	4.00	5.00	6.00	10.00
		With 6-inch offset	Each	4.50	6.00	7.50	9.00	15.00
	*No. 679, Drip or Drain Tees	Each	2.83	3.50	4.25	5.00	7.15	17.75
250-Pound	*No. 681, Drip or Drain Tees	Each		5.75	6.75	8.00	10.80	24.25
	*No. 679 E, Drip or Drain Tees	Each	5.65	7.00	8.50	10.00	14.30	35.50
	*No. 681 E, Drip or Drain Tees	Each			13.50	16.00	21.60	48.50

Drip or Drain Tees Carried in Stock

No. 679			No. 679 E			No. 681			No. 681 E		
A	B	C	A	B	C	A	B	C	A	B	C
2 1/2 x 2 1/2 x 1 1/2			2 1/2 x 2 1/2 x 1 1/4			3 x 3 x 1 1/2			3 1/2 x 3 1/2 x 1 1/2		
2 1/2 x 2 1/2 x 1 1/4			2 1/2 x 2 1/2 x 1			3 1/2 x 3 1/2 x 1 1/2			3 1/2 x 3 1/2 x 1 1/4		
2 1/2 x 2 1/2 x 1			3 x 3 x 1 1/4			3 1/2 x 3 1/2 x 1 1/4			4 x 4 x 2		
3 x 3 x 1 1/2			3 x 3 x 1			4 x 4 x 2			4 x 4 x 1 1/2		
3 x 3 x 1 1/4			3 1/2 x 3 1/2 x 1 1/2			4 x 4 x 1 1/2			5 x 5 x 2		
3 x 3 x 1			3 1/2 x 3 1/2 x 1 1/4			4 x 4 x 1 1/4			5 x 5 x 1 1/2		
3 1/2 x 3 1/2 x 2			4 x 4 x 2			5 x 5 x 2			6 x 6 x 2		
3 1/2 x 3 1/2 x 1 1/2			4 x 4 x 1 1/2			5 x 5 x 1 1/2			6 x 6 x 1 1/2		
3 1/2 x 3 1/2 x 1 1/4			5 x 5 x 2			6 x 6 x 2 1/2			8 x 8 x 2 1/2		
4 x 4 x 2			5 x 5 x 1 1/2			6 x 6 x 2			8 x 8 x 2		
4 x 4 x 1 1/2			6 x 6 x 2			6 x 6 x 1 1/2					
4 x 4 x 1 1/4			6 x 6 x 1 1/2			6 x 6 x 1 1/4					
4 x 4 x 1			8 x 8 x 2 1/2			6 x 6 x 1					
4 x 4 x 3/4			8 x 8 x 2			8 x 8 x 3					
						8 x 8 x 2 1/2					
						8 x 8 x 2					

Cast Iron Sprinkler Fittings: While these fittings are not included in the "American Standard", they are frequently used in sprinkler installations.

***Drip or Drain Tees:** List prices of Drip or Drain Tees apply only to the regular stock sizes shown in the above table. Straight sizes or other reducing sizes can be made to order; prices on application.

Flange dimensions and facing: The dimensions and drilling of the flanges on 175-Pound Fittings conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced, with a smooth finish.

The dimensions and drilling of the flanges on 250-

Pound Fittings conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). The flanges have a raised face 1/16-inch high. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices of fittings with flanges include facing and drilling to the American Standard. No deduction is made if fittings are ordered faced only.

Galvanized fittings: Galvanized fittings can be made to order, at the following advances over the list prices of black:

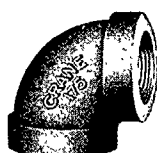
175-Pound — 100% advance over Black
 250-Pound — 50% advance over Black

175-Pound Cast Iron Fittings

WORKING PRESSURES

175 pounds steam

300 pounds cold water, oil, or gas, non-shock



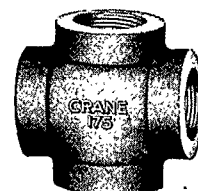
90° Elbow



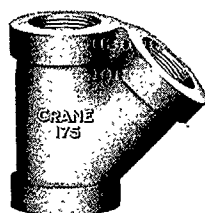
45° Elbow



Tee



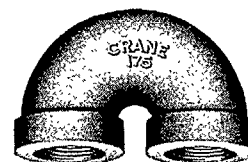
Cross



45° Y-Bend



Reducer



Return Bend
Prices on application
See dimension table
for list of sizes.

List Prices, Black

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
90° Elbows	Straight	Each	.09	.11	.15	.21	.28	.45	1.00	1.50	2.10	2.40	3.60	5.50	9.50	16.50	29.00
	*Reducing	Each		.13	.17	.23	.32	.52	1.15	1.70		2.75		6.25	11.00	19.00	33.00
45° Elbows	Straight	Each	.10	.12	.17	.22	.30	.50	1.10	1.65	2.30	2.65	4.00	6.00	10.50	18.25	32.00
	*Reducing	Each			.24	.33	.46	.72	1.60	2.50		3.85	6.00	9.25	15.25	26.50	48.00
Tees	Straight	Each	.13	.16	.21	.28	.40	.63	1.40	2.20	2.90	3.35	5.25	8.00	13.25	23.00	42.00
	*Reducing	Each															
Crosses	Straight	Each	.28	.35	.45	.55	.75	1.00	2.20	3.30	4.60	5.25	8.00	12.00	21.00	36.50	64.00
	*Reducing	Each						1.15		3.80		6.00		13.75	24.00	42.00	74.00
45° Y-Bends	Straight	Each							2.60	4.00		6.25	10.00	14.00	26.00	45.00	
Reducers		Each			.40	.50	.60	.70	1.10	1.50	2.00	2.25		4.50	9.00	13.50	20.00

***Reducing fittings:** List prices of Reducing 90° Elbows, Tees, Crosses, and Reducers apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows and 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing fittings that require making a new pattern are entirely special. Prices on application.

Service recommendations: Crane 175-Pound Cast Iron Fittings are recommended for services that are

too severe for Standard Cast Iron Fittings but not severe enough to require 250-Pound Cast Iron Fittings. They are suitable for all general service on steam, water, oil, or gas lines.

Rugged construction: The fittings are ruggedly constructed, being liberally reinforced at points subjected to greatest stress. They have a high safety factor; pressures required to break the fittings are far in excess of those for which they are recommended.

Threading: Crane 175-Pound Cast Iron Fittings are uniformly and accurately threaded to gauge. All openings are in true alignment and are slightly chamfered to assure easy entrance of the pipe.

Galvanized fittings: Galvanized fittings can be made to order, at double the list prices of black fittings.

175-Pound Cast Iron Fittings

Reducing Fittings Carried in Stock

Reducing 90° Elbows, Tees, Crosses, and Reducers are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for reducing fittings.

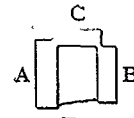
For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.



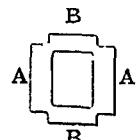
90° Elbow



Reducer



Tee

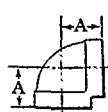


Cross

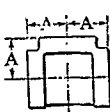
90° Elbows	Reducers	Tees												Crosses	
$\frac{3}{4}$ x $\frac{1}{2}$	1 x $\frac{3}{4}$	A	B	C	A	B	C	A	B	C	A	B	C	A	B
1 x $\frac{3}{4}$	1 $\frac{1}{4}$ x 1	1 x 1 x $\frac{3}{4}$	2 x 2 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	5 x 5 x 3	8 x 8 x 6	2 x $\frac{1}{2}$					
1 $\frac{1}{4}$ x 1	1 $\frac{1}{2}$ x $\frac{3}{4}$	1 x 1 x $\frac{1}{2}$	2 x 2 x 1	3 x 3 x 1	3 x 3 x 1	3 x 3 x 1	3 x 3 x 1	5 x 5 x 2	8 x 8 x 4	3 x 2					
1 $\frac{1}{2}$ x $\frac{3}{4}$	1 $\frac{1}{2}$ x 1	1 x $\frac{3}{4}$ x 1	2 x 2 x $\frac{3}{4}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	5 x 4 x 4	8 x 8 x 3	4 x $\frac{1}{2}$					
1 $\frac{1}{2}$ x 1	2 x $\frac{1}{2}$	1 x $\frac{3}{4}$ x $\frac{3}{4}$	2 x $\frac{1}{2}$ x $\frac{1}{2}$	3 x 3 x 1	3 x 3 x 1	3 x 3 x 1	3 x 3 x 1	5 x 3 x 5	8 x 8 x 2	4 x 2					
2 x $\frac{1}{2}$	2 $\frac{1}{2}$ x 2	1 x $\frac{3}{4}$ x $\frac{1}{2}$	2 x $\frac{1}{2}$ x $\frac{1}{4}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	5 x 2 x 5	8 x 6 x 8	6 x 4					
2 x 1	3 x $\frac{1}{2}$	1 x $\frac{1}{2}$ x 1	2 x $\frac{1}{2}$ x 1	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 6 x 5	8 x 6 x 6	6 x 2					
2 $\frac{1}{2}$ x 2	3 x 2	1 x $\frac{1}{2}$ x $\frac{1}{2}$	2 x $\frac{1}{2}$ x $\frac{3}{4}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 6 x 4	8 x 4 x 8	8 x 6					
2 $\frac{1}{2}$ x 1	3 $\frac{1}{2}$ x 3	1 $\frac{1}{4}$ x $\frac{1}{4}$ x $\frac{3}{4}$	2 x 1 x 2	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 6 x 3	6 x 6 x 8	10 x 8					
3 x $\frac{1}{2}$	4 x $\frac{3}{4}$	1 $\frac{1}{4}$ x 1 x 1	2 x 1 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 6 x 2	10 x 10 x 8	10 x 6					
3 x 2	4 x 3	1 $\frac{1}{4}$ x 1 x $\frac{3}{4}$	2 x $\frac{1}{2}$ x 2	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 6 x 1	10 x 10 x 4	10 x 10 x 3					
3 x $\frac{1}{2}$	4 x 1	1 $\frac{1}{4}$ x $\frac{3}{4}$ x $\frac{1}{4}$	1 x 1 x 2	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 4 x 6	10 x 8 x 10	10 x 8 x 8					
4 x 3	6 x 5	1 $\frac{1}{4}$ x 1 x $\frac{1}{4}$	2 $\frac{1}{2}$ x $\frac{1}{2}$ x 2	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 4 x 4	10 x 6 x 10	10 x 6 x 8					
4 x $\frac{1}{2}$	6 x 4	1 $\frac{1}{2}$ x $\frac{1}{2}$ x 1	2 $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 3 x 6	10 x 8 x 8	10 x 6 x 10					
4 x 2	6 x 3	1 $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{3}{4}$	2 $\frac{1}{2}$ x $\frac{1}{2}$ x 1	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	6 x 2 x 6	10 x 8 x 8	10 x 6 x 10					
4 x 1	6 x 2	1 $\frac{1}{2}$ x $\frac{1}{4}$ x $\frac{1}{4}$	2 $\frac{1}{2}$ x 2 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	4 x 4 x 6	10 x 6 x 10	10 x 8 x 8					
6 x 4	8 x 6	1 $\frac{1}{2}$ x $\frac{1}{4}$ x $\frac{3}{4}$	2 $\frac{1}{2}$ x 2 x 1	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x 6	12 x 12 x 10	12 x 12 x 8					
6 x 3	8 x 4	1 $\frac{1}{2}$ x 1 x 1	2 $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x 4	12 x 12 x 6	12 x 12 x 4					
6 x $\frac{1}{2}$	10 x 8	1 $\frac{1}{2}$ x $\frac{3}{4}$ x $\frac{1}{2}$	2 $\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	4 x 2 x 4	12 x 10 x 12	12 x 10 x 10					
6 x 2	10 x 6	1 $\frac{1}{2}$ x $\frac{3}{4}$ x $\frac{1}{4}$	2 $\frac{1}{2}$ x 1 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	4 x 2 x 2	12 x 8 x 12	12 x 8 x 8					
8 x 6	12 x 10	1 x 1 x $\frac{1}{2}$	2 x 2 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	3 x 3 x $\frac{1}{2}$	4 x 1 x 4	12 x 4 x 12						
8 x 4	12 x 8							4 x 1 x 4							
10 x 8	12 x 6							3 x 3 x 4							
10 x 6								2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x 4							
10 x 4															
12 x 10															
12 x 8															
12 x 6															

Dimensions, in Inches

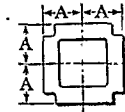
Dimensions apply only to straight sizes and to Reducers; dimensions of reducing sizes will be furnished on application.



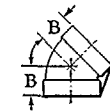
90° Elbow



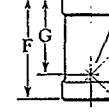
Tee



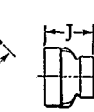
Cross



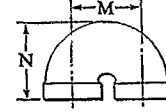
45° Elbow



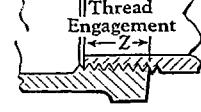
45° Y-Bend



Reducer



Return Bend



See page 591 for explanation

Size	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	3 $\frac{1}{2}$	4	5	6	8	10	12
A	1 $\frac{1}{4}$	1 $\frac{7}{16}$	1 $\frac{5}{8}$	1 $\frac{7}{8}$	2 $\frac{1}{8}$	2 $\frac{1}{2}$	3 $\frac{1}{4}$	3 $\frac{3}{4}$	4 $\frac{1}{8}$	4 $\frac{1}{2}$	5 $\frac{1}{2}$	6 $\frac{1}{4}$	7 $\frac{3}{4}$	9 $\frac{1}{4}$	11 $\frac{1}{2}$
B	1 $\frac{5}{16}$	1 $\frac{1}{16}$	1 $\frac{3}{16}$	1 $\frac{3}{8}$	1 $\frac{9}{16}$	1 $\frac{13}{16}$	2	2 $\frac{5}{16}$	2 $\frac{1}{2}$	2 $\frac{11}{16}$	3 $\frac{1}{8}$	3 $\frac{1}{2}$	4 $\frac{5}{16}$	5 $\frac{3}{16}$	6
F							6 $\frac{1}{4}$	7 $\frac{7}{8}$		9 $\frac{3}{4}$	11 $\frac{5}{8}$	13 $\frac{7}{16}$	16 $\frac{15}{16}$	20 $\frac{11}{16}$	
G							5 $\frac{3}{16}$	6 $\frac{1}{8}$		7 $\frac{5}{8}$	9 $\frac{1}{4}$	10 $\frac{3}{4}$	13 $\frac{5}{8}$	16 $\frac{3}{4}$	
J			2	2 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{7}{16}$	2 $\frac{11}{16}$	3	3 $\frac{1}{8}$	3 $\frac{3}{8}$		4 $\frac{3}{8}$	5 $\frac{1}{4}$	6 $\frac{3}{16}$	7 $\frac{1}{8}$
Z	$\frac{1}{2}$	$\frac{9}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	$\frac{3}{4}$	1 $\frac{5}{16}$	1	1 $\frac{1}{16}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{5}{16}$	1 $\frac{7}{16}$	1 $\frac{5}{8}$	1 $\frac{3}{4}$

Return Bends

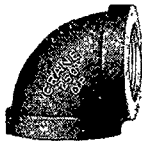
Size	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	1	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	2	2	2	2
M	1 $\frac{3}{4}$	2	3	4 $\frac{1}{2}$	2 $\frac{3}{8}$	3	3	2 $\frac{1}{2}$	2 $\frac{7}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$	6	3 $\frac{1}{4}$	4	4 $\frac{1}{2}$	5	6	6 $\frac{1}{2}$
N	2	2 $\frac{5}{16}$	2 $\frac{13}{16}$	3 $\frac{9}{16}$	2 $\frac{3}{4}$	3	3 $\frac{5}{16}$	3 $\frac{5}{16}$	3 $\frac{1}{2}$	3 $\frac{11}{16}$	3 $\frac{13}{16}$	5 $\frac{1}{16}$	4	4 $\frac{3}{8}$	4 $\frac{5}{8}$	4 $\frac{7}{8}$	5 $\frac{3}{8}$	5 $\frac{5}{8}$
Size	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	3	3	3	3	3	4	4	4	4	4	4	4	6	6
M	4 $\frac{1}{2}$	4 $\frac{7}{8}$	6	7	5	6 $\frac{1}{4}$	8	9	11	6	7	7 $\frac{1}{2}$	8	9	11	12	10	13
N	5 $\frac{5}{16}$	5 $\frac{1}{2}$	6 $\frac{1}{16}$	6 $\frac{9}{16}$	6	6 $\frac{5}{8}$	7 $\frac{1}{2}$	8	9	7 $\frac{3}{16}$	7 $\frac{11}{16}$	7 $\frac{15}{16}$	8 $\frac{3}{16}$	8 $\frac{11}{16}$	9 $\frac{1}{16}$	10 $\frac{3}{16}$	10 $\frac{5}{8}$	12 $\frac{1}{8}$

250-Pound Cast Iron Fittings

Short Pattern

WORKING PRESSURES

250 pounds steam
400 pounds cold water, oil, or gas, non-shock



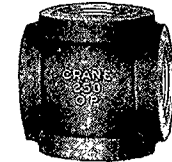
90° Elbow
No. 182 E, Straight
No. 184 E, Reducing



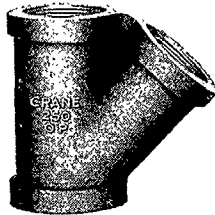
45° Elbow
No. 186 E, Straight



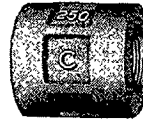
Tee
No. 188 E, Straight
No. 190 E, Reducing



Cross
No. 192 E, Straight



45° Y-Bend
No. 194 E, Straight



Coupling
No. 195 E, Right Hand
No. 196 E, Right & Left



Return Bend
No. 187 E, Right Hand
No. 189 E, Right & Left

List Prices, Black

Size			Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
90° Elbows	No. 182 E Straight	Right Hand	Each	.20	.20	.25	.30	.35	.45	.60	.75	1.25
		Right and Left	Each			.30	.36	.42	.54	.72	.90	
	No. 184 E, Reducing (*)		Each			.35	.40	.45	.55	.75	.95	1.55
45° Elbows	No. 186 E, Straight		Each			.35	.40	.44	.55	.70	.90	1.50
Tees	No. 188 E, Straight		Each	.35	.35	.40	.45	.55	.70	.90	1.15	1.80
	No. 190 E, Reducing (*)		Each			.55	.60	.70	.90	1.15	1.40	2.25
Crosses	No. 192 E, Straight		Each			.60	.65	.70	.90	1.20	1.50	2.50
45° Y-Bends	No. 194 E, Straight		Each					1.10	1.35	1.80	2.25	3.75
Couplings	No. 195 E, Right Hand		Each					.39	.50	.66	.83	
	No. 196 E, Right and Left		Each					.48	.60	.80	1.00	

Size		Inches	3	3½	4	5	6	8	10	12
90° Elbows	No. 182 E, Straight	Each	2.00	2.75	3.50	5.50	8.00	17.00	28.00	40.00
	No. 184 E, Reducing (*)	Each	2.50	3.40	4.40	6.80	10.00	21.00	35.00	50.00
45° Elbows	No. 186 E, Straight	Each	2.50	3.50	4.50	6.75	9.75	21.00	34.00	48.00
	No. 188 E, Straight	Each	3.00	4.25	5.50	8.25	12.00	25.00	42.00	60.00
Tees	No. 190 E, Reducing (*)	Each	3.75	5.30	6.85	10.25	15.00	31.00	52.00	75.00
	No. 192 E, Straight	Each	4.00	5.50	7.00	11.00	16.00	34.00		
Crosses										
45° Y-Bends	No. 194 E, Straight	Each	6.00		11.00	16.50	24.00	50.00		

List Prices, No. 187 E and No. 189 E Return Bends, Black

Size	Inches	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
Center to center	Inches	2 3/8	2 1/2	3	4	5	6	8	10	12	14	16
No. 187 E, Right Hand	Each	.70	.70	.80	.95	1.10	1.35	1.75	2.25	2.75	3.25	3.75
No. 189 E, Right & Left	Each	.80	.80					1.40	2.25	3.00	3.75	4.50

*Reducing fittings: List prices of reducing 90° Elbows and Tees apply to reducing sizes carried in stock, shown on the opposite page. Other reductions can be made to order by bushing in the sand; when so bushed, non-stock sizes use the same list prices as stock reducing sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Reducing 45° Elbows, Crosses, and 45° Y-Bends can be made to order by bushing in the sand from straight sizes. When so bushed, reducing sizes use the same list prices as straight sizes, but are sold at an advance in price; see the Crane Discount Sheet for prices. Reducing fittings that require making a new pattern

are entirely special. Prices are on application. **Rugged Construction:** Crane 250-Pound Cast Iron Fittings are of the Short Pattern. They are unusually rugged and have a high factor of safety above the recommended working pressure.

Threading: The thread lengths are longer than those found in standard weight fittings, and the threads are accurately cut to gauge. All openings are slightly chamfered to insure easy entrance of the pipe, and are in true alignment.

Galvanized fittings: Galvanized fittings can be made to order at double the list prices of black fittings.

250-Pound Cast Iron Fittings

Short Pattern

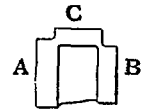
Reducing Fittings Carried in Stock



90° Elbow
No. 184 E

Reducing 90° Elbows and Tees are carried in stock in the sizes shown in the table below. These sizes are sold at the regular prices for reducing fittings.

For prices of reducing fittings not carried in stock, see the footnotes on the preceding page.

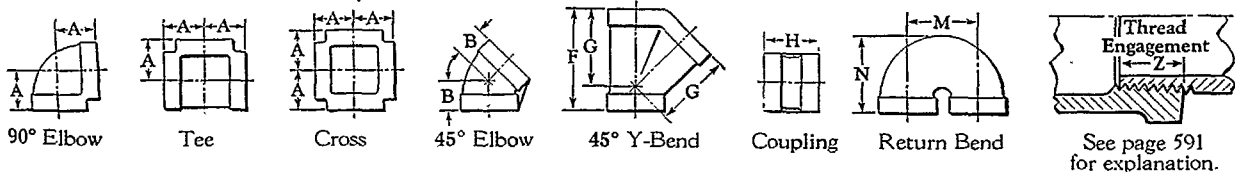


Tee
No. 190 E

No. 184 E 90° Elbows				No. 190 E Tees											
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
1/2 x 3/8	1/2 x 1/2 x 3/8	1/2 x 1/2 x 3/8	1/2 x 1/2 x 3/8	1 1/4 x 1/2 x 1	2 x 2 x 1 1/2	2 1/2 x 2 1/2 x 3/4	3 x 2 1/2 x 2	4 x 4 x 3	6 x 6 x 5						
1/2 x 1/4	1/2 x 1/2 x 1/4	1/2 x 1/2 x 1/4	1/2 x 1/2 x 1/4	1 1/4 x 1/4 x 1 1/4	2 x 2 x 1 1/4	2 1/2 x 2 1/2 x 1/2	3 x 2 1/2 x 1 1/2	4 x 4 x 2 1/2	6 x 6 x 4						
3/4 x 1/2	3/4 x 3/4 x 1/2	3/4 x 3/4 x 1/2	3/4 x 3/4 x 1/2	1 x 1 x 1 1/4	2 x 2 x 1	2 1/2 x 2 x 2 1/2	3 x 2 1/2 x 1 1/4	4 x 4 x 2	6 x 6 x 3 1/2						
3/4 x 3/8	3/4 x 3/4 x 3/8	3/4 x 3/4 x 3/8	3/4 x 3/4 x 3/8	1 x 3/4 x 1 1/4	2 x 2 x 3/4	2 1/2 x 2 x 2	3 x 2 1/2 x 1	4 x 4 x 1 1/2	6 x 6 x 3						
1 x 3/4	1 x 1 x 3/4	1 x 1 x 3/4	1 x 1 x 3/4	1 1/2 x 1 1/2 x 1 1/4	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 x 2 x 3	4 x 4 x 1 1/4	6 x 6 x 2 1/2						
1 1/4 x 1	1 1/4 x 1 1/4 x 1	1 1/4 x 1 1/4 x 1	1 1/4 x 1 1/4 x 1	1 1/2 x 1 1/2 x 3/4	2 x 2 x 1 1/4	2 1/2 x 2 x 1 1/4	3 x 2 x 2 1/2	4 x 4 x 1	6 x 6 x 2						
1 1/4 x 3/4	1 1/4 x 1 1/4 x 3/4	1 1/4 x 1 1/4 x 3/4	1 1/4 x 1 1/4 x 3/4	1 1/2 x 1 1/2 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1	3 x 2 x 2	4 x 4 x 3/4	6 x 6 x 1 1/2						
1 1/2 x 1 1/4	1 1/2 x 1 1/2 x 1 1/4	1 1/2 x 1 1/2 x 1 1/4	1 1/2 x 1 1/2 x 1 1/4	1 1/2 x 1 1/2 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 3/4	3 x 2 x 1 1/2	4 x 3 1/2 x 2 1/2	6 x 6 x 1 1/4						
1 1/2 x 1	1 1/2 x 1 1/2 x 1	1 1/2 x 1 1/2 x 1	1 1/2 x 1 1/2 x 1	1 1/2 x 1 1/2 x 1 1/4	2 x 2 x 1 1/4	2 1/2 x 2 x 1 1/2	3 x 2 x 1 1/4	4 x 3 1/2 x 2	6 x 6 x 1						
1 1/2 x 3/4	1 1/2 x 1 1/2 x 3/4	1 1/2 x 1 1/2 x 3/4	1 1/2 x 1 1/2 x 3/4	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 x 1 1/2 x 2	4 x 3 1/2 x 1 1/2	6 x 4 x 6						
2 x 1 1/2	2 x 1 x 1 1/2	2 x 1 x 1 1/2	2 x 1 x 1 1/2	1 1/2 x 1 1/4 x 1 1/4	2 x 2 x 1 1/4	2 1/2 x 2 x 2	3 x 1 x 3	4 x 3 x 4	6 x 4 x 4						
2 x 1 1/4	2 x 1 x 1 1/4	2 x 1 x 1 1/4	2 x 1 x 1 1/4	1 1/2 x 1 1/4 x 1	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	2 1/2 x 2 1/2 x 3	4 x 3 x 3	5 x 5 x 6						
2 x 1	2 x 1 x 1	2 x 1 x 1	2 x 1 x 1	1 1/2 x 1 1/4 x 3/4	2 x 2 x 1 1/4	2 1/2 x 2 x 1 1/2	2 x 2 x 3	4 x 2 1/2 x 4	8 x 8 x 6						
2 1/2 x 2	2 1/2 x 1 1/2 x 2	2 1/2 x 1 1/2 x 2	2 1/2 x 1 1/2 x 2	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 1 1/4	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 3	4 x 2 1/2 x 2 1/2	8 x 8 x 5						
2 1/2 x 1 1/2	2 1/2 x 1 1/2 x 1 1/2	2 1/2 x 1 1/2 x 1 1/2	2 1/2 x 1 1/2 x 1 1/2	1 1/2 x 1 1/4 x 1	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 2 1/2	4 x 2 x 4	8 x 8 x 4						
3 x 2 1/2	3 x 1 1/2 x 2 1/2	3 x 1 1/2 x 2 1/2	3 x 1 1/2 x 2 1/2	1 1/2 x 1 1/4 x 3/4	2 x 2 x 3/4	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 2	3 x 3 x 4	8 x 8 x 3						
3 x 2	3 x 1 x 2	3 x 1 x 2	3 x 1 x 2	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 3/4	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 1 1/2	5 x 5 x 4	8 x 8 x 2 1/2						
4 x 3	4 x 1 1/4 x 3	4 x 1 1/4 x 3	4 x 1 1/4 x 3	1 1/2 x 1 1/4 x 1	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 1 1/4	5 x 5 x 3	8 x 6 x 6						
5 x 4	5 x 1 1/4 x 4	5 x 1 1/4 x 4	5 x 1 1/4 x 4	1 1/2 x 1 1/4 x 3/4	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 1/2 x 1	5 x 5 x 2 1/2	8 x 6 x 4						
6 x 4	6 x 1 1/4 x 4	6 x 1 1/4 x 4	6 x 1 1/4 x 4	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 x 2	5 x 5 x 2	10 x 10 x 8						
6 x 2 1/2	6 x 1 1/4 x 1 1/2	6 x 1 1/4 x 1 1/2	6 x 1 1/4 x 1 1/2	1 1/2 x 1 1/4 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 x 1 1/2	5 x 5 x 1 1/2	10 x 10 x 6						
8 x 3	8 x 1 1/4 x 3	8 x 1 1/4 x 3	8 x 1 1/4 x 3	1 1/4 x 1 1/4 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 3 x 1 1/4	5 x 5 x 1	10 x 10 x 4						
12 x 8	12 x 1 1/4 x 8	12 x 1 1/4 x 8	12 x 1 1/4 x 8	1 1/4 x 1 1/4 x 1 1/2	2 x 2 x 1 1/2	2 1/2 x 2 x 1 1/2	3 1/2 x 2 1/2 x 2 1/2	5 x 4 x 3 1/2	12 x 12 x 10						
	1 1/4 x 1 x 3/4	1 1/4 x 1 x 3/4	1 1/4 x 1 x 3/4	1 1/4 x 1 x 1 1/2	2 1/2 x 2 1/2 x 2	3 x 2 1/2 x 3		5 x 4 x 3	12 x 12 x 8						
	1 1/4 x 1 x 1 1/2	1 1/4 x 1 x 1 1/2	1 1/4 x 1 x 1 1/2	1 1/4 x 3/4 x 1 1/2	2 1/2 x 2 1/2 x 1 1/2	3 x 2 1/2 x 3		5 x 4 x 2	12 x 12 x 6						
	1 1/4 x 3/4 x 1 1/4	1 1/4 x 3/4 x 1 1/4	1 1/4 x 3/4 x 1 1/4	1 x 1 x 1 1/2	2 1/2 x 2 1/2 x 1	3 x 2 1/2 x 3		5 x 3 x 5							
	1 1/4 x 1/2 x 1 1/4	1 1/4 x 1/2 x 1 1/4	1 1/4 x 1/2 x 1 1/4					5 x 2 x 5							

Dimensions, in Inches

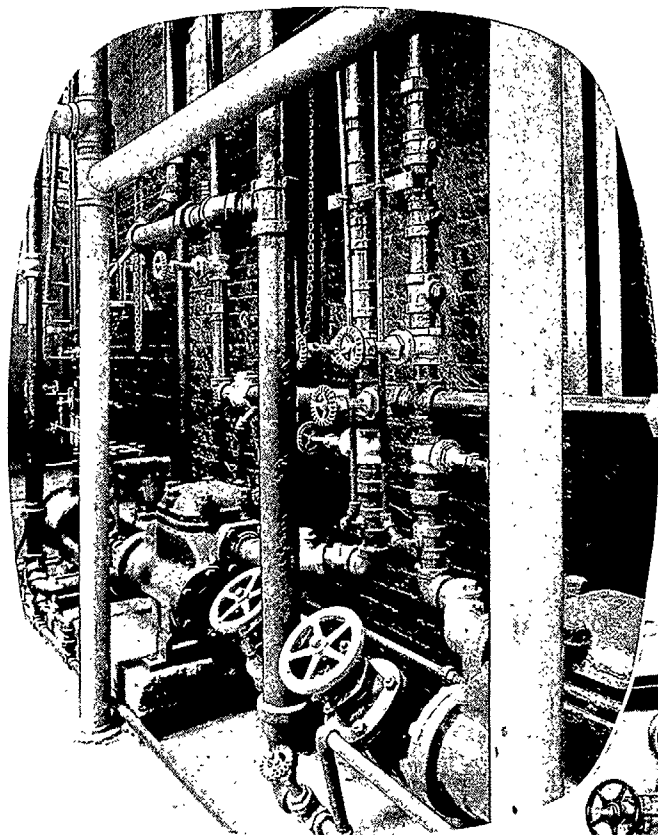
Dimensions apply only to straight sizes; dimensions of reducing sizes will be furnished on request.



Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
A	1 1/4	1 3/8	1 1/4	1 7/16	1 5/8	1 15/16	2 1/4	2 1/2	2 15/16	3 3/8	3 3/4	4 1/8	4 7/8	5 5/8	7	8 5/8	10
B			1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 9/16	2 13/16	3 3/16	3 11/16	4 5/8	4 7/8	5 1/2
F					4 1/4	4 7/8	5 3/4	6 3/4	7 7/8	8 7/8		10 5/8	13 7/16	15 1/4	18 1/8		
G					3 1/4	3 13/16	4 1/2	5 3/16	6 1/8	6 7/8		8 1/2	10 3/4	12 1/4	14		
H					2 9/16	2 15/16	3 3/16	3 5/8									
Z	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16	1 5/8	1 3/4

Return Bends

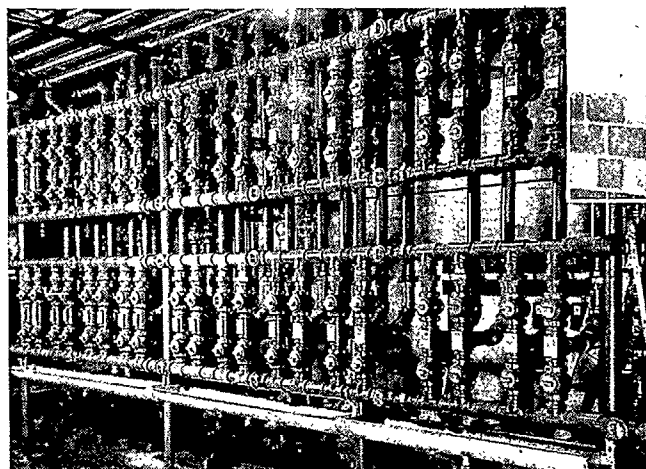
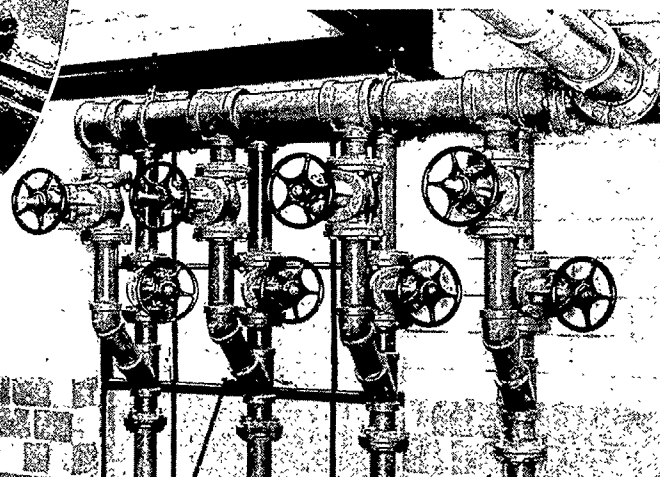
Size	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2
M—Center to center	2 3/8	2 1/2	3	4	5	6	8	2 1/2	3 1/2	3 1/4	4 1/2	6
N—Face to back	2 15/16	3 1/4	3 7/16	4 1/16	4 11/16	5 1/16	6 1/16	3 9/16	4	4 3/8	5 1/16	6



Metal working plants find in Crane's wide selection a reliable source of correct valves and fittings for each of their multitudinous piping requirements.



Large Crane cast iron screwed fittings, flanged gate valves, and flanges and flanged fittings installed in cooler lines of a beverage plant.

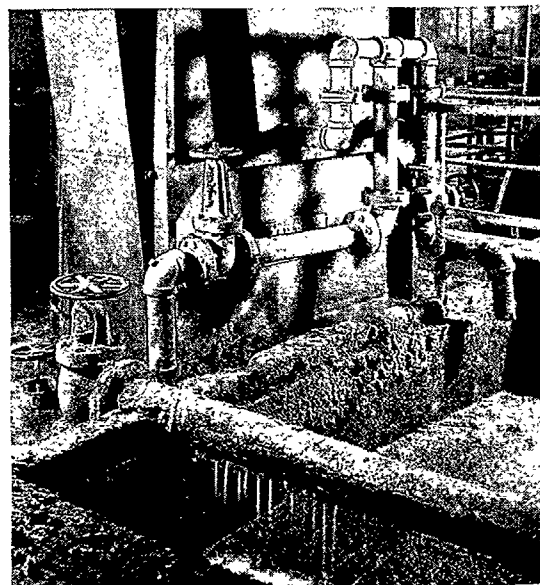


15

Front view of manifold in lubricating oils blending plant, assembled completely with Crane cocks, unions, and fittings.



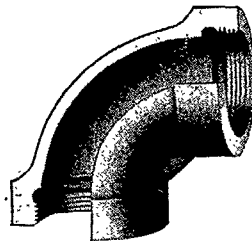
Cast iron valves, fittings, and flanges. Water supply lines to breaker beater in a paper mill — Crane-equipped, of course!



Cast Iron Drainage Fittings

Cast Iron Drainage Fittings.....	pages 216 to 220
Roof Connections.....	page 220
Traps, Increasers, and Offsets.....	page 221
Tucker Connections and Couplings.....	page 221
Dimensions of Drainage Fittings.....	pages 222 and 223
Crane-Hulbert Drainage Fittings.....	page 224

Other Cast Iron Screwed Fittings....pages 195 to 213



Crane Cast Iron Drainage Fittings have the same inside diameter as wrought pipe. When a joint is made, the end of the pipe practically meets the shoulder at the back of the thread chamber, forming an unobstructed passage-way for foreign matter. Each opening is chamfered to permit easy entrance of the pipe. Black fittings are coated, except when otherwise ordered for communities requiring uncoated fittings.

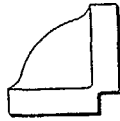
Malleable Iron Drainage Fittings, made from Cast Iron patterns, can be furnished to order. They have the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Brass Drainage Fittings can be made to order; prices on application.

Vacuum Cleaning: These fittings are well suited for vacuum cleaning installations. Regular pitched fittings are furnished unless orders specify unpitched.

Cast Iron Drainage Fittings

List Prices, Each



No. 1000, 90° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00
14	65.00	114.00
1½ x 1¼	.57	1.00
2 x 1½	.85	1.50
2 x 1¼		
5 x 4	4.25	7.40
6 x 5	6.50	11.35
Pitched ¼" per foot.		



No. 1002½ 67½° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40



No. 1002, 60° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00



No. 1003, 45° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
3½	1.90	3.35
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00
14	65.00	114.00



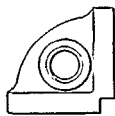
No. 1005 22½° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00
12	47.50	83.00



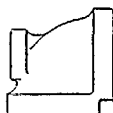
No. 1006, 11¼° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00



No. 1007, 5½° Elbows		
Size Inches	Black Each	Galv. Each
1	.28	.49
1¼	.30	.52
1½	.38	.67
2	.57	1.00
2½	1.20	2.10
3	1.45	2.55
4	2.30	4.00
5	4.25	7.40
6	6.25	11.00
8	15.00	26.25
10	31.00	54.00



No. 1008, 90° Elbows with 2-inch Side Outlet		
Size Inches	Black Each	Galv. Each
3	2.90	5.10
4	3.85	6.75
Pitched ¼" per foot.		



No. 1009, 90° Elbows with 2-inch Heel Outlet		
Size Inches	Black Each	Galv. Each
3	2.90	5.10
4	3.85	6.75
Pitched ¼" per foot.		



No. 1057 90° Street Elbows		
Size Inches	Black Each	Galv. Each
1¼	.35	.60
1½	.40	.70
2	.60	1.10



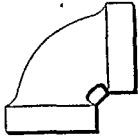
No. 1058 45° Street Elbows		
Size Inches	Black Each	Galv. Each
1¼	.35	.60
1½	.40	.70
2	.60	1.10

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions....page 222

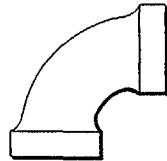
Cast Iron Drainage Fittings

List Prices, Each



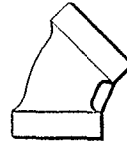
No. 1001 90° Elbows Long Turn		
Size Inches	Black Each	Galv. Each
1	.33	.57
1 1/4	.35	.60
1 1/2	.42	.72
2	.65	1.15
2 1/2	1.40	2.45
3	1.75	3.10
3 1/2	2.30	4.05
4	2.75	4.80
5	5.25	9.20
6	7.50	13.15
8	19.00	33.25
10	38.00	66.50
12	57.50	100.00
14	75.00	130.00

These elbows are pitched
1/4-inch per foot.

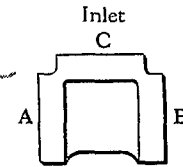


No. 1001 1/2 90° Elbows Extra Long Turn		
Size Inches	Black Each	Galv. Each
1 1/4	.35	.60
1 1/2	.42	.72
2	.65	1.15
2 1/2	1.40	2.45
3	1.75	3.10
4	2.75	4.80

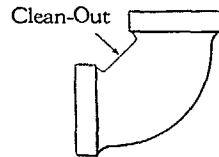
These elbows are pitched
1/4-inch per foot.



No. 1004 45° Elbows Long Turn		
Size Inches	Black Each	Galv. Each
1	.33	.57
1 1/4	.35	.60
1 1/2	.42	.72
2	.65	1.15
2 1/2	1.40	2.45
3	1.75	3.10
4	2.75	4.80
5	5.25	9.20
6	7.50	13.15
8	19.00	33.25
10	38.00	66.50
12	57.50	100.00
14	75.00	130.00

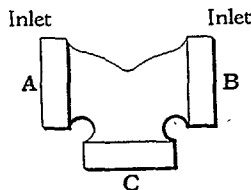


No. 1017 Tees		
Size Inches	Black Each	Galv. Each
1	.40	.70
1 1/4	.45	.80
1 1/2	.55	1.00
2	.80	1.40
2 1/2	1.50	2.50
3	2.00	3.50
4	3.25	5.70
5	6.00	10.50
6	8.75	15.25
8	21.00	37.00
10	43.00	75.00
12	60.00	100.00
14	79.00	133.00



No. 1047 90° Elbows Long Turn with Clean-out		
Size Inches	Black Each	Galv. Each
2	1.20	2.10
3	3.00	5.25
4	5.00	8.75
5	7.50	13.00
6	10.00	17.50

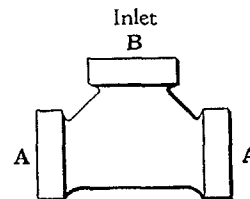
These elbows are pitched
1/4-inch per foot.



No. 1010 Three-Way Elbows		
Size Inches	Black Each	Galv. Each
1 1/4	.75	1.25
1 1/2	.85	1.50
2	1.10	1.95
2 1/2	2.25	3.90
3	3.00	5.25
4	5.00	8.75
5	7.50	13.15
6	13.50	23.50

A	B	C
1 1/4 x 1 1/4 x 1 1/2	.95	1.65
1 1/2 x 1 1/2 x 2	1.20	2.10
3 x 3 x 4	5.50	9.65
4 x 4 x 5	8.25	14.50
4 x 4 x 6	15.00	26.25
5 x 5 x 6		

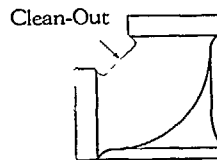
The inlets are pitched
1/4-inch per foot.



No. 1018 Basin Tees		
Size Inches	Black Each	Galv. Each
1 1/4	.60	1.00
1 1/2	.70	1.22
2	1.10	1.95
2 1/2	1.75	3.00

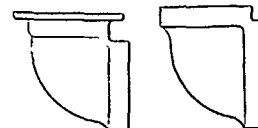
A	B
1 1/2 x 1 1/4	.77 1.35
2 x 1 1/2	1.20 2.10
2 x 1 1/4	

The inlet is pitched
1/4-inch per foot.



No. 1056 90° Elbows Long Turn with Clean-out and Base		
Size Inches	Black Each	Galv. Each
2	3.00	5.25
3	4.50	8.00
4	7.00	12.25
5	12.00	21.00
6	18.00	31.50

These elbows are pitched
1/4-inch per foot.



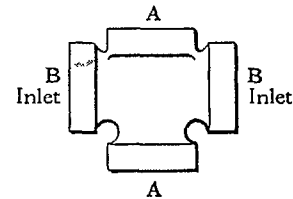
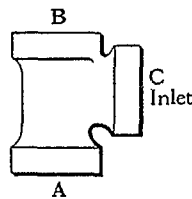
No. 1012 No. 1013
Closet Elbows
Prices on application

Malleable Iron: Malleable Iron Drainage Fittings made from the Cast Iron patterns can be furnished to order. They use the same list prices as the Cast Iron, but are sold at an advance in price; see the Crane Discount Sheet for prices.

Dimensions page 222

Cast Iron Drainage Fittings

List Prices, Each



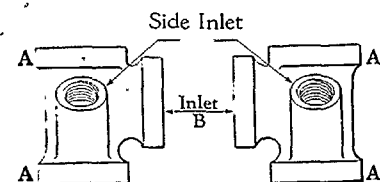
No. 1020 90° Y-Branches Tee Pattern					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1	.40	.70	A B C		
1¼	.45	.80	3½ x 3½ x 2	3.20	5.60
1½	.57	1.00	4 x 4 x 3	3.85	6.75
2	.85	1.50	4 x 4 x 2½		
2½	1.80	3.15	4 x 4 x 2		
3	2.20	3.85	4 x 4 x 1½		
3½	2.90	5.10	4 x 4 x 1¼	7.15	12.50
4	3.50	6.15	3 x 3 x 4		
5	6.50	11.35	5 x 5 x 4		
6	9.50	16.50	5 x 5 x 3		
8	23.00	40.00	5 x 5 x 2½	10.50	18.50
10	47.00	82.00	5 x 5 x 2		
12	70.00	124.00	5 x 5 x 1½		
A B C			6 x 6 x 5		
1¼ x 1¼ x 1	.50	.90	6 x 6 x 4	10.50	18.50
1½ x 1½ x 1¼	.63	1.10	6 x 6 x 3		
1½ x 1¼ x 1¼			6 x 6 x 2		
1½ x 1½ x 1			6 x 6 x 1½		
2 x 2 x 1½	.95	1.65	8 x 8 x 6	25.50	44.50
2 x 2 x 1¼			8 x 8 x 5		
2 x 1½ x 2			8 x 8 x 4		
2 x 1½ x 1½			8 x 8 x 3		
2½ x 2½ x 2	2.00	3.50	8 x 8 x 2	52.00	88.00
2½ x 2½ x 1½			10 x 10 x 5		
2½ x 2½ x 1¼			10 x 10 x 4		
3 x 3 x 2			12 x 12 x 5		
3 x 3 x 1½	2.40	4.20			
3 x 3 x 1¼					
3 x 2 x 3					

The inlet is pitched ¼-inch per foot.

The inlet is pitched 1/4-inch per foot.

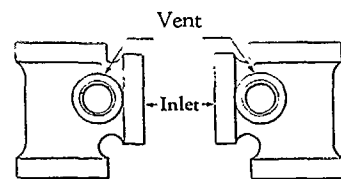
No. 1024 90° Double Y-Branches Tee Pattern					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1	.60	1.05	A B		
1¼	.70	1.22	2½ x 2	3.15	5.50
1½	.85	1.50	2½ x 1½		
2	1.30	2.30	3 x 2	3.75	6.55
2½	2.85	5.00	3 x 1½		
3	3.40	5.95	4 x 2	5.75	10.00
4	5.25	9.20	4 x 1½		
5	9.50	16.50	5 x 4	10.50	18.50
6	14.00	24.50	5 x 3		
8	36.00	62.00	5 x 2		
10	60.00	102.00	5 x 1½	15.50	27.00
A B			6 x 5		
1¼ x 1	.77	1.35	6 x 4		
1½ x 1¼	.95	1.65	6 x 2	40.00	68.00
2 x 1½	1.50	2.60	8 x 6		
2 x 1¼			8 x 4		
			8 x 3		
The inlets are pitched ¼-inch per foot.					

The inlets are pitched 1/4-inch per foot.



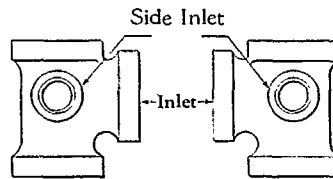
No. 1054
With Side Inlet
on Right Side

No. 1055
With Side Inlet
on Left Side



No. 1050
With Vent
on Right Side

No. 1051
With Vent
on Left Side



No. 1052
With Side Inlet
on Right Side

No. 1053
With Side Inlet
on Left Side

No. 1050 or No. 1051 90° Y-Branches with 2-inch Vent on Branch (Closet Tees)		
Size Inches	Black Each	Galv. Each
4	5.75	10.00

The 4-inch inlet is pitched 1/4-inch per foot.

No. 1052 or No. 1053 90° Y-Branches with 2-inch Side Inlet (Closet Tees)		
Size Inches	Black Each	Galv. Each
4	5.75	10.00

The 4-inch inlet is pitched 1/4-inch per foot.

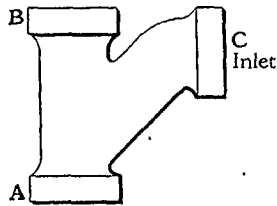
No. 1054 or No. 1055 90° Y-Branches with 2-inch 45° Side Inlet (Closet Tees)		
Size Inches	Black Each	Galv. Each
4	6.35	11.00
A B		
5 x 4	11.50	20.00
6 x 4	17.00	29.50

The 4-inch inlet is pitched 1/4-inch per foot.

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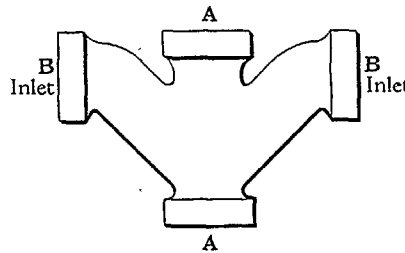
Dimensions...page 223

Cast Iron Drainage Fittings

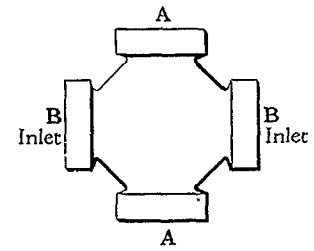


No. 1022 90° Y-Branches Long Turn, Tee Pattern			
Size Inches	Black Each	Galv. Each	
1 1/4	.57	1.00	
1 1/2	.70	1.22	
2	1.10	1.95	
2 1/2	2.40	4.20	
3	3.35	5.85	
4	6.00	10.50	
5	9.50	16.50	
6	20.00	35.00	
8	40.00	70.00	
10	55.00	90.00	
12	80.00	140.00	
A B C			
1 1/4 x 1 1/4 x 1	.63	1.10	
1 1/2 x 1 1/2 x 1 1/4	.80	1.40	
1 1/2 x 1 1/2 x 1			
2 x 2 x 1 1/2			
2 x 2 x 1 1/4	1.20	2.10	
2 x 2 x 1			
2 x 1 1/2 x 2			
2 1/2 x 2 1/2 x 2			
2 1/2 x 2 1/2 x 1 1/2	2.65	4.65	
2 1/2 x 2 1/2 x 1 1/4			
2 1/2 x 2 1/2 x 1			
3 x 3 x 2 1/2			
3 x 3 x 2	3.75	6.55	
3 x 3 x 1 1/2			
4 x 4 x 3			
4 x 4 x 2 1/2	6.60	11.55	
4 x 4 x 2			
4 x 4 x 1 1/2			
3 x 3 x 4			
5 x 5 x 4			
5 x 5 x 3	10.50	18.50	
5 x 5 x 2 1/2			
5 x 5 x 2			
5 x 5 x 1 1/2			
6 x 6 x 5			
6 x 6 x 4	22.00	38.50	
6 x 6 x 3			
6 x 6 x 2			
8 x 8 x 6			
8 x 8 x 4	44.00	77.00	
8 x 8 x 3			
10 x 10 x 8			
10 x 10 x 6	60.00	102.00	
10 x 10 x 5			
10 x 10 x 4			
12 x 12 x 6	85.00	150.00	
12 x 12 x 5			
The inlet is pitched 1/4-inch per foot.			

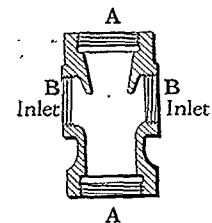
List Prices, Each



No. 1026 Double 90° Y-Branches Long Turn, Tee Pattern			
Size Inches	Black Each	Galv. Each	
1 1/4	1.00	1.75	
1 1/2	1.10	1.95	
2	1.75	3.10	
2 1/2	3.60	6.30	
3	5.00	8.75	
4	9.00	15.75	
5	14.00	24.50	
6	30.00	52.50	
8	60.00	105.00	
10	70.00	119.00	
A B			
1 1/4 x 1	1.10	1.90	
1 1/2 x 1 1/4	1.25	2.25	
1 1/2 x 1			
2 x 1 1/2	1.90	3.35	
2 x 1 1/4			
2 1/2 x 2			
2 1/2 x 1 1/2	4.00	7.00	
2 1/2 x 1 1/4			
3 x 2	5.50	9.65	
3 x 1 1/2			
4 x 3			
4 x 2	10.00	17.50	
4 x 1 1/2			
5 x 4			
5 x 3	15.50	27.00	
5 x 2			
6 x 5			
6 x 4	33.00	58.00	
6 x 3			
6 x 2			
8 x 6			
8 x 4	66.00	116.00	
8 x 3			
10 x 8	77.00	131.00	
10 x 5			
The inlets are pitched 1/4-inch per foot.			



No. 1019 Basin Crosses			
Size Inches	Black Each	Galv. Each	
1 1/4	1.25	2.25	
1 1/2	1.50	2.50	
2	1.75	3.10	
A B			
2 x 1 1/2	1.95	3.40	
The inlets are pitched 1/4-inch per foot.			



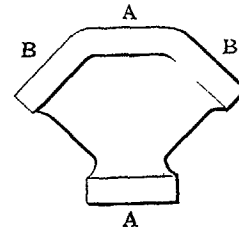
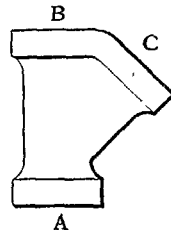
No. 1046 Partition Crosses			
Size Inches	Black Each	Galv. Each	
1 1/4	1.05	1.85	
A B			
1 1/2 x 1 1/4	1.25	2.20	
2 x 1 1/2	1.65	2.90	
2 x 1 1/4			
These Crosses are convenient fit- tings, but their use may not be per- mitted in some localities.			
The inlets are pitched 1/4-inch per foot.			

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Dimensions pages 222 and 223

Cast Iron Drainage Fittings

List Prices, Each



No. 1028 45° Y-Branches					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1	.46	.80	A B C		
1 1/4	.52	.90	4 x 4 x 2		
1 1/2	.65	1.15	4 x 4 x 1 1/2	4.25	7.40
2	.95	1.65	4 x 4 x 1 1/4		
2 1/2	2.10	3.70	5 x 5 x 4		
3	2.65	4.65	5 x 5 x 3	7.80	13.65
4	3.85	6.75	5 x 5 x 2		
5	7.10	12.50	5 x 5 x 1 1/2		
6	10.50	18.50	6 x 6 x 5		
8	25.00	44.00	6 x 6 x 4		
10	52.00	91.00	6 x 6 x 3		
12	75.00	130.00	6 x 6 x 2 1/2	11.50	20.00
14	95.00	165.00	6 x 6 x 2		
A B C			6 x 6 x 1 1/2		
1 1/2 x 1 1/2 x 1 1/4	.72	1.25	8 x 8 x 6		
2 x 2 x 1 1/2			8 x 8 x 5	27.50	48.00
2 x 2 x 1 1/4	1.05	1.85	8 x 8 x 4		
2 x 1 1/2 x 1 1/2			8 x 8 x 3		
2 1/2 x 2 1/2 x 2			10 x 10 x 6		
2 1/2 x 2 1/2 x 1 1/2	2.30	4.00	10 x 10 x 5	57.00	97.00
2 1/2 x 2 1/2 x 1 1/4			10 x 10 x 4		
3 x 3 x 2 1/2			12 x 12 x 8	80.00	140.00
3 x 3 x 2	2.90	5.10	12 x 12 x 6		
3 x 3 x 1 1/2			14 x 14 x 12		
3 x 3 x 1 1/4			14 x 14 x 6		
3 1/2 x 3 1/2 x 2 1/2	3.55	6.20	14 x 14 x 5	105.00	175.00
4 x 4 x 3			14 x 14 x 4		
4 x 4 x 2 1/2	4.25	7.40	14 x 14 x 3		

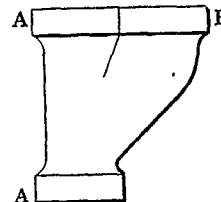
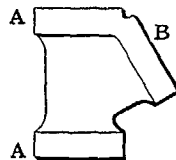
No. 1030 45° Double Y-Branches					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1 1/4	.90	1.60	A B		
1 1/2	1.00	1.75	3 x 2	4.40	7.70
2	1.45	2.55	3 x 1 1/2		
2 1/2	3.25	5.70	4 x 3	6.35	11.00
3	4.00	7.00	4 x 2		
4	5.75	10.00	5 x 4		
5	10.75	18.80	5 x 3	11.75	20.50
6	16.00	28.00	5 x 2		
8	38.00	66.50	6 x 4	17.50	30.50
10	78.00	137.00	6 x 3		
12	110.00	200.00	6 x 2		
A B			8 x 6	42.00	72.00
1 1/2 x 1 1/4	1.10	1.90	8 x 4		
2 x 1 1/2	1.60	2.80	10 x 6	86.00	146.00
2 1/2 x 2			12 x 8	121.00	215.00
2 1/2 x 1 1/2	3.60	6.30			
2 1/2 x 1 1/4					

*No. 1034, Roof Connections (illustrated at the right) are designed for use on steel or wrought iron vent pipes at the point they pass through a roof. They form a counterflashing at the top edge of the roof flashing around the pipe.



*No. 1034 Roof Connections		
Size Inches	Black Each	Galv. Each
1 1/2	1.10	1.90
2	1.15	2.00
3	1.20	2.10
4	1.50	2.60
5	2.00	3.50
6	4.25	7.40

These roof connections have straight threads.



No. 1032 60° Y-Branches					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1 1/4	.52	.90	A B		
1 1/2	.65	1.15	4 x 3		
2	.95	1.65	4 x 2	4.25	7.40
3	2.65	4.65	5 x 4		
4	3.85	6.75	5 x 3	7.80	13.65
5	7.10	12.50	5 x 2		
6	10.50	18.50	6 x 5		
A B			6 x 4	11.50	20.00
2 x 1 1/2	1.05	1.85	6 x 2		
3 x 2	2.90	5.10	8 x 6	27.50	48.00
			8 x 4		

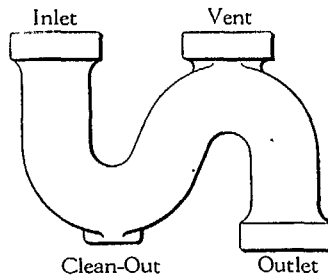
No. 1049 Special Upright Y-Branches					
Size Inches	Black Each	Galv. Each	Size Inches	Black Each	Galv. Each
1 1/2	2.55	4.55	A B		
2	2.65	4.65	2 x 1 1/2	2.90	5.10
3	5.50	9.75	2 1/2 x 1 1/2	4.50	7.75
4	8.00	14.00	2 1/2 x 2		
5	12.00	21.00	3 x 2	6.00	10.50
			4 x 2	8.75	15.25
			6 x 4	22.00	38.50

Malleable Iron:
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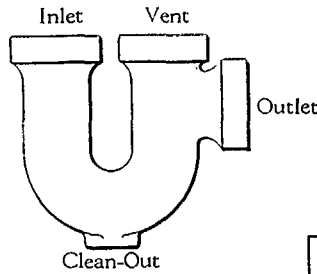
Dimensions....
...page 223

Cast Iron Drainage Fittings

List Prices, Each

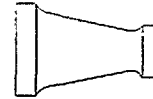


No. 1036 S Traps		
Size Inches	Black Each	Galv. Each
2	4.00	7.00
3	9.25	16.00
4	14.00	24.00
5	21.00	37.00
6	36.00	63.00

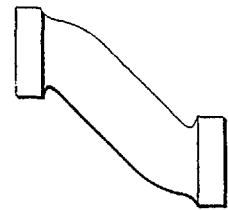


No. 1037 Half S Traps		
Size Inches	Black Each	Galv. Each
1 1/4	1.55	2.70
1 1/2	1.70	3.00
2	2.20	3.85
3	5.00	8.75
4	10.00	17.50
5	21.50	37.50
6	32.50	57.00
8	55.00	95.00
10	100.00	175.00

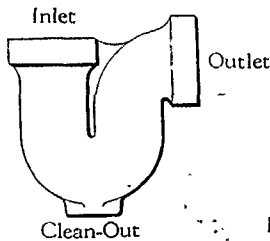
The outlet is pitched
1/4-inch per foot.



No. 1033 Increasers		
Size Inches	Black Each	Galv. Each
2 x 1 1/2	1.75	3.00
2 1/2 x 2	2.00	3.50
3 x 2 1/2	2.50	4.40
3 x 2		
3 x 1 1/2		
3 1/2 x 3	3.20	5.60
4 x 3 1/2	3.75	6.55
4 x 3		
4 x 2		
5 x 4	5.50	9.65
5 x 3		
5 x 2		
6 x 5	6.50	11.35
6 x 4		
8 x 6	15.00	26.25
8 x 4		
10 x 8	20.00	35.00
12 x 10	40.00	70.00

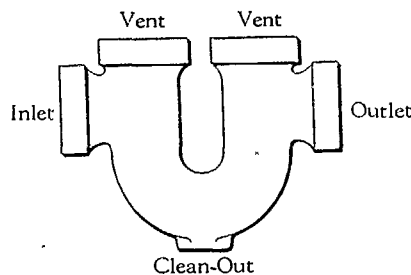


No. 1039 Offsets		
Size Inches	Black Each	Galv. Each
2 x 4	2.15	3.75
2 x 6	2.40	4.20
2 x 8	2.60	4.55
2 x 10	2.85	5.00
3 x 4	3.35	5.85
3 x 6	4.00	7.00
3 x 8	4.75	8.30
3 x 10	5.50	9.65
4 x 4	5.00	8.75
4 x 6	5.75	10.00
4 x 8	6.50	11.35
4 x 10	7.50	13.15
4 x 12	8.50	15.00
5 x 6	9.00	15.75
5 x 8	10.00	17.50
5 x 10	11.00	19.25
5 x 12	12.00	21.00
6 x 6	12.50	22.00
6 x 8	13.50	23.50
6 x 10	14.50	25.50
6 x 12	15.50	27.00



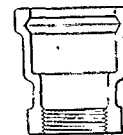
No. 1059 P Traps		
Size Inches	Black Each	Galv. Each
1 1/4	1.45	2.55
1 1/2	1.55	2.70
2	2.00	3.50
3	4.70	8.25
4	9.50	16.60

The outlet is pitched
1/4-inch per foot.



No. 1038 Running Traps		
Size Inches	Black Each	Galv. Each
1 1/4	2.40	4.20
1 1/2	2.70	4.70
2	3.30	5.75
3	5.50	9.50
4	9.75	17.00
5	24.50	43.00
6	33.50	58.50
8	65.00	115.00
10	115.00	200.00
12	180.00	300.00
14	300.00	500.00

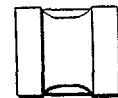
The inlet and outlet are
pitched 1/4-inch per foot.



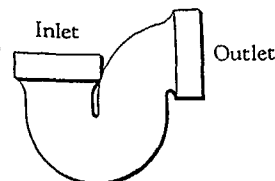
No. 1048 Tucker Connections		
Size Inches	Black Each	Galv. Each
1 1/4	.50	.90
1 1/2	.55	1.00
*2	.80	1.40
3	2.00	3.50
4	3.25	5.70
5	6.00	10.50
6	8.75	15.25

Sizes 4-inch and larger
are supplied with a loose
ring (not illustrated).

*The 2-inch size only is
made of malleable iron,
it will fit within a 4-inch
wall.



No. 1070 Couplings		
Size Inches	Black Each	Galv. Each
1 1/4	.70	1.25
1 1/2	.80	1.40
2	.90	1.60
2 1/2	1.20	2.10
3	1.50	2.60
4	2.50	4.40
5	4.00	7.00
6	6.00	10.50
8	10.00	17.50
10	14.00	24.50
12	22.00	38.50



No. 1059 1/2 Bath P Trap		
Size Inches	Black Each	Galv. Each
1 1/2	1.30	2.30
2	1.85	3.25

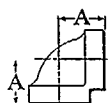
The outlet is pitched
1/4-inch per foot.

Dimensions
pages 222 and 223

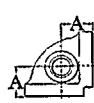
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Cast Iron Drainage Fittings

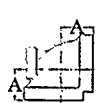
Dimensions, in Inches



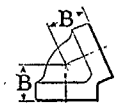
No. 1000
90° Elbow



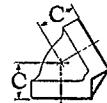
No. 1008
90° Elbow
with 2-inch
Side Outlet



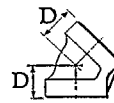
No. 1009
90° Elbow
with 2-inch
Heel Outlet



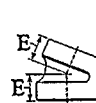
No. 1002 1/2
67 1/2° Elbow



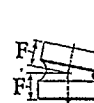
No. 1002
60° Elbow



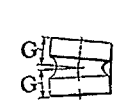
No. 1003
45° Elbow



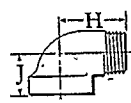
No. 1005
22 1/2° Elbow



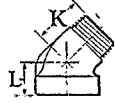
No. 1006
11 1/4° Elbow



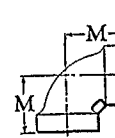
No. 1007
5 5/8° Elbow



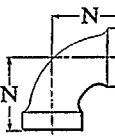
No. 1057
90° Street
Elbow



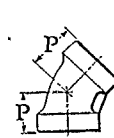
No. 1058
45° Street
Elbow



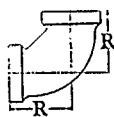
No. 1001
90° Elbow
Long Turn



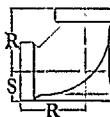
No. 1001 1/2
90° Elbow
Extra
Long Turn



No. 1004
45° Elbow
Long Turn



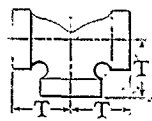
No. 1047
90° Elbow
with
*Clean-Out



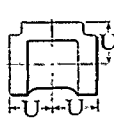
No. 1056
90° Elbow
Long Turn
with
*Clean-Out
and Base

*No. 1047 and No. 1056

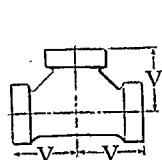
Size	Fitting	2	3	4	5	6
	Clean-Out	1	1 1/2	2	2 1/2	3



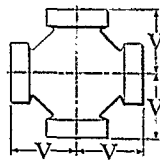
No. 1010
Three-Way
Elbow



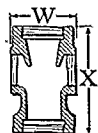
No. 1017
Tee



No. 1018
Basin Tee



No. 1019
Basin Cross



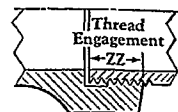
No. 1046
Partition
Cross



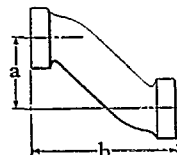
No. 1070
Coupling



No. 1033
Increaser



See page 591
for explanation.



No. 1039
Offset

Dimensions apply only to straight sizes and to Increasers;
dimensions of reducing sizes will be furnished on request.

Size	A	B	C	D	E	F	G	H	J	K	L	M
1	1 5/8	1 5/16	1 1/4	1 1/8	1	1	1					1 15/16
1 1/4	1 3/4	1 9/16	1 9/16	1 3/8	1 1/8	1	1	2 5/8	1 5/8	1 7/8	1 3/16	2 1/4
1 1/2	2 3/16	1 3/4	1 3/4	1 7/16	1 1/4	1 7/32	1 5/16	2 15/16	1 13/16	2	1 1/4	2 1/2
2	2 3/8	2	2	1 3/4	1 7/16	1 13/32	1 1/2	3 5/16	2 1/8	2 7/16	1 3/4	3 1/16
2 1/2	2 13/16		2 1/2	2 1/16	1 3/4	1 21/32	1 5/8					3 11/16
3	3 3/16	2 7/8	2 7/8	2 3/8	2	1 13/16	1 3/4					4 1/4
3 1/2	3 1/2		3 1/8	2 9/16								4 3/4
4	3 13/16	3 3/8	3 3/8	2 3/4	2 5/16	2 1/8	2					5 3/16
5	4 1/2	3 7/8	3 7/8	3 3/16	2 5/8	2 3/8	2 1/4					6 1/8
6	5 3/16		4 3/16	3 1/2	2 15/16	2 1/2	2 5/16					7 1/8
8	6 1/2		5 3/8	4 3/16	3 9/16	2 3/4	2 1/2					9
10	7 3/4		6 1/4	4 7/8	3 7/8	3	2 3/4					11
12	9			5 1/2	4 3/16							13
14	9 3/4			5 7/8								14 1/4

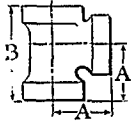
Size	N	P	R	S	T	U	V	W	X	Y	Z	ZZ
1		1 1/2				1 7/16						9/16
1 1/4	3	1 3/4			2 1/4	1 3/4	2 5/16	3	4 5/8	3		5/8
1 1/2	3 1/2	1 7/8			2 5/8	2 3/16	2 11/16			3 3/8		5/8
2	4	2 1/4	4	1 5/8	3 1/8	2 5/16	3 1/2			3 3/4	9	5/8
2 1/2	4 1/2	2 5/8			3 11/16	2 13/16	4 1/4			4	9	7/8
3	5 1/4	2 7/8	5 1/4	2 5/16	4 5/16	3 3/16				4 1/4	9	1 5/16
3 1/2											9	1
4	6 1/4	3 7/16	6 1/4	2 7/8	5 3/16	4				4 1/2	9	1 1/16
5		4 1/8	6 1/8	3 1/2	6 1/8	4 5/8				4 3/4	9	1 3/16
6		4 7/8	7 1/8	4 1/8	7 1/8	5 3/16				5	9	1 1/4
8		6				6 1/2				5 5/8	9	1 3/8
10		7 1/2				7 3/4				6 1/4	9	1 9/16
12		8 3/4				9				7	9	1 11/16
14		9 1/2				9 3/4						1 7/8

No. 1039 Offsets

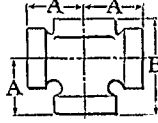
Size	2	2	2	2	3	3	3	3	4	4	4	4	4	5	5	5	5	6	6	6	6
a	4	6	8	10	4	6	8	10	4	6	8	10	12	6	8	10	12	6	8	10	12
b	7 1/2	9 1/2	11 1/2	13 1/2	8 3/4	10 3/4	12 3/4	14 3/4	9 3/4	11 3/4	13 3/4	15 3/4	17 3/4	12 5/8	14 5/8	16 5/8	18 5/8	13 5/8	15 5/8	17 5/8	19 5/8

Cast Iron Drainage Fittings

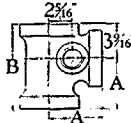
Dimensions, in Inches



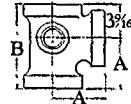
No. 1020
90° Y-Branch
Tee Pattern



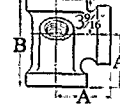
No. 1024
90° Double
Y-Branch
Tee Pattern



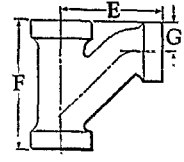
No. 1050 or
No. 1051
90° Y-Branches
with 2-inch
Vent on Branch
(Closet Tees)



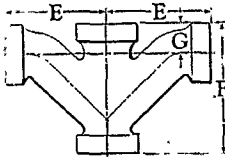
No. 1052 or
No. 1053
90° Y-Branches
with 2-inch
Side Inlet
(Closet Tees)



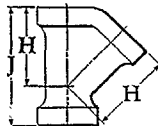
No. 1054 or
No. 1055
90° Y-Branches
with 2-inch
45° Side Inlet
(Closet Tees)



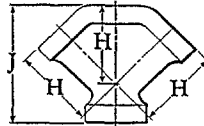
No. 1022
90° Y-Branch
Long Turn
Tee Pattern



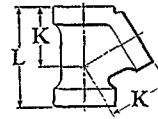
No. 1026
Double 90° Y-Branch
Long Turn
Tee Pattern



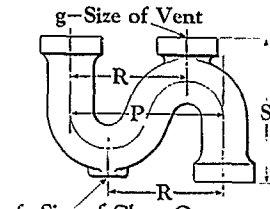
No. 1028
45° Y-Branch



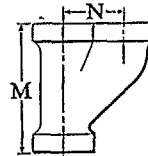
No. 1030
45° Double Y-Branch



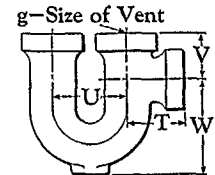
No. 1032
60° Y-Branch



No. 1036, S Trap



No. 1049
Special Upright
Y-Branch

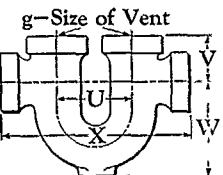


No. 1037
Half S Trap

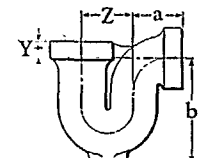
Dimensions apply to straight sizes only; dimensions of reducing sizes furnished on request.

Size	A	B	E	F	G	H	J	K	L	M	N	P	R
1	1 ⁵ / ₁₆	3 ¹ / ₄				2 ³ / ₄	4 ¹ / ₁₆						
1 ¹ / ₄	2 ¹ / ₄	3 ³ / ₄	3 ⁵ / ₈	4 ³ / ₄	1 ³ / ₁₆	3 ¹ / ₄	5	2 ⁵ / ₁₆	4 ³ / ₁₆				
1 ¹ / ₂	2 ¹ / ₂	4 ¹ / ₄	4 ¹ / ₈	5 ³ / ₈	1 ¹ / ₄	3 ⁵ / ₈	5 ¹ / ₂	2 ⁵ / ₈	4 ⁵ / ₈	5 ¹¹ / ₁₆	2 ⁵ / ₈		
2	3 ¹ / ₁₆	5 ³ / ₁₆	5 ⁷ / ₁₆	7 ¹ / ₁₆	1 ⁵ / ₈	4 ⁵ / ₁₆	6 ⁷ / ₁₆	3 ¹ / ₄	5 ¹ / ₂	7	3 ¹ / ₄	8 ¹ / ₄	6 ¹ / ₄
2 ¹ / ₂	3 ¹¹ / ₁₆	6 ⁵ / ₁₆	6 ¹ / ₄	8 ¹ / ₄	2	5 ³ / ₈	7 ⁷ / ₈						
3	4 ¹ / ₄	7 ¹ / ₄	7 ¹ / ₂	9 ¹³ / ₁₆	2 ⁵ / ₁₆	6 ³ / ₁₆	9	4 ³ / ₄	7 ³ / ₄	9 ¹¹ / ₁₆	4 ⁵ / ₈	10 ³ / ₄	8 ¹ / ₁₆
3 ¹ / ₂	4 ¹¹ / ₁₆	8											
4	5 ³ / ₁₆	8 ³ / ₄	9 ⁷ / ₈	13 ³ / ₄	2 ⁷ / ₈	7 ¹¹ / ₁₆	10 ⁷ / ₈	5 ³ / ₄	9 ³ / ₈	11 ³ / ₄	5 ¹³ / ₁₆	14 ¹ / ₈	10 ⁵ / ₈
5	6 ¹ / ₈	10 ⁵ / ₁₆	12 ¹ / ₄	15 ³ / ₄	3 ¹ / ₂	9 ³ / ₁₆	12 ¹⁵ / ₁₆	6 ³ / ₄	11 ¹ / ₈	13 ³ / ₄	7	16 ³ / ₄	12 ⁹ / ₁₆
6	7 ¹ / ₈	11 ¹⁵ / ₁₆	14 ⁹ / ₁₆	18 ¹¹ / ₁₆	4 ¹ / ₈	10 ³ / ₄	14 ³ / ₄	7 ⁷ / ₈	13			20 ¹ / ₄	15 ³ / ₁₆
8	9	15 ¹ / ₁₆	19 ⁵ / ₁₆	24 ⁹ / ₁₆	5 ¹ / ₄	13 ⁹ / ₁₆	18 ¹³ / ₁₆						
10	11 ³ / ₈	20	24 ³ / ₁₆	30 ⁵ / ₈	6 ¹ / ₂	16 ¹ / ₈	20						
12	13 ³ / ₄	24 ¹ / ₄	28 ⁵ / ₈	36	7 ³ / ₄	19 ⁵ / ₈	24 ¹ / ₄						
14						21 ¹ / ₂	28						

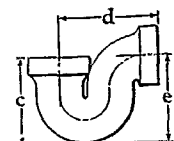
Size	S	T	U	V	W	X	Y	Z	a	b	c	d	e	f	g
1 ¹ / ₄		2 ⁵ / ₁₆	3 ¹ / ₈	2	3 ³ / ₄	7 ³ / ₄	3 ³ / ₄	2	11 ⁵ / ₁₆	4 ¹ / ₂				3 ³ / ₄	1 ¹ / ₄
1 ¹ / ₂		2 ¹ / ₂	3 ³ / ₈	2 ¹ / ₄	4 ³ / ₈	8 ³ / ₈	7 ³ / ₈	2 ¹ / ₄	2 ¹ / ₈	5	4 ¹ / ₁₆	4 ¹ / ₂	4 ⁵ / ₁₆	1	1 ¹ / ₂
2	8	3 ¹ / ₁₆	4	2 ⁹ / ₁₆	5 ³ / ₁₆	10 ¹ / ₈	7 ³ / ₈	2 ³ / ₄	2 ⁹ / ₁₆	5 ¹¹ / ₁₆	4 ¹³ / ₁₆	5 ⁵ / ₁₆	4 ¹³ / ₁₆	1	2
3	11 ¹ / ₄	4 ³ / ₁₆	5 ³ / ₈	3 ¹ / ₂	7 ¹ / ₈	13 ¹ / ₄	1 ³ / ₁₆	3 ³ / ₄	3 ³ / ₈	7 ¹ / ₈				1 ¹ / ₄	3
4	13 ³ / ₄	5 ¹ / ₈	7	4 ³ / ₁₆	9 ³ / ₈	17 ¹ / ₄	1 ¹ / ₂	5	4 ¹ / ₄	9 ¹ / ₁₆				2	4
5	16 ⁷ / ₈	6 ¹ / ₁₆	8 ³ / ₈	4 ³ / ₄	11 ³ / ₈	20 ¹ / ₂								2	4
6	19 ³ / ₄	6 ⁹ / ₁₆	10 ¹ / ₈	5 ⁷ / ₁₆	13 ¹ / ₂	23 ¹ / ₄								2	4
8		8 ¹⁵ / ₁₆	12 ³ / ₈	6 ³ / ₄	17 ¹ / ₄	30 ¹ / ₄								3	6
10		10 ³ / ₄	14 ³ / ₄	8 ¹ / ₄	20 ³ / ₄	36 ¹ / ₄								3	6
12			17	9 ¹ / ₂	24 ⁵ / ₈	41 ⁷ / ₈								3	6
14			18 ¹ / ₂	10 ¹ / ₂	27 ¹ / ₂	45								4	8



No. 1038
Running Trap

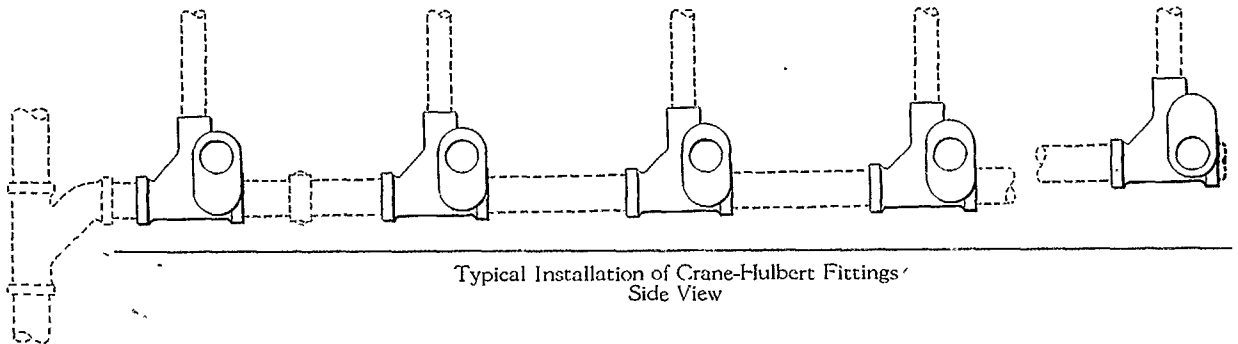


No. 1059, P Trap

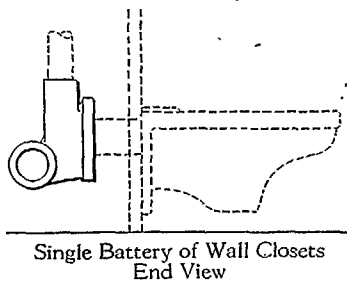


No. 1059¹/₂
Bath P Trap

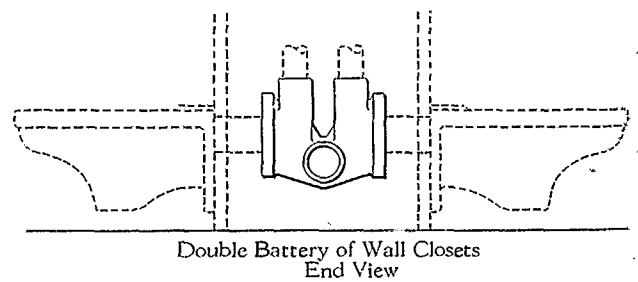
Crane-Hulbert Drainage Fittings For Wall Closets



Typical Installation of Crane-Hulbert Fittings
Side View



Single Battery of Wall Closets
End View



Double Battery of Wall Closets
End View

16

Crane-Hulbert Drainage Fittings are especially designed to facilitate the installation of single or double batteries of wall closets. They embody a combination of many features to serve a specific need in the simplest and most efficient manner.

In these fittings, the inlet openings are located at progressively different distances above the center of the lateral drain line, thus enabling the drain line to be properly pitched in keeping with plumbing practices. All of the closets in a battery can be installed at a uniform height from the floor, the

lateral drain line can be installed above the floor and the number of fittings and joints are materially reduced.

This line includes black or galvanized screwed or hub and spigot fittings in a liberal assortment of types and sizes. In addition to the long turn design illustrated above, a complete variety of Short Turn Crane-Hulbert Drainage Fittings are also available. These are provided for exceptionally compact installations where space restrictions do not permit the use of the Long Turn Fittings.

*Complete information, prices, and dimensions
will be furnished on application.*

Iron and Steel Bushings, Plugs, Couplings, Nipples, Etc.

Iron Bushings.....	page 226
Steel Bushings.....	page 227
Iron Plugs.....	page 228
Steel Plugs.....	page 228
Wrought Couplings.....	page 229
Wrought Steel Nipples.....	pages 230 and 231
Long Screws.....	page 232
Faced Couplings and Locknuts.....	page 232
Small Pipe Bends.....	page 232
Single Strap and Double Strap Clamps.....	page 233

The fittings mentioned above have been grouped together in this section of the catalog because they are used generally with Malleable Iron, Cast Iron, or Steel fittings.

For greater convenience, the following fittings are shown with related products in other sections of this catalog:

Hydrant Clamps.....	page 89
Wood Rod Couplings.....	page 89
Street Washer Keys.....	page 89
Hydrant Handles.....	page 89
Brass Couplings and Locknuts.....	page 256
Brass Bushings, Plugs, and Nipples.....	pages 258 and 259
Malleable Iron Couplings.....	pages 185 and 190
A.A.R. Malleable Iron Couplings.....	page 193
Forged Steel Couplings.....	pages 339 and 340

Iron Bushings



Outside Hexagon



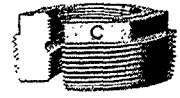
Inside Hexagon



Face



Eccentric



Double Tapped

Note: Face Bushings in sizes $\frac{3}{4}$ -inch and smaller do not have lugs (not illustrated).

List Prices, Each

Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	5	6	8	10	12
Hexagon	Black	.04	.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.93	1.25	2.75	3.75	5.00
	Galv.	.08	.08	.08	.10	.12	.14	.18	.28	.42	.60	.80	1.00	1.85	2.50	5.50	7.50	10.00
Face	Black	.08	.08	.09	.11	.13	.17	.22	.32	.48	.70	1.20	1.50	2.60	3.75	9.00	14.00	20.00
	Galv.	.12	.12	.14	.17	.20	.25	.33	.48	.72	1.05	1.80	2.25	3.90	5.60	13.50	21.00	30.00
Eccentric	Black						.22	.25	.27	.42	.60	.80	1.00	1.85	2.50	Prices on application		
	Galv.						.44	.50	.54	.84	1.20	1.60	2.00	3.70	5.00			
Double Tapped	Black								.50	.70	1.00	1.25	2.40		4.00			
	Galv.								1.00	1.40	2.00	2.50	4.80		8.00			

List prices shown above apply only to stock items. A tabulation of the sizes carried in stock and the materials from which they are made — cast iron, malleable iron, or steel — is shown in the table below. Other sizes or materials are special; prices on application.

Bushings Carried in Stock

Hexagon				Face				Eccentric				Double Tapped			
b $\frac{1}{4}$ x $\frac{1}{8}$	b $1\frac{1}{2}$ x $1\frac{1}{4}$	a $3\frac{1}{2}$ x 3	a 6 x 5	c $\frac{1}{4}$ x $\frac{1}{8}$	b $2\frac{1}{2}$ x 2	$1\frac{1}{4}$ x $\frac{3}{4}$	$3\frac{1}{2}$ x $2\frac{1}{2}$	b 2 x $1\frac{1}{2}$ x $1\frac{1}{2}$				b 2 x $1\frac{1}{2}$ x $1\frac{1}{2}$			
b $\frac{3}{8}$ x $\frac{1}{4}$	a $1\frac{1}{2}$ x 1	a $3\frac{1}{2}$ x $2\frac{1}{2}$	a 6 x 4	c $\frac{3}{8}$ x $\frac{1}{4}$	b $2\frac{1}{2}$ x $1\frac{1}{2}$	$1\frac{1}{4}$ x $\frac{1}{2}$	$3\frac{1}{2}$ x 2	b 2 x $1\frac{1}{4}$ x $1\frac{1}{4}$				2 x $1\frac{1}{4}$ x $1\frac{1}{4}$			
b $\frac{3}{8}$ x $\frac{1}{8}$	a $1\frac{1}{2}$ x $\frac{3}{4}$	a $3\frac{1}{2}$ x 2	a 6 x $3\frac{1}{2}$	c $\frac{3}{8}$ x $\frac{1}{8}$	b 2 x $1\frac{1}{4}$	$1\frac{1}{2}$ x $\frac{3}{4}$	$3\frac{1}{2}$ x $1\frac{1}{2}$	2 x $\frac{3}{4}$ x $\frac{3}{4}$				2 x $\frac{3}{4}$ x $\frac{3}{4}$			
b $\frac{1}{2}$ x $\frac{3}{8}$	a $1\frac{1}{2}$ x $\frac{1}{2}$	a $3\frac{1}{2}$ x $1\frac{1}{2}$	a 6 x 3	c $\frac{1}{2}$ x $\frac{3}{8}$	b 3 x $2\frac{1}{2}$	$1\frac{1}{2}$ x $\frac{1}{2}$	$3\frac{1}{2}$ x $1\frac{1}{4}$	2 x $1\frac{1}{4}$ x $1\frac{1}{4}$				2 x $1\frac{1}{4}$ x $1\frac{1}{4}$			
b $\frac{1}{2}$ x $\frac{1}{4}$	a $1\frac{1}{2}$ x $\frac{3}{8}$	a $3\frac{1}{2}$ x $1\frac{1}{4}$	a 6 x $2\frac{1}{2}$	c $\frac{1}{2}$ x $\frac{1}{4}$	b 3 x 2	2 x $\frac{1}{2}$	4 x 3	2 x $\frac{1}{2}$ x $\frac{1}{2}$				2 x $\frac{1}{2}$ x $\frac{1}{2}$			
b $\frac{1}{2}$ x $\frac{1}{8}$	a $1\frac{1}{2}$ x $\frac{1}{4}$	a $3\frac{1}{2}$ x 1	a 6 x 2	c $\frac{1}{2}$ x $\frac{1}{8}$	b 3 x $1\frac{1}{2}$	2 x $\frac{1}{4}$	4 x $2\frac{1}{2}$	2 x $\frac{1}{4}$ x $\frac{1}{4}$				2 x $\frac{1}{4}$ x $\frac{1}{4}$			
b $\frac{3}{4}$ x $\frac{1}{2}$	b 2 x $1\frac{1}{2}$	a $3\frac{1}{2}$ x $\frac{3}{4}$	a 6 x $1\frac{1}{2}$	c $\frac{3}{4}$ x $\frac{1}{2}$	b $3\frac{1}{2}$ x 3	2 x $\frac{3}{4}$	4 x 2	2 x $\frac{3}{4}$ x $\frac{3}{4}$				2 x $\frac{3}{4}$ x $\frac{3}{4}$			
b $\frac{3}{4}$ x $\frac{3}{8}$	2 x $1\frac{1}{4}$	4 x $3\frac{1}{2}$	a 6 x $1\frac{1}{4}$	c $\frac{3}{4}$ x $\frac{3}{8}$	b $3\frac{1}{2}$ x $2\frac{1}{2}$	2 x $\frac{1}{2}$	4 x $1\frac{1}{2}$	2 x $\frac{1}{2}$ x $\frac{1}{2}$				2 x $\frac{1}{2}$ x $\frac{1}{2}$			
b $\frac{3}{4}$ x $\frac{1}{4}$	a 2 x 1	4 x 3	a 6 x 1	c $\frac{3}{4}$ x $\frac{1}{4}$	b $3\frac{1}{2}$ x 2	2 x $\frac{1}{4}$	4 x $1\frac{1}{4}$	2 x $\frac{1}{4}$ x $\frac{1}{4}$				2 x $\frac{1}{4}$ x $\frac{1}{4}$			
b $\frac{3}{4}$ x $\frac{1}{8}$	a 2 x $\frac{3}{4}$	a 4 x $2\frac{1}{2}$	a 8 x 6	b 1 x $\frac{3}{4}$	b 4 x $3\frac{1}{2}$	$2\frac{1}{2}$ x $1\frac{1}{2}$	4 x 1	$2\frac{1}{2}$ x $1\frac{1}{4}$ x $1\frac{1}{4}$				$2\frac{1}{2}$ x $1\frac{1}{4}$ x $1\frac{1}{4}$			
b 1 x $\frac{3}{4}$	a 2 x $\frac{1}{2}$	a 4 x 2	a 8 x 5	b 1 x $\frac{1}{2}$	b 4 x 3	$2\frac{1}{2}$ x $1\frac{1}{4}$	5 x 4	$2\frac{1}{2}$ x $1\frac{1}{2}$ x $1\frac{1}{2}$				$2\frac{1}{2}$ x $1\frac{1}{2}$ x $1\frac{1}{2}$			
b 1 x $\frac{1}{2}$	a 2 x $\frac{3}{8}$	a 4 x $1\frac{1}{2}$	a 8 x 4	b 1 x $\frac{3}{8}$	b 4 x $2\frac{1}{2}$	$2\frac{1}{2}$ x $\frac{3}{4}$	5 x $3\frac{1}{2}$	$2\frac{1}{2}$ x $\frac{3}{4}$ x $\frac{3}{4}$				$2\frac{1}{2}$ x $\frac{3}{4}$ x $\frac{3}{4}$			
b 1 x $\frac{1}{4}$	a 2 x $\frac{1}{4}$	a 4 x $1\frac{1}{4}$	a 8 x 3	b 1 x $\frac{1}{4}$	b 4 x 2	$2\frac{1}{2}$ x $\frac{1}{2}$	5 x 3	$2\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$				$2\frac{1}{2}$ x $\frac{1}{2}$ x $\frac{1}{2}$			
a 1 x $\frac{3}{8}$	b $2\frac{1}{2}$ x 2	a 4 x 1	a 8 x $2\frac{1}{2}$	b $1\frac{1}{4}$ x 1	b 5 x 4	3 x 2	5 x $2\frac{1}{2}$	3 x 2 x 2				3 x 2 x 2			
a 1 x $\frac{1}{2}$	a $2\frac{1}{2}$ x $1\frac{1}{2}$	a 4 x $\frac{3}{4}$	a 8 x 2	b $1\frac{1}{4}$ x $\frac{3}{4}$	b 5 x 3	3 x $1\frac{1}{2}$	5 x 2	3 x $1\frac{1}{2}$ x $1\frac{1}{2}$				3 x $1\frac{1}{2}$ x $1\frac{1}{2}$			
a 1 x $\frac{3}{4}$	a $2\frac{1}{2}$ x $1\frac{1}{4}$	a 4 x $\frac{1}{2}$	a 8 x 2	b $1\frac{1}{4}$ x $\frac{1}{2}$	b 6 x 5	3 x $1\frac{1}{4}$	6 x 3	3 x $1\frac{1}{4}$ x $1\frac{1}{4}$				3 x $1\frac{1}{4}$ x $1\frac{1}{4}$			
a 1 x $\frac{1}{4}$	a $2\frac{1}{2}$ x 1	5 x 4	a 10 x 8	b $1\frac{1}{2}$ x 1	b 6 x 4	3 x 1	6 x $2\frac{1}{2}$	3 x 1 x 1				3 x 1 x 1			
a $1\frac{1}{4}$ x $\frac{3}{4}$	a $2\frac{1}{2}$ x $\frac{3}{4}$	5 x $3\frac{1}{2}$	a 10 x 6	b $1\frac{1}{2}$ x $\frac{3}{4}$	b 8 x 6	3 x $\frac{3}{4}$	6 x 2	3 x $\frac{3}{4}$ x $\frac{3}{4}$				3 x $\frac{3}{4}$ x $\frac{3}{4}$			
a $1\frac{1}{4}$ x $\frac{1}{2}$	a $2\frac{1}{2}$ x $\frac{1}{2}$	a 5 x 3	a 10 x 5	b $1\frac{1}{2}$ x $\frac{1}{2}$	b 10 x 8							3 x $\frac{1}{2}$ x $\frac{1}{2}$			
a $1\frac{1}{4}$ x $\frac{3}{8}$	a 3 x $2\frac{1}{2}$	a 5 x $2\frac{1}{2}$	12 x 10	b 2 x $1\frac{1}{2}$	b 12 x 10							4 x 3 x 3			
a $1\frac{1}{4}$ x $\frac{1}{4}$	a 3 x 2	a 5 x 2	a 12 x 8	b 2 x $1\frac{1}{4}$								4 x $2\frac{1}{2}$ x $2\frac{1}{2}$			
	a 3 x $1\frac{1}{2}$	a 5 x $1\frac{1}{2}$	a 12 x 6	b 2 x 1								4 x 2 x 2			
	a 3 x $1\frac{1}{4}$	a 5 x $1\frac{1}{4}$		b 2 x $\frac{3}{4}$								4 x $1\frac{1}{2}$ x $1\frac{1}{2}$			
	a 3 x 1	a 5 x 1										6 x 4 x 4			
	a 3 x $\frac{3}{4}$														
	a 3 x $\frac{1}{2}$														

a — Indicates sizes made with inside hexagon; other sizes have outside hexagon.

b — Indicates sizes made of malleable iron.

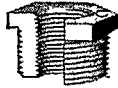
c — Indicates sizes made of steel; these do not have lugs (not illustrated).

Sizes not indicated by "b" or "c" are made of cast iron

Double Tapped Bushings: Double Tapped Bushings are used to reduce threaded tank openings to suction pipe sizes. They permit the passage of a

foot valve or strainer through the tank opening, and then close the opening down to suction pipe size. All sizes are recessed between the tappings.

Steel Bushings



No. 326 D
Hexagon Bushing



No. 327 D
Face Bushing



No. 347 D
Hexagon Bushing
Long Pattern

List Prices

Size Inches	No. 326 D Hexagon Each	No. 327 D Face Each	No. 347 D Hexagon Each	Size Inches	No. 326 D Hexagon Each	No. 327 D Face Each	No. 347 D Hexagon Each
1/4 x 1/8	.45	Use Regular Face Bushings shown on page 226.		3 x 2 1/2	8.00	5.00	17.75
3/8 x 1/4	.45		.50	3 x 2	8.00	5.00	
3/8 x 3/8	.45			3 x 1 1/2	7.25	5.00	
1/2 x 3/8	.45		.65	3 x 1 1/4	7.25		
1/2 x 1/4	.45			3 x 1	7.25		
1/2 x 1/8	.45			3 x 3/4	7.25		
3/4 x 1/2	.45		.90	3 x 1/2	7.25		
3/4 x 3/8	.45			3 1/2 x 3	9.00	6.00	24.50
3/4 x 1/4	.45			3 1/2 x 2 1/2	9.00	6.00	
3/4 x 1/8	.45			3 1/2 x 2	9.00	6.00	
1 x 3/4	.50	.60	1.25	3 1/2 x 1 1/2	8.25		
1 x 1/2	.50	.60		3 1/2 x 1 1/4	8.25		
1 x 3/8	.50	.60		3 1/2 x 1	8.25		
1 x 1/4	.50	.60		3 1/2 x 3/4	8.25		
1 x 1/8	.50			4 x 3 1/2	10.50	7.50	30.50
1 1/4 x 1	.66	.75	1.90	4 x 3	10.50	7.50	
1 1/4 x 3/4	.66	.75		4 x 2 1/2	10.50	7.50	
1 1/4 x 1/2	.66	.75		4 x 2	10.50	7.50	
1 1/4 x 3/8	.66			4 x 1 1/2	9.50		
1 1/4 x 1/4	.66			4 x 1 1/4	9.50		
1 1/2 x 1 1/4	.83	.95	2.75	4 x 1	9.50		
1 1/2 x 1	.83	.95		4 x 3/4	9.50		
1 1/2 x 3/4	.83	.95		4 x 1/2	9.50		
1 1/2 x 1/2	.83	.95		5 x 4	12.50	8.75	
1 1/2 x 3/8	.83			5 x 3 1/2	12.50		
1 1/2 x 1/4	.83			5 x 3	12.50	8.75	
2 x 1 1/2	1.32	1.50	6.75	5 x 2 1/2	12.50		
2 x 1 1/4	1.32	1.50		5 x 2	12.50		
2 x 1	1.32	1.50		5 x 1 1/2	12.50		
2 x 3/4	1.20	1.50		5 x 1 1/4	12.50		
2 x 1/2	1.20			5 x 1	12.50		
2 x 3/8	1.20			6 x 5	20.00	10.00	
2 x 1/4	1.20			6 x 4	20.00	10.00	
2 1/2 x 2	5.00	2.00	15.30	6 x 3 1/2	20.00	10.00	
2 1/2 x 1 1/2	5.00	2.00		6 x 3	20.00	10.00	
2 1/2 x 1 1/4	4.50	2.00		6 x 2 1/2	20.00		
2 1/2 x 1	4.50			6 x 2	20.00		
2 1/2 x 3/4	4.50			6 x 1 1/2	20.00		
2 1/2 x 1/2	4.50			6 x 1 1/4	20.00		
				6 x 1	20.00		

Working Pressures

(Steam, Water, Oil,
Oil Vapor, Gas, or Air)

Temper- Pounds, Non-Shock
ature

Degrees Fahr.	No. 326 D (Reduc- ing two or more sizes)	No. 347 D (2 1/2-inch and smaller)
	No. 327 D (3-inch and larger)	No. 347 D (2 1/2-inch and smaller)
100	6000	9000
150	5700	8550
200	5400	8100
250	5100	7650
300	4800	7200
350	4500	6750
400	4200	6300
450	3900	5850
500	3600	5400
550	3360	5040
600	3120	4680
650	2880	4320
700	2640	3960
750	2400	3600
800	2200	3300
850	2000	3000
900	1800	2700
950	1590	2385
1000	1140	1710

The No. 347 D are long pattern hexagon bushings, especially designed for one size reductions. They have heavy metal sections and will easily withstand

the severe and high-pressure services for which regular hexagon bushings reduced one size are not entirely satisfactory.

Iron Plugs



Square Head

Square Head
Tapped 1/8-inch
for Air CockSolid
(Square Head)

Countersunk

Bar Plug
(Solid)

Barrel Plug

List Prices, Each

Size		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	
Square Head	Right Hand	Black	.02	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.88	1.20	2.75	3.75	5.00	
		Galv.	.04	.04	.04	.04	.06	.08	.10	.14	.20	.36	.50	.76	.84	1.75	2.40	5.50	7.50	10.00	
	Left Hand	Black				.04	.06	.08	.09	.11	.15	.27	.38								
		Galv.				.08	.12	.16	.18	.22	.30	.54	.76								
	Tapped 1/8-inch for Air Cock	Black					.12	.15	.20	.25	.30										
		Galv.					.24	.30	.40	.50	.60										
Solid, Right Hand		Black	.02	.02	.02	.04	.06	.08	.09	.11	.15	.27	.38	.57	.63	1.35					
		Galv.	.04	.04	.04	.08	.12	.16	.18	.22	.30	.54	.76	1.14	1.26	2.70					
Countersunk, Right Hand		Black	.04	.04	.04	.04	.06	.08	.09	.11	.15	.30	.40	.92	1.10	2.00	3.50				
		Galv.		.08	.08	.08	.12	.16	.18	.22	.30	.60	.80	1.84	2.20	4.00	7.00				
Bar Plugs, Right Hand		Black													.63	1.35	1.80	4.15	5.75	7.50	
		Galv.													1.26	2.70	3.60	8.30	11.50	15.00	
Barrel Plugs, Right Hand		Black				.25			.35	.45											
		Galv.				.50			.70	.90											

Service suggestions: Square Head and Countersunk Plugs are generally used with:

Standard Cast or Malleable Iron Fittings

Solid Plugs and Bar Plugs are generally used with:

175-Pound Cast Iron Fittings
250-Pound Cast Iron Fittings
300-Pound Malleable Iron Fittings
Heavy Malleable Iron Fittings
Hydraulic Malleable Iron Fittings

American Standard: All iron plugs (except the Barrel Plug) conform to the American Standard for Pipe Plugs (B16-2-1936).

Materials: These plugs, illustrated and priced above, are made of the materials indicated in the following table:

Style	Steel	Malleable	Cast Iron
Square Head	1/8, 1/4, 3/8"		1/2" and larger
Solid	1/8, 1/4, 3/8"		1/2" and larger
Countersunk	1/4"	3/8 to 1 1/4"	1 1/2" and larger
Bar			All sizes
Barrel			All sizes

Note: Square Head Plugs sizes 1/2-inch and larger are cored, as illustrated. 1/8, 1/4, and 3/8-inch sizes are solid, being the same as the Solid Plugs.

Steel Plugs

Working Pressures (Steam, Water, Oil, Oil Vapor, Gas, or Air)

Temperature Degrees Fahr.	Pounds, Non-Shock		Temperature Degrees Fahr.	Pounds, Non-Shock	
	No. 320 D	No. 321 D		No. 320 D	No. 321 D
100	3000	9000	550	1680	5040
150	2850	8550	600	1560	4680
200	2700	8100	650	1440	4320
250	2550	7650	700	1320	3960
			750	1200	3600
300	2400	7200	800	1100	3300
350	2250	6750	850	1000	3000
400	2100	6300	900	900	2700
450	1950	5850	950	795	2385
500	1800	5400	1000	570	1710

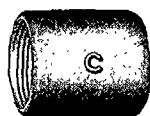
No. 320 D
Square Head
3000-PoundNo. 321 D
Hexagon Head
9000-Pound

List Prices

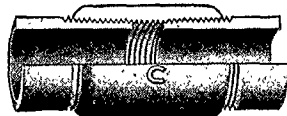
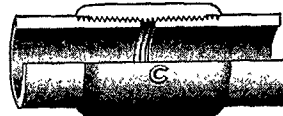
Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 320 D, 3000-Pound	Each	*See Note			.25	.30	.35	.50	.75	1.50	3.00	5.00	5.75	6.50
No. 321 D, 9000-Pound	Each		.25	.25	.25	.30	.40	.55	.85	1.65	3.30	5.50		

*Note: Use 1/8, 1/4, and 3/8-inch Square Head or Solid Plugs listed above; they are made of steel.

Wrought Couplings



Standard

Coupling
With Plain EndsExtra Heavy
XX Hydraulic
Car HeaterCoupling
With Recessed EndsExtra Heavy
XX HydraulicHalf Coupling
With Plain End
Extra Heavy

List Prices, Standard

Size		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Right Hand	Black	Each	.05	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.80	1.00
	Galv.	Each	.06	.06	.08	.10	.13	.18	.25	.32	.40	.55	.80	1.05	1.40
Right and Left	Black	Each		.07	.08	.11	.15	.20	.25	.30	.50	.85	1.20	1.60	2.00

Sizes 5 to 12-inch can be furnished to order. Prices on application.

Sizes 5 to 12-inch can be furnished to order. Prices on application.

List Prices, Extra Heavy, XX Hydraulic, and Half Couplings

Size		Inches															
		1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4			
Extra Heavy	Plain Ends	R. H.	Black	Each	.12	.12	.14	.14	.20	.26	.34	.42	.56	.80	1.20	1.60	2.00
			Galv.	Each	.17	.17	.20	.20	.25	.32	.42	.55	.75	1.05	1.50	1.90	3.00
	Recessed Ends	R. & L.	Black	Each				.20	.30	.40	.45	.55	.70				
				Galv.	Each	.22	.22	.25	.25	.30	.35	.45	.55	.70	.95	1.40	1.85	2.25
XX Hydraulic	Plain Ends	R. H.	Black	Each	.27	.27	.30	.30	.35	.40	.55	.70	.90	1.20	1.70	2.15	3.25
	Recessed Ends	R. H.	Black	Each					.40	.55	.70	.85	1.15	1.60			
Half Coupling,	Plain End	R. H.	Black	Each				.08	.12	.16	.20	.25	.34	.48	.72	.96	1.20

List Prices, Car Heater

List Prices, Car Heater								
Size		Inches	1/2	3/4	1	*1 1/4	1 1/2	2
Right Hand	Black	Each	.14	.20	.26	.34	.42	.56
	Galv.	Each	.20	.25	.32	.42	.55	.75
Right and Left	Black	Each	.20	.30	.40	.45	.55	.70

*Special short pattern.

Standard Seamless Steel Couplings: Standard Seamless Steel Couplings can be furnished to order. Prices on application.

Seamless Steel Line Pipe Couplings: Seamless Steel Line Pipe Couplings can be furnished to order. Prices on application.

Casing Couplings: Couplings for Merchant Casing for Water Wells and Irrigation purposes can be furnished to order. Prices on application.

Couplings for Large O.D. Pipe: Couplings for Large O.D. Pipe can be furnished to order. Prices on application.

Dimensions, in Inches

Size		Dimensions, in inches													
		⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	
Outside Diameter	*Standard	.594	.750	.906	1.063	1.297	1.563	1.969	2.234	2.719	3.313	3.938	4.531	5.000	
	Extra Heavy	.59	.75	.95	1.13	1.44	1.70	2.07	2.31	2.81	3.31	4.00	4.63	5.13	
	XX Hydraulic					1.66	1.90	2.22	2.44	3.19	3.62				
	Car Heater				1.13	1.44	1.70	2.07	2.31	2.81					
	Half				1.13	1.44	1.70	2.07	2.31	2.81	3.31	4.00	4.63	5.13	
Length	*Standard	⅞	1	1⅛	1⅜	1½	1¾	2⅛	2⅝ ₁₆	2⅞ ₁₆	2⅞	3⅛ ₁₆	3⅞ ₁₆	3⅞ ₁₆	
	Extra Heavy	1⅛	1⅜	1⅝	1⅞	2⅛	2⅜	2⅞	2⅞	3⅛	3½	3⅞ ₁₆	4¼	4¼	
	XX Hydraulic					2⅝ ₁₆	2⅝	2⅞	3⅛	3⅝	3⅝				
	Car Heater				1⅞	2⅛	2⅜	2⅞	2⅞	3⅛					
	Half				27 ₃₂	1	13 ₃₂	1⅜	1⅝	1½	1⅞ ₁₆	1¾	2⅛ ₁₆	2⅞ ₁₆	

*Dimensions of Standard Couplings, sizes 5 to 12-inch, will be furnished on request.

Black Wrought Steel Nipples



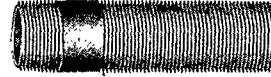
Close Nipple



Short Nipple



Long Nipple



Tank Nipple

Tank Nipples are 6 inches long and use the list prices of the 6-inch length. They have a Standard Taper Pipe Thread on one end; the other end has a Standard Taper Pipe Thread running into an American Standard Locknut Thread for a total thread length of 4 inches.

Black Right Hand Nipples

Size Inches	Length Inches		List Prices, Each																	
			Close	Short	Long															
	Close	Short			2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
1/8	¾	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
¼	7/8	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
⅜	1	1½	.05	.06	.07	.08	.08	.09	.09	.10	.11	.12	.13	.14	.15	.16	.17	.18	.20	
½	1½	1½	.06	.07	.08	.09	.09	.10	.10	.11	.12	.13	.14	.15	.17	.19	.21	.23	.25	
¾	1¾	2	.08	.09	.10	.11	.12	.13	.14	.15	.16	.17	.19	.21	.23	.25	.27	.29		
1	1½	2	.10	.11	.13	.14	.15	.16	.17	.18	.19	.20	.24	.27	.30	.32	.35	.38		
1¼	1⅝	2½	.13	.15	.16	.18	.20	.22	.24	.26	.28	.32	.36	.40	.44	.48	.52			
1½	1¾	2½	.16	.18	.20	.22	.25	.27	.29	.31	.34	.38	.43	.47	.52	.56	.60			
2	2	2½	.21	.24	.28	.31	.34	.37	.40	.44	.48	.53	.59	.66	.78	.80	.87			
2½	2½	3	.39	.45	.58	.63	.68	.73	.78	.85	.94	1.03	1.12	1.22	1.31	1.40				
3	2⅝	3	.54	.59	.65	.73	.81	.89	.96	1.04	1.19	1.34	1.50	1.65	1.80	1.95				
3½	2¾	4	.72	.98					1.06	1.14	1.21	1.29	1.45	1.61	1.76	1.92	2.08	2.24		
4	2⅞	4	.92	1.12					1.28	1.38	1.48	1.60	1.80	2.00	2.20	2.40	2.60	2.80		
5	3	4½	1.60	2.00						2.05	2.17	2.29	2.61	2.91	3.15	3.39	3.64	3.88		
6	3½	4½	2.00	2.45						2.58	2.73	2.90	3.36	3.68	4.08	4.31	4.60	4.94		
8	3½	5	4.30	4.87							5.00	5.44	5.71	6.10	6.48	6.85	7.25	7.65		
10	3⅞	5	5.88	6.50										8.00	8.55	9.10	9.65	10.20		
12	4½	6	7.40	8.70										10.00	10.90	11.80	12.70	13.60		

Crane Nipples are of unusually high quality and have accurately cut threads. They are made of new, full weight, mill tested pipe.

Standard: The list prices given above apply to wrought steel close, short, and long nipples, and to tank nipples, made from Standard Weight Pipe.

Extra Strong: For list prices of black nipples made from Extra Strong Pipe, double the list prices of Standard black nipples.

Double Extra Strong: For list prices of black nipples made from Double Extra Strong Pipe, multiply the list prices of Standard black nipples by four.

Seamless nipples: Standard or Extra Strong Seamless Steel Nipples use the same list prices as Standard or Extra Strong nipples made from welded steel pipe, but are sold at an advance in price. See the Crane Discount Sheet for prices.

Butt nipples: For net prices of butt nipples, add 20 per cent to the net prices of short nipples.

Lengths not listed: For lengths not listed (under 12 inches), use the list price given in the above table for the next longer length.

Lengths over 12 inches: For list prices of lengths over 12 inches and up to 24 inches, add the list prices of the two nearest equal lengths.

Nipples made from Copper Bearing Pipe — see the Crane Discount Sheet.

Black Right and Left Nipples

Size Inches	Length Inches		List Prices, Each																	
			Close	Short	Long															
	Close	Short			2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	
⅛	¾	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
¼	⅞	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
⅜	1	1½	.07	.08	.10	.11	.11	.12	.12	.13	.15	.16	.17	.19	.20	.21	.23	.24	.26	
½	1⅛	1½	.08	.10	.11	.12	.12	.13	.13	.15	.16	.17	.19	.20	.23	.25	.28	.30	.33	
¾	1⅜	2	.11	.12	.13	.15	.16	.17	.19	.20	.21	.23	.25	.28	.30	.33	.36	.38		
1	1½	2	.13	.15	.17	.19	.20	.21	.23	.24	.25	.26	.32	.36	.39	.42	.46	.50		
1¼	1⅝	2½	.17	.20		.21	.24	.26	.29	.32	.34	.37	.42	.47	.52	.58	.63	.68		
1½	1¾	2½	.21	.24		.26	.29	.33	.36	.38	.41	.45	.50	.56	.62	.68	.73	.78		
2	2	2½	.28	.32		.37	.41	.45	.49	.52	.58	.63	.69	.77	.86	.95	1.04	1.14		
2½	2½	3	.51	.59			.76	.82	.89	.95	1.02	1.11	1.23	1.34	1.46	1.59	1.71	1.82		
3	2⅝	3	.71	.77			.85	.95	1.06	1.16	1.25	1.36	1.55	1.75	1.95	2.15	2.34	2.54		
3½	2¾	4	.94	1.28					1.38	1.49	1.58	1.68	1.89	2.10	2.29	2.48	2.71	2.92		
4	2⅞	4	1.20	1.46					1.67	1.80	1.93	2.08	2.34	2.60	2.86	3.12	3.38	3.64		

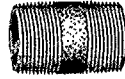
Malleable Iron R.&L. Hexagon Nipples...page 186

Genuine Wrought Iron Nipples — prices on application.

Galvanized Wrought Steel Nipples



Close Nipple



Short Nipple



Long Nipple



Tank Nipple

Tank Nipples are 6 inches long and use the list prices of the 6-inch length. They have a Standard Taper Pipe Thread on one end; the other end has a Standard Taper Pipe Thread running into an American Standard Locknut Thread for a total thread length of 4 inches.

Galvanized Right Hand Nipples

Size Inches	Length Inches		List Prices, Each																
			Close	Short	Long														
	Close	Short			2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12
1/8	3/4	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36
1/4	7/8	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36
3/8	1	1½	.07	.08	.10	.11	.12	.13	.14	.15	.16	.17	.19	.22	.25	.28	.30	.33	.36
1/2	1 1/8	1½	.08	.09	.11	.12	.13	.14	.15	.16	.17	.18	.20	.23	.26	.29	.32	.35	.38
3/4	1 3/8	2	.10	.12		.13	.14	.16	.18	.20	.22	.24	.26	.29	.32	.35	.39	.42	.45
1	1½	2	.13	.15		.18	.20	.22	.24	.26	.28	.30	.34	.38	.42	.46	.50	.54	.58
1 1/4	1 5/8	2½	.17	.22		.26	.28	.30	.34	.37	.40	.44	.48	.56	.62	.68	.74	.80	
1 1/2	1 3/4	2½	.22	.26		.30	.34	.38	.42	.45	.48	.52	.58	.65	.73	.80	.87	.94	
2	2	2½	.30	.35		.40	.45	.50	.55	.60	.65	.70	.79	.88	.97	1.06	1.15	1.24	
2 1/2	2 1/2	3	.60	.66			.75	.83	.90	.98	1.06	1.14	1.28	1.44	1.60	1.76	1.92	2.08	
3	2 5/8	3	.80	.87			1.01	1.10	1.20	1.30	1.40	1.50	1.70	1.90	2.10	2.30	2.50	2.70	
3 1/2	2 3/4	4	1.15	1.40				1.53	1.65	1.78	1.91	2.16	2.41	2.66	2.91	3.16	3.41		
4	2 7/8	4	1.27	1.60				1.85	2.00	2.15	2.30	2.60	2.90	3.20	3.50	3.80	4.10		
5	3	4½	2.29	2.87					3.01	3.21	3.40	3.95	4.35	4.73	5.12	5.52	5.90		
6	3 1/8	4½	2.86	3.56					3.79	4.03	4.30	5.00	5.52	6.03	6.53	7.05	7.54		
8	3 1/2	5	5.52	6.37							6.65	6.95	7.55	8.15	8.75	9.35	9.95	10.60	

Crane Nipples are of unusually high quality and have accurately cut threads. They are made of new, full weight, mill tested pipe.

Standard: The list prices given above apply to wrought steel close, short, and long nipples, and to tank nipples, made from Standard Weight Pipe.

Extra Strong: For list prices of galvanized nipples made from Extra Strong Pipe, add the list prices of Standard black nipples and Standard galvanized nipples.

Seamless nipples: Standard or Extra Strong

Seamless Steel Nipples use the same list prices as Standard or Extra Strong nipples made from welded steel pipe, but are sold at an advance in price. See the Crane Discount Sheet for prices.

Butt nipples: For net prices of butt nipples, add 20 per cent to the net prices of short nipples.

Lengths not listed: For lengths not listed (under 12 inches), use the list price of the next longer length.

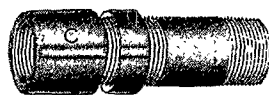
Lengths over 12 inches: For list prices of lengths over 12 inches and up to 24 inches, add the list prices of the two nearest equal lengths.

Nipples made from Copper Bearing Pipe — see the Crane Discount Sheet.

Galvanized Right and Left Nipples

Size Inches	Length Inches		List Prices, Each																
			Close	Short	Long														
	Close	Short			2	2½	3	3½	4	4½	5	5½	6	7	8	9	10	11	12
1/8	3/4	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42
1/4	7/8	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42
3/8	1	1½	.12	.13	.16	.18	.18	.20	.20	.21	.24	.26	.28	.31	.32	.34	.35	.39	.42
1/2	1 1/8	1½	.13	.16	.18	.20	.20	.21	.21	.24	.26	.28	.31	.32	.35	.40	.45	.48	.53
3/4	1 3/8	2	.18	.20		.21	.24	.26	.28	.31	.32	.34	.35	.40	.45	.48	.53	.58	.61
1	1½	2	.21	.24		.28	.31	.32	.34	.35	.39	.40	.42	.52	.58	.63	.68	.74	.80
1 1/4	1 5/8	2½	.28	.32		.34	.39	.42	.47	.52	.55	.60	.68	.76	.84	.93	1.01	1.09	
1 1/2	1 3/4	2½	.34	.39		.42	.47	.53	.58	.61	.66	.72	.80	.90	1.00	1.09	1.17	1.25	
2	2	2½	.45	.52		.60	.66	.72	.79	.84	.93	1.01	1.11	1.24	1.38	1.52	1.67	1.83	
2 1/2	2 1/2	3	.82	.95			1.22	1.32	1.43	1.52	1.64	1.78	1.97	2.15	2.34	2.55	2.74	2.92	
3	2 5/8	3	1.14	1.24			1.36	1.52	1.70	1.86	2.00	2.18	2.48	2.80	3.12	3.44	3.75	4.07	
3 1/2	2 3/4	4	1.51	2.05					2.19	2.39	2.53	2.69	3.03	3.36	3.67	3.97	4.34	4.68	
4	2 7/8	4	1.92	2.34					2.68	2.88	3.09	3.33	3.75	4.16	4.48	5.00	5.41	5.83	

Long Screws, Faced Locknuts, and Faced Couplings



Long Screw
Complete, with Locknut and Coupling



Faced Locknut



Faced Coupling

List Prices

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Long Screws, Complete	Standard Length	Inches	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	7	8	8 1/2	9
	Black	Each	.30	.35	.40	.55	.75	1.00	1.30	1.70	2.70	3.70	5.40	6.60
	Galv.	Each	.35	.40	.50	.66	1.00	1.25	1.60	2.10	3.10	4.70	6.50	7.75
Faced Locknuts	Black	Each	.08	.09	.10	.12	.15	.20	.25	.30	.35	.45	.95	1.35
	Galv.	Each	.11	.13	.15	.18	.22	.30	.35	.45	.50	.65	1.25	1.80
Faced Couplings	Black	Each	.09	.10	.12	.16	.22	.30	.40	.50	.70	.90	1.20	1.50
	Galv.	Each	.14	.15	.18	.24	.33	.45	.60	.75	1.00	1.35	1.80	2.25

Long Screws: The prices of Long Screws include one Faced Locknut and one Faced Coupling.

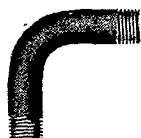
Long Screws longer than standard are made to order and charged as CUT PIPE with threads, locknuts, and couplings extra. When ordering, always specify the length of the straight thread.

Extra Heavy Long Screws are made to order of Extra Strong Pipe; prices on application.

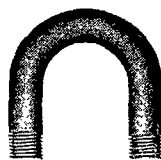
Faced Locknuts and Faced Couplings: Faced Locknuts and Faced Couplings sizes 3-inch and smaller are malleable iron. Sizes 3 1/2 and 4-inch are wrought iron.

Tank Nipples . . . pages 230 and 231

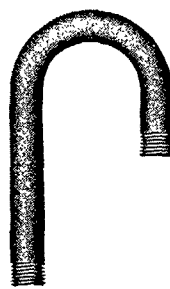
Small Pipe Bends



Quarter Bend



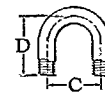
Return Bend



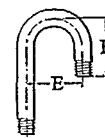
*Goose Neck
3/4, 1, and 1 1/4" sizes



Quarter Bend



Return Bend



Goose Neck

List Prices and Dimensions

Size			Inches	1/2	3/4	1	1 1/4	1 1/2	2
Quarter Bends, Black			Each	.45	.55	.75	1.25	2.00	3.25
Return Bends, Black			Each	.90	1.10	1.25	1.75	2.75	4.00
Dimensions in Inches	Quarter Bends	A—Radius		2 1/16	2 1/4	2 1/2	4 3/4	6 3/4	6 3/4
		B—Center to end		3 1/2	3 3/4	4 1/4	6 1/2	8 1/2	9 1/2
	Return Bends	C—Center to center		4 1/8	4 1/2	4 1/2	6	8	8
		D—Center to end		3 1/2	3 3/4	5	6	8	8
	Goose Necks	E—Minimum center to center			4	4 1/2	6		
		F—Minimum center to end			3 3/4	4 1/4	6		

Materials: Quarter Bends, Return Bends, and Goose Necks are made of Extra Strong Wrought Steel Pipe.

*Goose Necks: Goose Necks are made to order; prices on application. The table shown above gives

the minimum center to center and the minimum center to end. Orders should specify dimensions.

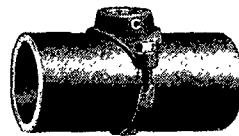
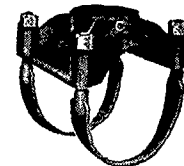
Special bends: Bends having dimensions other than those shown above, or bends of other shapes can be made to order. Prices on application; specify size of pipe, dimensions, and quantity required.

Single Strap and Double Strap Clamps

Malleable Iron with Wrought Iron Straps



Single Strap Clamp

Showing Application
of
Single Strap Clamp

Double Strap Clamp

When ordering Single Strap or Double Strap Clamps, specify the catalog number of the Clamp and the size of the pipe tapping.

Single Strap Clamps							Double Strap Clamps						
Cat. No.	Clamp will fit				Size of Pipe Tapping in Clamp	List Prices	Cat. No.	Clamp will fit				Size of Pipe Tapping in Clamp	List Prices
	Wrought Pipe	O.D. Casing	Cast Iron Pipe	O.D. of Circle				Wrought Pipe	O.D. Casing	Cast Iron Pipe	O.D. of Circle		
	Size Inches	Size Inches	Size Inches	Inches				Size Inches	Size Inches	Size Inches	Inches		
0	1½			1⅞	½ or ¾	1.00	40	1½			1⅞	½ or ¾	.90
1	2	2½		2⅜	½ to 1	1.00	41	2	2½		2⅜	½ to 1½	1.00
2	2½	2¾ & 3	2	2⅞	½ to 1¼	1.25	42	2½	2¾ & 3	2	2⅞	¾ to 1½	1.25
3	3	3½		3½	½ to 1	1.25	43	3	3½		3½	¾ to 2	1.25
4	3	3½		3½	1¼ to 2	1.50	44	3½	4	3	4	¾ to 2	1.40
5	3½	4	3	4	½ to 1	1.50	45	4	4½		4½	¾ to 2	1.50
6	3½	4	3	4	1¼ to 2	1.75	46	4½	5	4	5	¾ to 2	2.50
7	4	4½		4½	½ to 1½	1.75	47	5	5½		5⅞	¾ to 2	2.75
8	4	4½		4½	2	2.00	48	5	5½		5⅞	2½ or 3	2.75
9	4	4½		4½	2½ or 3	4.00	49	6	6⅝		6⅝	¾ to 2	2.75
10	4½	5	4	5	¾ to 1½	1.80	50	6	6⅝		6⅝	2½ to 4	5.75
11	4½	5	4	5	2	2.15	51	8	8⅝		8⅝	1 to 4	6.50
12	4½	5	4	5	2½ or 3	4.00	52	10	10¾		10¾	1½ to 4	10.00
13	5	5½		5⅞	¾ to 1½	1.80	53	10	10¾		10¾	5 or 6	10.00
14	5	5½		5⅞	2	2.15	54	12			12¾	1½ to 4	14.00
15	5	5½		5⅞	2½ or 3	4.00	55	12			12¾	5 or 6	14.00
16		6	5	6	½ to 1½	2.00							
17		6	5	6	2	2.40							
18		6	5	6	2½ or 3	4.50							
19	6	6⅝		6⅝	¾ to 1½	2.25							
20	6	6⅝		6⅝	2	2.50							
21	6	6⅝		6⅝	2½ or 3	5.00							
22		7	6	7	¾ to 1½	2.50							
23		7	6	7	2	2.70							
24		7	6	7	2½ or 3	5.00							
28		8	7	8	¾ to 1½	4.50							
29		8	7	8	2	5.00							
30		8	7	8	2½ or 3	5.50							
30½	8	8⅝		8⅝	¾ to 1½	5.50							
31	8	8⅝		8⅝	2 to 3	5.50							
32	8	8⅝		8⅝	4	6.00							
35	10	10¾		10¾	¾ to 2	9.00							
36	12			12¾	¾ to 2	10.00							

Galvanized Single Strap or Double Strap Clamps are made to order at an advance of 50 per cent over the prices of Black Clamps.

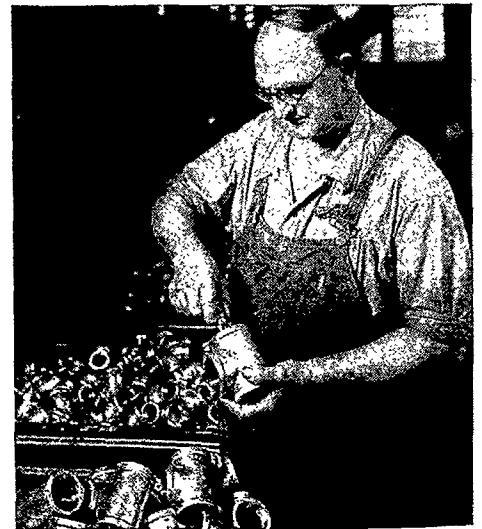
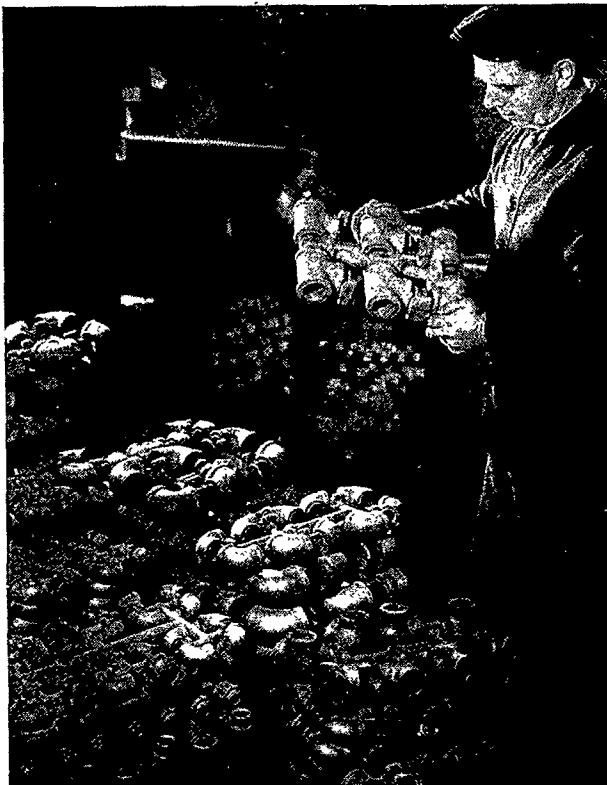
Miscellaneous Iron, Steel, and Brass Fittings

For greater convenience, the following fittings are shown with related products in other sections of this catalog:

Hydrant Clamps.....page 89
 Wood Rod Couplings.....page 89
 Street Washer Keys.....page 89
 Hydrant Handles.....page 89

Brass Couplings and Locknuts.....page 256
 Brass Bushings, Plugs, and Nipples..pages 258 and 259
 Malleable Iron Couplings.....pages 185 and 190
 A.A.R. Malleable Iron Couplings.....page 193
 Forged Steel Couplings.....pages 339 and 340

* * * * *



(Above) Gauging the threads of Screwed Fittings. This inspection is but one phase of the system that guards Crane Quality and assures the user satisfactory service.

(Left) Crane Screwed Fittings in multiple castings as they emerge from the molds in the foundries.

Iron and Steel

Unions, Union Fittings, and Flange Unions

150-Pound Malleable Iron Ground Joint Unions and Union Fittings.....	page 238
Standard Malleable Iron Gasket Type Unions and Union Fittings.....	page 239
"Chicago" Unions.....	page 239
Malleable Iron Railroad Unions and Union Fittings.....	pages 240 and 241
A.A.R. Malleable Iron Unions and Union Fittings.....	pages 242 to 244
A.A.R. Forged Steel Unions.....	page 244
300-Pound Malleable Iron Unions.....	page 246
Forged Steel Unions.....	page 247
Forged Steel Hammer Lug Unions.....	page 248
Forged Unions, Steel to Exelloy Seat.....	page 247
Cast Iron Flange Unions.....	pages 249 and 252
Malleable Iron Flange Unions.....	pages 250 to 252
Tongue and Groove Flange Unions.....	page 252
Forged Steel Combination Elbows.....	page 252
Forged Steel Flange Unions.....	pages 252 and 253
Saving Material and Labor with Unions and Union Fittings.....	pages 236 and 237
Unions and Union Fittings Applied to Air Brake Piping.....	page 245
Large Size Flange Unions Made from Screwed Flanges.....	page 254

Crane Co. manufactures an unusually diversified line of unions and union fittings. Whether it be a chromium-plated brass union for a restaurant steam table, an inexpensive ground joint malleable iron union for a domestic water line, a massive steel union for a central power station—a union for any service—it can be purchased from Crane Co.

The line includes brass, malleable iron, and forged steel unions and union fittings, and brass, cast iron, malleable iron, and forged steel flange unions.

Crane Unions are exceptionally strong, tough, and durable. Each part is liberally proportioned and amply reinforced at points subjected to greatest stress. Special attention has been given to the interchangeability of parts.

* * * * *

18

For greater convenience, several lines of unions and union fittings are included with allied material in other sections of this catalog. See the pages referred to below:

Brass Unions and Union Elbows.....	pages 262 and 263
Brass Flange Unions.....	page 263
Brass Radiator Union Elbows.....	page 78
Circulating Boiler Fittings.....	page 187
Brass Solder-Joint Unions.....	page 509
Brass Crane-Seal Unions and Union Fittings.....	page 497

Saving Material and Labor With Crane Unions and Union Fittings

Although female unions are extremely popular and are valuable fittings, many users fail to take advantage of Crane Male and Female Unions and the wide variety of Crane Union Fittings. Union Fittings actually combine the services of pipe (or nipples), unions, and pipe fittings, forming a more compact, convenient, and economical connection and saving labor and material.

The typical pipe line connections shown below clearly illustrate the manner in which union fittings may be adapted to improve an installation. It will be noted, especially in Figures A-4 and B-4, that the reduction in the amount of material is accompanied by fewer threads to be cut on the pipe and the least number

of assembled joints. The time required to make the connection is materially shortened, and maintenance is reduced because fewer joints assure fewer chances for leaks.

Steamfitters, piping contractors, and manufacturers of equipment on which piping is used as a part of the unit, will find it advantageous to study every screwed piping layout so as to obtain the most desirable and economical combination of unions and union fittings. The illustrations on the following page show how valuable savings can be multiplied by careful planning.

Crane engineers will be glad to offer assistance.

Elbow Connections with Union Joint

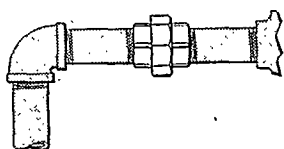


Figure A-1

3 Pieces of Pipe
2 Fittings
5 Pipe Threads
6 Joints Assembled

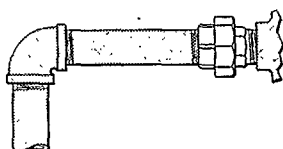


Figure A-2

2 Pieces of Pipe
2 Fittings
3 Pipe Threads
5 Joints Assembled

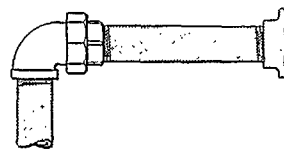


Figure A-3

2 Pieces of Pipe
1 Fitting
3 Pipe Threads
4 Joints Assembled

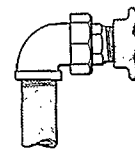


Figure A-4

1 Piece of Pipe
1 Fitting
1 Pipe Thread
3 Joints Assembled

Figure A-1, shows an ordinary elbow connection. A female union and a screwed elbow are used.

Figure A-2 shows the connection when a male and female union has been substituted for the female union.

Figure A-3 shows the connection after it has been

further simplified by using a union elbow with a female tail-piece in place of the female union and the elbow shown in Figure A-1.

Figure A-4 shows the connection in its simplest form, a union elbow with a male tail-piece being used instead of the male and female union and the elbow shown in Figure A-2.

Tee Connections with Union Joints

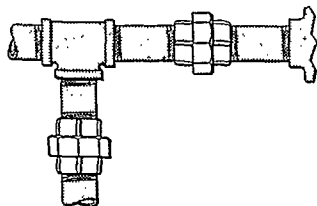


Figure B-1

5 Pieces of Pipe
3 Fittings
8 Pipe Threads
10 Joints Assembled

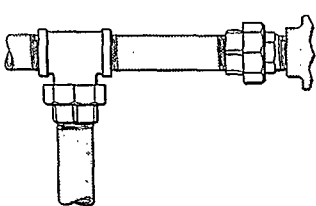


Figure B-2

3 Pieces of Pipe
2 Fittings
4 Pipe Threads
7 Joints Assembled

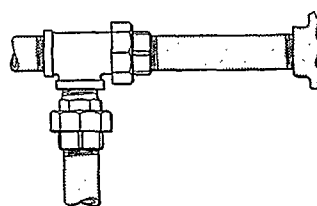


Figure B-3

3 Pieces of Pipe
2 Fittings
4 Pipe Threads
7 Joints Assembled

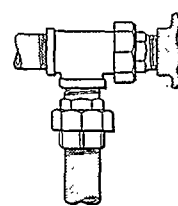


Figure B-4

2 Pieces of Pipe
2 Fittings
2 Pipe Threads
6 Joints Assembled

Figure B-1 shows an ordinary tee connection made with two female unions and a tee.

Figure B-2 shows the connection when a union tee (female union on outlet) and a male and female union are substituted for the two female unions and the tee.

Figure B-3 shows the connection made with a union

tee (female union on run) and a male and female union. The same number of joints, threads, fittings, and pieces of pipe as used in Figure B-2, are required.

Figure B-4 shows the connection in its simplest form, a union tee (male union on run) being used in combination with a male and female union.

Saving Material and Labor With Crane Unions and Union Fittings

Union Joints on Return Side of Blast Heaters

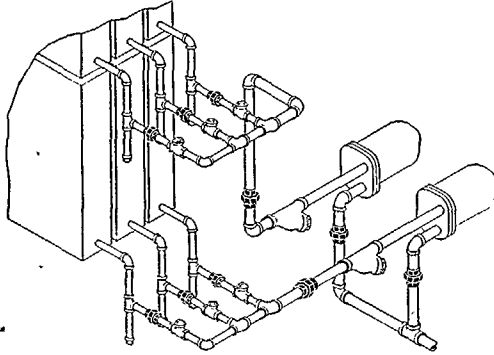


Figure C-1

Figure C-1 illustrates a typical complicated arrangement of piping on the return side of double tiered blast heaters. The return from the stacks in each tier are drained individually by a trap, and the condensation is accumulated by a single return header. The illustration shows the most common method of providing union joints on such an installation; only female unions are used.

Figure C-2 shows an improved and economical arrangement made by using male and female unions and union fittings in place of ordinary pipe fittings and female unions. The connections are more compact, and the piping has been simplified. Easy access to traps and all parts of the lines is maintained. 18 nipples, 36 pipe threads, 9 fittings, and 27 joints have been eliminated.

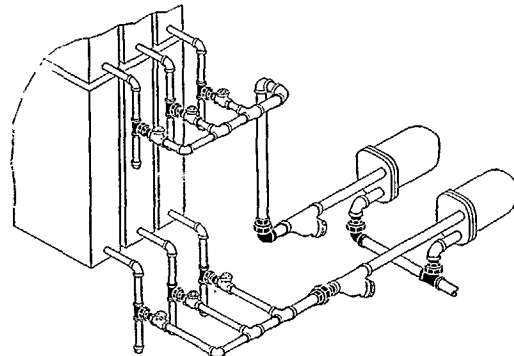
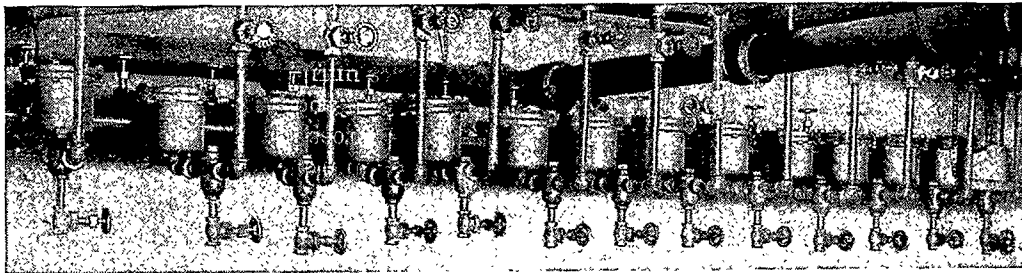


Figure C-2

Union Joints on Installation of Traps



Photograph of a battery of 13 Crane Inverted Open Float Steam Traps draining condensate from cooking kettles in a candy manufacturing plant.

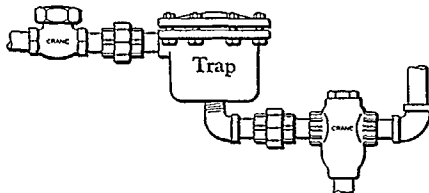


Figure D-1
Part of Present Piping on Each Trap

Figure D-1 illustrates a portion of the piping on each of the traps shown in the photograph. Only female unions are used.

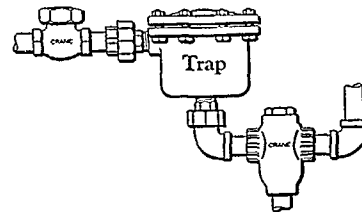
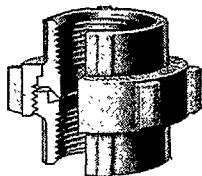


Figure D-2
Improved Economical Piping Arrangement

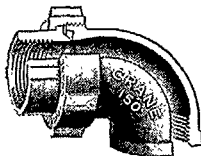
Figure D-2 shows an improved and more economical arrangement. Through the use of a male and female union and a union fitting the installation has been simplified and made compact, providing easy and direct access for removal of the trap. 2 nipples, 1 fitting and 3 joints are saved on each trap connection. Using this arrangement on the battery of traps would result in a very substantial saving of time, material, and labor.

*Crane Co. manufactures a complete line of
Unions and Union Fittings*

150-Pound—Ground Joint Malleable Iron Unions and Union Fittings



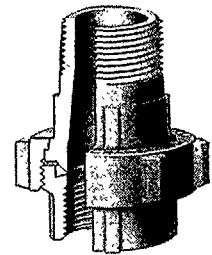
No. 1280, Union
Female



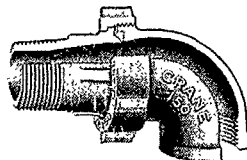
No. 1282, 90° Elbow
Female Union

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil, gas, or gasoline, non-shock

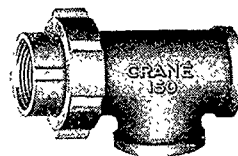
FEATURES
Brass to Iron Seat
Ground Joint
Underwriters' Approved
Air Tested



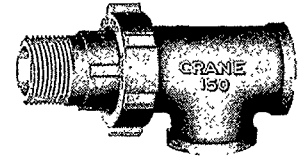
No. 1281, Union
Male and Female



No. 1283, 90° Elbow
Male Union



No. 1284, Tee
Female Union on Run



No. 1285, Tee
Male Union on Run

List Prices, Each

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Unions	No. 1280, Female	Black	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50
		Galv.	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60
	No. 1281, Male and Female	Black	.56	.56	.63	.75	1.00	1.50	1.94	2.88		
		Galv.	.67	.67	.74	.93	1.27	1.87	2.40	3.47		
90° Elbows	No. 1282, With Female Union	Black	.60	.60	.75	.90	1.20	1.80	2.40	3.00		
		Galv.	.80	.80	1.00	1.20	1.60	2.40	3.20	4.00		
	No. 1283, With Male Union	Black	.60	.60	.75	.90	1.20	1.80	2.40	3.00		
		Galv.	.80	.80	1.00	1.20	1.60	2.40	3.20	4.00		
Tees	No. 1284, With Female Union	Black	.66	.66	.82	1.00	1.32	1.98	2.64	3.30		
		Galv.	.88	.88	1.10	1.32	1.75	2.65	3.50	4.40		
	No. 1285, With Male Union	Black	.66	.66	.82	1.00	1.32	1.98	2.64	3.30		
		Galv.	.88	.88	1.10	1.32	1.75	2.65	3.50	4.40		

For 1/8-inch size female unions, use the No. 519 shown on page 240.

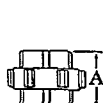
Service recommendations: This is a new line of 150-Pound Malleable Iron Unions and Union Fittings made with a brass to iron ground joint seat. They are unusually sturdy and rugged and will be found ideal for domestic service and for a wide variety of industrial applications on steam, hot water, cold water, oil, air, gas, and gasoline lines.

Construction: The unions and union fittings are designed to combine liberal strength with light weight and minimum overall dimensions; they have a high safety factor. The tail-piece, thread-piece, and union ring are circular in shape, being equipped with

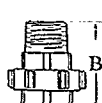
generous size lugs which provide an exceptionally good wrench grip.

Brass to iron seat: The brass to iron ground joint seat is non-corrosive and holds pressure easily; no gasket is required. It can be taken apart and re-assembled repeatedly without affecting the strength or tightness of the joint.

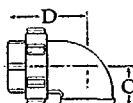
Listed by Underwriters' Laboratories: Crane 150-Pound Malleable Iron Unions and Union Fittings have been inspected and are listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.



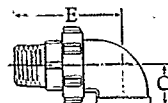
No. 1280



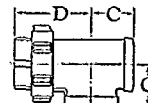
No. 1281



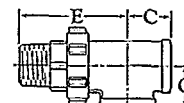
No. 1282



No. 1283



No. 1284



No. 1285

For thread engagement, see page 591.

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A	1 3/8	1 1/2	1 11/16	1 7/8	2 1/4	2 5/16	2 3/8	2 9/16	3 1/4	3 9/16
B	2 1/4	2 3/8	2 5/8	3	3 5/16	3 5/8	3 15/16	4 1/4		
C	1 3/16	1 5/16	1 1/8	1 5/16	1 1/2	1 3/4	1 15/16	2 1/4		
D	1 11/16	1 7/8	2 1/8	2 7/16	2 7/8	3 3/16	3 3/8	3 7/8		
E	2 7/16	2 3/4	3 1/16	3 9/16	3 15/16	4 7/16	4 15/16	5 1/2		

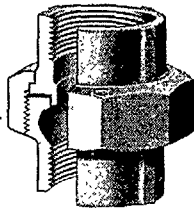
Standard—Gasket Type Malleable Iron Unions and Union Fittings

WORKING PRESSURES

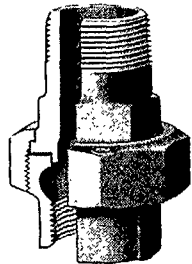
150 pounds steam
300 pounds cold water

Each union and union fitting (except the Two-Third Unions) is equipped with a rubber gasket.

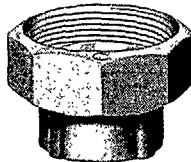
Extra gaskets . . . page 571



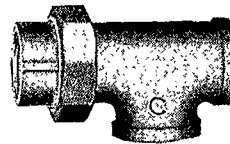
No. 1219
Union
Female



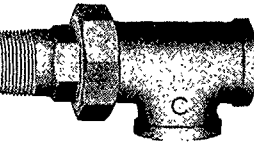
No. 1219 1/2
Union
Male and Female



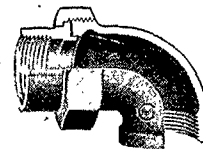
No. 1218
Two-Third Union
Female



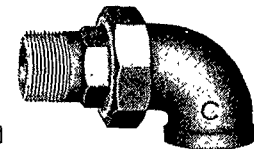
No. 1294
Tee
Female Union on Run



No. 1296
Tee
Male Union on Run



No. 1290
90° Elbow
Female Union



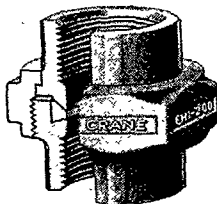
No. 1292
90° Elbow
Male Union

List Prices, Each, and Dimensions, in Inches

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 1219, Unions, Female	Black	.20	.20	.20	.22	.27	.33	.46	.58	.75	1.55	2.10	3.65	4.35
	Galv.	.30	.30	.30	.33	.40	.50	.70	.90	1.15	2.35	3.15	5.50	6.50
No. 1218, Two-Third Unions, Female	Black		.14	.14	.16	.19	.22	.30	.40	.50	1.00			
	Galv.		.20	.20	.22	.25	.35	.50	.60	.75	1.60			
No. 1219 1/2, Unions, Male and Female	Black		.25	.25	.28	.33	.40	.57	.72	.95	1.95	2.70		
	Galv.		.35	.35	.39	.46	.57	.81	1.04	1.35	2.75	3.75		
No. 1290, 90° Elbows, Female Union	Black		.40	.40	.42	.54	.63	.90	1.05	1.55	2.85	4.50		
	Galv.		.60	.60	.63	.81	.95	1.35	1.58	2.35	4.30	6.75		
No. 1292, 90° Elbows, Male Union	Black		.45	.45	.48	.62	.72	1.05	1.20	1.80	3.30	5.25		
	Galv.		.70	.70	.72	.93	1.08	1.60	1.80	2.70	4.95	7.90		
No. 1294, Tees, Female Union	Black		.43	.43	.45	.57	.70	.95	1.15	1.70	3.20	5.15		
	Galv.		.65	.65	.68	.86	1.05	1.45	1.75	2.55	4.80	7.75		
No. 1296, Tees, Male Union	Black		.50	.50	.52	.65	.80	1.10	1.30	1.95	3.70	6.00		
	Galv.		.75	.75	.78	1.00	1.20	1.65	1.95	2.95	5.55	9.00		
End to end, No. 1219		1 1/2	1 5/8	1 3/4	1 7/8	2 1/8	2 3/8	2 5/8	2 15/16	3 1/4	3 9/16	3 15/16	4 5/16	4 5/8
End to end, No. 1219 1/2			2 1/4	2 7/16	2 11/16	3 1/16	3 5/16	3 11/16	4	4 5/16	4 11/16	5 5/16		
Center to female end, Nos. 1290, 1292, 1294, 1296			1 3/16	1 5/16	1 7/8	1 5/16	1 7/16	1 3/4	1 15/16	2 1/4	2 11/16	3 3/8		
Center to union end, Nos. 1290, 1294			1 13/16	2 1/16	2 5/16	2 5/8	3	3 7/16	3 13/16	4 3/8	4 7/8	5 5/8		
Center to union end, Nos. 1292, 1296			2 7/16	2 3/4	3 1/16	3 1/2	3 15/16	4 7/16	4 3/4	5 3/8	6	6 15/16		

Malleable Iron "Chicago" Unions

Brass to Iron Seat—Ground Joint—Brass Hexagonal Ring



No. 515
"Chicago" Union

WORKING PRESSURES

200 pounds steam
400 pounds cold water, oil
or gas, non-shock

Air Tested

The "Chicago" Union lends itself to a wide variety of services for steam, oil, gas, or air lines. The union ring can be easily removed; being made of brass, it makes a non-corrosive connection with the thread-piece and tail-piece. The brass union ring together with the brass to iron ground joint permits the union to be repeatedly taken apart and reassembled without danger of leakage. A gasket is not required.

List Prices and Dimensions

List Prices and Dimensions												
Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 515	With Black Ends,	Each	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50
	With Galv. Ends,	Each	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60
End to end		Inches	1 5/8	1 3/4	1 7/8	2 1/8	2 3/8	2 5/8	2 15/16	3 1/4	3 7/8	4 1/2

Thread engagement . . . page 591

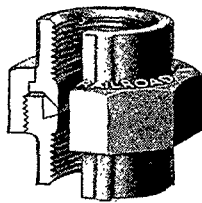
Malleable Iron Railroad Unions

WORKING PRESSURES

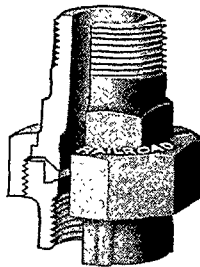
- 3-inch and smaller — 250 pounds steam
 — 500 pounds cold water, oil, gas, or gasoline, non-shock
 3½ and 4-inch — 200 pounds steam
 — 300 pounds cold water, oil, gas, or gasoline, non-shock

FEATURES

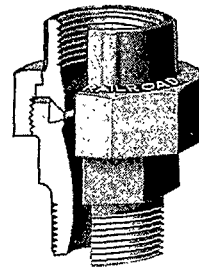
Brass to Iron Seat — Ground Joint
 Air Tested



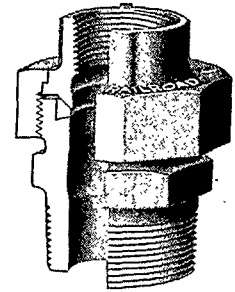
No. 519
Union
Female



No. 519½
Union
Male and Female



No. 517½
Straight Air Pump Union
(Both Ends Are Same Size)



No. 517
Reducing Air Pump Union
(Male End Is Larger)

List Prices, Unions

Size		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 519, Female	Black	Each	.45	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50	8.00	11.00
	Galv.	Each	.50	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60	10.00	13.50
No. 519 1/2, Male and Female	Black	Each		.56	.56	.63	.75	1.00	1.50	1.94	2.88	4.75	6.88		
	Galv.	Each		.67	.67	.74	.93	1.27	1.87	2.40	3.47	6.00	8.80		

List Prices, Air Pump Unions

Size	Inches	1 1/4	1 1/2	2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1	2 x 1 1/4	2 x 1 1/2
No. 517½, Straight	Black	Each	1.50	1.94	2.88					
	Galv.	Each	1.87	2.40	3.47					
No. 517, Reducing	Black	Each				1.20	1.65	2.45	3.30	3.30
	Galv.	Each				1.60	2.20	3.25	4.40	4.40

Service recommendations: Crane Railroad Unions and Union Fittings are recommended for exacting service on pipe lines carrying steam, water, oil, air, gas, gasoline, or other fluids. They are especially suitable for railroad work and are used on general locomotive, car, shop, and yard service.

Dependable construction: All parts are heavy and ruggedly constructed and will withstand strains resulting from making up joints, expansion and contraction, vibration, etc.

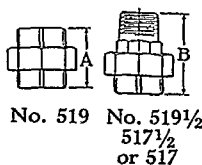
Brass to iron seat, ground joint: No gasket is necessary. The brass to iron ground joint is non-corrosive and makes a tight seat very easily. It can be taken apart and reassembled repeatedly without

affecting its strength or tightness. The brass seat ring is forced in under high pressure, and it will not loosen in service.

Test: Each union and union fitting is given an air-under-water test.

Interchangeability: Tail-pieces and union rings are interchangeable, size for size, with similar parts of the union fittings shown on the following page

Listed by Underwriters' Laboratories: Crane Railroad Unions and Union Fittings have been inspected and are listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.



No. 519
No. 519½
517½
or 517

Dimensions, in Inches

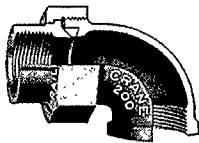
Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A—No. 519	1 1/2	1 5/8	1 3/4	1 7/8	2 1/8	2 3/8	2 5/8	2 15/16	3 1/4	3 7/8	4 1/2	4 5/16	4 5/8
B—No. 519½		2 1/4	2 7/16	2 11/16	3 1/16	3 5/16	3 11/16	4	4 5/16	4 7/8	5 5/8		
Size	1 1/4	1 1/2	2	1 x 3/4	1 1/4 x 1	1 1/2 x 1 1/4	2 x 1	2 x 1 1/4	2 x 1 1/2				
B—No. 517½		3 5/8	3 15/16	4 1/4									
B—No. 517					3 1/8	3 7/16	3 11/16	3 13/16	3 15/16	4 1/16			

Thread Engagement . . . page 591

Malleable Iron Railroad Union Fittings

WORKING PRESSURES
200 pounds steam
400 pounds cold water, oil, gas, or gasoline, non-shock

FEATURES
Brass to Iron Seat — Ground Joint
Air Tested



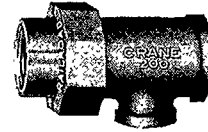
No. 590
90° Elbow
Female Union



No. 591
45° Elbow
Female Union



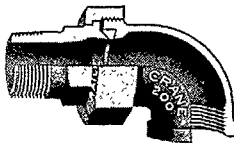
No. 594
Tee
Female Union on Run



No. 595
Reducing Tee
Female Union on Run



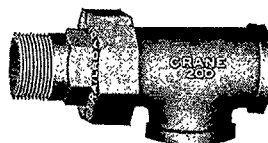
No. 598
Tee
Female Union
on Outlet



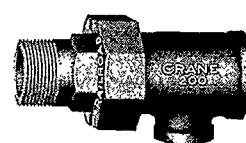
No. 592
90° Elbow
Male Union



No. 593
45° Elbow
Male Union



No. 596
Tee
Male Union on Run



No. 597
Reducing Tee
Male Union on Run



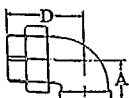
No. 598 1/2
Tee
Male Union
on Outlet

List Prices, Straight Fittings

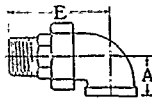
Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 590 or No. 592, 90° Elbows	Black Each	.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv. Each	.80	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 591 or No. 593, 45° Elbows	Black Each	.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
	Galv. Each	.80	.80	1.00	1.20	1.60	2.40	3.20	4.00	6.40	10.00
No. 594 or No. 596, Tees	Black Each	.66	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25
	Galv. Each	.88	.88	1.10	1.32	1.75	2.65	3.50	4.40	7.10	11.00
No. 598 or No. 598 1/2, Tees	Black Each	.75	.75	.82	1.00	1.32	1.98	2.64	3.30		
	Galv. Each	1.00	1.00	1.10	1.32	1.75	2.65	3.50	4.40		

List Prices, Reducing Tees

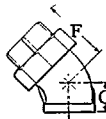
Size	Inches	1 x 3/8	1 x 1/2	1 x 3/4
No. 595 or No. 597, Reducing Tees	Black Each	1.45	1.45	1.45
	Galv. Each	1.95	1.95	1.95



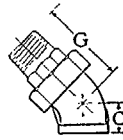
No. 590



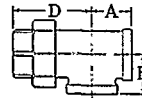
No. 592



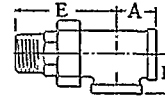
No. 591



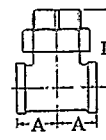
No. 593



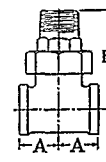
No. 594 or 595



No. 596 or 597



No. 598



No. 598 1/2

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	1 x 3/8	1 x 1/2	1 x 3/4
A	13/16	15/16	1 1/8	1 5/16	1 7/16	1 3/4	1 11/16	2 1/4	2 11/16	3 1/8	1 3/16	1 1/4	1 5/16
B	13/16	15/16	1 1/8	1 5/16	1 7/16	1 3/4	1 11/16	2 1/4	2 11/16	3 1/8	1 5/16	1 5/16	1 3/8
C	3/4	13/16	7/8	1	1 1/8	1 5/16	1 7/16	1 11/16	1 15/16	2 3/16			
D	1 13/16	2 1/16	2 5/16	2 5/8	3	3 7/16	3 13/16	4 3/8	5 1/8	5 15/16	2 5/8	2 11/16	2 13/16
E	2 7/16	2 3/4	3 1/16	3 1/2	3 15/16	4 7/16	4 3/4	5 3/8	6 1/8	7 1/16	3 9/16	3 5/8	3 3/4
F	1 9/16	1 11/16	1 7/8	2 1/8	2 7/16	2 3/4	3 1/16	3 1/2	4 1/16	4 3/4			
G	2 3/16	2 3/8	2 11/16	3	3 3/8	3 3/4	4	4 1/2	5 1/16	5 7/8			

Description page 240

Thread Engagement page 591

A. A. R. Malleable Iron Unions

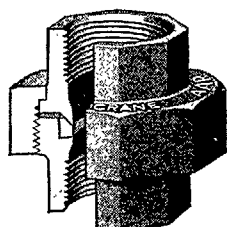
WORKING PRESSURES

300 pounds steam, 550° F.
600 pounds cold water, oil, gas, or gasoline, non-shock

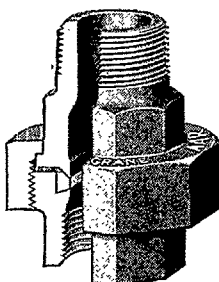
TEST PRESSURE — 150 pounds air under water

FEATURES

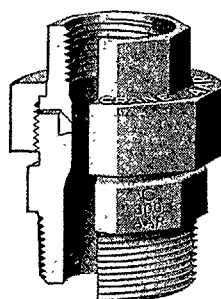
Brass to Iron Seat — Ground Joint
Octagon Ends



No. 819 E
Union
Female



No. 819 1/2 E
Union
Male and Female



No. 817 E
Reducing Air Pump Union
(Male End Is Larger)

For
Straight size
Air Pump Unions,
use either the
No. 819 1/2 E
or the
No. 919 1/2 E
shown on
page 244.

For **FORGED STEEL**
A.A.R. Unions,
see page 244.

List Prices, Unions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 819 E, Female	Black Each	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50
	Galv. Each	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60
No. 819 1/2 E, Male and Female	Black Each	.56	.56	.63	.75	1.00	1.50	1.94	2.88	4.75	6.88
	Galv. Each	.67	.67	.74	.93	1.27	1.87	2.40	3.47	6.00	8.80

List Prices, Air Pump Unions

Size	Inches	1 1/4 x 1	1 1/2 x 1	1 1/2 x 1 1/4	2 x 1	2 x 1 1/4	2 x 1 1/2
No. 817 E, Reducing, Black	Each	1.65	2.45	2.45	3.30	3.30	3.30

Service recommendations: Crane A. A. R. Unions and Union Fittings are ideal for service where long life and dependability are desired. They are especially suited for railroad work because they easily withstand abuse, piping strains, vibration, expansion, and contraction.

Unusually rugged: All parts are of massive, sturdy construction. The malleable iron from which they are made is exceptionally strong and tough.

Brass to iron seat, ground joint: The brass to iron ground joint seat is non-corrosive and holds pressure easily; no gasket is needed. It can be taken apart and reassembled repeatedly without affecting its strength or tightness. The brass seat ring is forced in under high pressure, and it will not loosen in service.

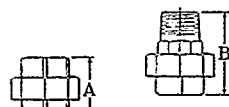
Listed by Underwriters' Laboratories: Crane A. A. R. Unions and Union Fittings have been

inspected and are listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

Association of American Railroads: The unions shown on this page and the union fittings shown on the following page conform to the specifications and recommended practice of the Association of American Railroads (A. A. R.) for 300-pound unions and union fittings. When subjected to tensile tests, their breaking strengths exceed those required by the specifications.

Interchangeability: The tail-pieces and the union rings on all of these unions and union fittings are interchangeable, size for size.

Galvanized Air Pump Unions: The Air Pump Unions can be furnished galvanized, when so ordered, at an advance in price; prices on application.



No. 819 E



No. 819 1/2 E
or No. 817 E

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
A—No. 819 E	1 3/8	1 13/16	1 15/16	2 1/4	2 7/16	2 13/16	3	3 3/8	4	4 5/16
B—No. 819 1/2 E	2 1/4	2 1/2	2 11/16	3 1/8	3 3/8	3 15/16	4 5/16	5 1/16	5 1/2	
Size	1 1/4 x 1	1 1/2 x 1	1 1/2 x 1 1/4	2 x 1	2 x 1 1/4	2 x 1 1/2				
B—No. 817 E	3 1/2	3 5/8	3 13/16	3 3/4	4	4 1/8				

A. A. R. Unions and Union Fittings with **STEEL** male tail-piece... page 244

A.A.R. Malleable Iron Screwed Fittings... page 193

A.A.R. Brass Valves... pages 42 to 45

A. A. R. Malleable Iron Union Fittings

WORKING PRESSURES

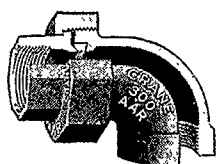
300 pounds steam, 550° F.

600 pounds cold water, oil, gas, or gasoline, non-shock

TEST PRESSURE — 150 pounds air under water

FEATURES

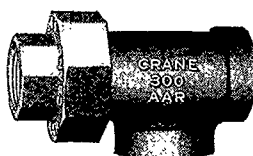
Brass to Iron Seat — Ground Joint
Octagon Ends



No. 890 E
90° Elbow
Female Union



No. 891 1/2 E
45° Elbow
Female Union



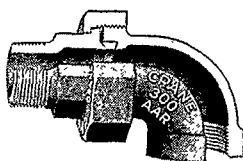
No. 894 E
Tee
Female Union on Run



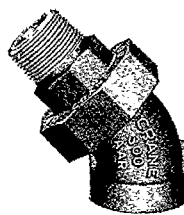
No. 895 E
Reducing Tee
Female Union on Run



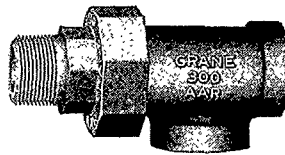
No. 898 E
Tee
Female Union
on Outlet



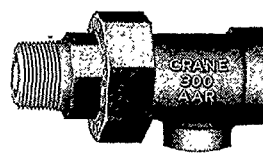
No. 892 E
90° Elbow
Male Union



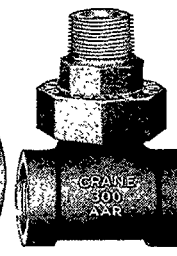
No. 893 E
45° Elbow
Male Union



No. 896 E
Tee
Male Union on Run



No. 897 E
Reducing Tee
Male Union on Run



No. 898 1/2 E
Tee
Male Union
on Outlet

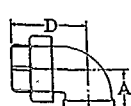
List Prices, Straight Fittings

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 890 E or No. 892 E, 90° Elbows, Black	Each	.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50
No. 891 1/2 E or No. 893 E, 45° Elbows, Black	Each	.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	
No. 894 E or No. 896 E, Tees, Black	Each	.66	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25
No. 898 E or No. 898 1/2 E, Tees, Black	Each	.75	.75	.82	1.00	1.32	1.98	2.64	3.30	5.30	

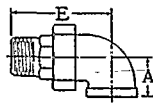
List Prices, Reducing Tees

Size	Inches	1 x 3/8	1 x 1/2	1 x 3/4
No. 895 E or 897 E, Reducing Tees, Black	Each	1.45	1.45	1.45

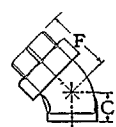
Galvanized Union Fittings: The Crane A.A.R. furnished galvanized, when so ordered, at an advance in price; prices on application.



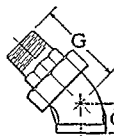
No. 890 E



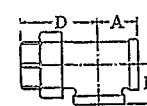
No. 892 E



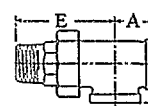
No. 891 1/2 E



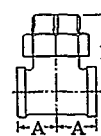
No. 893 E



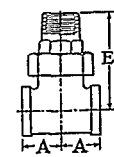
No. 894 E or 895 E



No. 896 E or 897 E



No. 898 E



No. 898 1/2 E

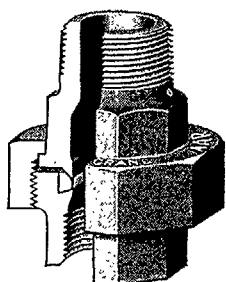
Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	1 x 3/8	1 x 1/2	1 x 3/4
A	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 15/16	3 3/8	1 5/16	1 7/16	1 1/2
B	15/16	1 1/16	1 1/4	1 7/16	1 5/8	1 15/16	2 1/8	2 1/2	2 15/16	3 3/8	1 7/16	1 1/2	1 9/16
C	13/16	7/8	1	1 1/8	1 5/8	1 1/2	1 11/16	2	2 1/4				
D	2	2 1/4	2 7/16	2 7/8	3 3/16	3 11/16	3 15/16	4 1/2	5 7/16	5 15/16	2 3/4	2 7/8	3
E	2 9/16	2 7/8	3 3/16	3 3/4	4 1/16	4 5/8	4 7/8	5 3/8	6 7/16	7 3/16	3 11/16	3 13/16	3 15/16
F	1 5/8	1 3/4	1 15/16	2 3/16	2 1/2	2 7/8	3 3/16	3 11/16	4 3/16				
G	2 3/16	2 7/16	2 11/16	3 1/16	3 7/16	3 13/16	4 1/8	4 9/16	5 3/16				

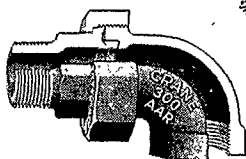
Description ... page 242

Thread Engagement ... page 591

A.A.R. Malleable Iron Unions and Union Fittings With Steel Male Tail-Piece



No. 919 1/2 E
Union

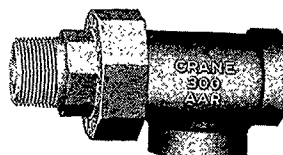


No. 992 E
90° Elbow

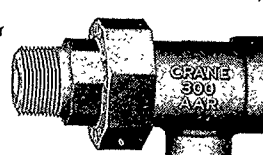


No. 993 E
45° Elbow

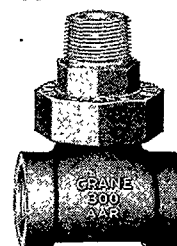
2 1/2 and 3-inch male
tail-pieces are cast steel.



No. 996 E
Tee
Union on Run



No. 997 E
Reducing Tee
Union on Run



No. 998 1/2 E
Tee
Union on Outlet

WORKING PRESSURES

300 pounds steam, 550° F.

600 pounds cold water, oil, or gas, non-shock

FEATURES

Brass to Steel Seat

Ground Joint — Octagonal Ends

These unions and union fittings are the same as those shown on pages 242 and 243 except that they have a steel tail-piece, making the male end unusually rugged. They are especially suited for the severe services where the strength and toughness of steel is needed in the male end.

All parts are interchangeable, size for size, with the corresponding parts of the Malleable Iron A.A.R. Unions and Union Fittings (pages 242 and 243).

Galvanized unions and union fittings are made to order; prices on application.

List Prices, Each, Black

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	Size	1 x 3/8
No. 919 1/2 E, Unions		.56	.56	.63	.75	1.00	1.50	1.94	2.88	4.75	6.88	Inches	1 x 1/2
No. 992 E, 90° Elbows		.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80	7.50		1 x 3/4
No. 993 E, 45° Elbows		.60	.60	.75	.90	1.20	1.80	2.40	3.00	4.80		No. 997 E	1.45
No. 996 E, Tees		.66	.66	.82	1.00	1.32	1.98	2.64	3.30	5.30	8.25	Reducing	
No. 998 1/2 E, Tees		.75	.75	.82	1.00	1.32	1.98	2.64	3.30	5.30		Tees	

A.A.R. Forged Steel Ground Joint Unions

WORKING PRESSURES—300 pounds steam

FEATURES

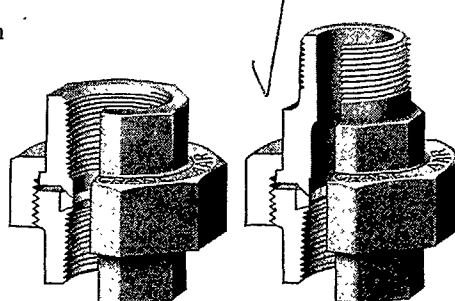
Ground Joint — Octagonal Ends
Brass to Steel Seat

Tested 150 pounds air under water

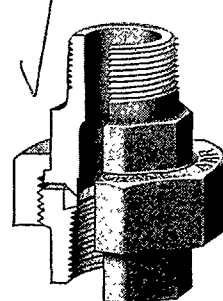
2 1/2 and 3-inch male
tail-pieces are cast steel.

These are light weight, rugged Forged Steel A.A.R. Unions, ideal for locomotive and other railroad services subjected to vibration and expansion and contraction.

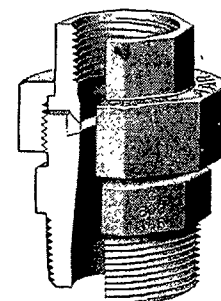
The brass to steel ground joint seat is non-corrosive and holds pressure easily; no gasket is required. Corresponding parts interchange with those of Unions shown on page 242 and above.



No. 950 H
Union
Female



No. 953 H
Union
Male and Female



No. 953 1/2 H
Reducing Air Pump Union
(Male end is larger)

A.A.R. These unions conform to the A.A.R. specifications for 300-pound unions. The union ring is marked "Crane-AAR-300".

List Prices, Black

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 950 H, Female Unions	Each	.40	.50	.60	.70	.80	1.20	1.60	2.30	4.50	6.75
No. 953 H, Male and Female Unions	Each	.50	.62	.75	.87	1.00	1.50	2.00	2.75	5.70	8.50
Air Pump Unions	Size	Inches									
	No. 953 1/2 H, Reducing	Each	3.75	5.00	5.00	6.50	6.50	6.50			

Dimensions, same as A.A.R. Malleable Iron Unions and Union Fittings, see pages 242 and 243.

The illustrations on this page show the application of Crane A.A.R. Unions and Union Fittings to the air brake piping of a locomotive.

is made in the labor cost of the installation. The male end unions and union fittings illustrated below are the Crane A.A.R. line shown on page 244. Their steel male tail-piece assures liberal strength and ruggedness. If desired, however, the unions and union fittings with malleable iron tail-piece, shown on pages 242 and 243, may be used; or the A.A.R. Forged Steel Unions, shown on page 244, may be used.



300-Pound Malleable Iron Unions

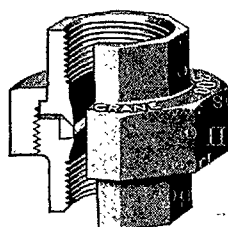
WORKING PRESSURES

No. 198 E and No. 198½ E—300 pounds steam, 550° F.
 No. 197 E —300 pounds saturated steam
 All types—600 pounds cold water, oil, or gas, non-shock

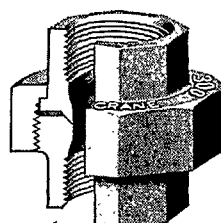
TEST PRESSURE—150 pounds air under water

FEATURES

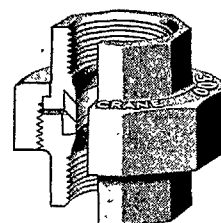
Brass to Iron, All-Iron, or Brass to Brass Seat
 Ground Joint Octagon Ends



No. 198 E
 Female Union
 Brass to Iron Seat



No. 198½ E
 Female Union
 All-Iron Seat



No. 197 E
 Female Union
 Brass to Brass Seat

List Prices

Size		Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Brass to Iron Seat	No. 198 E	Black Each	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50	8.00	11.00
		Galv. Each	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60	10.00	13.50
All-Iron Seat	No. 198½ E	Black Each	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50		
		Galv. Each	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60		
Brass to Brass Seat	No. 197 E	Black Each	.45	.45	.50	.60	.80	1.20	1.55	2.30	3.80	5.50		
		Galv. Each	.50	.50	.55	.70	.95	1.40	1.80	2.60	4.50	6.60		

Service recommendations: Crane 300-Pound Malleable Iron Unions are recommended where long life and dependability are desired on lines conveying steam, water, oil, air, gas, or similar fluids. Their sturdy construction makes them especially suitable for severe services.

Unusually rugged: All parts are massive and rugged. The malleable iron from which they are made has a high tensile strength and is exceptionally tough.

Choice of seat construction: The unions are made with three types of seat construction.

Brass to Iron Seat—No. 198 E

All-Iron Seat—No. 198½ E

Brass to Brass Seat—No. 197 E

Brass seat unions: Brass seat unions have durable, non-corrosive seating surfaces. The large brass rings are forced into the retaining grooves under high pressure; they will not loosen in service.

All-iron unions: All-iron unions have seating surfaces integral with the end-pieces. They are suitable for steam, oil, air, or gas lines where a non-corrosive

seat is not desired, and for acid lines where all-iron material is satisfactory.

Ground joint: All of these unions have a ground joint seat that holds pressure easily; no gasket is needed. The unions can be taken apart and re-assembled repeatedly without affecting their strength or tightness.

Interchangeability: The corresponding parts of these unions are interchangeable, size for size.

Identification of seat:

Brass to iron seat black unions are all black.

All-iron black unions have the union ring japanned green.

Brass to brass seat black unions have the union ring japanned maroon.

Galvanized unions are all-galvanized, with no other distinguishing color on the union ring.

Federal Specification: The No. 198 E Brass to Iron Seat Unions and the No. 198½ E All-Iron Seat Unions, sizes 1/4 to 3-inch inclusive, conform to Federal Specification No. WW-U-536, dated June, 1933.

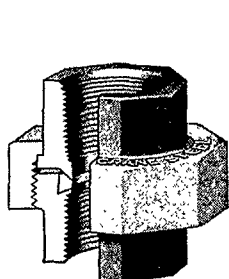
Dimensions, in Inches



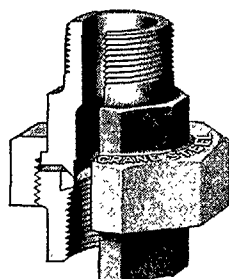
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A	1 5/8	1 13/16	1 5/16	2 1/4	2 7/16	2 13/16	3	3 3/8	4	4 5/16	4 11/16	5

Thread Engagement . . . page 591

Forged Steel Ground Joint Unions



No. 250 H
Female

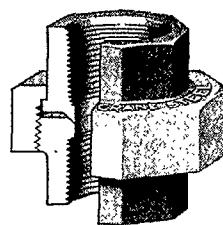


No. 253 H
Male and Female
Brass to Steel Seat

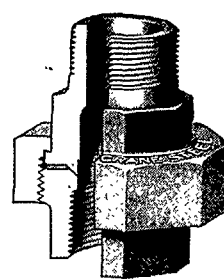
*Tested
300 pounds air
under water*

(2½ and 3-inch
male tail-pieces
are cast steel.)

These unions
are furnished with
black end-pieces
and cadmium plated
union ring, or are
cadmium plated
all over.



No. 252 H
Female



No. 254 H
Male and Female
Steel to Steel Seat

List Prices, Each, and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 250 H, or No. 252 H	Black with Cadmium Plated Ring	.40	.40	.50	.60	.70	.80	1.20	1.60	2.30	4.50	6.75
	Cadmium Plated all over	.50	.50	.60	.75	.90	1.05	1.50	2.10	2.90	5.25	7.75
No. 253 H, or No. 254 H	Black with Cadmium Plated Ring		.50	.62	.75	.87	1.00	1.50	2.00	2.75	5.70	8.50
	Cadmium Plated all over		.59	.70	.87	1.05	1.25	1.75	2.50	3.40	6.25	9.50
End to end	Female	Inches	1 1/2	1 5/8	1 13/16	1 15/16	2 1/4	2 7/16	2 13/16	3	3 3/8	4 45/16
	Male and Female	Inches		2 1/4	2 1/2	2 11/16	3 1/8	3 3/8	3 3/4	3 15/16	4 5/16	5 1/2

Service recommendations: These unions are recommended for high pressures and temperatures or for unusually severe service on steam, oil, water, air, or gas. Although light in weight, they are exceptionally tough and rugged.

Seat: The unions have steel to steel seats or brass to steel seats. In the former, the seats are integral with the end-pieces. In the latter, a large brass ring is rolled under high pressure into the thread-piece; it will not loosen in service.

Cadmium plating: These unions are furnished with black end-pieces and cadmium plated union ring or are cadmium plated all over. The parts are plated inside and outside after being machined and before being assembled. Cadmium plating offers excellent resistance to atmospheric corrosion (rust) and is a permanent and effective lubricant.

A.A.R. design: In design and dimensions, No.

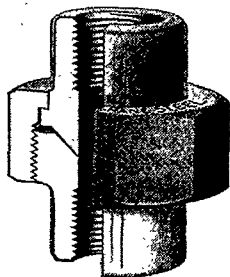
250 H and No. 253 H Unions sizes 1/4 to 3-inch comply with the specifications of the Association of American Railroads for 300-pound unions.

Identification of seat: Brass to steel seat unions are marked "600S-550° F."; steel to steel seat unions are marked "600S-900° F."

Working Pressures, Non-Shock (Steam, Water, Oil, Oil Vapor, Gas, or Air)

Temp. Degrees Fahr.	Pounds		Temp. Degrees Fahr.	Pounds Steel to Steel Seat
	Brass to Steel Seat	Steel to Steel Seat		
100	2000	2000	600	1040
150		1900	650	960
200		1800	700	880
250		1700	750	800
300		1600	800	740
350		1500	850	670
400		1400	900	600
450		1300	950	530
500		1200	1000	380
550	600	1120	....	...

Forged Ground Joint Unions—Steel to Exelloy Seat



No. 246 X, Female

Tested 300 pounds air under water

List Prices and Dimensions

Size Inches	List Price Each	End to end Inches
1/4	2.00	1 13/16
3/8	2.50	2 1/8
1/2	3.20	2 7/16
3/4	4.00	2 13/16
1	5.50	3 9/16

For larger sizes, use No. 330 D or
No. 331 D Flange Unions, page 253.

Working Pressures, Non-Shock (Steam, Water, Oil, Oil Vapor, Gas, or Air)

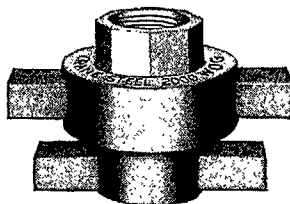
Temp.	Pounds	Temp.	Pounds
100° F.	6000	600 F.	3120
150	5700	650	2880
200	5400	700	2640
250	5100	750	2400
300	4800	800	2200
350	4500	850	2000
400	4200	900	1800
450	3900	950	1590
500	3600	1000	1140
550	3360	....	....

These exceptionally heavy, superior quality unions have a thread-piece of forged Exelloy, making both the seat and the ring thread joint non-corrosive. The tail-piece and union ring are forged steel.

Thread engagement page 591

Forged Steel Ground Joint Hammer Lug Unions

Unions with Double Hammer Lugs



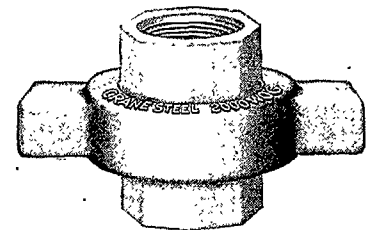
Female Union
No. 350 1/2 H
Brass to Steel Seat

For working pressures,
see table shown below.

Tested
300 pounds air
under water

Unions with Single Hammer Lugs

Cadmium Plated



Female Union
No. 350 H, Brass to Steel Seat
No. 352 H, Steel to Steel Seat

(The 4-inch size is cast steel.)

List Prices

Size		Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
Black	No. 350 1/2 H, Brass to Steel Seat	Each	1.00	1.20	1.40							
Cadmium	No. 350 H, Brass to Steel Seat	Each	.60	.75	.90	1.05	1.50	2.10	2.90	5.25	7.75	16.00
Plated	No. 352 H, Steel to Steel Seat	Each	.60	.75	.90	1.05	1.50	2.10	2.90	5.25	7.75	16.00

Service recommendations: These unions find wide application in many industries on temporary lines or on services where the union must be easily and quickly taken apart or reassembled. A blow with a hammer upon one of the lugs will instantly break or make the joint.

They are forged from a high quality steel and are strong and rugged. They will withstand hard usage and repeated dismantling. Their ground joint holds pressure easily; no gasket is required.

Unions with Double Hammer Lugs: The No. 350 1/2 H Unions have two hammer lugs on the thread-piece and two on the union ring. They are frequently used on hydraulic lines in steel mills.

All sizes are forged steel and have a brass to steel seat.

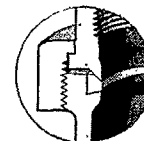
Unions with Single Hammer Lugs: The No. 350 H Brass to Steel Seat and No. 352 H Steel to Steel Seat Unions have hammer lugs (two) on the union ring only. They are used on many services; the larger sizes are popular in oil and gas fields.

The unions are cadmium plated inside and out after machining and before assembly. Cadmium plating offers excellent resistance to atmospheric corrosion (rust) and is a permanent and effective lubricant.

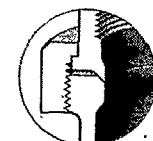
Sizes 3-inch and smaller are forged steel; the 4-inch size is cast steel.

The No. 352 H Steel to Steel Seat Unions have the lugs on the union ring painted green after being cadmium plated to identify them from the Brass to Steel Seat Unions.

Interchangeability: The union ring, thread-piece, and tail-piece on all of these unions sizes 3-inch and smaller are interchangeable with the corresponding parts of the No. 250 H, No. 252 H, No. 253 H, and No. 254 H Unions shown on page 247.



Brass to Steel Seat
Used in
Nos. 350 1/2 H and 350 H
(Brass ring rolled in
under high pressure;
will not loosen
in service.)



Steel to Steel Seat
Used in
No. 352 H
(Seats are
integral
with the
end pieces.)

Working Pressures

(Steam, Water, Oil, Oil Vapor Gas, or Air)

Temper- ature Degrees Fahr.	Pounds, Non-Shock		Temper- ature Degrees Fahr.	Pounds Non-Shock Steel to Steel Seat
	Brass to Steel Seat	Steel to Steel Seat		
100	2000	2000	600	1040
150		1900	650	960
200		1800	700	880
250		1700	750	800
300		1600	800	740
350		1500	850	670
400		1400	900	600
450		1300	950	530
500		1200	1000	380
550	600	1120		

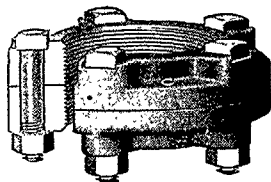
Dimensions, in Inches

Size		3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
No. 350 1/2 H	End to end	2 3/16	2 1/4	2 9/16							
	Distance across lugs on union ring	2 11/16	3 1/8	3 13/16							
No. 350 H No. 352 H	End to end	1 13/16	1 15/16	2 1/4	2 7/16	2 13/16	3	3 3/8	4	4 5/16	5 5/8
	Distance across lugs	2 11/16	3 1/8	3 13/16	4 3/8	5 3/16	5 11/16	6 5/8	7 7/8	9 3/4	12 1/2

Thread Engagement....page 591

Cast Iron Flange Unions

Standard—Gasket Type



Standard
Faced, Plain Face

WORKING PRESSURES

125 pounds steam
175 pounds cold water or gas, non-shock

When sizes 14-inch and larger are required use two No. 553 Standard Cast Iron Companion Flanges (page 292) bolted together.

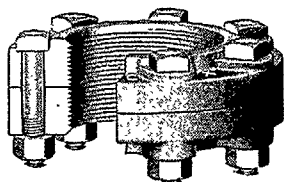
Each union is equipped with a rubber gasket.

Galvanized unions have galvanized bolts.

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Black	Each	.40	.46	.52	.64	.78	1.00	1.25	1.50	1.80	2.10	3.15	3.95	7.00	11.50	16.00
Galvanized	Each	.80	.92	1.04	1.28	1.56	2.00	2.50	3.00	3.60	4.20	6.30	7.90	14.00	23.00	32.00
End to end	Inches	1 3/16	1 5/16	1 7/16	1 9/16	1 11/16	1 13/16	2 5/16	2 7/16	2 9/16	2 11/16	2 15/16	3 1/16	3 9/16	3 15/16	4 5/16
Dia. of flanges	Inches	2 3/4	3 3/8	3 3/8	4 1/8	4 1/2	5 1/8	5 7/8	6 9/8	7 1/4	7 3/4	9 1/8	10 3/8	12 3/4	15 1/2	17 7/8
No. and dia. of bolts		3-3/8	3-7/16	3-7/16	4-7/16	4-1/2	4-1/2	4-5/8	4-5/8	4-5/8	5-5/8	5-5/8	6-5/8	8-5/8	10-3/4	12-3/4

250-Pound Gasket Type or Ground Joint

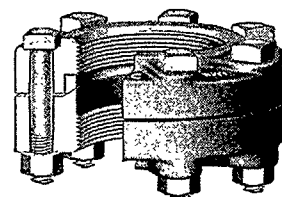


No. 97 E
Gasket Type
Faced, Plain Face

WORKING PRESSURES

250 pounds steam
400 pounds cold water, oil, or gas, non-shock

Galvanized unions have galvanized bolts.



No. 99 E
Ground Joint—Brass to Iron Seat
Navy Pattern

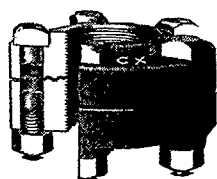
The No. 97 E Unions are equipped with a rubber gasket, suitable for steam, water, or gas service. For oil service, a Cranite gasket should be used. It is furnished only when ordered and is charged extra; see page 571 for list prices.

The No. 99 E Unions have a non-corrosive brass-to-iron ground joint seat; no gasket is needed. They can be taken apart and reassembled repeatedly without affecting their strength or tightness.

List Prices and Dimensions

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
No. 97 E	Black	Each	.70	.70	.80	1.00	1.15	1.50	1.90	2.25	2.70	3.15	4.75	6.00	10.50
	Galvanized	Each	1.40	1.40	1.60	2.00	2.30	3.00	3.80	4.50	5.40	6.30	9.50	12.00	21.00
No. 99 E	Black	Each		.60	.80	1.20	1.60	2.00	3.20	4.80	6.00	7.50	10.00	12.50	18.00
	Galvanized	Each		.90	1.20	1.80	2.40	3.00	4.80	7.20	9.00	11.25	15.00	18.75	27.00
End to end, No. 97 E		Inches	15/16	15/16	17/16	111/16	113/16	21/16	23/16	27/16	211/16	213/16	215/16	31/16	39/16
End to end, No. 99 E		Inches		19/16	1 3/4	1 11/16	21/8	2 1/2	2 5/8	2 7/8	3 1/8	3 3/8	3 5/8	3 7/8	4 1/2
Dia. of flanges		Inches	3 1/4	3 1/4	3 5/8	4 1/8	4 5/8	5 3/8	6	6 3/4	7 1/2	8	9 3/8	10 7/8	13 1/4
No. and dia. of bolts			4-7/16	4-7/16	4-7/16	4-1/2	4-1/2	5-9/16	5-5/8	6-5/8	6-5/8	7-5/8	8-3/4	9-3/4	10-3/4

5-Bolt Oil Country Pattern—Gasket Type



5-Bolt Oil Country Pattern
Not Faced,
Corrugated Face for Gasket

WORKING PRESSURE

600 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

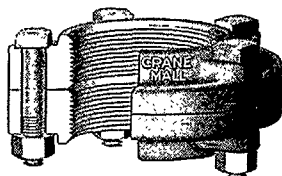
Size	Inches	2
Black	Each	1.85
End to end	Inches	2 5/8
Dia. of flanges	Inches	5 3/8
No. and dia. of bolts		5-5/8

Extra Gaskets...page 571

The flanges of this union are rough, not faced. To afford a stronger grip on the gasket, the bearing surfaces are corrugated. Each union is equipped with a rubber gasket. For extra gaskets, see page 571.

Malleable Iron Gasket Type Flange Unions

Standard Unions



Standard
Faced, Plain Face
Long Thread Type

WORKING PRESSURES
150 pounds steam
225 pounds cold water, oil,
or gas, non-shock

Galvanized unions
have galvanized bolts.

Each union is equipped with a rubber gasket, suitable for steam, water, or gas service. For oil service, a Crane gasket should be used. It is furnished only when ordered and is charged extra; see page 571 for list prices.

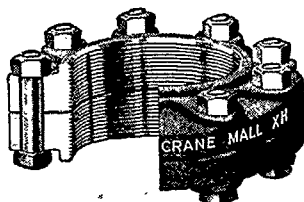
List Prices and Dimensions

Size	Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Black	Each	1.40	1.60	2.00	2.50	3.00	3.50	4.40	5.25	6.00	8.00	9.00	18.00	33.00	46.00
Galvanized	Each	2.80	3.20	4.00	5.00	6.00	7.00	8.80	10.50	12.00	16.00	18.00	36.00	66.00	92.00
End to end	Inches	1 1/8	1 7/16	1 9/16	1 13/16	2 3/8	2 7/8	2 15/16	3 1/16	3 3/16	3 3/8	3 9/16	4	4 7/16	4 13/16
Diameter of flanges	Inches	2 7/8	3 1/4	3 3/4	4 5/8	5 1/8	5 7/8	6 5/8	7 1/2	7 3/4	9 3/8	10 3/8	12 3/4	15 1/2	17 7/8
No. and dia. of bolts		3-3/8	4-3/8	4-7/16	4-1/2	4-1/2	4-5/8	4-5/8	4-5/8	5-5/8	5-5/8	6-5/8	8-5/8	10-3/4	12-3/4

These unions are heavier and have longer thread lengths than the ordinary commercial flange unions of this type. They have ample bolting and are sturdily constructed of a good quality malleable iron. Crane Standard Malleable Iron Flange Unions are

recommended for all general steam, water, oil, or gas service. Because of the extra safety factor resulting from their greater weight and longer threads, they are especially suitable where ordinary unions are not entirely satisfactory, as in oil refineries.

400-Pound W.O.G. Unions



No. 95 E
Faced, Plain Face
Long Thread Type

WORKING PRESSURES
250 pounds steam
400 pounds cold water, oil,
or gas, non-shock

Each union is equipped with a Crane gasket, suitable for steam, water, oil, or gas service

List Prices and Dimensions

Size	Inches	2	2 1/2	3	4	6	8	10	12
No. 95 E, Black	Each	4.85	6.75	9.00	11.50	21.00	Prices on application		
End to end	Inches	2 1/2	2 13/16	3	3 1/8	3 5/8	4	4 7/16	4 13/16
Diameter of flanges	Inches	5 3/8	6 3/16	7	8	11	13 1/4	16	18 7/8
No. and dia. of bolts		5-9/16	5-5/8	6-5/8	7-5/8	9-3/4	10-3/4	12-7/8	12-1

The No. 95 E Unions are made of a high quality malleable iron. They are strong, tough, and rugged, and have good resistance to shock or impact and to the strains resulting from the expansion and contraction of piping.

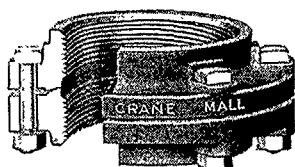
They are especially popular in oil and gas fields.

The threads are unusually long and are accurately cut to gauge.

These unions are regularly furnished with a Crane gasket. They are recommended for 400 pounds cold water, oil, or gas service, non-shock, and for 250 pounds saturated steam service.

Malleable Iron Ground Joint Flange Unions

Standard All-Iron Unions



No. 773
Long Thread Type

WORKING PRESSURES
150 pounds steam
225 pounds cold water, oil,
or gas, non-shock

Iron to Iron Seat
Ground Joint

List Prices and Dimensions

Size	Inches	2	2½	3	4	6	8
No. 773, Black	Each	3.25	4.50	6.00	7.50	14.00	*
End to end	Inches	2½ ¹¹ / ₁₆	3¾ ³ / ₁₆	3 ⁵ / ₁₆	3 ⁹ / ₁₆	4¼	4 ¹⁵ / ₁₆
Diameter of flanges	Inches	5½	5 ⁷ / ₈	6 ⁵ / ₈	7¾	10½	12¾
No. and dia. of bolts		4-½	4- ⁵ / ₈	4- ⁵ / ₈	5- ⁵ / ₈	6- ⁵ / ₈	8- ⁵ / ₈

*8-inch size can be made to order; price on application.

The No. 773 Standard All-Iron Flange Unions are popular in oil and gas fields. They have unusually long threads, accurately cut to gauge, making them suitable for pipe line service.

The malleable iron from which they are made is

strong, tough, and durable. It has good resistance to shock or impact and to the strains resulting from the expansion and contraction of piping.

The ground joint seat eliminates the need for a gasket. Each union is given a hydrostatic test.

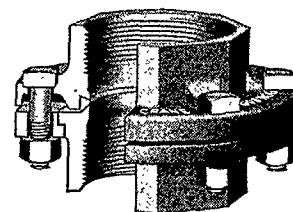
Three-Part Unions

Brass to Iron Seat
Ground Joint

Loose ring makes it easy
to line up bolt holes.

WORKING PRESSURES
600 pounds cold water, oil,
or gas, non-shock

Sizes 4-inch and smaller, 300 pounds steam
Sizes 5-inch and larger, 200 pounds steam



No. 775

List Prices and Dimensions

Size	Inches	2	2½	3	3½	4	5	6	*7	8	10
No. 775, Black	Each	4.00	6.40	9.60	12.00	15.00	20.00	25.00	30.00	36.00	57.60
End to end	Inches	3 ¹¹ / ₁₆	4 ¹ / ₈	4½	4 ¹¹ / ₁₆	5	5 ³ / ₈	5 ⁷ / ₈	6 ⁵ / ₁₆	6 ⁷ / ₈	8 ³ / ₁₆
Diameter of flanges	Inches	5¼	6 ³ / ₁₆	7 ³ / ₁₆	7¾	8 ³ / ₈	9¾	11	12½	14½	16 ⁷ / ₈
No. and dia. of bolts		5-½	5- ⁹ / ₁₆	5- ⁹ / ₈	5- ⁵ / ₈	6- ⁵ / ₈	6- ⁵ / ₈	8-¾	10-¾	10- ⁷ / ₈	12-1

Advantages of the three-part construction:
The No. 775 Union has three major parts: flange-piece, tail-piece, and loose ring. The ring combined with the ball type seat assures tightness even when the pipe line is slightly out of alignment. In addition, being loose, the ring can be conveniently swiveled to any desired position to line up the bolt holes.

Brass to iron seat, ground joint: The brass to iron seat is non-corrosive, and the ground joint eliminates the need for a gasket. The brass seat ring is forced into the tail-piece under high pressure

and will not loosen in service. The union can be taken apart and reassembled repeatedly without injuring its strength or seating qualities.

Loose ring painted yellow: The loose ring is painted yellow so that the union can be easily identified.

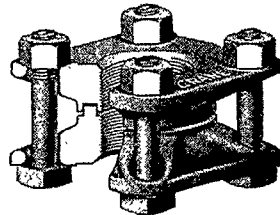
Test: Each union is given a hydrostatic test.

***7-inch Unions:** The 7-inch Unions can be used for 6⁵/₈-inch casing (7-inch O.D.) or 7¼-inch casing (7⁷/₈-inch O.D.). Orders should specify outside diameter of casing, number of threads per inch, and style of casing.

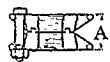
Tongue and Groove Flange Unions

WORKING PRESSURES, Pounds per Square Inch

	Sizes	Steam or oil 500° F.	Ammonia	Cold water, oil, or gas, non-shock
No. 1589, No. 1591½, or No. 1529	¼ to 3-inch	300	300	1000
	3½ to 6-inch	300	300	600
	8 to 12-inch	250	300	500

No. 1589
With Cranite Gasket

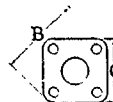
¼ to 3-inch are forged steel;
3½ to 6-inch are malleable iron;
8 to 12-inch are Ferroteel.



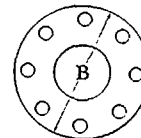
"A" is end
to end
of threads.



Oval



Square



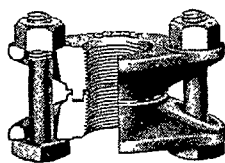
Round

These are rugged, serviceable unions. They are made by bolting together a No. 1547 Tongue Flange and a No. 1545 Groove Flange (shown on page 484). Each union is equipped with a Cranite gasket.

Reducing sizes are made to order; prices on application.

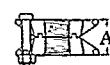
List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12
No. 1589	Each	.90	1.00	1.20	1.55	2.15	2.25	2.70	3.10	5.50	6.75	7.75	9.25	11.00	13.75	20.00	28.00	40.00
Style of flanges		Oval				Square				Round								
A	Inches	1⅝	1½	1⅞	1⅞	2	2⅛	2⅜	2¼	2⅜	3	3¼	3⅝	3⅝	3⅞	3¾	4⅜	4⅞
B	Inches	3⅝	3⅜	4	4⅜	4½	5	6	6½	7½	8¼	9	10	11	12½	15	17½	20½
C	Inches	1⅝	1¾	2	2¼	3⅞	3⅞	4⅞	5⅞	5⅞								
No. of bolts		2	2	2	2	4	4	4	4	4	8	8	8	8	12	12	16	16
Dia. of bolts	Inches	½	½	½	⅝	½	½	⅝	⅝	¾	¾	¾	¾	¾	¾	⅞	1	1⅞

No. 1591½
With Cranite Gasket

List Prices and Dimensions

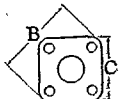
Size	Inches	1	1¼	2
No. 1591½	Each	1.50	1.75	2.80
Style of flanges		Oval		Square
A	Inches	2	2⅛	2⅞
B	Inches	4¾	5¼	5⅞
C	Inches	2⅝	3	4½
No. and dia. of bolts	Inches	2-⅝	2-⅝	4-⅝



"A" is end
to end
of threads.



Oval



Square

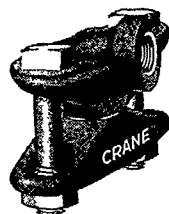
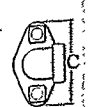
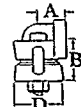
These are unusually compact unions, equipped with a Cranite gasket. They are ideal for making up pipe coils with close centers and for other services where a good union joint must be made in a small space.

Forged Steel Combination Elbows

Furnished complete unless otherwise ordered

List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1	1¼
No. 1529, Complete	Each	1.40	1.55	1.85	2.20	2.60	3.90
No. 1529, Elbow only	Each	.85	.95	1.05	1.20	1.40	2.60
A	Inches	1⅜	1⅝	1⅞	1⅞	2⅞	2⅞
B	Inches	1½	1⅞	2⅞	2⅞	2⅞	2⅞
C	Inches	3⅝	3⅜	4	4¾	4¾	5¼
D	Inches	1⅝	1¾	2	2¼	2⅝	3
No. and dia. of bolts	Inches	2-½	2-½	2-½	2-⅝	2-⅝	2-⅝

No. 1529, Complete
With Flange, Bolts,
and Cranite GasketNo. 1529
Elbow Only

Strong, compact connections are made conveniently and economically with these elbows. They are ideal where a union angle joint is needed in close quarters and for making meter, small by-pass, and similar connections.

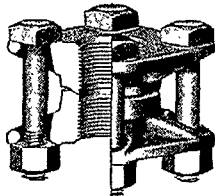
When used in place of ordinary screwed fittings, the No. 1529 replaces an elbow, a nipple, and a flange,

eliminating two joints. When used in place of a flanged elbow, it eliminates one gasket joint. In both cases, the No. 1529 takes up less space.

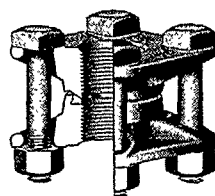
The flange portion is the No. 1547 (shown on page 484) on sizes ¾-inch and smaller and the tongue half of the No. 1591½ Union (shown above) on the 1-inch and 1¼-inch sizes.

Extra Gaskets... page 571

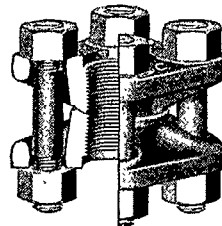
2000, 6000, and 9000-Pound W.O.G. Forged Steel Ground Joint Flange Unions



Steel to Steel Seat
No. 328 D, 2000-Pound
No. 340 D, 2000-Pound
*Triplex Steel Bolt-Studs



Brass to Steel Seat
No. 329 D, 2000-Pound

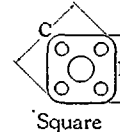


Steel to Steel Seat
No. 330 D, 6000-Pound
Cold Rolled Steel Bolt-Studs

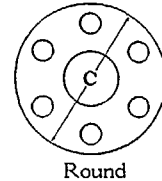
No. 331 D
9000-Pound, Sizes 1/4 to 2 1/2-inch
6000-Pound, Sizes 3 to 6-inch
*Triplex Steel Bolt-Studs



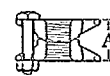
Oval



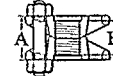
Square



Round



2000-Pound



6000 and
9000-Pound

2000-Pound Flange Unions										6000 and 9000-Pound Flange Unions									
Size Inches	List Prices			Dimensions, in Inches				Style of flange		Size Inches	List Prices			Dimensions, in Inches				Style of flange	
	No. 328 D Each	No. 329 D Each	No. 340 D Each	A	C	D	No. & dia. of bolts				No. 330 D Each	No. 331 D Each		A	B	C	D		
1/4	1.60	1.85	2.05	1 3/4	3 5/8	1 5/8	2-1 1/2	Oval		1/4	6.00	7.50		2 1/4	11 1/16	3 7/8	2	Oval	
3/8	1.80	2.10	2.30	1 7/8	3 13/16	1 3/4	2-1 1/2			3/8	6.00	7.50		2 1/4	11 1/16	3 7/8	2		
1/2	2.05	2.40	2.60	2	4	2	2-9/16			1/2	6.00	7.50		2 1/4	11 1/16	3 7/8	2		
3/4	2.45	2.85	3.10	2 1/8	4 3/4	2 1/4	2-3/4			3/4	7.00	8.75		2 3/8	11 3/16	3 5/8	3		
1	2.90	3.35	3.70	2 3/8	4 3/4	2 5/8	2-3/4	Square		1	8.00	10.00		2 1/2	2	4 1/2	3 3/8	Square	
1 1/4	3.40	3.90	4.35	2 5/8	5	3 15/16	4-5/8			1 1/4	9.00	11.25		2 3/4	2 3/16	5 1/4	4 1/4		
1 1/2	3.90	4.50	5.00	2 3/4	6	4 11/16	4-5/8			1 1/2	10.00	12.50		2 7/8	2 5/16	5 7/8	4 3/4		
2	4.40	5.10	5.70	2 3/4	6 1/2	5 1/16	4-3/4			2	16.00	20.00		3 11/16	3	6 7/8	5 1/2		
2 1/2	7.70	8.90	9.90	3 3/8	7 1/2	5 13/16	4-7/8	Round		2 1/2	29.00	36.25		3 5/16	3 1/8	7 13/16	6 1/4	Round	
3	11.70	13.50	15.00	3 3/8	8 1/4		6-7/8			3	47.00	58.75		4 5/8	3 7/8	9 1/2			
3 1/2	14.30	16.50	19.00	3 3/8	9		8-7/8			4	72.00	90.00		5 11/16	4 5/8	11 1/2			
4	17.60	20.25	23.50	3 3/8	10		8-1			5	110.00	138.00		6 3/8	5 3/8	13 3/4			
5	21.00	24.25	28.25	3 7/8	11		8-1 1/8			6	147.00	184.00		6 7/8	6	15			
6	30.00	34.50	41.00	4	12 1/2		10-1 1/4												
8	45.00	52.00	61.00	4 3/4	15		10-1 3/8												
10	65.00	75.00	87.00	5 1/8	17 1/2		12-1 1/2												
12	86.00	100.00	115.00	5 5/8	20 1/2		14-1 1/2												

Service recommendations: The 2000-Pound Unions are compact, yet amply strong. They are recommended especially for hydraulic lines. In addition, the No. 340 D, having Triplex Steel bolting, are suitable for high pressure-temperature service.

The 6000 and 9000-Pound Unions are made for the extreme pressures and temperatures encountered in some steam plants and oil refineries, and for very high hydraulic pressures. They are unusually massive and rugged, and they have liberal bolting.

Construction: These unions are forged from a high grade steel, especially selected for its strength and toughness. They have long thread lengths, and their ground joint holds pressure exceptionally well.

Bolting: The Nos. 328 D and 329 D sizes 6-inch and smaller have commercial bolts; larger sizes have cold rolled steel bolt-studs. The No. 330 D Unions have cold rolled steel bolt-studs.

The Nos. 340 D and 331 D have Triplex Steel bolt-studs, threaded full length, and fitted with medium carbon oil-quenched semi-finished hexagon steel nuts. Triplex Steel has excellent physical properties.

Working Pressures					
Steam, Water, Oil, Oil Vapor, Gas, or Air					
Temper- ature	Working Pressures — Pounds (Non-Shock)				
	2000-Pound		6000-Pound		9000-Pound
Degrees Fahr.	Nos. 328 D and 329 D	No. 340 D	No. 330 D	No. 331 D Sizes 3 to 6-inch	No. 331 D Sizes 1/4 to 2 1/2-inch
100	2000	2000	6000	6000	9000
150	1900	1900	5700	5700	8550
200	1800	1800	5400	5400	8100
250	1700	1700	5100	5100	7650
300	1600	1600	4800	4800	7200
350	1500	1500	4500	4500	6750
400	1400	1400	4200	4200	6300
450	1300	1300	3900	3900	5850
500	1200	1200	3600	3600	5400
550		1120		3360	5040
600		1040		3120	4680
650		960		2880	4320
700		880		2640	3960
750		800		2400	3600
800		740		2200	3300
850		670		2000	3000
900		600		1800	2700
950		530		1590	2385
1000		380		1140	1710

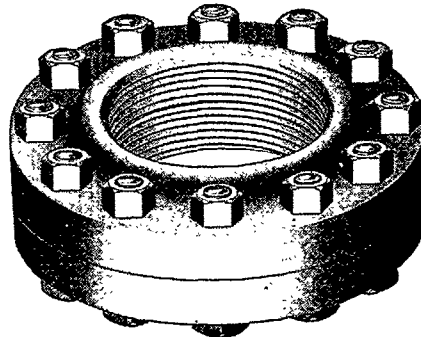
Large Size Flange Unions

Made from Screwed Flanges

Although the Crane line of Flange Unions, shown on pages 249 to 253, is exceptionally complete, very large pipe lines may sometimes require sizes larger than those that are regularly listed. These can be conveniently and economically made by bolting together two screwed companion flanges.

For this purpose, the user can make an excellent selection from the complete line of Crane Screwed Flanges. It includes flanges made in a variety of metals, in a full range of sizes, and for every service requirement. See the pages referred to below:

25-Pound Cast Iron Flanges.....	page 291
125-Pound Cast Iron or Malleable Iron Flanges.....	pages 292 and 293
250-Pound Cast Iron Flanges.....	pages 294 and 295
150-Pound Forged Steel Flanges.....	page 364
300-Pound Forged Steel Flanges.....	page 364
400-Pound Forged Steel Flanges.....	page 365
600-Pound Forged Steel Flanges.....	page 365
900-Pound Forged Steel Flanges.....	page 365
1500-Pound Forged Steel Flanges.....	page 365
Machine Bolts.....	page 556
Triplex Steel Bolt-Studs.....	pages 558 and 559
Gaskets.....	pages 566 to 571



A Large Size Flange Union
Made by bolting together
two Crane Cast Iron Screwed Flanges
Complete with Bolts and Gasket

Brass Fittings, Flanges, and Unions

Standard Screwed Fittings.....	pages 256 to 258
Nipples.....	page 258
250-Pound Screwed Fittings.....	pages 260 and 261
Plugs.....	page 259
Bushings.....	page 259
Screwed Unions and Union Fittings....	pages 262 and 263
Flange Unions.....	page 263
150-Pound Flanged Fittings.....	page 264
150-Pound Companion Flanges.....	page 264
300-Pound Flanged Fittings.....	page 264
300-Pound Companion Flanges.....	page 264

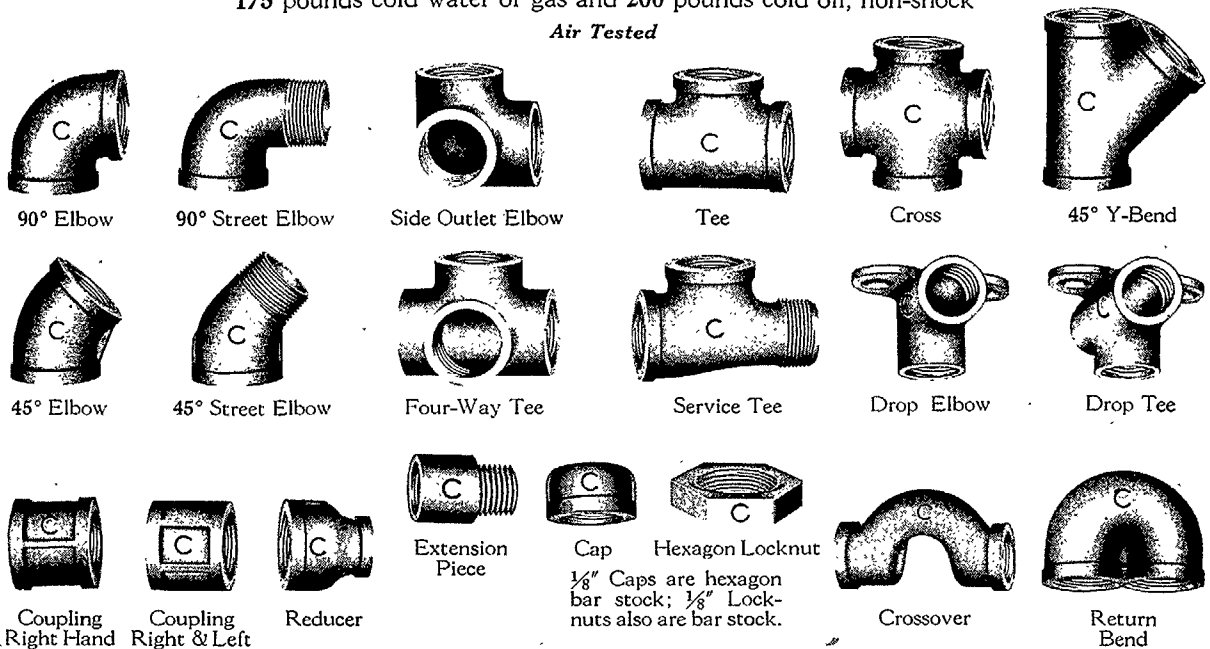
The fittings mentioned above constitute an exceptionally complete line for brass threaded or flanged joints. They are well proportioned and of ample weight, assuring a liberal factor of safety over the recommended working pressures. Unless otherwise indicated, the cast fittings are made of Crane Steam Brass, a good quality alloy of copper, tin, lead, and zinc (85-5-5-5), commonly classed as "Red Brass".

<i>How to read reducing fittings.....</i>	<i>page 644</i>
<i>Brass Solder-Joint Fittings.....</i>	<i>pages 499 to 512</i>
<i>Brass Crane-Seal Fittings.....</i>	<i>pages 489 to 498</i>
<i>Brass Railing Fittings.....</i>	<i>page 267</i>
<i>Brass Fittings for Marine Service.....</i>	<i>page 461</i>

Standard Brass Fittings

WORKING PRESSURES — 125 pounds steam
175 pounds cold water or gas and 200 pounds cold oil, non-shock

Air Tested



List Prices, Each, Rough

Size	Inches																		1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Elbows	90°	Straight		.11	.11	.11	.14	.21	.36	.59	.75	1.20	2.45	3.63	5.45	7.20	14.00	21.50	49.00															
		Reducing			.15	.15	.18	.25	.45	.70	.90	1.55	2.75	4.35	6.25	8.00	16.75	25.00	57.00															
		Right & Left			.40	.40	.55	.70	1.00	1.20	1.55	2.30																						
		Street		.17	.17	.17	.22	.30	.50	.80	1.05	1.75	3.25	5.50	8.16	10.50																		
	45°		.13	.13	.13	.15	.23	.40	.65	.83	1.32	2.68	3.98	6.00	7.90	15.50	23.75	54.00																
	45°, Street		.17	.17	.17	.22	.30	.50	.80	1.05	1.75																							
	Side Outlet (Plain)			.72	.72	1.00	1.30	1.85	2.50	3.00	4.75	7.20	10.75																					
Drop (Plain)					.35	.40	.55	.70																										
Tees	Straight		.17	.17	.17	.22	.30	.50	.80	1.05	1.75	3.25	5.00	8.15	10.50	21.00	30.00	75.00																
	Reducing	1 opening	.20	.20	.26	.36	.60	.95	1.25	2.10	3.90	6.00	9.75	12.60	25.00	36.00	90.00																	
		2 openings	.22	.22	.29	.39	.65	1.05	1.40	2.30	4.25	6.50	10.60	13.65	27.30	39.00	97.50																	
	Service			.27	.36	.50	.85	1.25	1.67	2.75																								
	Four-Way (Plain)		.80	.80	1.10	1.46	2.05	2.75	3.30	5.25																								
Drop (Plain)				.40	.50	.70	.95																											
Crosses	Straight		.32	.32	.32	.42	.58	.79	1.26	1.63	3.00	5.60	9.50	13.00	17.00	35.00	50.00	125.00																
	Reducing			.40	.40	.53	.72	1.00	1.60	2.05	3.75	7.00	11.90	16.25	21.25	44.00	62.50	156.00																
Couplings	Right Hand		.11	.11	.11	.14	.21	.36	.58	.70	1.16	1.75	2.50	3.60	4.60	10.00	14.00	32.00																
	Right & Left		.29	.29	.29	.34	.40	.60	.80	.90	1.50	2.25	3.30																					
45° Y-Bends					.40	.45	.60	1.00	1.60	2.10	3.50	6.50	10.00		21.00																			
Reducers	Reducing 1 or 2 sizes		.12	.12	.16	.23	.40	.64	.77	1.28	1.95	2.75	4.00	5.00	11.00	15.40	35.00																	
	Reducing 3 or more sizes				.17	.25	.44	.70	.84	1.40	2.10	3.00	4.30	5.50	12.00	17.00	38.50																	
Extension Pieces (Plain)					.25	.36	.50	.90	1.40	1.75	3.00																							
Caps			.11	.11	.11	.13	.18	.27	.45	.57	.95	1.60	2.30	3.40	4.40	8.50	14.00	32.00																
Hexagon Locknuts			.06	.06	.06	.10	.12	.18	.27	.35	.55	1.00	1.55	2.30	3.00	5.00	8.00	20.00																
Crossovers						.60	.80																											
Return Bends			Close Pattern										Open Pattern																					
	Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2			1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3																
	Center to center	Inches	1	1 1/4	1 1/2	1 3/4	2 1/4	2 3/4			1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5																
	Right Hand		.35	.55	.90	1.25	1.70	3.25			.45	.75	1.20	1.70	2.30	4.35	7.00	9.00																
	Right & Left		.85	1.05	1.50	1.80	2.40	4.00			1.00	1.25	1.80	2.30	3.00	5.10	8.50	12.00																

For prices of polished and polished-chromium-plated fittings, see the opposite page. For prices of Standard Brass Fittings polished-nickel-plated or rough-tinned, refer to the Crane Discount Sheet.

The largest opening on reducing fittings determines the list price; e.g., a 1 x 3/4 x 1" Tee (reducing 1 opening) is \$.60 list, a 1 x 1/2 x 3/4" or 3/4 x 3/4 x 1" Tee (reducing 2 openings) is \$.65 list, etc.

Dimensions... page 258

Brass Plugs, Bushings, and Unions... pages 259 and 262

Brass Nipples... page 258

Standard Brass Fittings

List Prices, Each, Polished

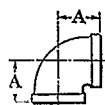
Size	Inches																	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Elbows	90°	Straight		.22	.22	.22	.28	.42	.72	1.20	1.50	2.40	4.90	7.25	10.90	14.40	28.00	43.00	98.00														
		Reducing			.30	.30	.36	.50	.90	1.40	1.80	3.10	5.50	8.70	12.50	16.00	33.50	50.00	114.00														
		Right & Left			.51	.51	.69	.91	1.35	1.80	2.30	3.50																					
		Street		.34	.34	.34	.44	.60	1.00	1.60	2.10	3.50	6.50	11.00	16.30	21.00																	
	45°		.26	.26	.26	.30	.46	.80	1.30	1.65	2.65	5.35	7.95	12.00	15.80	31.00	47.50	108.00															
	45°, Street		.34	.34	.34	.44	.60	1.00	1.60	2.10	3.50																						
	Side Outlet (Plain)			1.45	1.45	2.00	2.60	3.70	5.00	6.00	9.50	14.40	21.50																				
Drop (Plain)					.70	.80	1.10	1.40																									
Tees	Straight		.34	.34	.34	.44	.60	1.00	1.60	2.10	3.50	6.50	10.00	16.30	21.00	42.00	60.00	150.00															
	Reducing	1 opening		.40	.40	.52	.72	1.20	1.90	2.50	4.20	7.80	12.00	19.50	25.20	50.00	72.00	180.00															
		2 openings		.44	.44	.58	.78	1.30	2.10	2.80	4.60	8.50	13.00	21.20	27.30	54.60	78.00	195.00															
	Service				.54	.72	1.00	1.70	2.50	3.35	5.50																						
	Four-Way (Plain)			1.60	1.60	2.20	2.92	4.10	5.50	6.60	10.50																						
Drop (Plain)					.80	1.00	1.40	1.90																									
Crosses	Straight		.64	.64	.64	.84	1.15	1.60	2.50	3.25	6.00	11.20	19.00	26.00	34.00	70.00	100.00	250.00															
	Reducing			.80	.80	1.05	1.45	2.00	3.20	4.10	7.50	14.00	23.80	32.50	42.50	88.00	125.00	312.00															
Couplings	Right Hand		.22	.22	.22	.28	.42	.72	1.15	1.40	2.30	3.50	5.00	7.20	9.20	20.00	28.00	64.00															
	Right & Left		.40	.40	.40	.48	.61	.96	1.40	1.60	2.65	4.00	5.80																				
45° Y-Bends						.80	.90	1.20	2.00	3.20	4.20	7.00	13.00	20.00		42.00																	
Reducers	Reducing 1 or 2 sizes			.24	.24	.32	.46	.80	1.30	1.55	2.55	3.90	5.50	8.00	10.00	22.00	30.80	70.00															
	Reducing 3 or more sizes					.34	.50	.88	1.40	1.70	2.80	4.20	6.00	8.60	11.00	24.00	34.00	77.00															
Extension Pieces (Plain)						.50	.72	1.00	1.80	2.80	3.50	6.00																					
Caps				.22	.22	.22	.26	.36	.54	.90	1.15	1.90	3.20	4.60	6.80	8.80	17.00	28.00	64.00														
Hexagon Locknuts				.12	.12	.12	.20	.24	.36	.54	.70	1.10	2.00	3.10	4.60	6.00	10.00	16.00	40.00														
Crossovers							1.20	1.60																									
Return Bends	Size		Inches		Close Pattern												||		Open Pattern														
	Center to center		Inches		1	1 1/4	1 1/2	1 3/4	2 3/16	2 5/8	||	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5														
	Right Hand				.70	1.10	1.80	2.50	3.40	6.50	||	.90	1.50	2.40	3.40	4.60	8.70	14.00	18.00														
	Right & Left				1.20	1.60	2.40	3.05	4.10	7.25	||	1.45	2.00	3.00	4.00	5.30	9.45	15.50	21.00														

List Prices, Each, Polished and Chromium Plated

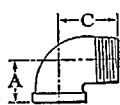
Size	Inches																	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Elbows	90°	Straight		.33	.33	.33	.42	.63	1.08	1.75	2.25	3.60	7.35	10.90	16.35	21.60	42.00	64.50	147.00														
		Reducing			.45	.45	.54	.75	1.35	2.10	2.70	4.65	8.25	13.00	18.75	24.00	50.00	75.00	171.00														
		Right & Left			.62	.62	.83	1.12	1.72	2.35	3.05	4.70																					
		Street	.51	.51	.51	.66	.90	1.50	2.40	3.15	5.25	9.75	16.50	24.50	31.50																		
	45°		.39	.39	.39	.45	.69	1.20	1.95	2.50	3.95	8.05	12.00	18.00	23.70	46.50	71.25	162.00															
	45°, Street	.51	.51	.51	.66	.90	1.50	2.40	3.15	5.25																							
	Side Outlet (Plain)		2.16	2.16	3.00	3.90	5.55	7.50	9.00	14.25	21.60	32.25																					
Drop (Plain)					1.05	1.20	1.65	2.10																									
Tees	Straight		.51	.51	.51	.66	.90	1.50	2.40	3.15	5.25	9.75	15.00	24.50	31.50	63.00	90.00	225.00															
	Reducing	1 opening		.60	.60	.78	1.08	1.80	2.85	3.75	6.30	11.70	18.00	29.25	37.80	75.00	108.00	270.00															
		2 openings		.66	.66	.87	1.17	1.95	3.15	4.20	6.90	12.75	19.50	31.80	41.00	82.00	117.00	292.50															
	Service				.81	1.08	1.50	2.55	3.75	5.00	8.25																						
	Four-Way (Plain)		2.40	2.40	3.30	4.40	6.15	8.25	9.90	15.75																							
Drop (Plain)					1.20	1.50	2.10	2.85																									
Crosses	Straight		.96	.96	.96	1.25	1.75	2.35	3.80	4.90	9.00	16.80	28.50	39.00	51.00	105.00	150.00	375.00															
	Reducing		1.20	1.20	1.60	2.15	3.00	4.80	6.15	11.25	21.00	35.70	48.75	63.75	132.00	187.50	468.00																
Couplings	Right Hand		.33	.33	.33	.42	.63	1.08	1.74	2.10	3.50	5.25	7.50	10.80	13.80	30.00	42.00	96.00															
	Right & Left		.51	.51	.51	.62	.82	1.32	1.96	2.30	3.84	5.75	8.30																				
45° Y-Bends						1.20	1.35	1.80	3.00	4.80	6.30	10.50	19.50	30.00		63.00																	
Reducers	Reducing 1 or 2 sizes			.36	.36	.48	.69	1.20	1.92	2.30	3.85	5.85	8.25	12.00	15.00	33.00	46.00	105.00															
	Reducing 3 or more sizes					.51	.75	1.32	2.10	2.50	4.20	6.30	9.00	12.90	16.50	36.00	51.00	115.50															
Extension Pieces (Plain)						.75	1.08	1.50	2.70	4.20	5.25	9.00																					
Caps				.33	.33	.33	.39	.54	.81	1.35	1.70	2.85	4.80	6.90	10.20	13.20	25.50	42.00	96.00														
Hexagon Locknuts				.18	.18	.18	.30	.36	.54	.81	1.05	1.65	3.00	4.65	6.90	9.00	15.00	24.00	60.00														
Crossovers							1.80	2.40																									
Return Bends	Size	Inches	Close Pattern								Open Pattern																						
			1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3																	
			Center to center	Inches	1	1 1/4	1 1/2	1 3/4	2 3/16	2 5/8	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5															
			Right Hand	1.05	1.65	2.70	3.75	5.10	9.75	1.35	2.25	3.60	5.10	6.90	13.00	21.00	27.00																
Right & Left			1.55	2.15	3.30	4.30	5.80	10.50	1.90	2.75	4.20	5.70	7.60	13.75	22.50	30.00																	

Standard Brass Fittings

Dimensions, in Inches

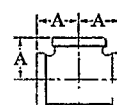


90° Elbow

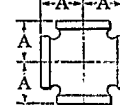


90° Street Elbow

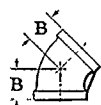
The dimensions shown below cover the most currently used straight size fittings and Reducers. Dimensions of reducing sizes and of other types of fittings furnished on application.



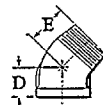
Tee



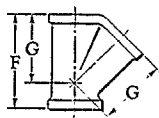
Cross



45° Elbow



45° Street Elbow



45° Y-Bend



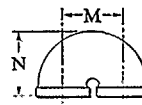
Cap



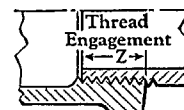
Coupling



*Reducer



Return Bend



For explanation, see page 591.

Size	A	B	C	D	E	F	G	H	J	*K	Z
1/8	9/16	1/2	15/16	11/16	7/8			1/2	7/8		1/4
1/4	11/16	9/16	11/8	5/8	15/16			9/16	15/16	15/16	3/8
3/8	13/16	5/8	11/4	11/16	11/16	113/16	15/16	5/8	11/16	11/16	3/8
1/2	1	13/16	11/2	13/16	13/16	23/16	15/8	3/4	15/16	11/8	1/2
3/4	13/16	7/8	111/16	15/16	15/16	23/8	115/16	7/8	17/16	13/8	9/16
1	17/16	11/16	2	11/16	11/2	33/16	23/8	1	111/16	19/16	11/16
1 1/4	111/16	11/4	2 1/4	11/4	111/16	37/8	27/8	1 1/8	17/8	111/16	11/16
1 1/2	17/8	15/16	27/16	13/8	17/8	41/4	31/8	13/16	115/16	17/8	11/16
2	23/16	11/2	27/8	111/16	21/4	5	33/4	15/16	23/16	21/16	3/4
2 1/2	211/16	115/16	313/16			61/4	411/16	111/16	27/8	31/4	15/16
3	31/8	23/16	41/2			71/4	59/16	13/4	33/16	311/16	1
3 1/2	37/16	21/4	51/8					17/8	37/16	4	11/16
4	33/4	23/8	511/16			813/16	615/16	2	311/16	43/8	11/8
5	47/16	31/16						25/16	43/16	37/8	11/4
6	53/16	31/2						29/16	43/4	43/8	15/16
8	61/2	45/16						31/8	51/4	51/4	17/16

*Dimension "K" is for fittings reducing one or two sizes only.

Return Bends					
Size	M	N	Size	M	N
Close Pattern			Open Pattern		
1/2	1	1 1/2	1/2	1 1/2	1 7/8
3/4	1 1/4	1 3/4	3/4	2	2 1/4
1	1 1/2	2 1/8	1	2 1/2	2 5/8
1 1/4	1 3/4	2 13/16	1 1/4	3	3 3/16
1 1/2	2 3/16	3	1 1/2	3 1/2	3 9/16
2	2 3/8	3 3/8	2	4	4 3/8
			2 1/2	4 1/2	4 15/16
			3	5	5 9/16

Brass Nipples



Close Nipple

These are high quality Brass Nipples, made from new pipe, having clean, sharp threads accurately cut to gauge.



Long Nipple

List Prices, Each

For special nipples, add the following advances to the list prices shown in the table:

Right & Left.....	50%
Extra Strong.....	100%
Polished.....	50%
Copper.....	25%
Red Brass.....	25%
Nickel-plated.....	75%
Chromium-plated..	100%
Tinned.....	75%

Brass Plugs.....page 259
Brass Bushings.....page 259
Brass Unions.....pages 262 and 263

Size	Close		Length of Long Nipples, Inches											
	Length	Each	1½	2	2½	3	3½	4	4½	5	5½	6	6½ to 12	
1/8	¾	.11	.13	.15	.17	.19	.21	.23	.25	.27	.29	.31	Add the proportionate advance per inch.	
1/4	⅞	.13	.16	.19	.22	.25	.28	.31	.34	.37	.40	.43		
3/8	1	.15	.19	.23	.27	.31	.35	.39	.43	.47	.51	.55		
1/2	1⅛	.23	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70		
3/4	1⅜	.28		.35	.42	.49	.56	.63	.70	.77	.84	.91		
1	1½	.37		.44	.53	.62	.71	.80	.89	.98	1.07	1.16		
1¼	1⅝	.60			.75	.88	1.01	1.14	1.27	1.40	1.53	1.66		
1½	1¾	.70			.90	1.05	1.20	1.35	1.50	1.65	1.80	1.95		
2	2	1.00			1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60		
2½	2½	1.70				2.00	2.30	2.60	2.90	3.20	3.50	3.80		
3	2⅝	2.50				2.90	3.30	3.70	4.10	4.50	4.90	5.30		
3½	2¾	4.00						5.40	6.00	6.60	7.20	7.80		
4	2⅞	4.75						6.15	6.85	7.55	8.25	8.95		
5	3	8.50							10.60	11.65	12.70	13.75		
6	3⅛	11.50							14.10	15.40	16.70	18.00		

Add the proportionate advance per inch.

Brass Plugs and Bushings



Square Head Plug

Solid Plug
(Square Head)

Countersunk Plug

*Bushing
Outside Hexagon*Bushing
Inside Hexagon

Face Bushing

List Prices, Each

Size		Inches																	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	
		Rough																																	
Plugs	Square Head		.11	.11	.11	.13	.15	.20	.30	.38	.63	1.00	1.60	2.25	3.00	5.00	8.00	20.00																	
	Solid		.11	.11	.11	.13	.18	.27	.45	.57	.95	1.65	2.70	4.50	6.50	11.00	18.00	35.00																	
	Countersunk					.13	.18	.27	.45	.57	.95	1.65	2.70	4.50	6.50																				
Bushings	Hexagon	Reducing 1 or 2 sizes		.08	.08	.10	.14	.21	.35	.45	.65	1.30	2.00	3.00	4.00	8.00	12.00	27.00																	
		Reducing 3 or more sizes				.12	.17	.25	.42	.54	.78	1.56	2.40	3.60	4.80	9.60	14.40	33.00																	
	Face	Reducing 1 or 2 sizes		.19	.19	.22	.30	.45	.60	.76	.96	1.75	3.00	3.75	5.00																				
		Reducing 3 or more sizes				.26	.36	.54	.72	.92	1.15	2.10	3.60	4.50	6.00																				
		Polished																																	
Plugs	Square Head		.22	.22	.22	.26	.30	.40	.60	.76	1.25	2.00	3.20	4.50	6.00	10.00	16.00	40.00																	
	Solid		.22	.22	.22	.26	.36	.54	.90	1.15	1.90	3.30	5.40	9.00	13.00	22.00	36.00	70.00																	
	Countersunk					.26	.36	.54	.90	1.15	1.90	3.30	5.40	9.00	13.00																				
Bushings, Hexagon		Reducing 1 or 2 sizes		.16	.16	.20	.28	.42	.70	.90	1.30	2.60	4.00	6.00	8.00	16.00	24.00	54.00																	
		Reducing 3 or more sizes				.24	.34	.50	.84	1.08	1.55	3.10	4.80	7.20	9.60	19.20	28.80	66.00																	
		Polished and Chromium-Plated																																	
Plugs	Square Head		.33	.33	.33	.39	.45	.60	.90	1.14	1.90	3.00	4.80	6.75	9.00	15.00	24.00	60.00																	
	Solid		.33	.33	.33	.39	.54	.81	1.35	1.70	2.85	4.95	8.10	13.50	19.50	33.00	54.00	105.00																	
	Countersunk					.39	.54	.81	1.35	1.70	2.85	4.95	8.10	13.50	19.50																				
Bushings, Hexagon		Reducing 1 or 2 sizes		.24	.24	.30	.42	.63	1.05	1.35	1.95	3.90	6.00	9.00	12.00	24.00	36.00	81.00																	
		Reducing 3 or more sizes				.36	.51	.75	1.26	1.62	2.34	4.70	7.20	10.80	14.40	29.00	43.00	99.00																	

Square Head Plugs: Square Head Plugs in sizes 1/2-inch and larger are cored, as shown in the illustration above. Smaller sizes are made solid, being exactly the same as Solid Plugs. These sizes — 1/8, 1/4, and 3/8-inch — are made of rod brass.

***Hexagon Bushings:** Hexagon Bushings are made either with an outside or an inside hexagon, depending upon the size. The following Bushings have the outside hexagon; all other sizes have the inside hexagon:

All reductions in sizes 2 1/2" and smaller	3 x 2 1/2"	4 x 3 1/2"
	3 1/2 x 3"	4 x 3"
	3 1/2 x 2 1/2"	5 x 4"
		6 x 5"

Face Bushings: Face Bushings in sizes 1/2-inch and smaller are made from bar stock. These do not have the two small lugs shown in the illustration above.

Nickel-plated or Tinned Plugs and Bushings: Polished-nickel-plated or rough-tinned Plugs and Bushings can be furnished when ordered. For prices, refer to the Crane Discount Sheet.

Service suggestions: Square Head Plugs and Countersunk Plugs are generally used with the Standard Brass Fittings shown on pages 256 and 257. Solid (Square Head) Plugs are generally used with the 250-Pound Brass Fittings shown on page 260.

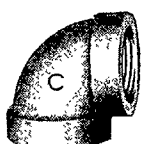
250-Pound Brass Fittings

WORKING PRESSURES

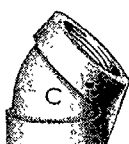
250 pounds steam

400 pounds cold water, oil, or gas, non-shock

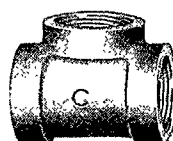
Air Tested



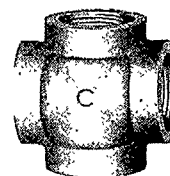
90° Elbow



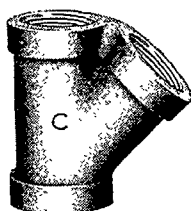
45° Elbow



Tee



Cross



45° Y-Bend



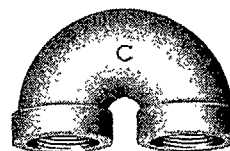
Coupling



Reducer



Cap



Return Bend

List Prices, Each, Rough

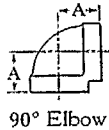
Size		Inches																1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Elbows	90°	Straight	.22	.22	.37	.50	.78	1.15	1.50	2.40	5.70	7.50	10.20	14.50	20.00	33.50	82.50															
		Reducing			.49	.53	.99	1.25	1.65	2.75	6.00	8.20	11.00	15.30	22.75	37.00	90.50															
		Right & Left	.51	.51	.78	.99	1.40	1.75	2.30	3.50	8.00	10.90																				
	45°		.24	.24	.38	.52	.82	1.20	1.60	2.50	5.90	7.90	10.80	15.20	21.50	35.75	87.50															
Tees	Straight	.38	.38	.52	.76	1.10	1.75	2.15	4.15	6.20	9.80	15.40	17.30	34.25	51.00	128.00																
	Reducing	1 opening			.56	.82	1.20	1.90	2.35	4.50	6.90	10.80	17.00	19.40	38.25	57.00	143.00															
		2 openings			.59	.85	1.25	2.00	2.50	4.70	7.20	11.30	17.90	20.50	40.50	60.00	150.00															
Crosses	Straight	.56	.56	.90	1.15	1.60	2.30	3.10	5.50	8.50	13.30	18.00	21.00	47.00	57.00	143.00																
	Reducing				1.30	1.80	2.65	3.50	6.30	9.90	15.70	21.25	25.25	56.00	69.50	175.00																
45° Y-Bends					1.00	1.26	1.94	3.00	4.30	8.25	11.60	19.60	24.00	33.00	52.00	67.00																
Couplings, Right Hand			.23	.23	.46	.54	.80	1.10	1.70	2.40	3.45	4.30	6.70	8.50	16.30	30.50	65.00															
Reducers	Reducing 1 or 2 sizes				.56	.84	1.15	1.75	2.55	3.65	4.55	7.10	8.90	17.30	32.00	68.00																
	Reducing 3 or more sizes				.58	.88	1.20	1.85	2.65	3.80	4.80	7.40	9.40	18.30	33.50	71.50																
Caps										2.50	3.90	5.60	7.30	9.60	15.50	20.00	37.50															
Return Bends	Size	Inches				1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4																		
	Close Pattern	Center to center	Inches				1 1/4	1 1/2	1 3/4	2 1/4	2 1/2	3 1/4	3 3/4	4 1/4	6																	
		Right Hand					1.15	1.30	1.90	3.40	3.75	5.40	8.60	11.70	21.00																	
		Right & Left					1.65	1.85	2.60	4.20	4.70	6.50																				
	Open Pattern	Center to center	Inches					1 7/8	2 1/2	3	3 1/2	4 1/2	5 1/2	6 1/2	7 1/2																	
		Right Hand						1.70	2.55	4.20	5.00	6.00	11.00	15.50	27.00																	
		Right & Left						2.30	3.35	5.10	6.10	7.20	12.50	18.00																		

These Brass Fittings are recommended for 250 pounds saturated steam and for 400 pounds cold water, oil, or gas, non-shock. They are unusually rugged, having heavy bands reinforcing the ends. Threads are accurately cut to gauge.

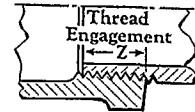
Reducing fittings: The largest opening on reducing fittings determines the list price; for example, a 1 x 3/4 x 1/2" Tee (reducing 1 opening) is \$1.20 list, a 1 x 3/4 x 1/2" or 3/4 x 3/4 x 1/2" Tee (reducing 2 openings) is \$1.25 list, etc.

250-Pound Brass Fittings

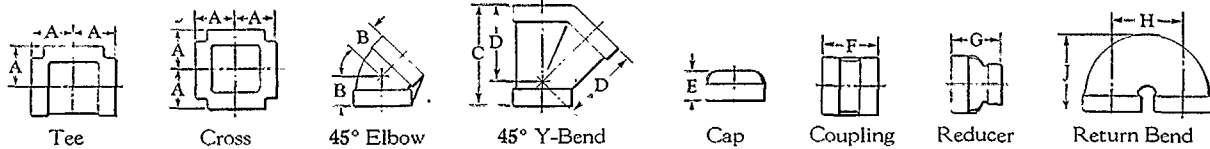
Dimensions, in Inches



Dimensions of 90° Elbows, Tees, and Crosses apply only to straight sizes; dimensions of reducing sizes will be furnished on request.



See page 591 for explanation.



Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
A	13/16	15/16	1 1/8	15/16	1 1/2	1 3/4	1 15/16	2 1/4	2 11/16	3 1/8	3 7/16	3 3/4	4 1/2	5 1/8	6 9/16
B	3/4	13/16	7/8	1	1 1/8	1 5/16	1 7/16	1 11/16	1 15/16	2 3/16	2 3/8	2 5/8	3 1/16	3 7/16	4 1/4
C			2 1/2	3	3 1/2	4 1/4	4 7/8	5 3/4	6 3/4	7 7/8	8 7/8	9 3/4	11 5/8	13 7/16	
D			1 7/8	2 1/4	2 3/4	3 1/4	3 13/16	4 1/2	5 3/16	6 1/8	6 7/8	7 5/8	9 1/4	10 3/4	
E								1 1/2	1 13/16	1 7/8	2	2 1/16	2 3/8	2 5/8	3 1/8
F	15/16	1 1/2	1 11/16	1 15/16	2 3/16	2 7/16	2 5/8	2 15/16	3 3/16	3 3/8	4 9/16	4 7/16	5 1/4	6 1/8	6 13/16
G				1 1/2	1 7/8	2 1/8	2 1/4	2 7/16	2 5/8	2 7/8	3 1/8	3 3/8	3 7/8	4 3/8	5 1/4
Z	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16

Close Pattern Return Bends										Open Pattern Return Bends							
Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
H	1 1/4	1 1/2	1 3/4	2 1/4	2 1/2	3 1/4	3 3/4	4 1/4	6	1 7/8	2 1/2	3	3 1/2	4 1/2	5 1/2	6 1/2	7 1/2
J	1 3/4	2 1/16	2 3/8	2 15/16	3 1/4	4	4 9/16	5 3/16	6 13/16	2 1/4	2 11/16	3 5/16	3 3/4	4 5/8	5 7/16	6 5/16	7 9/16

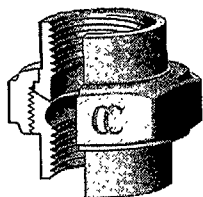


At the Chicago Works of Crane Co.
Inspecting and checking the alignment of Crane Screwed Fittings.

Brass Unions and Union Elbows

All Unions and Union Elbows shown on this page are air tested.

Rough



No. 521 1/2
Rough

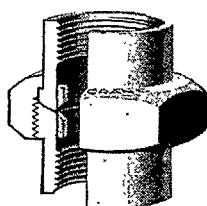
Ground Joint — No Gasket Required

WORKING PRESSURES — 150 pounds steam

300 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 521 1/2, Rough	Each	Use	.40	.40	.48	.66	.88	1.28	1.52	2.28	4.15	6.40	10.50	14.00
End to end	Inches	No. 522	1 7/16	1 5/8	1 7/8	1 15/16	2 3/16	2 3/8	2 1/2	2 13/16	3 9/16	4 1/8	4 5/16	4 5/8



No. 522
Semi-Finished

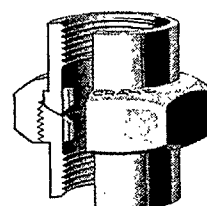
Semi-Finished or Polished

Ground Joint — No Gasket Required

WORKING PRESSURES — 200 pounds steam

400 pounds cold water, oil, or gas, non-shock

Sizes 1" and larger have lugs on the inside of the end-pieces, as illustrated; sizes 3/4" and smaller do not.



No. 523
Polished

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 522, Semi-Finished	Each	.50	.50	.50	.60	.82	1.10	1.60	1.90	2.85	5.20	8.00
No. 523, Polished	Each	.65	.65	.65	.78	1.07	1.43	2.08	2.47	3.70	6.75	10.40
No. 523, Polished and Chromium Plated	Each	.80	.80	.80	.96	1.32	1.76	2.56	3.05	4.60	8.30	12.80
End to end	Inches	1 3/8	1 1/2	1 5/8	1 3/4	2 1/8	2 3/8	2 5/8	2 13/16	3 1/8	3 9/16	4

Government Pattern

Ground Joint — No Gasket Required

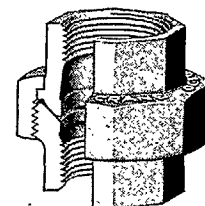
WORKING PRESSURES — 200 pounds steam

400 pounds cold water, oil, or gas, non-shock

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 523 1/2, Rough	Each	Use	.70	.70	.90	1.25	1.65	2.30	3.00	4.50	7.20	11.30
No. 523 1/2, Polished	Each	No. 522	1.15	1.15	1.50	2.10	2.75	3.80	5.00	7.50	12.00	18.80
End to end	Inches	Union	1 3/8	1 13/16	1 15/16	2 3/16	2 7/16	2 5/8	2 3/4	3 1/8	3 9/16	3 3/4

The No. 523 1/2 Unions, when cast in the required composition, comply with U. S. Navy Department Specifications.



No. 523 1/2
Octagon Ends
Rough

Brass Union Elbows

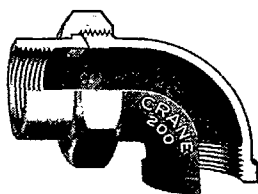
Ground Joint — No Gasket Required

WORKING PRESSURES — 200 pounds steam

400 pounds cold water, oil, or gas, non-shock

Tail-pieces 3/4" and smaller do not have lugs on the inside; larger sizes do, as illustrated.

The union ring and tail-piece are semi-finished; the elbow portion is rough.



No. 524 1/2
90° Union Elbow

List Prices and Dimensions

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 524 1/2, 90° Elbow	Each	.85	.85	.85	1.15	1.55	2.25	3.15	3.90	6.00
Center to end	Inches	9/16	13/16	15/16	1 1/8	1 5/16	1 7/16	1 3/4	1 15/16	2 1/4
Center to union end	Inches	1 1/2	1 3/4	1 5/8	1 15/16	2 3/16	2 5/8	3	3 7/16	4 1/4

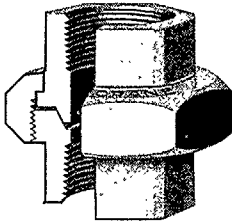
Radiator Union Elbows... page 78

Brass Unions

250-Pound Brass Unions

Crane Special Brass

Ground Tapered Joint — No Gasket Required



No. 96 E

WORKING PRESSURES
250 pounds steam, 500° F.
500 pounds cold water, oil, or gas, non-shock

Air Tested

No. 96 E Unions have hexagon ends. The union rings are semi-finished; the end-pieces are rough.

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 96 E	Each	1.10	1.10	1.25	1.75	2.40	3.40	4.20	6.20	12.00	18.00
End to end	Inches	1 5/8	1 3/4	2 1/16	2 3/8	2 9/16	2 15/16	3	3 5/16	3 3/8	4 1/16

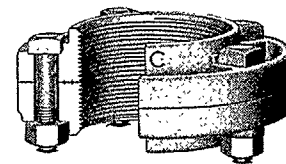
Standard Brass Flange Unions

Gasket Type

These unions have steel bolts and nuts.

Each union is equipped with a rubber gasket.

WORKING PRESSURES
150 pounds steam
225 pounds cold water or gas, non-shock



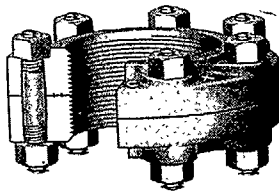
Standard

Each flange is plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Price, Rough	Each	4.00	4.80	5.40	7.00	8.00	10.00	12.00	14.00	17.00	20.00	35.00	45.00	62.00
End to end	Inches	1 1/8	1 1/8	1 7/16	1 9/16	1 13/16	2 3/8	2 7/8	3	3 1/16	3 3/16	3 3/8	3 9/16	4
Diameter of flanges	Inches	2 13/16	2 7/8	3 1/4	3 3/4	4 5/8	5 3/8	6	6 11/16	7 1/2	8	9 3/8	10 3/8	12 3/4
No. and dia. of bolts		3-3/8	3-3/8	4-3/8	4-7/16	4-1/2	4-9/16	4-5/8	4-5/8	4-3/8	5-5/8	5-5/8	6-5/8	8-5/8

250-Pound Brass Flange Unions



250-Pound

Each flange is plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Crane Special Brass

Gasket Type

WORKING PRESSURES
250 pounds steam, 500° F.
375 pounds cold water or gas, non-shock

These unions have cold rolled steel bolt-studs with cold pressed semi-finished nuts.

Each union is equipped with a rubber gasket, suitable for saturated steam, water, or gas service. For superheated steam, a Crane gasket should be used. Crane gaskets are furnished only when ordered and are charged extra; see page 571 for list prices.

List Prices and Dimensions

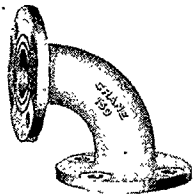
Size	Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Price, Rough	Each	7.75	8.75	11.20	12.75	16.00	19.25	22.50	27.00	32.00	56.00	72.00	100.00
End to end	Inches	1 5/16	1 7/16	1 11/16	1 13/16	2 1/16	2 3/16	2 7/16	2 11/16	2 13/16	2 15/16	3 1/16	3 9/16
Diameter of flanges	Inches	3 1/4	3 5/8	4 7/8	4 5/8	5 3/8	6	6 3/4	7 1/2	8	9 3/8	10 3/8	13 1/4
No. and dia. of bolts		4-7/16	4-7/16	4-1/2	4-1/2	5-9/16	5-5/8	6-5/8	6-5/8	7-5/8	8-3/4	9-3/4	10-3/4

Extra Gaskets . . . page 571

150 and 300-Pound Brass Flanged Fittings and Flanges

WORKING PRESSURES

- 150-Pound — 150 pounds saturated steam
 — 225 pounds cold water, oil, or gas, non-shock
 300-Pound — 300 pounds steam, 550° F.
 — 500 pounds cold water, oil, or gas, non-shock



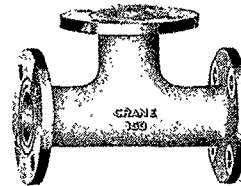
90° Elbow
No. 2100, 150-Pound
No. 2105, 300-Pound



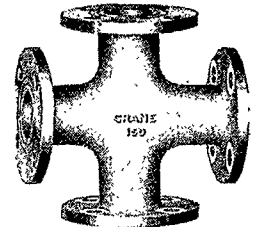
Brass Companion Flange
No. 2104, 150-Pound
No. 2109, 300-Pound



45° Elbow
No. 2101, 150-Pound
No. 2106, 300-Pound



Tee
No. 2102, 150-Pound
No. 2107, 300-Pound



Cross
No. 2103, 150-Pound
No. 2108, 300-Pound



Forged Steel Flange
No. 300 E, 300-Pound
Use with Brass Products

List Prices, Each, Faced, Drilled, and Spot Faced

Size	Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
150 Pound	No. 2100, 90° Elbows	13.00	14.00	16.00	21.00	26.00	35.00	45.00	60.00	70.00	95.00	125.00	214.00
	No. 2101, 45° Elbows	14.00	15.00	17.00	23.00	28.50	38.50	49.00	65.00	75.00	100.00	135.00	229.00
	No. 2102, Tees	19.50	21.00	24.00	31.50	39.00	52.50	67.50	90.00	105.00	140.00	190.00	321.00
	No. 2103, Crosses	26.00	28.00	32.00	42.00	52.00	70.00	90.00	120.00	140.00	190.00	250.00	428.00
	No. 2104, Screwed Flanges	2.50	3.00	3.50	4.50	5.50	6.50	8.00	10.00	12.50	15.00	18.75	27.50
300 Pound	No. 2105, 90° Elbows	16.00	17.50	20.50	26.50	33.00	44.50	52.00	76.00	90.00	120.00	158.00	270.00
	No. 2106, 45° Elbows	17.00	19.00	21.50	29.00	36.00	48.50	62.00	82.00	95.00	126.00	170.00	290.00
	No. 2107, Tees	24.50	26.50	30.50	40.00	49.00	66.00	85.00	115.00	135.00	177.00	240.00	405.00
	No. 2108, Crosses	31.50	35.50	40.50	53.00	66.00	88.00	115.00	155.00	177.00	240.00	315.00	540.00
	No. 2109, Screwed Flanges	3.00	3.60	4.20	5.40	6.60	7.80	9.60	12.00	15.00	18.00	22.50	33.00
	No. 300 E, Forged Steel Flanges	8.00	8.00	9.00	10.00	11.00	13.00	15.00	19.00	20.00	24.00	27.00	35.00

150-Pound: The 150-Pound line is made of red brass. Dimensions conform to the MSS 150-Pound SP Bronze Flange and Flanged Fitting Standard (No. SP-2-1937). Sizes 1-inch and larger interchange with American Standard Cast Iron Flanged Fittings and Flanges, Class 125, differing only in flange thickness and in facing.

300-Pound: The 300-Pound line, except the No. 300 E, is made of Crane Special Brass, a high grade steam metal. Dimensions conform to the MSS 300-Pound SP Bronze Flange and Flange Fitting Standard (No. SP-2-1937). Sizes 1-inch and larger interchange with 250-Pound American Standard Cast Iron Flanged Fittings and Flanges, differing only in flange thickness and in facing.

The No. 300-E Flanges are forged steel, and are for use with 300-Pound brass valves and fittings.

Facing: Flanges are plain faced, with two V-shaped

concentric grooves between the port and the bolt holes. Full face gaskets should be used.

Drilling: These fittings and flanges are furnished faced, drilled, and spot faced unless ordered faced only. Prices include facing and drilling to the MSS Standard, and spot facing. No deduction is made when ordered faced only.

Bolting to iron or steel material: When brass flanged fittings and flanges are bolted to iron or steel material which normally has a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cranelap Flanged Pipe Joints.

Additional sizes and types: Other sizes and types, reducing sizes, and brass flanged fittings and flanges made from regular 125 and 250-pound cast iron patterns can be made to order; prices will be furnished on application.

Dimensions, in Inches

Size		3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
150 Pound	Center to face, 90° Elbows, Tees, Crosses	3 1/4	3 1/2	3 3/4	4	4 1/2	5	5 1/2	6	6 1/2	7 1/2	8	9
	Center to face, 45° Elbows	1 3/4	1 3/4	2	2 1/4	2 1/2	3	3	3 1/2	4	4 1/2	5	5 1/2
	Diameter of flanges	3 7/8	4 1/4	4 5/8	5	6	7	7 1/2	8 1/2	9	10	11	13 1/2
	Thickness of flanges	11/32	3/8	13/32	7/16	1/2	9/16	5/8	11/16	11/16	3/4	13/16	15/16
300 Pound	Center to face, 90° Elbows, Tees, Crosses	3 1/2	4	4 1/4	4 1/2	5	5 1/2	6	6 1/2	7	8	8 1/2	10
	Center to face, 45° Elbows	2	2	2 1/2	2 3/4	3	3 1/2	3 1/2	4	4 1/2	5	5 1/2	6
	Diameter of flanges	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	7 1/2	8 1/4	9	10	11	12 1/2	15
	Thickness of flanges	17/32	19/32	5/8	11/16	3/4	13/16	29/32	31/32	11/16	1 1/8	13/16	1 3/8

Templates for drilling... page 550

Railing Fittings

Brass Ball Pattern Railing Fittings.....	page 267
Malleable Iron Ball Pattern Railing Fittings.....	pages 268 and 269
" " Stair Railing Fittings.....	page 270
" " Adjustable Railing Fittings.....	page 271
" " Enclosure Railing Fittings.....	page 271
" " Plain Pattern Railing Fittings.....	page 272
" " Auxiliary Fittings for Railings.....	page 272
Railing Threads — Dimensions and Normal Engagement.....	page 266
Rivets for Railings — Size of Rivets and Drilling.....	page 266

* * * * *

Crane Shops can furnish Pipe Railings of all descriptions and for a large variety of services. They can be manufactured from any kind of commercial pipe, using any of the regular railing fittings listed or special types when exceptional conditions prevail.

Pipe Railings can be supplied with the fittings and pipe loose, all completely cut to length and prepared ready for field assembly. Small sizes of railings and sections of large railings can be assembled in Crane Shops and delivered to the field site for final assembly by the user.

Beyond the scope of the regular Railing Fittings, Crane Co. can provide special fittings for screwed, slip, or slip and pinned joints to fill every requirement. For long railings, the posts can be assembled separately, using threaded joints, and the horizontal

runs of the fittings reamed and drilled for slip and pin connections; random runs of pipe can then be economically utilized to complete the railing in the field.

When so desired, special Pipe Railings requiring bent sections or welded construction can be fabricated in Crane Shops.

Orders and inquiries for price or information on Pipe Railings should be accompanied by a sketch showing dimensions. In the case of stair railings, the angle should be specified.

Inquiries or orders should also specify the kind and finish of the pipe, the type or figure number of the fittings, details regarding the openings, and whether or not partially or completely assembled.

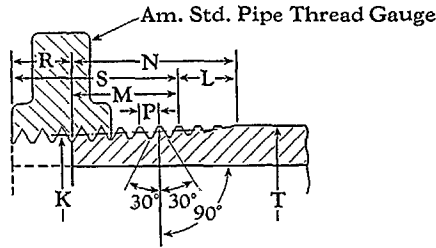


2-inch Galvanized Double Pipe Railing — total length of railing 6000 feet
Fabricated in a Crane Branch House Shop

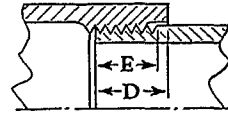
Crane Railing Pipe Threads

Threading Tolerance:
Nothing Large
One turn Small

Dotted lines show the amount that an American Standard Pipe Thread is shortened at the end.



Total Taper $\frac{3}{4}$ -inch per Foot



Crane Railing Fitting Thread Assembly

The recess in the fitting provides a covering for the last scratch or imperfect thread on the Railing Pipe making a neat appearing joint.

Dimensions, in Inches

Size of Pipe	T O.D. of Pipe	Number of Threads Per Inch	K Pitch Dia. at End of Male Thread	S Effective Length of Am. Std. Pipe Thread	M Effective Length of Am. Std. Railing Pipe Thread	N Total Length of Male Thread (Max.)	R Amount, Am. Std. Pipe Thread is Shortened at the End	P Pitch of Thread	L Imperfect Threads due to Lead of Die. (Max.)	D Length of Pipe Entering Recessed Railing Fitting	E Normal Engagement for Railing Threads
							Thds. | Inches		Thds. | Inches		
$\frac{1}{2}$	.840	14	.77182	.5337	.3194	.4980	3 | .2143	.07143	$2\frac{1}{2}$ | .1786	$\frac{1}{2}$	.3194
$\frac{3}{4}$	1.050	14	.98107	.5457	.3314	.5100	3 | .2143	.07143	$2\frac{1}{2}$ | .1786	$\frac{1}{2}$	.3314
1	1.315	$11\frac{1}{2}$	1.22993	.6828	.4219	.6393	3 | .2609	.08696	$2\frac{1}{2}$ | .2174	$\frac{5}{8}$	.4219
$1\frac{1}{4}$	1.660	$11\frac{1}{2}$	1.57343	.7068	.4459	.7068	3 | .2609	.08696	3 | .2609	$1\frac{1}{16}$	.4459
$1\frac{1}{2}$	1.900	$11\frac{1}{2}$	1.81239	.7235	.4626	.7235	3 | .2609	.08696	3 | .2609	$\frac{3}{4}$	.4626
2	2.375	$11\frac{1}{2}$	2.28532	.7565	.4956	.7565	3 | .2609	.08696	3 | .2609	$\frac{3}{4}$	.4956
$2\frac{1}{2}$	2.875	8	2.75078	1.1375	.6375	1.0125	4 | .5000	.12500	3 | .3750	1	.6375
3	3.500	8	3.37188	1.2000	.7000	1.0750	4 | .5000	.12500	3 | .3750	$1\frac{1}{16}$	.7000
$3\frac{1}{2}$	4.000	8	3.86875	1.2500	.7500	1.1250	4 | .5000	.12500	3 | .3750	$1\frac{1}{8}$	.7500
4	4.500	8	4.36563	1.3000	.8000	1.1750	4 | .5000	.12500	3 | .3750	$1\frac{3}{16}$	.8000

Cutting Railing Pipe Threads

The above Railing Pipe Threads are the same as the American Standard Taper Pipe Threads except they are shortened at the small end by 3 or 4 threads as shown in Column "R". Regular solid or adjustable dies may be used, making allowance for the 3 or 4 threads that this thread is shortened. The dies,

therefore, should only be run on far enough to provide the specified "R" dimension. The total thread length "N" is maximum and if necessary may be shorter provided the length of imperfect threads "L" caused by the lead of the die is reduced the same amount.

Crane Thread Lubricants....page 548

Rivet Data

When Malleable Iron Stair Railing Fittings shown on page 270 are supplied, they will have the horizontal and inclined openings reamed for a slip joint and

drilled for rivets. Other Railing Fittings illustrated on pages 268 and 272 can also be especially prepared for rivets, when so ordered; prices on application.

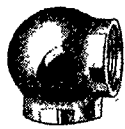
Dimensions, in Inches

Nominal Pipe Size of Fitting	Drilling of Rivet Holes for All Mall. Iron Railing Fittings		Diameter of Rivet	Length of Rivet (measured from under head)	
	Diameter of Hole	C. of Hole to End of Fitting		Ball Pat., p. 268 Plain Pat., p. 272 No. 77 Cross, p. 271	Stair Railing Fittings, p. 270
$\frac{1}{2}$	$\frac{3}{16}$	$\frac{5}{16}$	$\frac{3}{16}$	$1\frac{1}{4}$	—
$\frac{3}{4}$	$\frac{3}{16}$	$\frac{5}{16}$	$\frac{3}{16}$	$1\frac{1}{2}$	—
1	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$1\frac{3}{4}$	2
$1\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{8}$
$1\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{5}{8}$
2	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{5}{16}$	3	$3\frac{1}{4}$
$2\frac{1}{2}$	$\frac{5}{16}$	$\frac{7}{16}$	$\frac{5}{16}$	$3\frac{1}{2}$	—
3	$\frac{5}{16}$	$\frac{7}{16}$	$\frac{5}{16}$	$4\frac{1}{4}$	—
$3\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	5	—
4	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$5\frac{1}{2}$	—

For all Crane Railing Fittings supplied for riveted joints the diameter of the rivet hole and its location in relation to the end of the fitting will conform to the table at the left. Any other drilling for rivets is considered special, and order must be accompanied by complete details or sketch; prices will be furnished on application.

To assure satisfactory results, users are urged to abide by the diameters and lengths of rivets given for all sizes of Crane Railing Fittings.

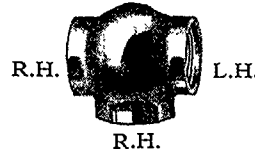
Brass Ball Pattern Railing Fittings



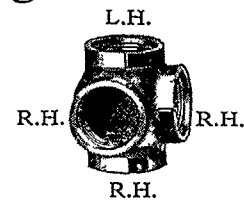
90° Elbow
No. 1, Right Hand



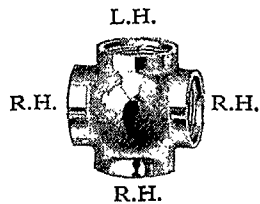
90° Side Outlet Elbow
No. 2, Right Hand



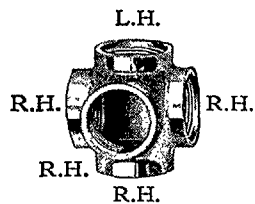
Tee
No. 3, Tapped as shown
No. 3 1/2, Right Hand



Side Outlet Tee
No. 4, Tapped as shown
No. 4 1/2, Right Hand



Cross
No. 5, Tapped as shown
No. 5 1/2, Right Hand



Side Outlet Cross
No. 6, Right Hand
No. 6 1/2, Tapped as shown



Male Ball Ornament
No. 8, Left Hand
No. 8 1/2, Right Hand



Female Ball Ornament
No. 13, Right Hand



Square Floor Flange
No. 7, Right Hand

Threading: Fittings threaded other than shown can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.



Round Floor Flange
Right Hand

List Prices

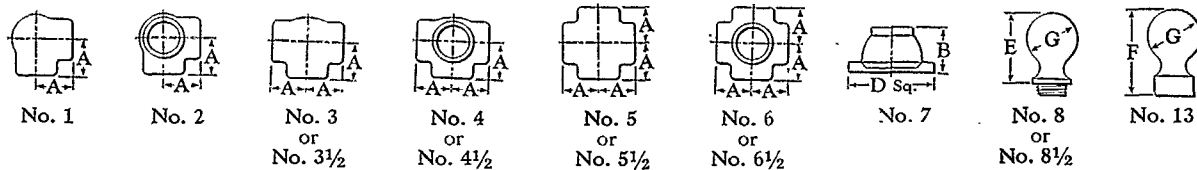
Size	Inches	Polished						Polished and Chromium-Plated					
		1/2	3/4	1	1 1/4	1 1/2	2	1/2	3/4	1	1 1/4	1 1/2	2
No. 1	Each	.40	.60	.80	1.20	1.60	2.50	.63	.94	1.25	1.87	2.50	3.75
No. 2	Each	.75	1.00	1.10	1.70	2.00	3.00	1.13	1.50	1.69	2.56	3.00	4.50
No. 3 or No. 3 1/2	Each	.60	.85	1.10	1.70	2.00	3.00	.94	1.31	1.69	2.56	3.00	4.50
No. 4 or No. 4 1/2	Each	1.05	1.25	1.50	2.00	2.40	3.50	1.62	1.87	2.25	3.00	3.62	5.25
No. 5 or No. 5 1/2	Each	1.05	1.25	1.50	2.00	2.40	3.50	1.62	1.87	2.25	3.00	3.62	5.25
No. 6 or No. 6 1/2	Each	1.20	1.45	1.70	2.25	3.00	4.00	1.81	2.19	2.56	3.37	4.50	6.00
No. 7	Each	.75	.90	1.00	1.35	1.75	2.50	1.13	1.38	1.56	2.00	2.62	3.75
No. 8 or No. 8 1/2	Each	.75	.90	1.00	1.35	1.75	2.50	1.13	1.38	1.56	2.00	2.62	3.75
No. 13	Each	.75	.90	1.00	1.35	1.75	2.50	1.13	1.38	1.56	2.00	2.62	3.75

List Prices of Round Floor Flanges

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Diameter	Inches	2 1/2	2 3/4	3	3 1/4	3 5/8	4	4 3/8	5
Rough	Each	.28	.30	.35	.47	.75	.85	1.20	1.65
Polished	Each	.42	.45	.53	.70	1.12	1.27	1.80	2.47
Polished and chromium-plated	Each	.56	.60	.70	.94	1.50	1.70	2.40	3.30

Polished and nickel-plated, see the Crane Discount Sheet for prices.

Dimensions, in Inches



Size	1/2	3/4	1	1 1/4	1 1/2	2
A	1 1/16	1 1/4	1 5/16	1 9/16	1 3/4	2 1/8
B	1 1/8	1 7/16	1 5/8	1 13/16	2 1/16	2 9/16
D	2 1/16	2 7/16	2 15/16	3 7/16	3 15/16	4 15/16
E	1 15/16	2 7/16	2 11/16	3 5/16	3 3/4	4 5/8
F	2 7/16	3	3 3/8	4 1/8	4 5/8	5 1/2
G	1 7/16	1 13/16	2	2 7/16	2 3/4	3 3/8

Threading and normal thread engagement, see page 266.

Malleable Iron Ball Pattern Railing Fittings



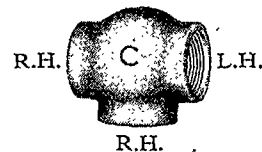
90° Elbow
No. 1, Right Hand



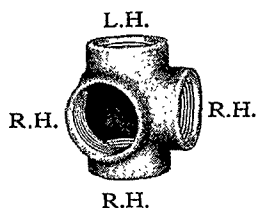
90° Side Outlet Elbow
No. 2, Right Hand



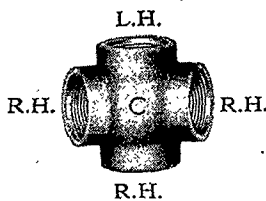
45° Side Outlet Elbow
No. 11, Right Hand



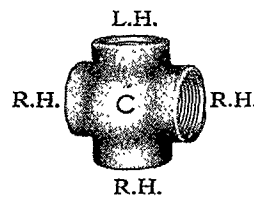
Tee
No. 3, Tapped as shown
No. 3 1/2, Right Hand



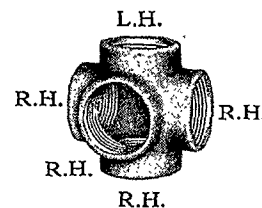
Side Outlet Tee
No. 4, Tapped as shown
No. 4 1/2, Right Hand



45° Side Outlet Tee
No. 12, Tapped as shown
No. 12 1/2, Right Hand



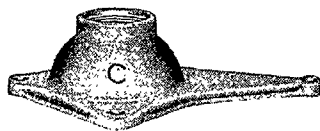
Cross
No. 5, Tapped as shown
No. 5 1/2, Right Hand



Side Outlet Cross
No. 6, Tapped as shown
No. 6 1/2, Right Hand



Square Floor Flange,
No. 7, Right Hand



Floor Flange with Long Base
No. 10, Right Hand



Male Ball Ornament
No. 8, Left Hand
No. 8 1/2, Right Hand



Female Ball Ornament
No. 13, Right Hand

List Prices, Straight Sizes

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
No. 1, 90° Elbows	Black Each	.10	.12	.14	.22	.30	.44	1.00	2.00	3.75
	Galv. Each	.13	.15	.18	.29	.39	.57	1.30	2.60	4.90
No. 2, 90° Side Outlet Elbows	Black Each	.19	.23	.28	.44	.60	.88	2.00	3.35	6.10
	Galv. Each	.25	.30	.36	.57	.78	1.15	2.60	4.35	8.00
No. 3 or No. 3 1/2, Tees	Black Each	.13	.16	.19	.28	.40	.57	1.30	2.60	4.90
	Galv. Each	.17	.21	.25	.36	.52	.75	1.70	3.40	6.40
No. 4 or No. 4 1/2, Side Outlet Tees	Black Each	.25	.31	.37	.57	.80	1.15	2.60	5.00	8.25
	Galv. Each	.33	.40	.48	.75	1.05	1.50	3.40	6.50	10.75
No. 5 or No. 5 1/2, Crosses	Black Each	.18	.21	.25	.38	.53	.77	1.75	3.40	6.30
	Galv. Each	.23	.27	.33	.49	.70	1.00	2.30	4.45	8.20
No. 6 or No. 6 1/2, Side Outlet Crosses	Black Each	.32	.38	.46	.70	1.00	1.45	3.15	6.00	10.00
	Galv. Each	.42	.50	.60	.91	1.30	1.90	4.10	7.80	13.00
No. 7, Square Floor Flanges	Black Each	.12	.16	.20	.34	.50	.80	1.55	2.75	5.00
	Galv. Each	.16	.21	.26	.44	.65	1.05	2.00	3.60	6.50
No. 8 or No. 8 1/2, Male Ball Ornaments	Black Each	.12	.16	.20	.28	.38	.60	1.25	2.15	4.35
	Galv. Each	.16	.21	.26	.36	.50	.78	1.65	2.80	5.65
No. 10, Floor Flanges with Long Base	Black Each			.37	.52	.70	1.10			
	Galv. Each			.48	.68	.90	1.45			
No. 11, 45° Side Outlet Elbows	Black Each			.40	.60	.80	1.20			
	Galv. Each			.52	.78	1.05	1.55			
No. 12 or No. 12 1/2, 45° Side Outlet Tees	Black Each			.55	.80	1.05	1.60			
	Galv. Each			.72	1.05	1.38	2.10			
No. 13, Female Ball Ornaments	Black Each	.12	.16	.20	.28	.38	.60			
	Galv. Each	.16	.21	.26	.36	.50	.78			

Threading: Fittings threaded other than shown above can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Reamed fittings: Fittings with one or more open-

ings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Malleable Iron Ball Pattern Railing Fittings

List Prices, Reducing Sizes

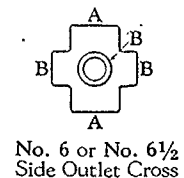
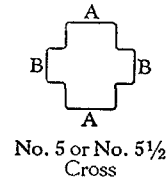
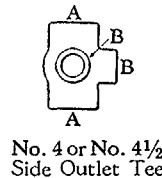
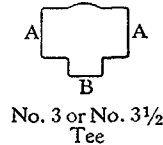
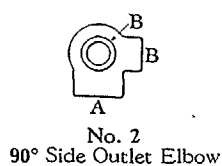
Size	Inches	1 1/4	1 1/2	2	2 1/2	3
No. 1, 90° Elbows	Black Each	.25	.35	.51	1.15	2.30
	Galv. Each	.32	.45	.66	1.50	3.00
No. 2, 90° Side Outlet Elbows	Black Each	.51	.70	1.05	2.30	3.85
	Galv. Each	.66	.90	1.35	3.00	5.00
No. 3 or No. 3 1/2, Tees	Black Each	.32	.46	.66	1.50	3.00
	Galv. Each	.42	.60	.86	1.95	3.90
No. 4 or No. 4 1/2, Side Outlet Tees	Black Each	.66	.92	1.32	3.00	5.75
	Galv. Each	.86	1.20	1.70	3.90	7.45
No. 5 or No. 5 1/2, Crosses	Black Each	.45	.62	.90	2.05	3.90
	Galv. Each	.58	.80	1.15	2.65	5.05
No. 6 or No. 6 1/2, Side Outlet Crosses	Black Each			1.67		
	Galv. Each			2.15		

The above list prices apply to reducing sizes carried in stock, shown in the table below. Other reductions can be made to order; prices on application.

Threading: Fittings threaded other than shown on the preceding page can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accom-

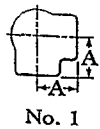
panied by a sketch or description for each opening.

Reamed fittings: Fittings with one or more openings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

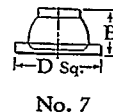
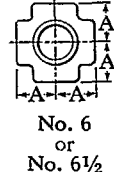
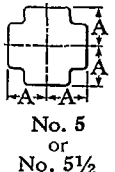
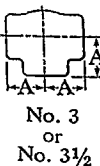
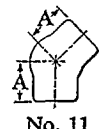
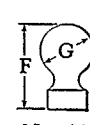


Reducing Fittings Carried in Stock

No. 1	No. 2	No. 3 or No. 3 1/2		No. 4 or No. 4 1/2	No. 5 or No. 5 1/2	No. 6 or No. 6 1/2
	A B	A B	A B	A B	A B	A B
1 1/4 x 1		1 1/4 x 1	1 1/2 x 2	1 1/4 x 1	1 1/4 x 1	
1 1/2 x 1 1/4	1 1/4 x 1	1 1/2 x 1 1/4	1 1/4 x 2	1 1/2 x 1 1/4	1 1/2 x 1 1/4	
2 x 1 1/2	1 1/2 x 1 1/4	1 1/2 x 1 1/2	2 1/2 x 2	2 x 1 1/2	2 x 1 1/2	
2 x 1 1/4	2 x 1 1/2	1 1/4 x 1 1/2	2 x 2 1/2	2 x 1 1/4	2 x 1 1/4	
2 1/2 x 2	2 1/2 x 2	2 x 1 1/2	3 x 2 1/2	2 1/2 x 2	2 1/2 x 2	
3 x 2 1/2	3 x 2 1/2	2 x 1 1/4	2 1/2 x 3	3 x 2 1/2	3 x 2 1/2	2 x 1 1/2



Dimensions, in Inches

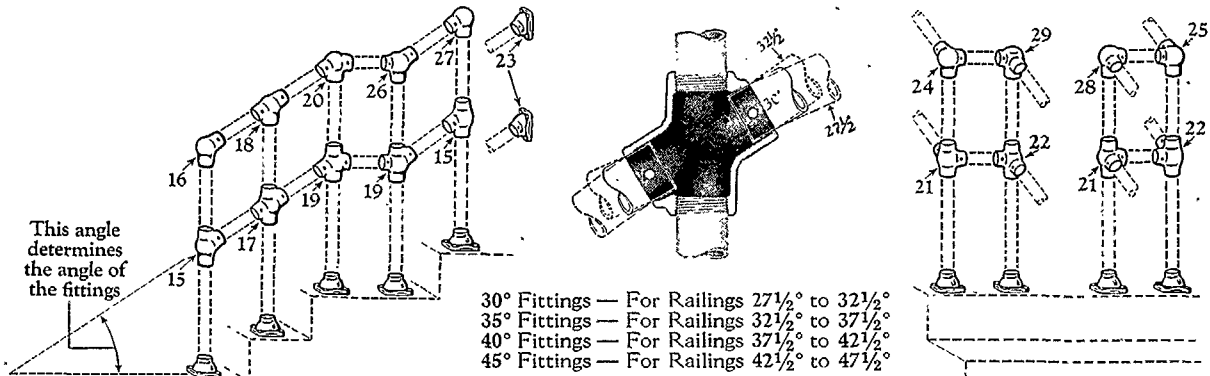


Size	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4
A	1 1/8	1 5/16	1 1/2	1 3/4	1 15/16	2 1/4	2 11/16	3 1/8	3 15/16
B	1 3/16	1 1/2	1 3/4	2 3/16	2 1/2	2 15/16	3 7/16	3 7/8	4 5/16
C			1 11/16	1 15/16	2 1/8	2 5/8	3 3/16		
D	2 1/8	2 1/2	3 5/16	4 3/16	4 3/4	5 3/4	6 15/16	8 1/4	10 1/16
E	2	2 1/2	2 11/16	3 3/8	3 3/4	4 11/16	5 3/4	6 15/16	8 13/16
F	2 1/2	3 1/16	3 7/16	4 3/16	4 11/16	5 9/16			
G	1 1/2	1 7/8	2 1/16	2 1/2	2 13/16	3 7/16	4 5/16	5 3/16	6 5/8

Dimensions of straight sizes are shown in the table at the left. Dimensions of reducing sizes will be furnished on application.

Threading, normal thread engagement, and rivet data....page 266

Malleable Iron Stair Railing Fittings



Orders must specify the catalog number and the angle of the fittings.

List Prices, Black

Size	Inches	1	1¼	1½	2
No. 15, Tees	Each	1.30	1.50	2.00	2.50
No. 16, Elbows	Each	1.10	1.25	1.70	2.25
No. 17, Crosses	Each	1.50	1.75	2.35	2.75
No. 18, Tees	Each	1.30	1.50	2.00	2.50
No. 19, Stair Landing Crosses	Each	1.50	1.75	2.35	2.75
No. 20, Stair Landing Tees	Each	1.30	1.50	2.00	2.50
No. 21, Side Outlet Tees	Each	1.85	2.20	3.00	3.60
No. 22, Side Outlet Tees	Each	1.85	2.20	3.00	3.60
No. 23, Wall Flanges	Each	1.50	1.75	1.90	2.25
No. 24, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 25, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 26, Stair Landing Tees	Each	1.30	1.50	2.00	2.50
No. 27, Elbows	Each	1.10	1.25	1.70	2.25
No. 28, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 29, Side Outlet Elbows	Each	1.65	1.95	2.70	3.35
No. 30, Angle Floor Flanges	Each	1.80	2.10	2.40	2.95

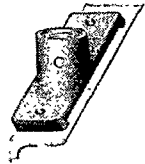
Galvanized fittings, add 30 per cent to list prices of Black.

As indicated in the illustration above, these fittings are threaded in the openings used for the vertical posts, thereby providing rigidity to the railing. The ends used for inclined

or horizontal rails are slip joint, and are drilled for rivets. This construction enables assembling the railing conveniently.

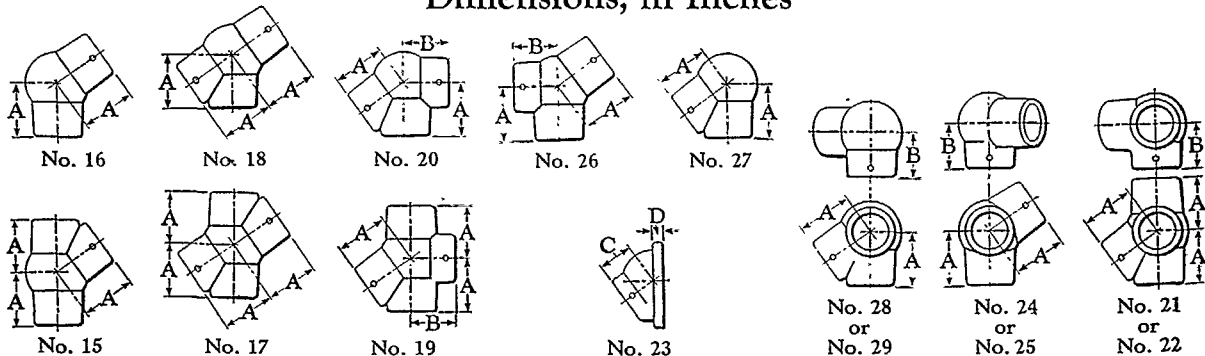
The fittings can be supplied in 30°, 35°, 40°, or 45° angles. The construction of the slip-joint openings provides for swinging the pipe 2½° on either side of the center line. Therefore, a 30° fitting may be used for angles from 27½° to 32½°. To take advantage of this variation in angles, the pipe must not extend through the fitting but merely into it.

No. 30 Angle Floor Flanges are very convenient for mounting railings to structural steel. They can be supplied in 30°, 35°, 40°, or 45° angles. The bottom of the flange is provided with a raised pad at each end, enabling the installer to grind off the bottom to secure the exact angle required.



No. 30 Angle Floor Flange

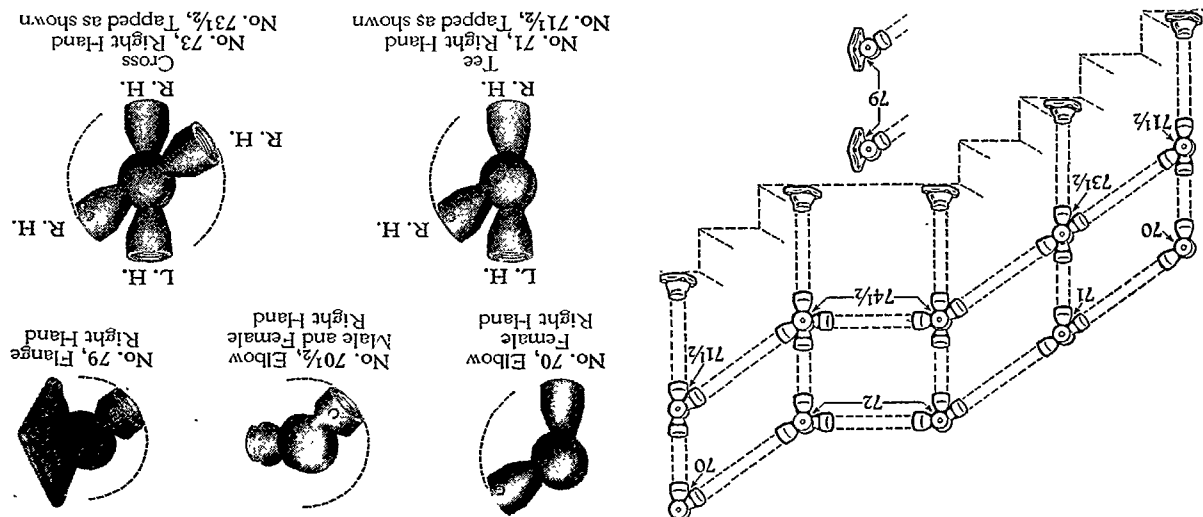
Dimensions, in Inches



Size	30°				35°				40°				45°			
	1	1¼	1½	2	1	1¼	1½	2	1	1¼	1½	2	1	1¼	1½	2
A	1⅞	2¼	2⅞	3¼	2	2⅜	2¾	3⅛	2⅞	2⅞	3	3⅜	2⅞	2⅞	3¼	3⅛
B	1⅞	1⅞	2⅞	2⅞	1⅞	2	2¼	2⅞	2⅞	2⅞	2⅞	2⅞	2⅞	2⅞	2⅞	3⅛
C	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞
D	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜	⅜

Threading, normal thread engagement, and rivet data... page 266

Malleable Iron Adjustable Railing Fittings



List Prices, Black

Size	Inches	1	1 1/4	1 1/2	2
No. 70	Each	1.10	1.25	1.70	2.25
No. 70 1/2	Each	.80	.90	1.20	1.65
No. 71 or No. 71 1/2	Each	1.30	1.50	2.00	2.50
No. 72	Each	1.30	1.60	2.15	2.50
No. 73 or No. 73 1/2	Each	1.50	1.75	2.35	2.75
No. 74 or No. 74 1/2	Each	1.50	1.85	2.50	2.75
No. 79	Each	1.65	1.75	1.90	2.50

These fittings are adjustable as shown in the illustrations, and may be used in railings of any angle from horizontal to 45 degrees. All openings are threaded, to afford rigidity to the railing.

No. 70 1/2 Male and Female Elbows may be used in combination with Ball Pattern or Plain Pattern

Railing Fittings shown on pages 268 and 272. Such combinations provide for corner fittings, and enable erecting railings of a steeper angle than 45 degrees.

Galvanized fittings, add 50 per cent to list prices of Black.

Dimensions, in Inches	Size	1	1 1/4	1 1/2	2
A	2 3/4	3 1/4	3 3/4	4 1/4	
B	2 3/16	2 1/2	2 3/8	3 1/4	
C	1 11/16	2 1/8	2 3/8	2 15/16	
D	1 11/16	1 11/16	1 7/8	2 1/4	

Thread Engagement... page 266

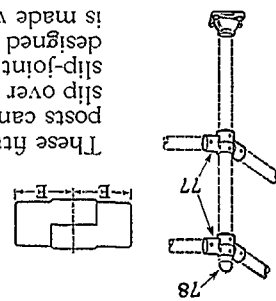
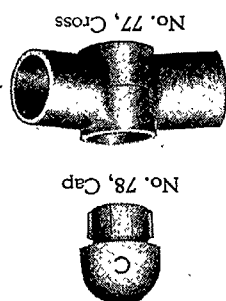
Malleable Iron Enclosure Railing Fittings

List Prices and Dimensions

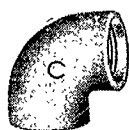
Size	Inches	1	1 1/4	1 1/2	2
No. 77	Black Each	1.25	1.40	1.65	2.25
	Galv. Each	1.50	1.75	2.10	2.85
No. 78	Black Each	.40	.45	.50	.60
	Galv. Each	.50	.55	.65	.80

These fittings enable making enclosure railings conveniently. The posts can be made of single pieces of pipe; the cross is designed to slip over the post and be riveted to it. The outlets of the cross are designed to be driven into the top end of the post. An extra charge is made when No. 77 Crosses are drilled for rivets.

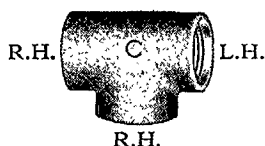
For drilling and size of rivets, see page 266.



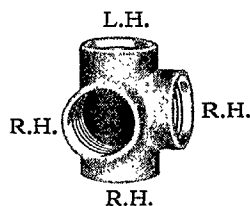
Malleable Iron Plain Pattern Railing Fittings



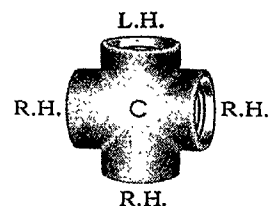
90° Elbow
No. 61, Right Hand



Tee
No. 63, Tapped as shown
No. 63½, Right Hand



Side Outlet Tee
No. 64, Tapped as shown
No. 64½, Right Hand



Cross
No. 65, Tapped as shown
No. 65½, Right Hand



90° Side Outlet Elbow
No. 62, Right Hand



No. 61



No. 62



No. 63
or
No. 63½



No. 64
or
No. 64½



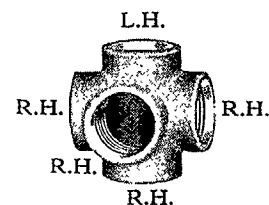
No. 65
or
No. 65½



No. 66
or
No. 66½

Threading: Fittings threaded other than shown can be made to order, at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.

Reamed fittings: Fittings with one or more openings reamed for slip joint, or with one or more openings reamed for slip joint and drilled for rivets, can be made to order at an advance over regular list prices. See the Crane Discount Sheet for prices. Orders should be accompanied by a sketch.



Side Outlet Cross
No. 66, Right Hand
No. 66½, Tapped as shown

List Prices, Each, and Dimensions

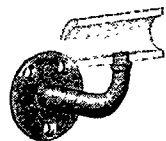
Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 61	Black	.08	.11	.14	.22	.27	.44	.80	1.10
	Galv.	.10	.14	.18	.29	.35	.57	1.05	1.45
No. 62	Black	.16	.22	.28	.44	.55	.88	1.60	2.20
	Galv.	.22	.29	.36	.57	.72	1.15	2.10	2.85
No. 63 or No. 63½	Black	.10	.14	.19	.28	.36	.57	1.00	1.45
	Galv.	.13	.18	.25	.36	.47	.75	1.30	1.90
No. 64 or No. 64½	Black	.20	.28	.37	.57	.72	1.15	2.00	2.90
	Galv.	.26	.36	.48	.75	.95	1.50	2.60	3.80
No. 65 or No. 65½	Black	.15	.20	.25	.38	.48	.77	1.40	1.95
	Galv.	.20	.26	.33	.49	.62	1.00	1.85	2.55
No. 66 or No. 66½	Black	.25	.35	.46	.70	.90	1.45	2.50	3.65
	Galv.	.33	.45	.60	.91	1.17	1.90	3.25	4.75
A—Center to end	Inches	1 1/8	1 5/16	1 1/2	1 3/4	1 15/16	2 1/4	2 11/16	3 1/8

Threading, normal thread engagement, and rivet data... page 266

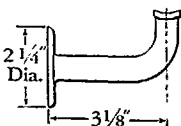
Malleable Iron Auxiliary Railing Fittings



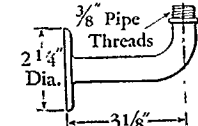
No. 50
Stair Rail Bracket



No. 51
Stair Rail Bracket



No. 52, Flush Joint
Stair Rail Bracket



No. 55
Cast Iron Loafer Rail
18 inches long



No. 56
Hitching Post Cap
Male

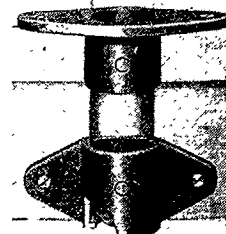


No. 57
Hitching Post Cap
Female

List Prices, Each, Black

Size	Inches	1	1 1/4	1 1/2	2
No. 50		.35	.35	.35	.35
No. 51		.45	.45	.45	.45
No. 52		1.10	1.30		
No. 55		.30	.30	.30	.30
No. 56				.35	
No. 57				.40	.90
No. 58 or No. 59		.35	.40	.50	.65

Galvanized fittings, add 50 per cent to list prices of Black.



No. 58
Board Walk Flange

No. 59
Board Walk Bracket

Iron Flanged Fittings

125-Pound Fittings

General description and working pressures.....	page 274
Dimensions.....	pages 274 and 275
Elbows and Reducers.....	pages 276 and 277
Tees.....	pages 278 and 279
Crosses and 45° Laterals.....	page 280

250-Pound Fittings

General description and working pressures.....	page 282
Dimensions.....	pages 282 and 283
Elbows and Reducers.....	pages 284 and 285
Tees.....	pages 286 and 287
Crosses and 45° Laterals.....	page 288

Special Flanged Fittings.....	page 281
Flanged Fittings with 25-Pound Drilling.....	page 274
Galvanized Fittings.....	page 574

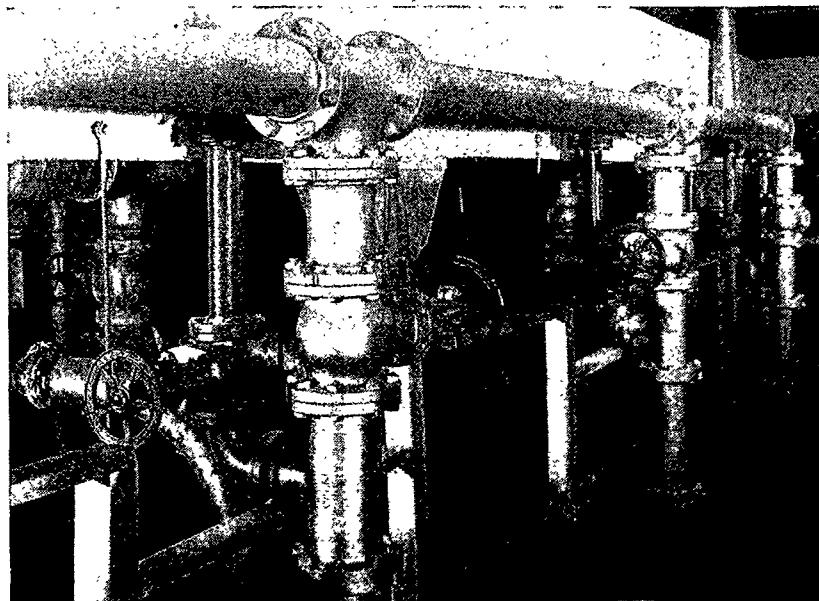
These fittings are made of high quality materials and are accurately machined and finished. Crane Cast Iron, used for the smaller sizes, and Crane Ferrosteel, used for the larger sizes, exceed the minimum requirements of A.S.T.M. Specification A 126, covering Gray-Iron Castings for Valves, Flanges, and Pipe Fittings.

Crane Co. also manufactures iron flanges, a complete line of steel flanged fittings and flanges, and brass flanged fittings and flanges. For information on these and other allied products, see the pages referred to below:

Iron Flanges.....	pages 289 to 295
Cast Steel Flanged Fittings.....	pages 343 to 350
Forged Steel Flanges.....	pages 361 to 367
Welding Fittings.....	pages 351 to 360
Brass Flanged Fittings and Flanges.....	page 264
Iron Flange Unions.....	pages 249 to 252

These water lines in a chemical plant are equipped with Crane Cast Iron Flanged Fittings, Cast Iron Flanges, and Iron Body Wedge Gate Valves.

Quality, performance, and durability are built into all Crane products.



125-Pound Cast Iron Flanged Fittings

WORKING PRESSURES

- 1 to 24-inch — 125 pounds steam
 1 to 12-inch — 175 pounds cold water, oil, or gas, non-shock
 14 to 24-inch — 150 pounds cold water, oil, or gas, non-shock

Pages 275 to 280 illustrate Crane 125-Pound Cast Iron Flanged Fittings. This line offers the user an unusually complete selection of types and sizes. In addition, special fittings of any design can be made to order on receipt of drawings.

Sprinkler service; Underwriters' approved: Crane 125-Pound Cast Iron Flanged Fittings are listed as approved and inspected by the Underwriters' Laboratories, Chicago, for sprinkler service.

American Standard: The material, dimensions, and drilling of these fittings conform to the American Cast Iron Fitting Standard, Class 125 (B16a-1939).

Material: All fittings sizes 12-inch and smaller are made of cast iron; sizes 14-inch and larger are made of Ferrosteeel, to conform to the American Standard.

Larger sizes: 30, 36, 42, and 48-inch fittings are made to order of a design suitable for the pressure intended. They have American Standard center to face dimensions, flange dimensions, and drilling.

Facing and drilling: The end flanges are plain faced, with a smooth finish. They are furnished drilled unless ordered faced only, and the bolt holes on sizes 18-inch and larger are regularly spot faced.

The bolt holes on drilled fittings straddle the center lines unless otherwise ordered, in which case a sketch should accompany the order.

For bolts smaller than $1\frac{3}{4}$ -inch diameter, the bolt holes are drilled $\frac{1}{8}$ -inch larger than the diameter of the bolts; for bolts $1\frac{3}{4}$ -inch diameter and larger, $\frac{1}{4}$ -inch larger than the diameter of the bolts.

Drilling to the 25-Pound Standard: When so ordered, sizes 5 to 24-inch inclusive can be drilled with smaller bolt holes to conform to the 25-Pound American Tentative Cast Iron Flanged Fitting Standard (B16b2-1931). See page 551 for templates.

Side Outlet Elbows: All openings are on the intersecting center lines. Reducing sizes are regularly made reduced only on the side outlet. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Double Branch Elbows: In describing Double Branch Elbows, the branches are named first, and then the outlet. Reducing Double Branch Elbows are regularly made reduced only on the branches, with both branches the same size. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Base Elbows: The base on Base Elbows is neither faced nor drilled unless so ordered.

Round bases, when drilled, will be drilled to the template of the flange corresponding to the size of the supporting pipe.

Special Angle Elbows: Elbows from 1° to 45° have the same center to face dimensions as 45° Elbows; 46° to 90° , the same center to face dimensions as 90° Elbows. These fittings are made to order only.

Single Sweep Tees: Single Sweep Tees with the outlet larger than the run are made to order only. Prices and dimensions on application.

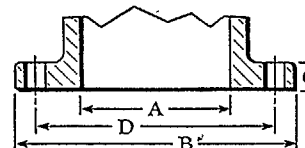
Double Sweep Tees: Double Sweep Tees reduced on the run are made to order only. Prices and dimensions on application. Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for Reducing Side Outlet Tees should be accompanied by a sketch showing the size and location of all openings.

Base Tees: Base Tees are made to order only; prices on application. The dimensions of the base are the same as for Base Elbows.

45° Laterals: Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices and dimensions on application.

Dimensions of Flanges, in Inches



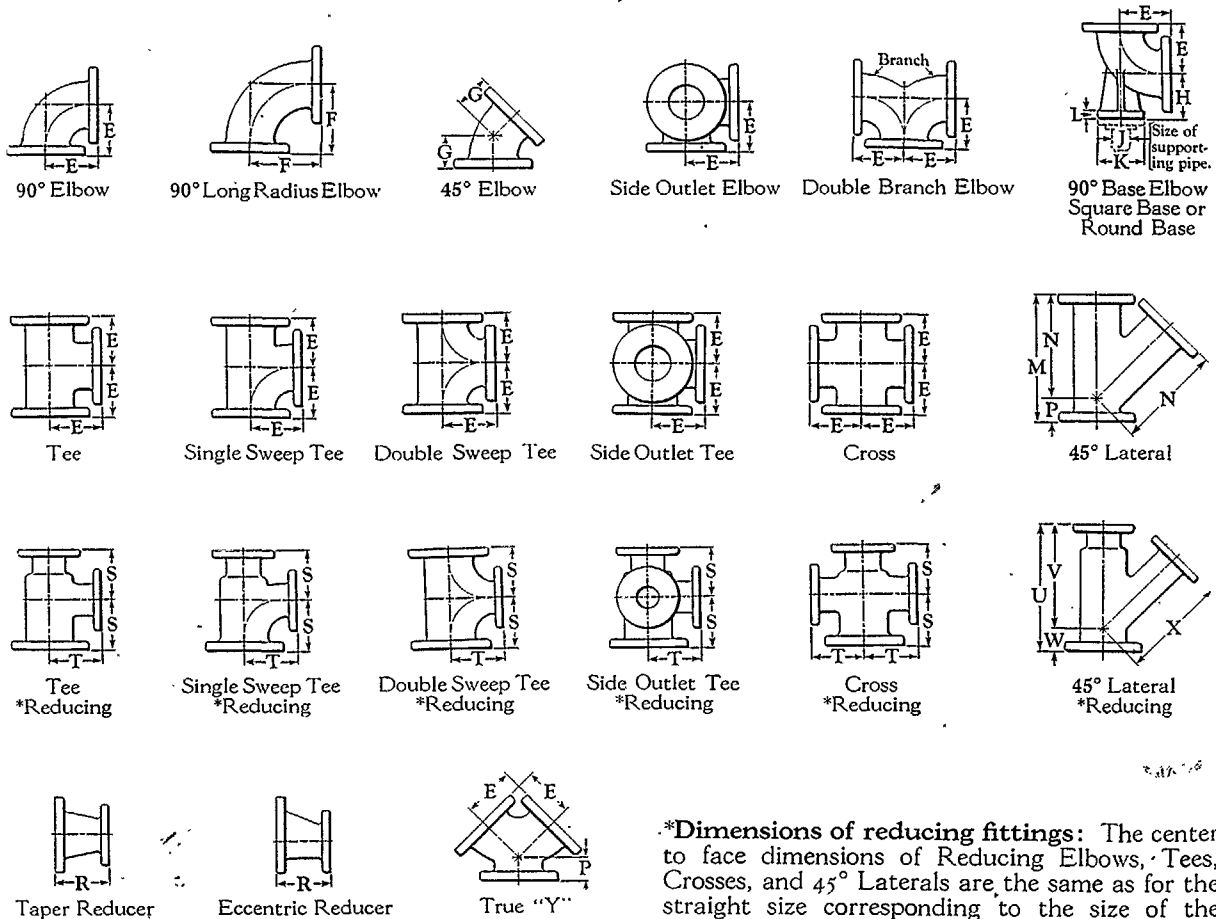
Size	A	B	C	D	No. of bolts	Dia. of bolts
1	1	$4\frac{1}{4}$	$\frac{7}{16}$	$3\frac{1}{8}$	4	$\frac{1}{2}$
$1\frac{1}{4}$	$1\frac{1}{4}$	$4\frac{5}{8}$	$\frac{1}{2}$	$3\frac{1}{2}$	4	$\frac{1}{2}$
$1\frac{1}{2}$	$1\frac{1}{2}$	5	$\frac{9}{16}$	$3\frac{3}{8}$	4	$\frac{1}{2}$
2	2	6	$\frac{5}{8}$	$4\frac{3}{4}$	4	$\frac{5}{8}$
$2\frac{1}{2}$	$2\frac{1}{2}$	7	$1\frac{1}{16}$	$5\frac{1}{2}$	4	$\frac{5}{8}$
3	3	$7\frac{1}{2}$	$\frac{3}{4}$	6	4	$\frac{5}{8}$
$3\frac{1}{2}$	$3\frac{1}{2}$	$8\frac{1}{2}$	$\frac{13}{16}$	7	8	$\frac{5}{8}$
4	4	9	$1\frac{5}{16}$	$7\frac{1}{2}$	8	$\frac{5}{8}$
5	5	10	$1\frac{5}{16}$	$8\frac{1}{2}$	8	$\frac{3}{4}$
6	6	11	1	$9\frac{1}{2}$	8	$\frac{3}{4}$
8	8	$13\frac{1}{2}$	$1\frac{1}{8}$	$11\frac{3}{4}$	8	$\frac{3}{4}$
10	10	16	$1\frac{3}{16}$	$14\frac{1}{4}$	12	$\frac{7}{8}$
12	12	19	$1\frac{1}{4}$	17	12	$\frac{7}{8}$
14	14	21	$1\frac{3}{8}$	$18\frac{3}{4}$	12	1
16	16	$23\frac{1}{2}$	$1\frac{7}{16}$	$21\frac{1}{4}$	16	1
18	18	25	$1\frac{9}{16}$	$22\frac{3}{4}$	16	$1\frac{1}{8}$
20	20	$27\frac{1}{2}$	$1\frac{11}{16}$	25	20	$1\frac{1}{8}$
24	24	32	$1\frac{7}{8}$	$29\frac{1}{2}$	20	$1\frac{1}{4}$
30	30	$38\frac{3}{4}$	$2\frac{1}{8}$	36	28	$1\frac{1}{4}$
36	36	46	$2\frac{3}{8}$	$42\frac{3}{4}$	32	$1\frac{1}{2}$
42	42	53	$2\frac{5}{8}$	$49\frac{1}{2}$	36	$1\frac{1}{2}$
48	48	$59\frac{1}{2}$	$2\frac{3}{4}$	56	44	$1\frac{1}{2}$

List prices . . . pages 276 to 280

How to read reducing sizes . . . page 644

125-Pound Cast Iron Flanged Fittings

Dimensions, in Inches



***Dimensions of reducing fittings:** The center to face dimensions of Reducing Elbows, Tees, Crosses, and 45° Laterals are the same as for the straight size corresponding to the size of the largest opening, *with the following exception:*

Exception: In sizes 18-inch and larger, if the outlet of a Reducing Tee, Cross, or 45° Lateral is the size given in the table below, or is smaller, use the "Short Body" dimensions shown below.

The face to face dimension of Reducers is governed by the size of the larger opening, regardless of the size of the smaller opening.

Size	E	EE	F	G	H	J	K	L	M	N	P	R
1	3 1/2	7	5	1 3/4	3 1/2	3/4	3 1/2	7/16	7 1/2	5 3/4	1 3/4	
1 1/4	3 3/4	7 1/2	5 1/2	2	3 3/8	3/4	3 1/2	7/16	8	6 1/4	1 3/4	
1 1/2	4	8	6	2 1/4	3 3/4	1	4 1/4	7/16	9	7	2	
2	4 1/2	9	6 1/2	2 1/2	4 1/8	1 1/4	4 5/8	1/2	10 1/2	8	2 1/2	5
2 1/2	5	10	7	3	4 1/2	1 1/4	4 5/8	1/2	12	9 1/2	2 1/2	5 1/2
3	5 1/2	11	7 3/4	3	4 7/8	1 1/2	5	9/16	13	10	3	6
3 1/2	6	12	8 1/2	3 1/2	5 1/4	1 1/2	5	9/16	14 1/2	11 1/2	3	6 1/2
4	6 1/2	13	9	4	5 1/2	2	6	5/8	15	12	3	7
5	7 1/2	15	10 3/4	4 1/2	6 1/4	2 1/2	7	1 1/16	17	13 1/2	3 1/2	8
6	8	16	11 1/2	5	7	2 1/2	7	1 1/16	18	14 1/2	3 1/2	9
8	9	18	14	5 1/2	8 3/8	4	9	1 5/16	22	17 1/2	4 1/2	11
10	11	22	16 1/2	6 1/2	9 3/4	4	9	1 5/16	25 1/2	20 1/2	5	12
12	12	24	19	7 1/2	11 1/4	6	11	1	30	24 1/2	5 1/2	14
14	14	28	21 1/2	7 1/2	12 1/2	6	11	1	33	27	6	16
16	15	30	24	8	13 3/4	6	11	1	36 1/2	30	6 1/2	18
18	16 1/2	33	26 1/2	8 1/2	15	8	13 1/2	1 1/8	39	32	7	19
20	18	36	29	9 1/2	16	8	13 1/2	1 1/8	43	35	8	20
24	22	44	34	11	18 1/2	8	13 1/2	1 1/8	49 1/2	40 1/2	9	24
30	25	50	41 1/2	15					59	49	10	30
36	28	56	49	18								36
42	31	62	56 1/2	21								
48	34	68	64	24								

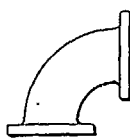
Short Body Reducing Fittings									
Tees and Crosses					45° Laterals				
Size	Size of outlet and smaller	S	SS	T	Size	Size of outlet and smaller	U	V	W X
18	12	13	26	15 1/2	18	8	26	25	1 27 1/2
20	14	14	28	17	20	10	28	27	1 29 1/2
24	16	15	30	19	24	12	32	31 1/2	1 1/2 34 1/2
30	20	18	36	23	30	14	39	39	0 42
36	24	20	40	26					
42	Dimensions 42 and 48" on application								
48									

125-Pound Cast Iron Flanged Fittings

For working pressures, see page 274.



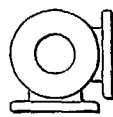
90° Elbow
No. 525
Straight



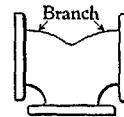
90° Long Radius Elbow
No. 551
Straight



45° Elbow
No. 527
Straight



Side Outlet Elbow
No. 526, Straight
*No. 528, Reducing



Double Branch Elbow
No. 538, Straight
†No. 540, Reducing



90° Base Elbow
No. 549, Square Base
No. 550, Round Base

List Prices, Each

Size Inches	90° Elbows		90° Long Radius Elbows		45° Elbows		90° Base Elbows		
	No. 525 Straight		No. 551 Straight		No. 527 Straight		No. 549, with Square Base No. 550, with Round Base		
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced except Base	Faced and Drilled except Base	Facing and Drilling Base
1	3.00	3.60	5.00	5.90	3.30	3.90			
1 1/4	3.00	3.60	5.00	5.90	3.30	3.90			
1 1/2	3.00	3.60	5.00	5.90	3.30	3.90			
2	3.00	3.60	5.00	5.90	3.30	3.90			
2 1/2	3.15	3.75	5.25	6.15	3.50	4.10			
3	3.45	4.15	5.75	6.85	3.80	4.50			
3 1/2	4.05	4.90	6.75	8.00	4.50	5.35			
4	4.50	5.50	7.50	9.00	5.00	6.00	9.00	10.00	3.00
5	6.25	7.25	10.50	12.00	6.90	7.90	12.50	13.50	3.50
6	7.60	8.90	12.65	14.60	8.35	9.65	15.25	16.55	3.50
8	12.00	13.60	20.00	22.40	12.60	14.20	24.00	25.60	5.00
10	19.00	21.70	31.50	35.50	20.00	22.70	38.00	40.70	5.00
12	28.00	31.00	46.50	51.00	29.50	32.50	56.00	59.00	7.50
14	41.50	45.25	69.00	74.50	41.50	45.25	70.00	73.75	7.50
16	54.50	59.50	91.00	98.50	54.50	59.50	90.00	95.00	7.50
18	71.00	77.00	118.00	127.00	71.00	77.00	105.00	111.00	12.00
20	90.00	97.00	150.00	160.00	90.00	97.00	120.00	127.00	12.00
24	140.00	150.00	235.00	250.00	140.00	150.00	190.00	200.00	12.00

Size Inches	Side Outlet Elbows				Double Branch Elbows			
	No. 526 Straight		No. 528 *Reducing		No. 538 Straight		No. 540 †Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
4	26.50	28.00	29.50	31.00	28.50	30.00	31.50	33.00
5	28.50	30.00	31.50	33.00	36.00	37.50	39.50	41.00
6	33.00	35.00	36.00	38.00	38.00	40.00	42.00	44.00
8	47.50	50.00	52.50	55.00	47.50	50.00	52.50	55.00
10	76.00	80.00	84.00	88.00	66.00	70.00	73.50	77.50
12	100.50	105.00	110.50	115.00	90.50	95.00	100.50	105.00
14	129.50	135.00	144.50	150.00	119.50	125.00	132.50	138.00
16	152.50	160.00	167.50	175.00	142.50	150.00	157.50	165.00

*Side Outlet Elbows: The outlet is on the intersecting center lines.

"Reducing" list prices apply to elbows reduced only on the side outlet. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

†Double Branch Elbows: "Reducing" list prices apply only to elbows reduced on the branches, and with both branches the same size. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

In describing Double Branch Elbows, the branch openings are named first, then the outlet.

Materials: All fittings sizes 12-inch and smaller are made of cast iron; larger sizes are made of Ferrosteeel.

Bolting on Companion Flanges....page 557

Drilling: The end flanges on these fittings are furnished faced and drilled unless ordered faced only. The base on Base Elbows is neither faced nor drilled unless so ordered.

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Spot facing: 125-Pound Fittings sizes 16-inch and smaller are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole. Sizes 18-inch and larger are regularly spot faced.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 293.

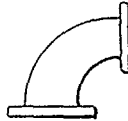
Larger sizes: Larger sizes are made to order. Prices on application.

Galvanized Flanged Fittings....page 557
Dimensions.....pages 274 and 275
Templates for drilling.....page 557

125-Pound Cast Iron Flanged Fittings



No. 545
90° Elbow
*Reducing



No. 546
90° Long Radius Elbow
*Reducing

For working pressures,
see page 274.



No. 547
*Taper Reducer



No. 548
*Eccentric Reducer

List Prices, Each

Size Inches	90° Elbows		90° Long Radius Elbows		Reducers		Reducers	
	No. 545 *Reducing		No. 546 *Reducing		No. 547 *Taper		No. 548 *Eccentric	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1½	6.00	6.60						
2	6.00	6.60	10.00	10.90	6.00	6.60		
2½	6.30	6.90	10.50	11.40	6.30	6.90	6.30	6.90
3	6.90	7.60	11.50	12.60	6.90	7.60	6.90	7.60
3½	8.10	8.95			8.10	8.95	8.10	8.95
4	9.00	10.00	15.00	16.50	9.00	10.00	9.00	10.00
5	12.50	13.50	21.00	22.50	12.50	13.50	12.50	13.50
6	15.25	16.55	25.30	27.25	15.25	16.55	15.25	16.55
8	24.00	25.60	40.00	42.40	24.00	25.60	24.00	25.60
10	38.00	40.70	63.00	67.00	38.00	40.70	38.00	40.70
12	56.00	59.00	93.00	97.50	56.00	59.00	56.00	59.00
14	70.00	73.75	138.00	143.50	70.00	73.75	70.00	73.75
16	90.00	95.00	182.00	189.50	90.00	95.00	90.00	95.00
18	105.00	111.00	236.00	245.00	105.00	111.00	105.00	111.00
20	120.00	127.00	300.00	310.00	120.00	127.00	120.00	127.00
24	187.00	197.00	470.00	485.00	190.00	200.00	190.00	200.00

*List prices of Reducing Elbows and Reducers apply only to the reductions shown below. Other reductions are entirely special; prices on application.

No. 545 90° Elbows			No. 546 90° Elbows Long Radius			No. 547 Reducers			No. 548 Eccentric Reducers		
1½ x 1¼	6 x 5	16 x 14	2 x 1½	10 x 8	2 x 1¼	6 x 5	16 x 14	2½ x 2	14 x 12		
2 x 1½	6 x 4	16 x 12	2½ x 2	10 x 6	2½ x 1½	6 x 4	16 x 12	3 x 2½	14 x 10		
2 x 1¼	6 x 3½	16 x 10	2½ x 1½	10 x 5	2½ x 1¼	6 x 3½	16 x 10	3 x 2	14 x 8		
2½ x 2	6 x 3	16 x 8	3 x 2½	12 x 10	3 x 2	6 x 3	16 x 8	3 x 1½	14 x 6		
2½ x 1½	6 x 2½	18 x 16	3 x 2	12 x 8	3 x 1½	6 x 2½	16 x 6	3½ x 3	16 x 14		
2½ x 1¼	6 x 2	18 x 14	3 x 1½	12 x 6	3 x 1¼	6 x 2	18 x 16	3½ x 2½	16 x 12		
3 x 2½	8 x 6	18 x 12	4 x 3½	14 x 12	3½ x 3	8 x 6	18 x 14	3½ x 2	16 x 10		
3 x 2	8 x 5	18 x 10	4 x 3	14 x 10	3½ x 2½	8 x 5	18 x 12	4 x 3	16 x 8		
3 x 1½	8 x 4	20 x 18	4 x 2½	16 x 14	3½ x 2	8 x 4	18 x 10	4 x 2½	16 x 6		
3 x 1¼	8 x 3½	20 x 16	4 x 2	16 x 12	3½ x 1½	8 x 3½	18 x 8	4 x 2	18 x 16		
3½ x 3	8 x 3	20 x 14	4 x 1½	16 x 10	4 x 3½	8 x 3	18 x 6	5 x 4	18 x 14		
3½ x 2½	10 x 8	20 x 12	5 x 4	18 x 16	4 x 3	10 x 8	20 x 18	6 x 5	18 x 12		
3½ x 2	10 x 6	24 x 20	5 x 3½	18 x 14	4 x 2½	10 x 6	20 x 16	6 x 4	18 x 10		
3½ x 1½	10 x 5	24 x 18	5 x 3	18 x 10	4 x 2	10 x 5	20 x 14	6 x 3½	18 x 8		
4 x 3½	12 x 10	24 x 16	5 x 2½	18 x 10	4 x 1½	10 x 4	20 x 10	6 x 3	20 x 16		
4 x 3	12 x 8	24 x 14	6 x 5	20 x 18	5 x 4	12 x 10	20 x 8	8 x 6	20 x 14		
4 x 2½	12 x 6	24 x 12	6 x 4	20 x 16	5 x 3½	12 x 8	24 x 20	8 x 5	20 x 12		
4 x 2	12 x 5	24 x 10	6 x 3½	20 x 14	5 x 3	12 x 6	24 x 18	8 x 4	24 x 20		
4 x 1½	12 x 4	24 x 8	6 x 3	20 x 12	5 x 2½	12 x 5	24 x 16	10 x 8	24 x 18		
5 x 4	14 x 12	24 x 6	6 x 2½	24 x 18	5 x 2	12 x 4	24 x 14	10 x 6	24 x 16		
5 x 3½	14 x 10		6 x 2	24 x 16	5 x 1½	14 x 12	24 x 12	10 x 5	24 x 14		
5 x 3	14 x 8		8 x 6			14 x 10		12 x 4	24 x 12		
5 x 2½	14 x 6		8 x 5			14 x 8		12 x 3			
5 x 2			8 x 4			14 x 6		12 x 2			
			8 x 3½					12 x 1			

Materials: All fittings sizes 12-inch and smaller are made of cast iron; larger sizes are made of Ferrosteeel.

Bolting on Companion Flanges.....page 557 Dimensions.....pages 274 and 275
Galvanized Flanged Fittings.....page 572 Templates for drilling.....page 551

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

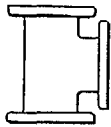
Spot facing: 125-Pound Fittings sizes 16-inch and smaller are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole. Sizes 18-inch and larger are regularly spot-faced.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For flanges, see page 293.

Larger sizes: Larger sizes are made to order. Prices on application.

125-Pound Cast Iron Flanged Fittings

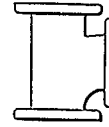
For working pressures,
see page 274.



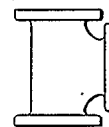
Tee
No. 529, Straight
*No. 531, Reducing



Side Outlet Tee
No. 530, Straight
No. 532, Reducing



Single Sweep Tee
No. 533, Straight
*No. 535, Reducing



Double Sweep Tee
No. 534, Straight
*No. 536, Reducing

List Prices, Each

Size Inches	Tees				Single Sweep Tees				Double Sweep Tees			
	No. 529 Straight		No. 531 *Reducing		No. 533 Straight		No. 535 *Reducing		No. 534 Straight		No. 536 *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1	4.35	5.25										
1 1/4	4.35	5.25	5.00	5.90								
1 1/2	4.35	5.25	5.00	5.90								
2	4.35	5.25	5.00	5.90	5.00	5.90			5.00	5.90		
2 1/2	4.55	5.45	5.25	6.15	5.25	6.15	6.00	6.90	5.25	6.15	6.00	6.90
3	5.00	6.10	5.75	6.85	5.75	6.85	6.60	7.70	5.75	6.85	6.60	7.70
3 1/2	5.85	7.10	6.75	8.00	6.75	8.00	7.75	9.00	6.75	8.00	7.75	9.00
4	6.50	8.00	7.50	9.00	7.50	9.00	8.65	10.15	7.50	9.00	8.65	10.15
5	9.10	10.60	10.50	12.00	10.50	12.00	12.00	13.50	10.50	12.00	12.00	13.50
6	11.00	12.95	12.65	14.60	12.65	14.60	14.50	16.45	12.65	14.60	14.50	16.45
8	17.40	19.80	20.00	22.40	20.00	22.40	23.00	25.40	20.00	22.40	23.00	25.40
10	27.50	31.50	31.50	35.50	31.50	35.50	36.00	40.00	31.50	35.50	36.00	40.00
12	40.50	45.00	46.50	51.00	46.50	51.00	53.50	58.00	46.50	51.00	53.50	58.00
14	60.00	65.50	69.00	74.50	69.00	74.50	79.00	84.50	69.00	74.50	79.00	84.50
16	79.00	86.50	91.00	98.50	91.00	98.50	105.00	112.50	91.00	98.50	105.00	112.50
18	103.00	112.00	118.00	127.00								
20	130.00	140.00	150.00	160.00								
24	203.00	218.00	233.00	248.00								

Size Inches	Side Outlet Tees			
	No. 530 Straight		No. 532 Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled
4	31.00	33.00	34.00	36.00
5	35.00	37.00	39.00	41.00
6	42.25	45.00	47.25	50.00
8	56.75	60.00	62.75	66.00
10	84.50	90.00	94.50	100.00
12	114.00	120.00	126.00	132.00
14	142.50	150.00	157.50	165.00
16	170.00	180.00	190.00	200.00

Side Outlet Tees: Orders for No. 532 Reducing Side Outlet Tees should be accompanied by a drawing showing the size and location of all openings.

Materials: All fittings sizes 12-inch and smaller are made of cast iron; larger sizes are made of Ferrosteel.

***Reducing sizes:** List prices of No. 531, No. 535, and No. 536 Reducing Tees apply to sizes carried in stock, shown on the opposite page. Non-stock sizes are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the opposite page for price advances.

Single Sweep Tees: No. 535 Single Sweep Tees with the outlet larger than the run are entirely special. Prices and dimensions on application.

Double Sweep Tees: No. 536 Double Sweep Tees reduced on the run are entirely special. Prices and dimensions on application.

Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

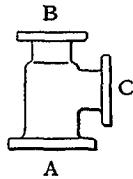
Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Spot facing: 125-Pound Fittings sizes 16-inch and smaller are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole. Sizes 18-inch and larger are regularly spot faced.

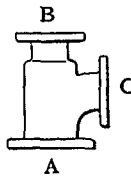
Larger sizes: Larger sizes are made to order. Prices on application.

125-Pound Cast Iron Flanged Fittings

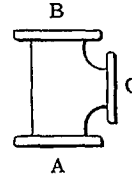
Reducing Flanged Tees Carried in Stock



No. 531
Reducing Tee



No. 535
Single Sweep Reducing Tee



No. 536
Double Sweep Reducing Tee

Nos. 531, 535, and 536 Reducing Tees are carried in stock in the sizes shown in the table below; these are furnished at the regular "Reducing" prices.

Non-stock sizes are made to order, at an advance in price depending upon the quantity of a size ordered at one time; see the table below for price advances.

No. 531 Tees				No. 535 Single Sweep Tees				No. 536 Double Sweep Tees			
A	B	C		A	B	C		A	B	C	
2	x 2	x 1 1/2	5 x 5 x 4	8 x 8	x 6	12 x 12	x 10	4 x 4	x 2	4 x 4	x 2
2 1/2	x 2 1/2	x 2	5 x 5 x 3 1/2	8 x 8	x 5	12 x 12	x 8	6 x 6	x 5	6 x 6	x 5
2 1/2	x 2 1/2	x 1 1/2	5 x 5 x 3	8 x 8	x 4	12 x 12	x 6	6 x 6	x 4	6 x 6	x 4
2 1/2	x 2	x 2 1/2	5 x 5 x 2 1/2	8 x 8	x 3 1/2	12 x 12	x 5	6 x 6	x 3	6 x 6	x 3
2 1/2	x 2	x 2	5 x 5 x 2	8 x 8	x 3	12 x 12	x 4	6 x 6	x 2 1/2	8 x 8	x 6
2 1/2	x 2	x 1 1/2	5 x 5 x 1 1/2	8 x 8	x 2 1/2	12 x 12	x 3	8 x 8	x 6	10 x 10	x 8
2 1/2	x 2	x 1 1/4	5 x 5 x 1 1/4	8 x 8	x 2	12 x 12	x 2	8 x 8	x 5	10 x 10	x 6
3	x 3	x 2 1/2	5 x 4 x 5	8 x 6	x 8	12 x 10	x 12	8 x 8	x 3	10 x 10	x 5
3	x 3	x 2	5 x 4 x 4	8 x 6	x 6	12 x 10	x 10	8 x 8	x 6	10 x 10	x 4
3	x 3	x 1 1/2	5 x 4 x 3	8 x 6	x 5	12 x 10	x 8	8 x 6	x 4		
3	x 3	x 1 1/4	5 x 4 x 2 1/2	8 x 6	x 4	12 x 10	x 6				
3	x 3	x 1	5 x 4 x 2	8 x 6	x 3	12 x 8	x 12				
3	x 2 1/2	x 3	5 x 3 1/2 x 4	8 x 5	x 8	12 x 8	x 10				
3	x 2 1/2	x 2 1/2	5 x 3 x 5	8 x 5	x 6	12 x 8	x 8				
3	x 2 1/2	x 2	5 x 3 x 3 1/2	8 x 5	x 5	12 x 8	x 6				
3	x 2	x 3	5 x 3 x 3	8 x 4	x 8	12 x 6	x 12				
3	x 2	x 2 1/2	5 x 2 1/2 x 5	8 x 4	x 6	12 x 6	x 8				
3	x 2	x 2	5 x 2 x 5	8 x 4	x 4	12 x 4	x 12				
2 1/2	x 2 1/2	x 3	4 x 4 x 5	8 x 3 1/2	x 8	10 x 10	x 12				
3 1/2	x 3 1/2	x 3	6 x 6 x 5	8 x 3	x 8	8 x 8	x 12				
3 1/2	x 3 1/2	x 2 1/2	6 x 6 x 4	6 x 6	x 8	14 x 14	x 12				
3 1/2	x 3 1/2	x 2	6 x 6 x 3 1/2	5 x 5	x 8	14 x 14	x 10				
3 1/2	x 2 1/2	x 2 1/2	6 x 6 x 3	10 x 10	x 8	14 x 14	x 8				
4	x 4	x 3 1/2	6 x 6 x 2 1/2	10 x 10	x 6	14 x 14	x 6				
4	x 4	x 3	6 x 6 x 2	10 x 10	x 5	14 x 14	x 5				
4	x 4	x 2 1/2	6 x 6 x 1 1/2	10 x 10	x 4	14 x 14	x 4				
4	x 4	x 2	6 x 5 x 6	10 x 10	x 3 1/2	14 x 12	x 14				
4	x 4	x 1 1/2	6 x 5 x 5	10 x 10	x 3	14 x 12	x 12				
4	x 4	x 1 1/4	6 x 5 x 4	10 x 10	x 2 1/2	14 x 10	x 10				
4	x 3 1/2	x 4	6 x 5 x 3	10 x 10	x 2	10 x 10	x 14				
4	x 3	x 4	6 x 5 x 2 1/2	10 x 8	x 10	16 x 16	x 14				
4	x 3	x 3	6 x 4 x 6	10 x 8	x 8	16 x 16	x 12				
4	x 3	x 2 1/2	6 x 4 x 5	10 x 8	x 6	16 x 16	x 10				
4	x 3	x 2	6 x 4 x 4	10 x 8	x 5	16 x 16	x 8				
4	x 2 1/2	x 4	6 x 4 x 3	10 x 8	x 4	16 x 16	x 6				
4	x 2 1/2	x 3	6 x 4 x 2 1/2	10 x 6	x 10	16 x 12	x 12				
4	x 2 1/2	x 2 1/2	6 x 3 x 6	10 x 6	x 8	12 x 12	x 16				
4	x 2	x 4	6 x 3 x 4	10 x 6	x 6						
4	x 2	x 2	6 x 3 x 3	5 x 5	x 10						
3	x 3	x 4	6 x 2 1/2 x 6	10 x 4	x 10						
2 1/2	x 2 1/2	x 4	6 x 2 x 6	10 x 3	x 10						
			5 x 5 x 6	8 x 8	x 10						
			5 x 4 x 6	8 x 6	x 10						
			4 x 4 x 6	6 x 6	x 10						

Price Advances for Non-Stock Sizes

Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

These price advances do not apply to Single Sweep or Double Sweep Reducing Tees with the outlet larger than the run. Such tees are special; prices on application.

Size	1 to 3½ inch	4 to 8 inch	10 inch	12 to 24 inch
1 piece	100%	50%	25%	No advance
2 pieces	80%	40%	20%	
3 pieces	60%	30%	15%	
4 pieces	40%	20%	10%	
5 pieces	20%	10%	5%	
6 or more	No advance			

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges.

Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 293.

Materials: All fittings sizes 12-inch and smaller are made of cast iron; larger sizes are made of Ferrosteeel.

Drilling: 125-Pound Cast Iron Flanged Fittings are furnished faced and drilled unless ordered faced only.

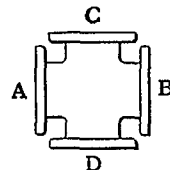
Facing: The flanges are plain faced, with a smooth finish.

Spot facing: 125-Pound Fittings sizes 16-inch and smaller are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole. Sizes 18-inch and larger are regularly spot faced.

Bolting on Companion Flanges.....page 557
Galvanized Flanged Fittings.....page 572

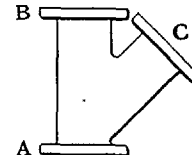
Templates for drilling.....page 551
Dimensions.....pages 274 and 275

125-Pound Cast Iron Flanged Fittings



Cross
No. 537, Straight
*No. 539, Reducing

For working pressures,
see page 274.



45° Lateral
No. 541, Straight
*No. 543, Reducing

List Prices, Each

Size Inches	Crosses				45° Laterals			
	No. 537 Straight		No. 539 *Reducing		No. 541 Straight		No. 543 *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1	6.75	7.95						
1 1/4	6.75	7.95	7.75	8.95				
1 1/2	6.75	7.95	7.75	8.95				
2	6.75	7.95	7.75	8.95	6.75	7.95		
2 1/2	6.95	8.15	8.00	9.20	6.95	8.15	8.00	9.20
3	7.65	9.05	8.75	10.15	7.65	9.05	8.75	10.15
3 1/2	9.00	10.70	10.35	12.05	9.00	10.70	10.35	12.05
4	10.00	12.00	11.50	13.50	10.00	12.00	11.50	13.50
5	13.75	15.75	15.75	17.75	13.75	15.75	15.75	17.75
6	16.75	19.25	19.25	21.75	16.75	19.25	19.25	21.75
8	26.50	29.75	30.50	33.75	26.50	29.75	30.50	33.75
10	42.00	47.50	48.00	53.50	42.00	47.50	48.00	53.50
12	61.50	67.50	71.00	77.00	61.50	67.50	71.00	77.00
14	91.00	98.50	105.00	112.50	91.00	98.50	105.00	112.50
16	120.00	130.00	138.00	148.00	120.00	130.00	138.00	148.00
18	157.00	169.00	180.00	192.00	157.00	169.00	180.00	192.00
20	198.00	212.00	228.00	242.00	198.00	212.00	228.00	242.00
24	310.00	330.00	355.00	375.00	310.00	330.00	355.00	375.00

*Reducing fittings: List prices of No. 539 Reducing Crosses and No. 543 Reducing 45° Laterals apply to sizes carried in stock, shown below. Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

These price advances do not apply to No. 543 Reducing 45° Laterals with the outlet larger than the run. Such Laterals are entirely special; prices on application.

Sizes carried in stock				Price advances for non-stock sizes					
No. 539 Crosses		No. 543 45° Laterals		Size	1 to 3 1/2 inch	4 to 8 inch	10 inch	12 to 24 inch	
A B C D	A B C	A B C		1 piece	100%	50%	25%		No advance
4x4 x3 x3	4x4 x2 1/2			2 pieces	80%	40%	20%		
5x5 x4 x4	6x6 x4			3 pieces	60%	30%	15%		
5x5 x3 x3	6x6 x3			4 pieces	40%	20%	10%		
5x5 x2 1/2 x2 1/2	6x6 x2 1/2			5 pieces	20%	10%	5%		
6x6 x6 x4	8x8 x6			6 or more	No advance				
6x6 x5 x5	8x8 x3								
6x6 x4 x4	8x6 x6								
6x6 x3 x3	10x10 x8								
8x8 x6 x6	10x10 x6								
8x8 x5 x5	10x8 x10								
8x8 x4 x4	10x8 x8								
8x8 x3 x3									
8x6 x8 x6									
8x6 x6 x6									
10x10 x8 x8									
10x10 x6 x6									
10x10 x5 x5									

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges.

Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 203.

Materials: All fittings sizes 12-inch and smaller are made of cast iron; larger sizes are made of Ferrosteeel.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: The flanges on 125-Pound Cast Iron Flanged Fittings are plain faced, with a smooth finish.

Spot facing: 125-Pound Fittings sizes 16-inch and smaller are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole. Sizes 18-inch and larger are regularly spot faced.

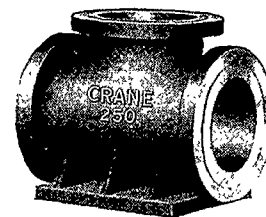
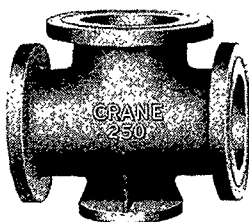
Larger sizes: Larger sizes are made to order. Prices are furnished on application.

Dimensions.....pages 274 and 275
Templates for drilling.....page 551
Galvanized Flanged Fittings....page 572
Bolting on
Companion Flanges.....page 557

Special Flanged Fittings



Special Angle Elbow

Anchorage Tee
with Outlet at Top

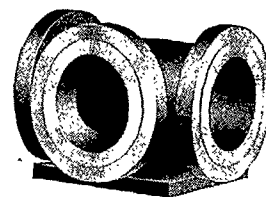
Base Tee

In addition to the ordinary types of Flanged Fittings listed and described on pages 274 to 288, Crane Co. can supply special fittings of any shape or size, made to special dimensions, and for any pressure and service. These can be made of Cast Iron, Ferrosteel, or Cast Steel.

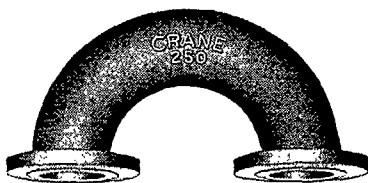
The illustrations on this page show only a few varieties, ranging from simple Special Angle Elbows to exceedingly intricate and massive fittings built to meet peculiar piping conditions.

Attention is directed especially to the fittings in the two photographs at the bottom of the page. These are merely typical of the many unusually special fittings that have been made in the Crane factories over a period of many years.

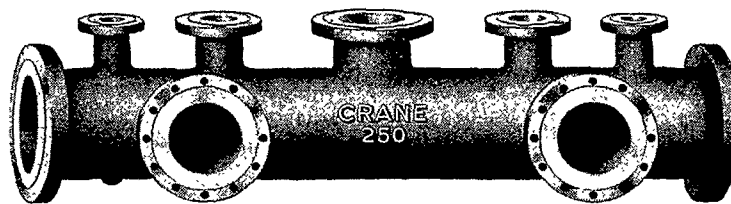
Prices will be quoted on application. Inquiries should be accompanied by drawings.

Anchorage Tee
with Outlet at SideFiller Piece
with Parallel Faces

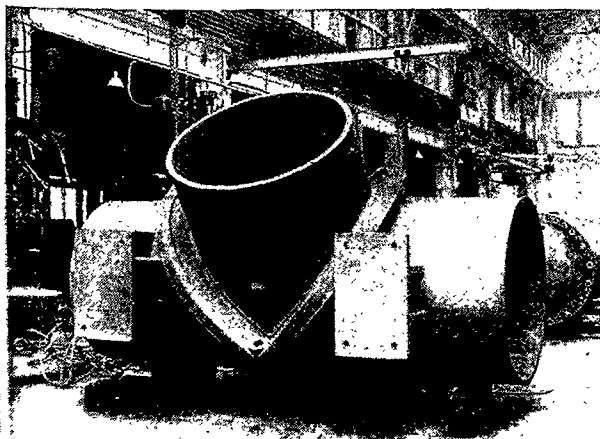
Beveled Filler Piece



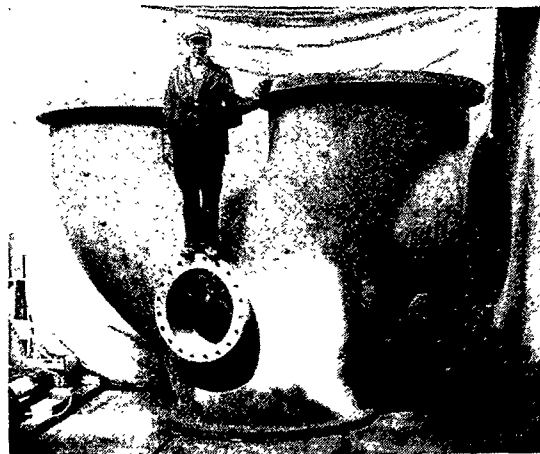
Return Bend



Special Header



Special 48-inch Cast Iron Tee with Spigot Ends



Special Cast Iron Y-Bend

250-Pound Cast Iron Flanged Fittings

WORKING PRESSURES

- 1 to 24-inch — 250 pounds steam
 1 to 12-inch — 400 pounds cold water, oil, or gas, non-shock
 14 to 24-inch — 350 pounds cold water, oil, or gas, non-shock

Pages 283 to 288 illustrate Crane 250-Pound Cast Iron Flanged Fittings. They are recommended for the pressures shown above. For higher pressures and for high temperature service, Crane Cast Steel Fittings are recommended; see pages 343 to 350.

American Standard: The dimensions and drilling of these fittings conform to the 250-Pound American Cast Iron Flanged Fitting Standard (B16b-1928).

Materials: Except laterals, all fittings sizes 10-inch and smaller are made of cast iron, and larger sizes, of Ferrosteeel. Laterals 6-inch and smaller are cast iron, and larger sizes, Ferrosteeel.

Larger sizes: Fittings larger than 24-inch are made to order of a design suitable for the pressure intended, retaining the American Standard center to face dimensions, flange dimensions, and drilling.

Facing: The flanges have a $\frac{1}{16}$ -inch raised face. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish. Fittings with male, female, tongue, or groove faces can be made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Drilling: Fittings are furnished faced and drilled unless ordered faced only. The bolt holes on drilled fittings straddle the center lines unless otherwise ordered, in which case a sketch should accompany the order.

For bolts smaller than $1\frac{3}{4}$ -inch diameter, the bolt holes are drilled $\frac{1}{8}$ -inch larger than the diameter of the bolts; for bolts $1\frac{3}{4}$ -inch diameter and larger, $\frac{1}{4}$ -inch larger than the diameter of the bolts.

Side Outlet Elbows: All openings are on the intersecting center lines.

Reducing Side Outlet Elbows are regularly made reduced only on the side outlet. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Double Branch Elbows: In describing Double Branch Elbows, the branches are named first, and then the outlet.

Reducing Double Branch Elbows are regularly made reduced only on the branches, with both branches the same size. Other reductions are made to order only; orders should be accompanied by a sketch showing the size and location of all openings; prices on application.

Base Elbows: The base on Base Elbows is neither faced nor drilled unless so ordered.

Round bases, when drilled, will be drilled to the template of the flange corresponding to the size of the supporting pipe.

Special Angle Elbows: Elbows from 1° to 45° have the same center to face dimensions as 45° Elbows; 46° to 90° , the same center to face dimensions as 90° Elbows. These fittings are made to order only.

Single Sweep Tees: Single Sweep Tees with the outlet larger than the run are made to order only. Prices and dimensions on application.

Double Sweep Tees: Double Sweep Tees reduced on the run are made to order only. Prices and dimensions on application.

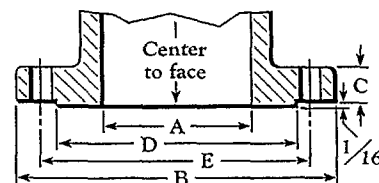
Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for Reducing Side Outlet Tees should be accompanied by a sketch showing the size and location of all openings.

Base Tees: Base Tees are made to order only; prices on application. The dimensions of the base are the same as for Base Elbows.

45° Laterals: Reducing 45° Laterals with the outlet larger than the run are entirely special. Prices and dimensions on application.

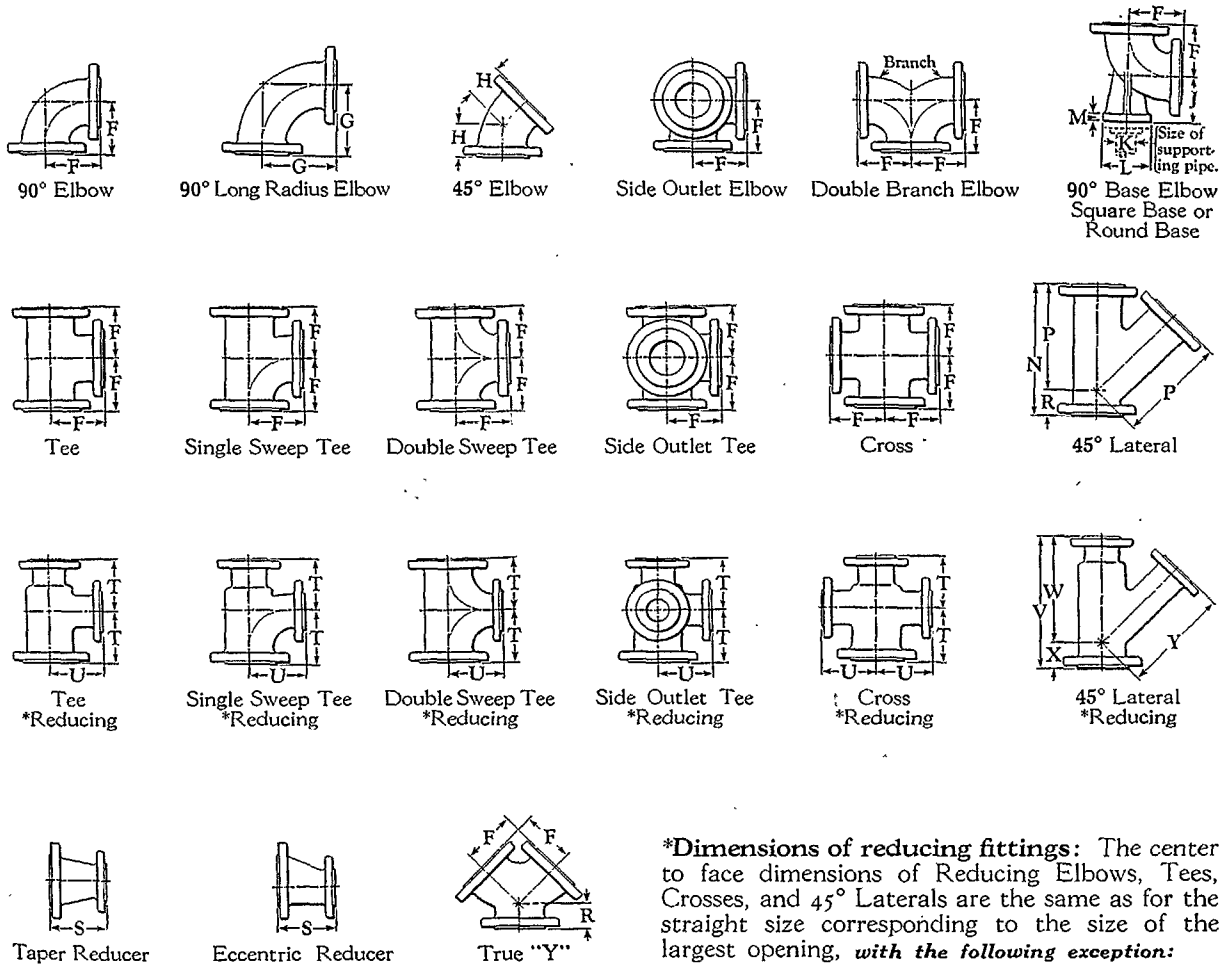
Dimensions of Flanges, in Inches



Size	A	B	C	D	E	No. of bolts	Dia. of bolts
1	1	4 $\frac{7}{8}$	1 $\frac{1}{16}$	2 $\frac{11}{16}$	3 $\frac{1}{2}$	4	$\frac{5}{8}$
1 $\frac{1}{4}$	1 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{3}{4}$	3 $\frac{1}{16}$	3 $\frac{7}{8}$	4	$\frac{5}{8}$
1 $\frac{1}{2}$	1 $\frac{1}{2}$	6 $\frac{1}{8}$	1 $\frac{3}{16}$	3 $\frac{9}{16}$	4 $\frac{1}{2}$	4	$\frac{3}{4}$
2	2	6 $\frac{1}{2}$	$\frac{7}{8}$	4 $\frac{3}{16}$	5	8	$\frac{5}{8}$
2 $\frac{1}{2}$	2 $\frac{1}{2}$	7 $\frac{1}{2}$	1	4 $\frac{5}{16}$	5 $\frac{7}{8}$	8	$\frac{3}{4}$
3	3	8 $\frac{1}{4}$	1 $\frac{1}{8}$	5 $\frac{11}{16}$	6 $\frac{3}{8}$	8	$\frac{3}{4}$
3 $\frac{1}{2}$	3 $\frac{1}{2}$	9	1 $\frac{3}{16}$	6 $\frac{5}{16}$	7 $\frac{1}{4}$	8	$\frac{3}{4}$
4	4	10	1 $\frac{1}{4}$	6 $\frac{15}{16}$	7 $\frac{7}{8}$	8	$\frac{3}{4}$
5	5	11	1 $\frac{3}{8}$	8 $\frac{5}{16}$	9 $\frac{1}{4}$	8	$\frac{3}{4}$
6	6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	9 $\frac{11}{16}$	10 $\frac{5}{8}$	12	$\frac{3}{4}$
8	8	15	1 $\frac{5}{8}$	11 $\frac{5}{16}$	13	12	$\frac{7}{8}$
10	10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	14 $\frac{1}{16}$	15 $\frac{1}{4}$	16	1
12	12	20 $\frac{1}{2}$	2	16 $\frac{7}{16}$	17 $\frac{3}{4}$	16	1 $\frac{1}{8}$
14	13 $\frac{3}{4}$	23	2 $\frac{1}{8}$	18 $\frac{5}{16}$	20 $\frac{1}{4}$	20	1 $\frac{1}{8}$
16	15 $\frac{1}{4}$	25 $\frac{1}{2}$	2 $\frac{1}{4}$	21 $\frac{1}{16}$	22 $\frac{1}{2}$	20	1 $\frac{1}{4}$
18	17	28	2 $\frac{3}{8}$	23 $\frac{5}{16}$	24 $\frac{3}{4}$	24	1 $\frac{1}{4}$
20	19	30 $\frac{1}{2}$	2 $\frac{1}{2}$	25 $\frac{9}{16}$	27	24	1 $\frac{1}{4}$
24	23	36	2 $\frac{3}{4}$	30 $\frac{5}{16}$	32	24	1 $\frac{1}{2}$
30	29	43	3	37 $\frac{3}{16}$	39 $\frac{1}{4}$	28	1 $\frac{3}{4}$

250-Pound Cast Iron Flanged Fittings

Dimensions, in Inches



***Dimensions of reducing fittings:** The center to face dimensions of Reducing Elbows, Tees, Crosses, and 45° Laterals are the same as for the straight size corresponding to the size of the largest opening, **with the following exception:**

Exception: In sizes 18-inch and larger, if the outlet of a Reducing Tee, Cross, or 45° Lateral is the size given in the table below, or is smaller, use the "Short Body" dimensions shown below.

The face to face dimension of Reducers is governed by the size of the larger opening, regardless of the size of the smaller opening.

Size	F	FF	G	H	J	K	L	M	N	P	R	S
1	4	8	5	2	3 3/4	3/4	4	5/8	8 1/2	6 1/2	2	
1 1/4	4 1/4	8 1/2	5 1/2	2 1/2	4	3/4	4	5/8	9 1/2	7 1/4	2 1/4	
1 1/2	4 1/2	9	6	2 3/4	4 1/8	1	4 7/8	11 1/16	11	8 1/2	2 1/2	
2	5	10	6 1/2	3	4 1/2	1 1/4	5 1/4	3/4	11 1/2	9	2 1/2	5
2 1/2	5 1/2	11	7	3 1/2	4 3/4	1 1/4	5 1/4	3/4	13	10 1/2	2 1/2	5 1/2
3	6	12	7 3/4	3 1/2	5 1/4	1 1/2	6 1/8	13/16	14	11	3	6
3 1/2	6 1/2	13	8 1/2	4	5 5/8	1 1/2	6 1/8	13/16	15 1/2	12 1/2	3	6 1/2
4	7	14	9	4 1/2	6	2	6 1/2	7/8	16 1/2	13 1/2	3	7
5	8	16	10 1/4	5	6 3/4	2 1/2	7 1/2	1	18 1/2	15	3 1/2	8
6	8 1/2	17	11 1/2	5 1/2	7 1/2	2 1/2	7 1/2	1	21 1/2	17 1/2	4	9
8	10	20	14	6	9	4	10	1 1/4	25 1/2	20 1/2	5	11
10	11 1/2	23	16 1/2	7	10 1/2	4	10	1 1/4	29 1/2	24	5 1/2	12
12	13	26	19	8	12	6	12 1/2	1 7/16	33 1/2	27 1/2	6	14
14	15	30	21 1/2	8 1/2	13 1/2	6	12 3/2	1 7/16	37 1/2	31	6 1/2	16
16	16 1/2	33	24	9 1/2	14 3/4	6	12 1/2	1 7/16	42	34 1/2	7 1/2	18
18	18	36	26 1/2	10	16 1/4	8	15	1 5/8	45 1/2	37 1/2	8	19
20	19 1/2	39	29	10 1/2	17 7/8	8	15	1 5/8	49	40 1/2	8 1/2	20
24	22 1/2	45	34	12	20 3/4	10	17 1/2	1 7/8	57 1/2	47 1/2	10	24
30	27 1/2	55	41 1/2	15								30

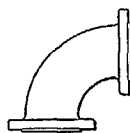
Short Body Reducing Fittings									
Tees and Crosses					45° Laterals				
Size	Size of outlet and smaller	T	TT	U	Size	Size of outlet and smaller	V	W	X Y
18	12	14	28	17	18	8	34	31	3 32 1/2
20	14	15 1/2	31	18 1/2	20	10	37	34	3 36
24	16	17	34	21 1/2	24	12	44	41	3 43
30	20	20 1/2	41	25 1/2					

250-Pound Cast Iron Flanged Fittings

For working pressures, see page 282.



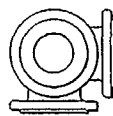
90° Elbow
No. 101 E
Straight



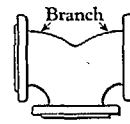
90° Long Radius Elbow
No. 127 E
Straight



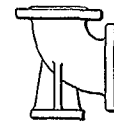
45° Elbow
No. 103 E
Straight



Side Outlet Elbow
No. 131 E, Straight
*No. 133 E, Reducing



Double Branch Elbow
No. 139 E, Straight
†No. 141 E, Reducing



90° Base Elbow
No. 125 E, Square Base
No. 125½ E, Round Base

List Prices, Each

Size Inches	90° Elbows		90° Long Radius Elbows		45° Elbows		90° Base Elbows		
	No. 101 E Straight		No. 127 E Straight		No. 103 E Straight		No. 125 E, with Square Base No. 125½ E, with Round Base		
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced except Base	Faced and Drilled except Base	Facing and Drilling Base
1	4.50	5.40	7.50	8.85	5.00	5.90			
1¼	4.50	5.40	7.50	8.85	5.00	5.90			
1½	4.50	5.40	7.50	8.85	5.00	5.90			
2	4.50	5.40	7.50	8.85	5.00	5.90			
2½	4.75	5.65	8.00	9.35	5.25	6.15			
3	5.15	6.25	8.60	10.25	5.65	6.75			
3½	6.10	7.35	10.25	12.15	6.75	8.00			
4	6.75	8.25	11.25	13.50	7.50	9.00	13.50	15.00	4.50
5	9.35	10.85	15.50	17.75	10.35	11.85	18.75	20.25	5.25
6	11.40	13.40	19.00	22.00	12.50	14.50	22.75	24.75	5.25
8	18.00	20.50	30.00	33.75	19.00	21.50	36.00	38.50	7.50
10	28.50	32.50	47.75	53.75	30.00	34.00	57.00	61.00	7.50
12	42.00	46.50	70.00	76.75	44.00	48.50	84.00	88.50	11.00
14	62.00	67.50	103.50	111.75	62.00	67.50	105.00	110.50	11.00
16	82.00	90.00	137.00	149.00	82.00	90.00	135.00	143.00	11.00
18	106.00	115.00	177.00	191.00	106.00	115.00			
20	135.00	145.00	225.00	240.00	135.00	145.00			
24	210.00	225.00			210.00	225.00			

Size Inches	Side Outlet Elbows				Double Branch Elbows			
	No. 131 E Straight		No. 133 E *Reducing		No. 139 E Straight		No. 141 E †Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
4	35.75	38.00	39.75	42.00	35.75	38.00	39.75	42.00
5	37.75	40.00	41.75	44.00	42.75	45.00	47.75	50.00
6	42.00	45.00	47.00	50.00	49.50	52.50	54.50	57.50
8	61.25	65.00	67.25	71.00	66.25	70.00	73.75	77.50
10	89.00	95.00	99.00	105.00	84.00	90.00	94.00	100.00
12	113.25	120.00	123.25	130.00	108.25	115.00	118.25	125.00
14	146.75	155.00	161.75	170.00	141.75	150.00	156.75	165.00
16	168.00	180.00	183.00	195.00	168.00	180.00	188.00	200.00

*Side Outlet Elbows: The outlet is on the intersecting center lines.

"Reducing" list prices apply to elbows reduced only on the side outlet. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

†Double Branch Elbows: "Reducing" list prices apply only to elbows reduced on the branches, and with both branches the same size. Other reductions are entirely special, and orders should be accompanied by a sketch; prices on application.

In describing Double Branch Elbows, the branch openings are named first, then the outlet.

Larger sizes: Larger sizes are made to order; prices on request.

Dimensions.....pages 282 and 283 Special facings.....page 560

Materials: All fittings shown on this page sizes 10-inch and smaller are cast iron; larger sizes are Ferrosteeel.

Drilling: The end flanges on these fittings are furnished faced and drilled unless ordered faced only.

The base on Base Elbows is neither faced nor drilled unless so ordered.

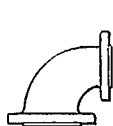
Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Male, female, tongue, or groove faces can be made to order. See page 560 for dimensions and the Crane Discount Sheet for prices.

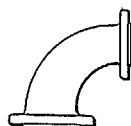
Spot facing: 250-Pound Fittings are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

Bolting on Companion Flanges.....page 557
Galvanized Flanged Fittings.....page 572
Templates for drilling.....page 552

250-Pound Cast Iron Flanged Fittings



No. 121 E
90° Elbow
*Reducing



No. 122 E
90° Long Radius Elbow
*Reducing

For working pressures,
see page 282.



No. 123 E
*Taper Reducer



No. 123 1/2 E
*Eccentric Reducer

List Prices, Each

Size Inches	90° Elbows		90° Long Radius Elbows		Reducers			
	No. 121 E *Reducing		No. 122 E *Reducing		No. 123 E *Taper		No. 123 1/2 E *Eccentric	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1 1/2	9.00	9.90						
2	9.00	9.90			9.00	9.90		
2 1/2	9.50	10.40	16.00	17.35	9.50	10.40	9.50	10.40
3	10.25	11.35	17.20	18.85	10.25	11.35	10.25	11.35
3 1/2	12.25	13.50	20.50	22.40	12.25	13.50		
4	13.50	15.00	22.50	24.75	13.50	15.00	13.50	15.00
5	18.75	20.25	31.00	33.25	18.75	20.25	18.75	20.25
6	22.75	24.75	38.00	41.00	22.75	24.75	22.75	24.75
8	36.00	38.50	60.00	63.75	36.00	38.50	36.00	38.50
10	57.00	61.00	95.50	101.50	57.00	61.00	57.00	61.00
12	84.00	88.50	140.00	146.75	84.00	88.50	84.00	88.50
14	105.00	110.50	207.00	215.25	105.00	110.50		
16	135.00	143.00	274.00	286.00	135.00	143.00		
18					157.00	166.00		
20					180.00	190.00		
24					285.00	300.00		

*List prices of Reducing Elbows and Reducers apply only to the reductions shown below. Other reductions are entirely special; prices on application.

No. 121 E 90° Elbows		No. 122 E 90° Elbows Long Radius		No. 123 E Reducers			No. 123 1/2 E Eccentric Reducers	
1 1/2 x 1 1/4	6 x 5	2 1/2 x 2	2 1/2 x 1 1/2	2 x 1 1/2	6 x 5	14 x 12	2 1/2 x 2	8 x 6
2 x 1 1/2	6 x 4	2 1/2 x 1 1/2	2 1/2 x 2	2 1/2 x 2	6 x 4	14 x 10	3 x 2 1/2	8 x 5
2 x 1 1/4	6 x 3 1/2	3 x 2 1/2	3 x 2 1/2	3 x 2 1/2	6 x 3 1/2	14 x 8	3 x 2	8 x 4
2 1/2 x 2	6 x 3	3 x 2	3 x 2	3 x 2	6 x 3	14 x 6	4 x 3 1/2	8 x 3 1/2
2 1/2 x 1 1/2	6 x 2 1/2	3 1/2 x 2 1/2	3 1/2 x 3	3 1/2 x 3	6 x 2 1/2	16 x 14	4 x 3	8 x 3
2 1/2 x 1 1/4	6 x 2	3 1/2 x 2 1/2	3 1/2 x 2 1/2	3 1/2 x 2 1/2	6 x 2	16 x 12	4 x 2 1/2	10 x 8
3 x 2 1/2	8 x 6	4 x 3 1/2	4 x 3	4 x 3 1/2	8 x 6	16 x 10	4 x 2	10 x 6
3 x 2	8 x 5	4 x 3	5 x 4	4 x 3 1/2	8 x 5	16 x 8	5 x 4	10 x 5
3 x 1 1/2	8 x 5	5 x 3	5 x 3	4 x 3	8 x 4	18 x 16	5 x 3 1/2	10 x 4
3 x 1 1/4	8 x 4	5 x 4	6 x 5	4 x 2 1/2	8 x 3 1/2	18 x 14	5 x 3	12 x 10
3 1/2 x 3	8 x 3	6 x 5	6 x 4	4 x 2	8 x 3	18 x 12	5 x 2 1/2	12 x 8
3 1/2 x 2 1/2	10 x 8	6 x 4	6 x 3	5 x 4	10 x 8	18 x 10	5 x 2	12 x 6
3 1/2 x 2	10 x 6	8 x 6	8 x 5	5 x 3 1/2	10 x 6	20 x 18	6 x 5	12 x 5
3 1/2 x 1 1/2	10 x 5	8 x 5	8 x 4	5 x 3	10 x 5	20 x 16	6 x 4	
3 1/2 x 1 1/4	10 x 4	8 x 4	10 x 8	5 x 2 1/2	10 x 4	20 x 14	6 x 3 1/2	
4 x 3 1/2	12 x 10	10 x 8	12 x 12	5 x 2	12 x 10	20 x 12	6 x 3	
4 x 3	12 x 8	10 x 6	12 x 10		12 x 8	24 x 20		
4 x 2 1/2	12 x 6	10 x 5	12 x 8		12 x 6	24 x 18		
4 x 2	12 x 5	10 x 4	12 x 6		12 x 5	24 x 16		
4 x 1 1/2	14 x 12	12 x 10	14 x 14					
5 x 4	14 x 10	12 x 8	16 x 14					
5 x 3 1/2	14 x 6	12 x 6	16 x 12					
5 x 3	16 x 14	14 x 12	16 x 10					
5 x 2 1/2	16 x 12	16 x 14	16 x 8					

Materials: All fittings shown on this page sizes 10-inch and smaller are cast iron; larger sizes are Ferrosteeel.

Larger sizes: Larger sizes are made to order. Prices on application.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Cast Iron Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

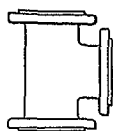
Fittings with male, female, tongue, or groove faces can be made to order. See page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: 250-Pound Fittings are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

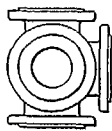
Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges; specify "Reduce with flanges if necessary". For reducing flanges, see page 295.

250-Pound Cast Iron Flanged Fittings

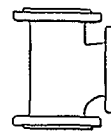
For working pressures,
see page 282.



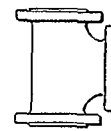
Tee
No. 105 E, Straight
*No. 107 E, Reducing



Side Outlet Tee
No. 135 E, Straight
No. 137 E, Reducing



Single Sweep Tee
No. 109 E, Straight
*No. 111 E, Reducing



Double Sweep Tee
No. 112 E, Straight
*No. 112½ E, Reducing

List Prices, Each

Size Inches	Tees				Single Sweep Tees				Double Sweep Tees			
	No. 105 E Straight		No. 107 E *Reducing		No. 109 E Straight		No. 111 E *Reducing		No. 112 E Straight		No. 112½ E *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1	6.50	7.85										
1¼	6.50	7.85	7.50	8.85								
1½	6.50	7.85	7.50	8.85								
2	6.50	7.85	7.50	8.85	7.50	8.85			7.50	8.85		
2½	6.90	8.25	8.00	9.35	8.00	9.35	9.15	10.50	8.00	9.35	9.15	10.50
3	7.50	9.15	8.60	10.25	8.60	10.25	9.90	11.55	8.60	10.25	9.90	11.55
3½	8.90	10.80	10.25	12.15	10.25	12.15	11.75	13.65	10.25	12.15	11.75	13.65
4	9.75	12.00	11.25	13.50	11.25	13.50	13.00	15.25	11.25	13.50	13.00	15.25
5	13.50	15.75	15.50	17.75	15.50	17.75	17.85	20.10	15.50	17.75	17.85	20.10
6	16.50	19.50	19.00	22.00	19.00	22.00	22.00	25.00	19.00	22.00	22.00	25.00
8	26.00	29.75	30.00	33.75	30.00	33.75	34.50	38.25	30.00	33.75	34.50	38.25
10	41.50	47.50	47.75	53.75	47.75	53.75	55.00	61.00	47.75	53.75	55.00	61.00
12	61.00	67.75	70.00	76.75	70.00	76.75	80.00	86.75	70.00	76.75	80.00	86.75
14	90.00	98.25	103.50	111.75	103.50	111.75	119.00	127.25	103.50	111.75	119.00	127.25
16	119.00	131.00	137.00	149.00	137.00	149.00	158.00	170.00	137.00	149.00	158.00	170.00
18	154.00	168.00	177.00	191.00	177.00	191.00	204.00	218.00	177.00	191.00	204.00	218.00
20	195.00	210.00	225.00	240.00	225.00	240.00	260.00	275.00	225.00	240.00	260.00	275.00
24	305.00	328.00	350.00	373.00	350.00	373.00	402.00	425.00	350.00	373.00	402.00	425.00

Size Inches	Side Outlet Tees			
	No. 135 E Straight		No. 137 E Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled
4	42.00	45.00	47.00	50.00
5	47.00	50.00	52.00	55.00
6	53.50	57.50	59.00	63.00
8	72.50	77.50	80.00	85.00
10	102.00	110.00	112.00	120.00
12	131.00	140.00	146.00	155.00
14	159.00	170.00	174.00	185.00
16	184.00	200.00	204.00	220.00

*Reducing sizes: List prices of No. 107 E, No. 111 E, and No. 112½ E Reducing Tees apply to sizes carried in stock, shown on the opposite page. Sizes not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See the opposite page for price advances.

Larger sizes: Larger sizes are made to order; prices on application.

Materials: All fittings shown on this page sizes 10-inch and smaller are cast iron; larger sizes are Ferrosteeel.

Single Sweep Tees: No. 111 E Single Sweep Tees with the outlet larger than the run are entirely special. Prices and dimensions on application.

Double Sweep Tees: No. 112½ E Tees reduced on the run are entirely special. Prices and dimensions on application.

Double Sweep Tees with the outlet larger than the run can be made with only a reasonable increase in the size of the outlet.

Side Outlet Tees: Orders for No. 137 E Reducing Side Outlet Tees should be accompanied by a drawing showing the size and location of all openings.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a ⅛-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

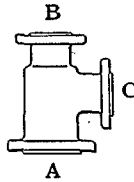
Fittings with male, female, tongue, or groove faces can be made to order. See page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: 250-Pound Fittings are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

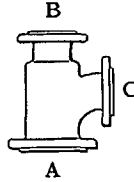
Templates for drilling... page 552 Special facings... page 560

250-Pound Cast Iron Flanged Fittings

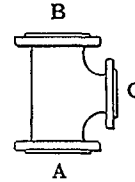
Reducing Flanged Tees Carried in Stock



No. 107 E
Reducing Tee



No. 111 E
Single Sweep Reducing Tee



No. 112 1/2 E
Double Sweep Reducing Tee

No. 107 E, No. 111 E, and No. 112 1/2 E Tees are carried in stock in the sizes shown below; these are furnished at the regular "Reducing" prices. Sizes

not carried in stock are made to order, at an advance in price depending upon the quantity of a size ordered at one time. See table below for price advances.

No. 107 E Tees				No. 111 E Single Sweep Tees				No. 112 1/2 E Double Sweep Tees			
A	B	C		A	B	C		A	B	C	
2 1/2 x 2 1/2 x 2			5 x 5 x 4	8 x 8 x 6	12 x 12 x 10		4 x 4 x 2 1/2	4 x 4 x 2 1/2			
2 1/2 x 2 1/2 x 1 1/2			5 x 5 x 3 1/2	8 x 8 x 5	12 x 12 x 8		4 x 4 x 2	4 x 4 x 2			
2 1/2 x 2 1/2 x 1 1/4			5 x 5 x 3	8 x 8 x 4	12 x 12 x 6		6 x 6 x 4	5 x 5 x 4			
2 1/2 x 2 x 2			5 x 5 x 2 1/2	8 x 8 x 3 1/2	12 x 12 x 5		6 x 4 x 4	5 x 5 x 3			
3 x 3 x 2 1/2			5 x 5 x 2	8 x 8 x 3	12 x 12 x 4		8 x 8 x 6	6 x 6 x 4			
3 x 3 x 2			5 x 5 x 1 1/2	8 x 8 x 2 1/2	12 x 12 x 3 1/2		8 x 6 x 6	6 x 6 x 3			
3 x 3 x 1 1/2			5 x 4 x 5	8 x 8 x 2	12 x 12 x 3			8 x 8 x 6			
3 x 3 x 1 1/4			5 x 3 x 5	8 x 6 x 8	12 x 12 x 2 1/2			8 x 8 x 5			
3 x 3 x 1			5 x 2 1/2 x 5	8 x 4 x 8	12 x 10 x 12			8 x 8 x 4			
3 x 2 1/2 x 3			5 x 4 x 4	8 x 3 x 8	12 x 8 x 12						
3 x 2 x 3			5 x 4 x 3	8 x 6 x 6	12 x 10 x 10						
3 x 1 1/2 x 3			5 x 4 x 2 1/2	8 x 6 x 5	12 x 10 x 8						
3 x 1 1/4 x 3			5 x 3 x 4	8 x 6 x 4	12 x 10 x 6						
3 x 2 1/2 x 2 1/2			5 x 3 x 3	8 x 5 x 6	12 x 8 x 8						
3 x 2 x 2			4 x 4 x 5	8 x 5 x 5	12 x 8 x 6						
2 x 2 x 3				8 x 4 x 6	10 x 10 x 12						
				8 x 4 x 4	8 x 8 x 12						
3 1/2 x 3 1/2 x 2 1/2			6 x 6 x 5	6 x 6 x 8	14 x 14 x 12						
3 1/2 x 3 1/2 x 2			6 x 6 x 4	6 x 6 x 8	14 x 14 x 10						
3 1/2 x 2 1/2 x 3 1/2			6 x 6 x 3 1/2	5 x 5 x 8	14 x 14 x 8						
			6 x 6 x 3		14 x 14 x 6						
4 x 4 x 3 1/2			6 x 6 x 2 1/2	10 x 10 x 8	16 x 16 x 14						
4 x 4 x 3			6 x 6 x 2	10 x 10 x 6	16 x 16 x 12						
4 x 4 x 2 1/2			6 x 5 x 6	10 x 10 x 5	16 x 16 x 10						
4 x 4 x 2			6 x 4 x 6	10 x 10 x 4	16 x 16 x 8						
4 x 4 x 1 1/2			6 x 3 x 6	10 x 10 x 3 1/2	16 x 16 x 6						
4 x 3 x 4			6 x 2 1/2 x 6	10 x 10 x 3							
4 x 2 1/2 x 4			6 x 5 x 5	10 x 10 x 2							
4 x 2 x 4			6 x 5 x 4	10 x 8 x 10							
4 x 3 x 3			6 x 5 x 3	10 x 6 x 10							
4 x 3 x 2			6 x 5 x 2 1/2	10 x 8 x 8							
4 x 3 x 1 1/2			6 x 5 x 2	10 x 8 x 6							
4 x 2 1/2 x 2 1/2			6 x 4 x 5	10 x 8 x 5							
4 x 2 x 3			6 x 4 x 4	10 x 6 x 8							
3 x 3 x 4			6 x 4 x 3	10 x 6 x 6							
2 1/2 x 2 1/2 x 4			6 x 3 x 3	8 x 8 x 10							
			5 x 5 x 6								
			4 x 4 x 6								

Price Advances for Non-Stock Sizes
 Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

These price advances do not apply to Single Sweep or Double Sweep Reducing Tees with the outlet larger than the run. Such tees are special; prices on application.

Size	1 to 3½ inch	4 to 8 inch	10 to 24 inch
1 piece	50%	25%	No advance
2 pieces	40%	20%	
3 pieces	30%	15%	
4 pieces	20%	10%	
5 pieces	10%	5%	
6 or more	No advance		

Materials: All fittings shown on this page sizes 10-inch and smaller are made of cast iron; larger sizes are made of Ferrosteeel.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

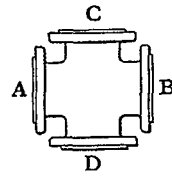
Fittings with male, female, tongue, or groove faces

can be made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: 250-Pound Cast Iron Flanged Fittings are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For reducing flanges, see page 295.

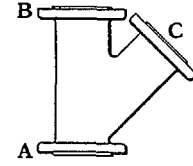
250-Pound Cast Iron Flanged Fittings



Cross

No. 113 E, Straight
*No. 115 E, Reducing

For working pressures,
see page 282.



45° Lateral

No. 117 E, Straight
*No. 119 E, Reducing

List Prices, Each

Size Inches	Crosses				45° Laterals			
	No. 113 E Straight		No. 115 E *Reducing		No. 117 E Straight		No. 119 E *Reducing	
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled
1	10.00	11.80						
1 1/4	10.00	11.80	11.50	13.30				
1 1/2	10.00	11.80	11.50	13.30				
2	10.00	11.80	11.50	13.30	10.00	11.80		
2 1/2	10.50	12.30	12.00	13.80	10.50	12.30	12.00	13.80
3	11.50	13.75	13.25	15.50	11.50	13.75	13.25	15.50
3 1/2	13.50	16.00	15.50	18.00	13.50	16.00	15.50	18.00
4	15.00	18.00	17.00	20.00	15.00	18.00	17.00	20.00
5	20.50	23.50	23.50	26.50	20.50	23.50	23.50	26.50
6	25.00	29.00	29.00	33.00	25.00	29.00	29.00	33.00
8	40.00	45.00	46.00	51.00	40.00	45.00	46.00	51.00
10	63.00	71.00	72.00	80.00	63.00	71.00	72.00	80.00
12	92.00	101.00	106.00	115.00	92.00	101.00	106.00	115.00
14	136.00	147.00	158.00	169.00	136.00	147.00	158.00	169.00
16	180.00	196.00	207.00	223.00	180.00	196.00	207.00	223.00
18	235.00	253.00	270.00	288.00	235.00	253.00	270.00	288.00
20	300.00	320.00	345.00	365.00	300.00	320.00	345.00	365.00
24	465.00	495.00	535.00	565.00	465.00	495.00	535.00	565.00

***Reducing fittings:** List prices of No. 115 E Reducing Crosses and No. 119 E Reducing 45° Laterals apply only to sizes carried in stock, shown below. Sizes not carried in stock are made to order, at the following price advances over "Reducing" list prices, depending upon the quantity of a size ordered at one time.

These price advances do not apply to No. 119 E Reducing 45° Laterals with the outlet larger than the run. Such Laterals are special; prices on application.

Sizes carried in stock				Price advances for non-stock sizes					
No. 115 E Crosses				No. 119 E 45° Laterals		Size	1 to 3½ inch	4 to 8 inch	10 to 24 inch
A	B	C	D	A	B	C	1 piece	50%	25%
3	x 3	x 2½	x 2½	4	x 4	x 2½	2 pieces	40%	20%
4	x 4	x 2½	x 2½	6	x 6	x 2½	3 pieces	30%	15%
6	x 6	x 4	x 4				4 pieces	20%	10%
6	x 6	x 3	x 3				5 pieces	10%	5%
8	x 8	x 6	x 6				6 or more	No advance	
8	x 8	x 5	x 5						
8	x 8	x 4	x 4						

Reducing with flanges: To avoid delays, orders for reducing fittings not carried in stock can be filled by using reducing companion flanges. Orders should specify "Reduce with flanges if necessary". For flanges, see page 295.

Larger sizes: Larger sizes are made to order. Prices are furnished on application.

Materials: Crosses 10-inch and smaller and 45° laterals 6-inch and smaller are made of cast iron; in larger sizes, crosses and laterals are made of Ferrosteeel.

Drilling: These fittings are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Cast Iron Flanged Fittings are regularly furnished with a 1/16-inch raised face on the flanges. The raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Fittings with male, female, tongue, or groove faces can be made to order. See page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: 250-Pound Fittings are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

Bolting on Companion Flanges.....page 557
Galvanized Flanged Fittings.....page 572
Special facings.....page 560
Dimensions.....pages 282 and 283
Templates for drilling.....page 552

Iron Flanges

Common Flanges.....	page 290
Round Floor Flanges.....	page 290
25-Pound Screwed and Blind Flanges.....	page 291
125-Pound Screwed and Blind Flanges.....	pages 292 and 293
250-Pound Screwed and Blind Flanges.....	pages 294 and 295
Galvanized Flanges.....	page 572

The Crane line of Iron Flanges is shown on pages 290 to 295. The Common Flanges, Round Floor Flanges, and 25, 125, and 250-Pound Screwed and Blind Flanges are made of Cast Iron or of Ferrosteel. Round Floor Flanges and 125-Pound Screwed Flanges also are made of Crane Malleable Iron, a rugged, tough material having high tensile strength. For description of these materials, see page 4.

Crane Flanges are accurately machined and finished, special care being exercised in the threading operation to assure having flange faces at right angles to the run of the pipe line.

Crane piping materials also include iron flanged fittings, brass flanges and flanged fittings, and a wide assortment of forged steel flanges and of cast steel flanged fittings for severe or high pressure-temperature service. Information on these and other related products is shown on the pages referred to below:

Iron Flanged Fittings.....	pages 273 to 288
Iron Flange Unions.....	pages 249 to 252
Forged Steel Flanges.....	pages 361 to 367
Cast Steel Flanged Fittings.....	pages 343 to 350
Welding Fittings.....	pages 351 to 360
Brass Flanges and Flanged Fittings.....	page 264
Brass Flange Unions.....	page 263
Brass Floor Flanges.....	page 267

Cast Iron Common Flanges



No. 521, Cast Iron Common Flange

Galvanized Flanges

Cast Iron Common Flanges can be furnished galvanized at double the list prices of black flanges.

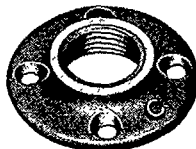
Common Flanges are neither faced nor drilled. When wanted drilled, orders must specify size and number of holes, and the diameter of the bolt circle. An extra charge is made for drilling.

These flanges are intended for structural work and not for pressure service on pipe lines.

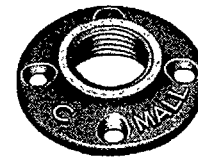
List Prices

Size	No. 521 Black	Size	No. 521 Black
Inches	Each	Inches	Each
1 1/4 x 5	.30	2 x 8	.90
1 1/2 x 5		2 1/2 x 8	
1 1/4 x 6	.40	3 x 8	
2 x 6		3 1/2 x 8	
2 1/2 x 6	.42	4 x 8	1.00
2 1/2 x 6 1/2		3 1/2 x 8 1/2	
3 x 6 1/2	.50	4 x 9	1.15
2 x 7		4 x 10	1.50
2 1/2 x 7	.62	5 x 10	
3 x 7		6 x 11	1.75
3 x 7 1/2	.75	8 x 13 1/2	2.80

Cast Iron or Malleable Iron Round Floor Flanges



Cast Iron Floor Flange



Malleable Iron Floor Flange

Floor Flanges are cast with countersunk holes for screws and are not faced.

List Prices and Dimensions

Size	Cast Iron Round Floor Flanges						Malleable Iron Round Floor Flanges					
	List Prices		Dimensions, in Inches				List Prices		Dimensions, in Inches			
	Black	Galv.	Flange thickness A	Hub length B	Bolt circle C	No. and dia. of holes	Black	Galv.	Flange thickness A	Hub length B	Bolt circle C	No. and dia. of holes
Inches	Each	Each					Each	Each				
1/4 x 2 13/16	.10	.20	7/32	1/2	1 1/8	4-1/4						
3/8 x 3	.10	.20	7/32	7/16	2	4-1/4						
1/2 x 3 1/2	.15	.30	9/32	9/16	2 1/2	4-1/4	.15	.30	9/32	9/16	2 1/2	4-1/4
3/4 x 3 1/2	.15	.30	5/16	5/8	2 1/2	4-1/4	.15	.30	5/16	5/8	2 1/2	4-1/4
1 x 4	.16	.32	11/32	11/16	3	4-1/4	.16	.32	11/32	11/16	3	4-1/4
1 1/4 x 4	.16	.32	11/32	3/4	3	4-1/4	.16	.32	11/32	3/4	3	4-1/4
1 1/2 x 4 1/2	.22	.44	3/8	7/8	3 1/2	4-5/16	.22	.44	3/8	7/8	3 1/2	4-5/16
2 x 5 1/2	.35	.70	13/32	1	4 1/4	4-5/16	.35	.70	13/32	1	4 1/4	4-5/16

25-Pound Cast Iron Flanges

WORKING PRESSURES

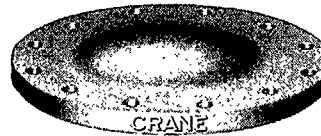
25 pounds steam or cold gas — 43 pounds cold water or oil, non-shock



Screwed Flange
No. 583, Cast Iron



16 inches O.D. and smaller
Blind Flange—No. 584, Cast Iron



Reducing Screwed Flange
No. 583 1/2, Cast Iron

List Prices, Each

Size of pipe Inches	No. 583 Screwed		No. 584 Blind		No. 583½, Reducing Screwed									
	Faced	Faced and Drilled	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	
5	1.60	2.05	2.40	2.85	1½ x 10	2.65	3.10	1½ x 16	7.45	8.45	4 x 21	15.00	16.35	
6	2.00	2.50	3.00	3.50	2 x 10			2 x 16			5 x 21			
8	3.10	3.80	4.60	5.30	2½ x 10			2½ x 16			6 x 21			
10	4.50	5.50	6.75	7.75	3 x 10			3 x 16			8 x 21			
12	6.50	7.65	9.75	10.90	3½ x 10			3½ x 16			10 x 21			
14 OD	9.00	10.35	13.50	14.85	4 x 10	3.30	3.80	4 x 16	10.75	11.90	12 x 21	22.00	23.80	
16 OD	13.50	15.30	20.00	21.80	1½ x 11			5 x 16			6 x 23½			
18 OD	16.00	18.00	24.00	26.00	2 x 11			6 x 16			8 x 23½			
20 OD	19.00	21.50	28.00	30.50	2½ x 11			8 x 16			10 x 23½			
24 OD	27.00	30.50	40.00	43.50	3 x 11			1½ x 19			12 x 23½			
					3½ x 11			2 x 19			14 x 23½			
					4 x 11			2½ x 19			6 x 25			
					5 x 11			3 x 19			8 x 25			
					1½ x 13½			3½ x 19			10 x 25			
					2 x 13½			4 x 19			12 x 25			
					2½ x 13½	5 x 19	14 x 25							
					3 x 13½	6 x 19	16 x 25							
					3½ x 13½	8 x 19	14 x 27½							
					4 x 13½	10 x 19	16 x 27½							
					5 x 13½		18 x 27½							
					6 x 13½		14 x 32							
							16 x 32							
							18 x 32							
							20 x 32							

Drilling: 25-Pound Flanges are regularly furnished faced and drilled unless ordered faced only.

Facing: The flanges are plain faced, with a smooth finish.

Spot facing: Cast iron flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing is 10 cents per hole.

Drilling: 25-Pound Flanges are regularly furnished faced and drilled unless ordered faced only.

Facing: The flanges are plain faced, with a smooth finish.

Spot facing: Cast iron flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing is 10 cents per hole.

25-Pound Flanges: 25-Pound Cast Iron Flanges (sizes 5 to 24-inch inclusive) are the same as 125-Pound Cast Iron Flanges except that they have smaller bolt holes. When sizes smaller than 5-inch are required, use 125-Pound Flanges; see pages 292 and 293. Prices and dimensions of sizes larger than 24-inch are furnished on application.

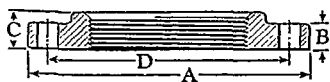
American Standard: The dimensions of these flanges conform to the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931). As

specified in the Standard, the thickness of the flanges is the same as the thickness of 125-Pound Cast Iron Flanges.

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 25-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered

6" x 16" Reducing Flange.

Dimensions, in Inches



Templates for drilling
page 551

Size of pipe	5	6	8	10	12	14 OD	16 OD	18 OD	20 OD	24 OD
A	10	11	13 1/2	16	19	21	23 1/2	25	27 1/2	32
B	1 5/16	1	1 1/8	1 3/16	1 1/4	1 3/8	1 7/16	1 9/16	1 11/16	1 7/8
C	1 7/16	1 9/16	1 3/4	1 5/16	2 3/16	2 1/4	2 1/2	2 11/16	2 7/8	3 1/4
D	8 1/2	9 1/2	11 3/4	14 1/4	17	18 3/4	21 1/4	22 3/4	25	29 1/2
No. of bolts	8	8	8	12	12	12	16	16	20	20
Dia. of bolts	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	3/4	3/4

125-Pound Cast Iron or Malleable Iron Flanges



Screwed Flange
No. 553, *Cast Iron
No. 559, Malleable Iron

WORKING PRESSURES

1 to 36-inch — 125 pounds steam
1 to 12-inch — 175 pounds cold water, oil, or gas, non-shock
14 to 36-inch — 150 pounds cold water, oil, or gas, non-shock



16 inches O.D. and smaller



19 inches O.D. and larger

Blind Flange
No. 555, *Cast Iron



List Prices and Dimensions

Size of pipe	List Prices, Each						Dimensions, in Inches					
	Screwed Flanges				Blind Flanges		A	B	C	D	No. of Bolts	Dia. of Bolts
	No. 553 *Cast Iron		No. 559 Malleable Iron		No. 555 *Cast Iron							
	Faced	Faced and Drilled	Faced	Faced and Drilled	Faced	Faced and Drilled						
Inches												
1	.55	.80			.85	1.10	4 1/4	7/16	1 1/16	3 1/8	4	1/2
1 1/4	.60	.85			.90	1.15	4 5/8	1/2	1 3/16	3 1/2	4	1/2
1 1/2	.65	.90			1.00	1.25	5	9/16	7/8	3 7/8	4	1/2
2	.75	1.00	1.50	1.75	1.15	1.40	6	5/8	1	4 3/4	4	5/8
2 1/2	.85	1.10	1.70	1.95	1.30	1.55	7	1 1/16	1 3/16	5 1/2	4	5/8
3	.95	1.25	1.90	2.20	1.40	1.70	7 1/2	3/4	1 1/4	6	4	5/8
3 1/2	1.20	1.55	2.40	2.75	1.80	2.15	8 1/2	1 3/16	1 1/4	7	8	5/8
4	1.35	1.80	2.70	3.15	2.00	2.45	9	1 5/16	1 5/16	7 1/2	8	5/8
5	1.60	2.05	3.20	3.65	2.40	2.85	10	1 5/16	1 7/16	8 1/2	8	3/4
6	2.00	2.50	4.00	4.50	3.00	3.50	11	1	1 9/16	9 1/2	8	3/4
8	3.10	3.80	6.20	6.90	4.60	5.30	13 1/2	1 1/8	1 3/4	11 3/4	8	3/4
10	4.50	5.50	9.00	10.00	6.75	7.75	16	1 3/16	1 15/16	14 1/4	12	7/8
12	6.50	7.65	13.00	14.15	9.75	10.90	19	1 1/4	2 3/16	17	12	7/8
14 OD	9.00	10.35			13.50	14.85	21	1 3/8	2 1/4	18 3/4	12	1
16 OD	13.50	15.30			20.00	21.80	23 1/2	1 7/16	2 1/2	21 1/4	16	1
18 OD	16.00	18.00			24.00	26.00	25	1 9/16	2 11/16	22 3/4	16	1 1/8
20 OD	19.00	21.50			28.00	30.50	27 1/2	1 11/16	2 7/8	25	20	1 1/8
24 OD	27.00	30.50			40.00	43.50	32	1 7/8	3 1/4	29 1/2	20	1 1/4
30 OD					90.00	100.00	38 3/4	2 1/8		36	28	1 1/4
36 OD					137.50	150.00	46	2 3/8		42 3/4	32	1 1/2

***Materials:** The No. 553 and No. 555 Flanges sizes 12-inch and smaller are made of cast iron; larger sizes are regularly made of Ferrosteeel, to conform to the American Standard.

Drilling: 125-Pound Flanges are furnished faced and drilled unless ordered faced only.

Facing: These flanges are plain faced, with a smooth finish.

Spot facing: Cast iron or malleable iron flanges are not spot faced unless so ordered, and then at an extra price.

The list price for spot facing bolt holes is 10 cents per hole.

American Standard: The dimensions of these flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

125-Pound Cast Iron Reducing Flanges

WORKING PRESSURES

5 to 32-inch O.D. — 125 pounds steam
5 to 19-inch O.D. — 175 pounds cold water, oil, or gas, non-shock
21 to 32-inch O.D. — 150 pounds cold water, oil, or gas, non-shock



Reducing Screwed Flange.
No. 557, *Cast Iron



Eccentric Reducing Screwed Flange
Prices on application

List Prices, No. 557, Each

Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled
1 x 5	1.15	1.40	1½ x 10	2.65	3.10	1½ x 16	7.45	8.45	4 x 21	15.00	16.35
1¼ x 5			2 x 10			2 x 16			5 x 21		
1 x 6			2½ x 10			2½ x 16			6 x 21		
1¼ x 6			3 x 10			3 x 16			8 x 21		
1½ x 6	1.45	1.70	3½ x 10	3.30	3.80	3½ x 16	10.75	11.90	10 x 21	22.00	23.80
1½ x 7			4 x 10			4 x 16			12 x 21		
2 x 7			1½ x 11			5 x 16			6 x 23½		
1 x 7½			2 x 11			6 x 16			8 x 23½		
1¼ x 7½	1.55	1.85	2½ x 11	5.10	5.80	8 x 16	10.75	11.90	10 x 23½	26.50	28.50
1½ x 7½			3 x 11			1½ x 19			12 x 23½		
2 x 7½			3½ x 11			2 x 19			14 x 23½		
2½ x 7½			4 x 11			2½ x 19			6 x 25		
1½ x 8½	2.00	2.35	5 x 11			3 x 19			8 x 25	31.00	33.50
2 x 8½			1½ x 13½			3½ x 19			10 x 25		
2½ x 8½			2 x 13½			4 x 19			12 x 25		
3 x 8½			2½ x 13½			5 x 19			14 x 25		
1 x 9	2.20	2.65	3 x 13½	5.10	5.80	6 x 19	10.75	11.90	16 x 25	44.00	47.50
1¼ x 9			3½ x 13½			8 x 19			14 x 27½		
1½ x 9			4 x 13½			10 x 19			16 x 27½		
2 x 9			5 x 13½						18 x 27½		
2½ x 9			6 x 13½						14 x 32		
3 x 9									16 x 32		
3½ x 9									18 x 32		
									20 x 32		

*** Materials:** The No. 557 Flange sizes 19-inch O.D. and smaller are made of cast iron; larger sizes are regularly made of Ferrosteeel, to conform to the American Standard.

Drilling: 125-Pound Cast Iron Reducing Flanges are furnished faced and drilled, unless ordered faced only.

Facing: These flanges are plain faced, with a smooth finish.

Spot facing: Cast iron flanges are not spot faced unless so ordered, and then at an extra price.

The list price for spot facing bolt holes is 10 cents per hole.

American Standard: The dimensions of these flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange. For example, a 125-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 16 inches) should be ordered

6" x 16" Reducing Flange.

250-Pound Cast Iron Flanges



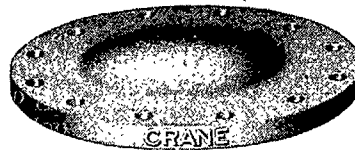
Screwed Flange
No. 151 E, *Cast Iron

WORKING PRESSURES

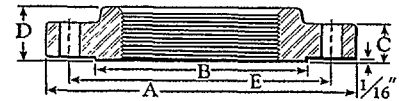
- 1 to 24-inch — 250 pounds steam
1 to 12-inch — 400 pounds cold water, oil, or gas, non-shock
14 to 24-inch — 350 pounds cold water, oil, or gas, non-shock



15-inch O.D. and smaller



Blind Flange
No. 153 E, *Cast Iron



List Prices and Dimensions

Size of pipe Inches	List Prices, Each				Dimensions, in Inches						
	No. 151 E Screwed Flanges		No. 153 E Blind Flanges		A	B	C	D	E	No. of Bolts	Dia. of Bolts
	Faced	Faced and Drilled	Faced	Faced and Drilled							
1	.95	1.30	1.45	1.80	4 7/8	2 11/16	1 1/16	7/8	3 1/2	4	5/8
1 1/4	1.00	1.35	1.50	1.85	5 1/4	3 1/16	3/4	1	3 7/8	4	5/8
1 1/2	1.10	1.45	1.65	2.00	6 1/8	3 9/16	1 3/16	1 1/8	4 1/2	4	3/4
2	1.25	1.60	1.90	2.25	6 1/2	4 3/16	7/8	1 1/4	5	8	5/8
2 1/2	1.40	1.75	2.10	2.45	7 1/2	4 5/16	1	1 7/16	5 7/8	8	3/4
3	1.60	2.05	2.40	2.85	8 1/4	5 11/16	1 1/8	1 9/16	6 5/8	8	3/4
3 1/2	2.00	2.55	3.00	3.55	9	6 5/16	1 3/16	1 5/8	7 1/4	8	3/4
4	2.25	2.95	3.35	4.05	10	6 5/16	1 1/4	1 3/4	7 7/8	8	3/4
5	2.65	3.35	4.00	4.70	11	8 5/16	1 3/8	1 7/8	9 1/4	8	3/4
6	3.30	4.05	5.00	5.75	12 1/2	9 11/16	1 7/16	2	10 5/8	12	3/4
8	5.10	6.15	7.65	8.70	15	11 5/16	1 5/8	2 3/16	13	12	7/8
10	7.40	8.90	11.00	12.50	17 1/2	14 1/16	1 7/8	2 3/8	15 1/4	16	1
12	10.75	12.50	16.00	17.75	20 1/2	16 7/16	2	2 9/16	17 3/4	16	1 1/8
14 OD	15.00	17.00	22.50	24.50	23	18 5/16	2 1/8	2 11/16	20 1/4	20	1 1/8
16 OD	22.25	25.00	33.50	36.25	25 1/2	21 1/16	2 1/4	2 7/8	22 1/2	20	1 1/4
18 OD	26.00	29.00	39.00	42.00	28	23 5/16	2 3/8	3 1/8	24 3/4	24	1 1/4
20 OD	31.00	35.00	46.00	50.00	30 1/2	25 9/16	2 1/2	3 5/16	27	24	1 1/4
24 OD	45.00	50.00	67.00	72.00	36	30 5/16	2 3/4	3 11/16	32	24	1 1/2

***Materials:** 250-Pound Flanges in sizes 10-inch and smaller are made of cast iron; in sizes 12-inch and larger, the flanges are regularly made of Ferroteel.

Drilling: These flanges are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Flanges are regularly furnished with a 1/16-inch raised face; the raised face is finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Flanges with male, female, tongue, or groove faces

are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: These flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

American Standard: The dimensions of these flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Steel flanges: For higher pressures or for high temperature service, Crane Forged Steel Flanges are recommended; see pages 361 to 367.

250-Pound Cast Iron Reducing Flanges

WORKING PRESSURES

6 $\frac{1}{8}$ to 36-inch O.D. — 250 pounds steam
 6 $\frac{1}{8}$ to 20 $\frac{1}{2}$ -inch O.D. — 400 pounds cold water, oil, or gas, non-shock
 23 to 36-inch O.D. — 350 pounds cold water, oil, or gas, non-shock



Reducing Screwed Flange
No. 155 E, *Cast Iron



Eccentric Reducing Screwed Flange
Prices on application

List Prices, Each

Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled	Size Inches	Faced	Faced and Drilled
1 $\frac{1}{4}$ x 6 $\frac{1}{8}$	1.80	2.15	1 $\frac{1}{2}$ x 12 $\frac{1}{2}$	5.50	6.25	2 $\frac{1}{2}$ x 20 $\frac{1}{2}$	17.50	19.25
1 $\frac{1}{2}$ x 6 $\frac{1}{2}$	2.10	2.45	2 x 12 $\frac{1}{2}$			3 x 20 $\frac{1}{2}$		
1 $\frac{1}{2}$ x 7 $\frac{1}{2}$	2.30	2.65	2 $\frac{1}{2}$ x 12 $\frac{1}{2}$			3 $\frac{1}{2}$ x 20 $\frac{1}{2}$		
2 x 7 $\frac{1}{2}$			3 x 12 $\frac{1}{2}$			4 x 20 $\frac{1}{2}$		
1 $\frac{1}{2}$ x 8 $\frac{1}{4}$	2.65	3.10	4 x 12 $\frac{1}{2}$			5 x 20 $\frac{1}{2}$		
2 x 8 $\frac{1}{4}$			5 x 12 $\frac{1}{2}$			6 x 20 $\frac{1}{2}$		
2 $\frac{1}{2}$ x 8 $\frac{1}{4}$			1 $\frac{1}{2}$ x 15	8.40	9.45	8 x 20 $\frac{1}{2}$	25.00	27.00
1 $\frac{1}{2}$ x 9	3.30	3.85	2 x 15			10 x 20 $\frac{1}{2}$		
2 x 9			2 $\frac{1}{2}$ x 15			6 x 23		
2 $\frac{1}{2}$ x 9			3 x 15			8 x 23		
3 x 9			3 $\frac{1}{2}$ x 15			10 x 23		
1 $\frac{1}{2}$ x 10	3.70	4.40	4 x 15	12.00	13.50	12 x 23	37.00	39.75
2 x 10			5 x 15			10 x 25 $\frac{1}{2}$		
2 $\frac{1}{2}$ x 10			6 x 15			12 x 25 $\frac{1}{2}$		
3 x 10			2 x 17 $\frac{1}{2}$			14 x 25 $\frac{1}{2}$		
3 $\frac{1}{2}$ x 10	4.40	5.10	2 $\frac{1}{2}$ x 17 $\frac{1}{2}$			12 x 28	43.00	46.00
1 $\frac{1}{2}$ x 11			3 x 17 $\frac{1}{2}$			14 x 28		
2 x 11			4 x 17 $\frac{1}{2}$			16 x 28		
2 $\frac{1}{2}$ x 11			5 x 17 $\frac{1}{2}$			14 x 30 $\frac{1}{2}$	51.00	55.00
3 x 11			6 x 17 $\frac{1}{2}$			16 x 30 $\frac{1}{2}$		
3 $\frac{1}{2}$ x 11			8 x 17 $\frac{1}{2}$			18 x 30 $\frac{1}{2}$		
4 x 11						18 x 36	74.00	79.00
						20 x 36		

***Material:** 250-Pound Reducing Flanges sizes 17 $\frac{1}{2}$ inch O.D. and smaller are made of cast iron; larger sizes are made of Ferroteel.

How to order reducing flanges: When ordering reducing flanges, the screwed or reduced size should be designated first, and then the outside diameter of the flange.

For example, a 250-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 17 $\frac{1}{2}$ inches) should be ordered

6" x 17 $\frac{1}{2}$ " Reducing Flange.

Drilling: These flanges are furnished faced and drilled unless ordered faced only.

Facing: 250-Pound Flanges are furnished with a $\frac{1}{16}$ -inch raised face; the raised face is finished with

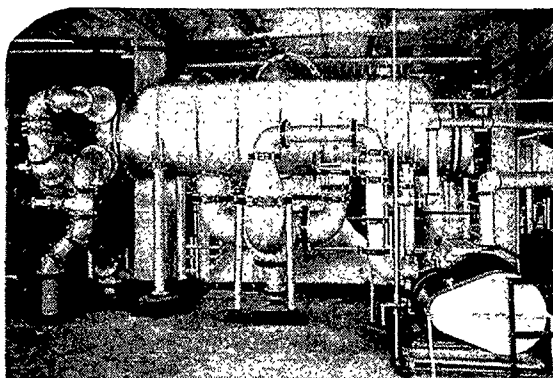
concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Flanges with male, female, tongue, or groove faces are made to order; see page 560 for dimensions and the Crane Discount Sheet for prices.

Spot facing: Cast iron flanges are not spot faced unless so ordered, and then at an extra price. The list price for spot facing bolt holes is 10 cents per hole.

American Standard: The dimensions of these flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Steel flanges: For higher pressures or for high temperature service, Crane Forged Steel Flanges are recommended; see pages 361 to 367.

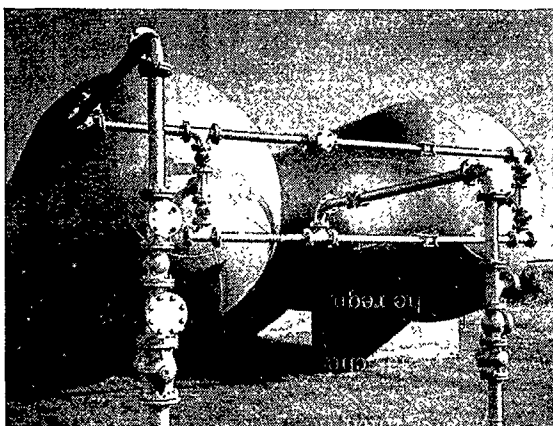


Piping assembly in a sugar refinery. Innumerable Crane valves and fittings are used in such plants.

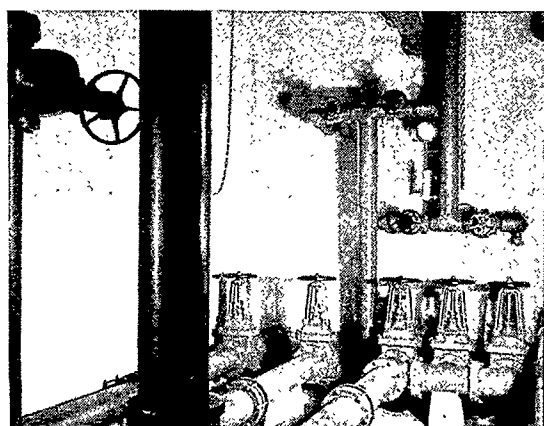


Crane iron valves and flanged fittings on the water circulating lines to coke ovens in a steel mill.

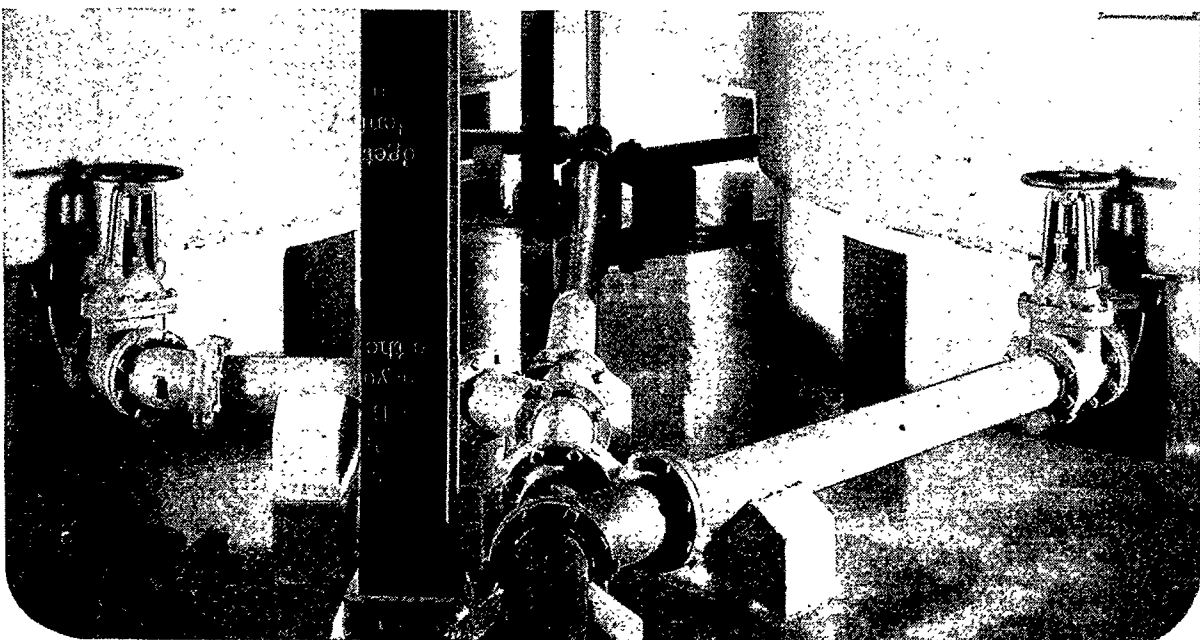
★



Many tanks like these in butane gas storage service are Crane-equipped.



Part of piping gallery in a sewage disposal plant — showing Crane valves.



Crane cast iron flanged fittings, iron flanges, and iron body wedge gate valves on fermenter discharge lines in a large brewery.

Thanks!...

You Helped Us Make A Better Catalog!

THIS is the catalog you helped prepare—hundreds of you—valve and fitting buyers and specifiers—in large and small plants—in the north, east, south, and west!

This is the catalog which incorporates those

convenience features most widely preferred by regular users of valve and fitting catalogs in every industry—as disclosed in a national survey conducted by an independent research organization during 1940.

SURVEY SHOWS CRANE NO. 52 MOST WIDELY USED

One fact was clearly brought out by this study: the Crane No. 52, then current, was all industry's most favorite piping equipment catalog.

Why? You said it was easy to use and read . . . that it was thorough . . . highly informative . . . and fully dependable. You said the Crane No. 52 contained most of what you wanted in a valve and fitting catalog.

But the real purpose of the survey was to get your ideas on how subsequent Crane Catalogs could be made even better. For example, we

learned from you what size is handiest . . . what arrangement is most practical . . . what information you require in greater detail, or prefer in more condensed form . . . what methods of indexing are most helpful and time-saving.

We combined your suggestions with the features you liked so well in the Crane No. 52. We put them all into the Crane No. 41. And here it is—designed to your own specifications of the ideal catalog. Thanks! You helped us produce a better buying guide for every valve and fitting user!



IT STANDS OUT—ALWAYS AT YOUR "FINGER TIPS!"

On the shelf or in your drawer file, you quickly see the new Crane No. 41. Its distinctive color stands

out. And just as it is distinguished by color, your Crane Catalog stands out for its completeness. It

is your dependable source of valves, fittings, and piping accessories for every flow control service. It shows more than 38,000 individual items which include a full range of sizes and patterns. They are made of brass, iron, steel, and alloy steels and in all working pressure classes.

COMPLETE ALPHABETICAL AND NUMERICAL INDEXES FACILITATE USE

Right at the front of your Crane No. 41 is the most comprehensive piping equipment catalog index ever published. It occupies 25 pages. All items are described and cross-indexed alphabetically so that almost no matter where you look

first, you quickly find any product. Immediately following is the numerical index of all products listed. Users who have learned to identify Crane Valves and Fittings by catalog number will find this well-arranged index a great convenience.

NEW QUICK SECTION INDEX FOR REGULAR USERS

On the inside of this colored paper insert is a new quick index to the No. 41. Here, on two facing pages, set in easily-read type and grouped by section, you see everything the No. 41 contains. To save time and effort, you can now find the section number of any item in only one section of the

want. This feature will be especially appreciated by regular catalog users. In time, you will find that the time saved becomes



**SECTION
NUMBER**

START ON PAGE

INDEX TO

If the item you are looking for does not readily fall into any of the classifications shown, you will find it in the complete

1	Indexes (Alphabetical and Numerical)	I
2	Metals and Materials	1
3	Brass Valves, Gate	13
4	Globe, Angle, and Cross	25
5	Check and Foot	51
6	Quick-Opening and Hose; Hose and Hose Goods	65
7	Radiator; Heating Specialties	77
8	Cocks and Stops, Brass and Iron	87
9	Iron Body Valves, Wedge Gate; Clamp Gate	97
10	Double Disc Gate; A.W.W.A. Valves	119
11	Globe, Angle, and Cross	143
12	Check and Foot	155
13	Valve Accessories and Parts	167
14	Fittings, Malleable Iron Screwed	179
15	Cast Iron Screwed; Sprinkler Fittings	195
16	Cast Iron Drainage	215
17	Iron and Steel Bushings, Plugs, Couplings, Nipples, etc.	225
18	Iron and Steel Unions, Union Fittings, and Flange Unions	235
19	Brass; Brass Flanges; Brass Unions	255
20	Railing, Brass and Malleable Iron	265
21	Iron Flanged	273
22	Iron Flanges	289

SECTIONS

Alphabetical index in section one. If you know the catalog number of the product, refer to Numerical index in section one.

START ON PAGE

SECTION NUMBER

297.....	Steel Valves, Gate	23
309.....	Globe and Angle; Bar Stock.....	24
327.....	Check.....	25
337.....	Steel Fittings, Screwed, Forged and Cast Steel	26
343.....	Flanged, Cast Steel.....	27
351.....	Welding (Socket and Butt).....	28
361.....	Forged Steel Flanges.....	29
369.....	Specialties, Stop-Check, Blow-Off, Pulp Stock, Back Pressure, Float Valves	30
383.....	Safety and Relief Valves.....	31
409.....	Pressure Regulators; Steam Traps; Separators; Expansion Joints.....	32
429.....	Flexible Joints; Gauges; Fusible Plugs; Miscellaneous Specialties.....	33
443.....	Special Service Valves and Fittings, Corrosion-Resistant Alloy	34
459.....	Marine.....	35
479.....	Ammonia.....	36
489.....	Crane-Seal.....	37
499.....	Solder-Joint.....	38
513.....	Pipe Hangers and Supports	39
535.....	Pipe Tools; Insulating Materials; Thread Lubricants	40
549.....	Drilling Templates; Bolts; Flange Facings; Gaskets; Galvanization	41
573.....	Pipe; Pipe Data; Thread Information	42
597.....	Fabricated Piping	43
621.....	Engineering Data	44

Continued from third preceding page, in front of "Index to Sections"

TABLE OF CONTENTS IN EACH SECTION

When you have turned to the proper section, you are not left to thumbing of pages to find the item you want. On the first page of each section,

there's a clear, concise table of contents. This page also gives cross-references to semi-related equipment listed in other sections.

MORE COMPACT—LESS TURNING OF PAGES

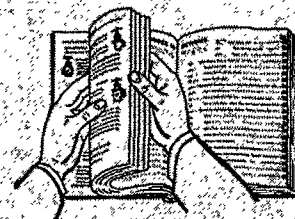
While the Crane No. 41 Catalog lists more products than any previous edition, it is relatively smaller in number of pages. This means that you need turn fewer pages to see the full showing of any family of products. Mind you,

nothing essential was omitted, and we did not crowd the pages. We simply condensed certain sections as you suggested. The Crane Catalog, now more than ever before, is your most complete buying guide for valves and fittings.

ITEMS OF COMMON USAGE ARE GROUPED

This catalog was planned to save your time in every way. For example, it is divided in two parts by the new center index. The first half covers brass, iron, and steel goods of common usage in every industry. For most of your piping needs, you actually use just one-half of the catalog.

Back of the center index are the less frequently needed items and those required for more specialized services; also, engineering data.



STANDARD PAGE STYLE SAVES NEEDLESS READING



Your Crane No. 41 Catalog eliminates a lot of needless reading. Clear, cross-section product illustrations show basic design and construction. Exterior views, with catalog numbers directly below, illustrate the pattern range of each line. All pertinent information, such as pressure

ratings, service recommendations, etc., is well displayed—easy to see and absorb!

All other data is concise, given in short paragraphs in clear readable type, and is introduced with a bold-face type caption so that you get essential facts and can make your selection with minimum reading.

The standard page style you liked so well in the No. 52 is used in the Crane No. 41. As you turn to any page, because of similarity of layout, at a glance you can pick out the information desired. The ruled, easy-to-read price and dimension tables minimize the chance of error in pricing materials and when designing piping systems.



FULL DIMENSION DATA GIVEN

Of special interest to design engineers and piping maintenance men, is the completeness of dimensional information given in Crane Catalogs. In the No. 41, such data has been elabo-

rated in many cases, and was relocated in others to make its use more convenient for everyone.

ENGINEERING DATA SECTION IS MODERNIZED

Crane Engineering Data needs no introduction to experienced valve and fitting catalog users. Engineers everywhere say that nowhere else is there between two covers such a wealth of prac-

tical information relative to industrial flow control. In the No. 41 Catalog, this section was brought up to date. It was also condensed into more practical form for popular usage.

YOU'LL GET MOST BY REGULAR USAGE OF YOUR CRANE NO. 41

It places before you more than 38,000 dependable valves and fittings for every service. It gives you accurate application data. It is industry's most widely used handbook on piping.

Only by regular usage can you gain the full benefit of its valuable contents for your pipelines. The sure way to piping satisfaction is to consult your Crane Catalog and your Crane Representative on every flow control problem.



Cast and Forged Steel Gate Valves

23

The Crane line of Steel Gate Valves can be classified into two general groups. The first group covers valves 2-inch and smaller, of forged or cast steel; these are frequently considered general utility valves and are used in a wide variety of services, often at pressures and temperatures lower than the recommended maximum. The second group covers cast steel valves ranging in size as large as 24-inch, all made similar in design and available in each of the American Standard pressure classes; the sizes range below 2-inch in some of the pressure classes.

Sizes 2-Inch and Smaller

600-Pound Cast Steel, Screwed, Flanged, and Socket-Welding. pages 298 and 299
 600-Pound Forged Steel, Flanged. page 300
 900-Pound Forged Steel, Screwed and Butt-Welding. page 300

Cast Steel Valves, 150, 300, 400, 600, 900, and 1500-Pound

Pressure-Temperature Ratings. page 301
 Description and Specification of Materials. pages 302 and 303
 List Prices. page 304
 Dimensions. page 305
 By-Passes. page 306
 Gearing. page 307
 2500-Pound. page 307

* * * * *

The Cast and Forged Steel Gate Valves listed above comprise only a part of the complete line of Crane steel products.

Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

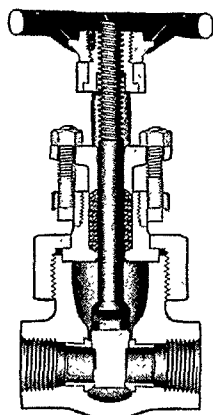
Steel Globe and Angle Valves. pages 309 to 326
 Steel Check Valves. pages 327 to 336
 Steel Stop-Check Valves. pages 370 to 374
 Steel Blow-Off Valves. page 377

Steel Safety Valves. pages 391 and 392
 Steel Relief Valves. pages 403 to 407
 Steel Steam Traps. page 416
 Steel Sediment Separators. page 423

Steel Flanged Fittings. pages 343 to 350
 Steel Welding Fittings. pages 351 to 360
 Steel Flanges. pages 361 to 367
 Steel Screwed Fittings. pages 337 to 342
 Steel Bushings. page 227
 Steel Plugs. page 228

Wrought Couplings. page 229
 Wrought Steel Nipples. pages 230 and 231
 Forged Steel Unions. pages 247 and 248
 Forged Steel Flange Unions. pages 252 and 253

600-Pound Cast Steel Wedge Gate Valves Outside Screw and Yoke



Union Bonnet

This new Crane line answers the need for low cost, compact, light but strong, small steel gate valves. Unusually rugged and durable, their design includes features heretofore found only in larger size or more expensive valves.

The valves are made with a union bonnet and screwed ends in the $\frac{1}{4}$ to $\frac{3}{4}$ -inch sizes, and with a bolted bonnet and screwed, flanged, or socket-welding ends in the $\frac{1}{2}$ to 2-inch sizes.

Body, bonnet, and yoke: The body, bonnet, and yoke are cast from high quality carbon steel. $\frac{1}{4}$ and $\frac{3}{8}$ -inch valves have a one-piece ring, bonnet, and yoke. $\frac{1}{2}$ and $\frac{3}{4}$ -inch union bonnet valves have the bonnet and yoke cast separately and joined by long, fine threads; they are held to the body by a heavy forged steel ring. All sizes of bolted bonnet valves have a one-piece bonnet and yoke.

The valves have a larger port than is usual for valves of this type; the seat opening diameter is approximately the same as the nominal valve size.

Bonnet joint: Bonnet joints are fitted with a soft iron gasket, assuring tightness and ease of maintenance. The integral bonnet ring on $\frac{1}{4}$ and $\frac{3}{8}$ -inch valves and the male and female joint on all other sizes eliminate any possibility of a gasket blowout.

The bonnet joint has generous strength and can be quickly and easily dismantled and reassembled. Bolted bonnet valves, for greater compactness, are fitted with studs, made of Triplex Steel.

Disc and body seat rings: In "X" trimmed valves, for oil or oil vapor, the disc and body seat rings are Exelloy; in "W" trimmed valves, for steam or water, these parts are hardened stainless steel (Brinell hardness number, 500 minimum). Body seat rings

HYDROSTATIC TEST PRESSURES

Screwed and Socket-Welding	Flanged
Shell — 2100 pounds	Shell — 2000 pounds
Seat — 2100 pounds	Seat — 1550 pounds

Valve seat tested 100 pounds air-under-water.

WORKING PRESSURES

Temp. Deg. F.	Pounds, Non-Shock		
	Screwed or Socket- Welding Valves	Flanged With $\frac{1}{4}$ -inch Male Facing	With Ring Joint Facing
Class "W", for Steam or Water			
100	2000	1000	1200
150	1900	960	1150
200	1800	930	1100
250	1700	900	1050
Class "X", for Oil or Oil Vapor			
300	1600	870	1000
350	1500	840	950
400	1400	810	900
450	1300	780	850
500	1200	750	800
550	1120	720	760
600	1040	690	720
650	960	660	680
700	880	630	640
750	800	600	600

Class "X", for Oil or Oil Vapor			
800	740	550	550
850	670	490	490
900	600	420	420
950	530	330	330
1000	380	240	240

Air and gas ratings, page 301.

have heavy sections. They seat against a square shoulder. Being securely rolled into place, there is no danger of leakage around the ring, and they will not loosen in service.

Disc guides: Full length machined guide ribs on each side of the disc operate in channels in the valve body. With the disc closely guided throughout its entire travel, seating surfaces are protected against unnecessary wear.

Stem: The stem is Exelloy. Of liberal diameter, the lower end has an integral tee-head and is finished with a tapered shoulder for back-seating in the bonnet.

Accurately cut threads on the upper end provide positive control with minimum friction; being on the outside, they are easily lubricated.

Disc-stem connection: These valves have a tee-head disc-stem connection, providing a safe, rugged, but flexible coupling between the stem and disc. The tee-head on the stem slips into a machined slot of corresponding shape in the disc. The connection is exceptionally strong, yet it cannot distort the stem; binding of parts is avoided.

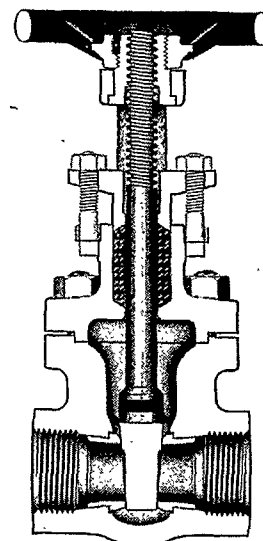
Bolted gland: The bolted gland avoids threading — and thereby weakening — the yoke legs. Cadmium-plated steel tee-head bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place; the packing load can be adjusted easily. Lugs on the bonnet anchor the bolt heads; the bolts will not come off in service.

Stuffing box: A wide and deep stuffing box provides liberal packing space for a tight seal. It is filled with high quality cut ring packing.

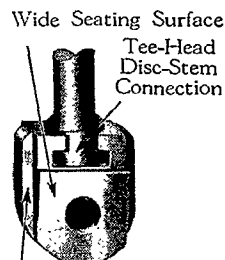
Yoke sleeve: The yoke sleeve is Crane No. 48 Nickel Alloy, a metal having excellent bearing qualities, strength, and an unusually high melting point.

Handwheel: Wheels are made of tough, durable malleable iron and are locked in place by a setscrew. For easier handling, valves $\frac{1}{4}$ -inch and smaller have a new dished design wheel, made with small rounded gripping knobs around the outer edge.

Repacking: These valves, when wide open, can be repacked while under pressure.



Bolted Bonnet



Long Disc Guides

600-Pound Cast Steel Wedge Gate Valves Outside Screw and Yoke

23

Working pressures are shown on the preceding page.

Union Bonnet Valves

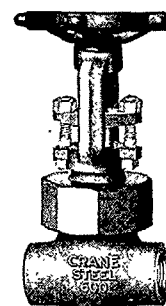
Service recommendations: These Cast Steel Union Bonnet Gate Valves are unusually tough, rugged, and durable. They are ideal for a wide variety of services in oil refineries, oil and gas fields,

central power stations, and general industrial plant installations, on hydraulic lines and on high-pressure high-temperature steam or oil lines.

List Prices and Dimensions

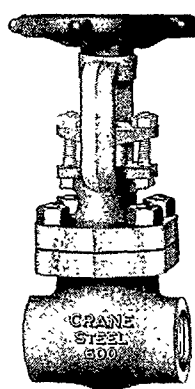
Size	Inches	1/4	3/8	1/2	3/4
No. 3606 X or W, Screwed Each	9.75	9.75	12.00	16.50	
End to end	Inches	2 3/4	2 3/4	3	3 1/2
Center to top, open	Inches	5	5	6 3/8	7 3/4
Diameter of wheel	Inches	3	3	3 1/2	4

"X" trimmed valves are recommended for oil or oil vapor service on temperatures up to 1000° F.; "W" trimmed valves, for steam, water, or general service on temperatures up to 750° F.

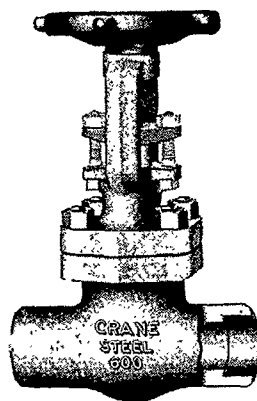


Gate, Screwed
No. 3606 X
No. 3606 W

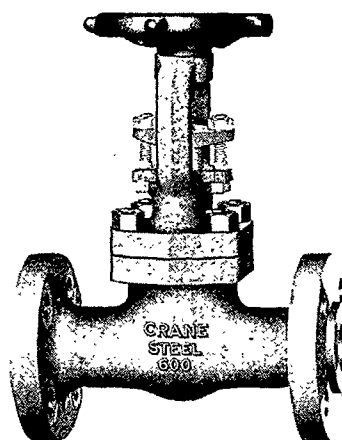
Bolted Bonnet Valves



Gate, Screwed
No. 3607 X
No. 3607 W



Gate, Socket-Welding
No. 3611 X
No. 3611 W



Gate, Flanged, No. 3615 X or No. 3615 W

Service recommendations: These strong, compact Cast Steel Bolted Bonnet Gate Valves are suitable for the same services as the union bonnet valves which are listed above.

"X" trimmed valves are recommended for oil or oil vapor service on temperatures up to 1000° F.; "W" trimmed valves, for steam, water, or general service on temperatures up to 750° F.

List Prices, Each

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 3607 X or W, Screwed		12.50	17.00	21.75	28.50	36.75	51.00
No. 3611 X or W, Socket-Welding		21.00	26.00	32.25	40.50	51.50	68.00
No. 3615 X or W, Flanged, F.D. & S.F.		30.00	35.00	43.00	53.00	66.00	85.00

Dimensions, in Inches

Size	1/2	3/4	1	1 1/4	1 1/2	2
End to end, Screwed	3	3 1/2	4 1/8	4 1/4	4 1/2	5 1/4
End to end, Socket-Welding	Furnished on Application					
Depth of socket	5/8	1 1/16	3/4	1 3/16	7/8	1
*Face to face, Flanged	6 1/2	7 1/2	8 1/2	9	9 1/2	11 1/2
Center to top, open	6 3/8	7 13/16	9 3/16	10 5/16	12	14 1/2
Diameter of wheel	3 1/2	4	5	5	6	7
Diameter of flange	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
*Thickness of flange	9/16	5/8	1 1/16	1 3/16	7/8	1
Diameter of male face	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8
Diameter of bolt circle	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5
No. and dia. of bolts	4 - 1/2	4 - 5/8	4 - 5/8	4 - 5/8	4 - 3/4	8 - 5/8

* Face to face dimensions include the 1/4" male face; thickness of flange dimensions do not. Face to face dimensions conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged Valves (No. B16.10-1939). 1/2" and 3/4" 600-Pound Gate Valves are not included in this Standard.

Flange dimensions, facing, and drilling: End flanges on flanged valves conform to the 600-Pound American Standard (B16e-1939). They

have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

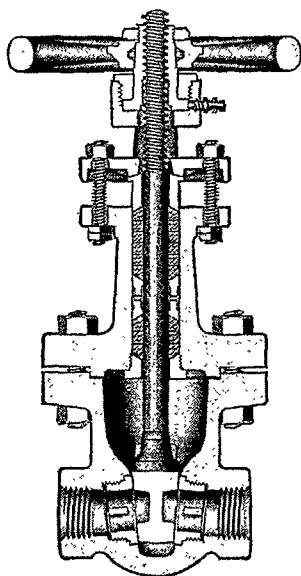
When so ordered, flanged valves can be furnished with ring joint, female, tongue, or groove facing; see the Crane Discount Sheet for prices.

List prices include drilling to the 600-Pound American Standard (B16e-1939), and spot facing. No deduction is made if valves are ordered faced only.

Socket-welding valves: The No. 3611 X or W Gate Valves are designed especially for socket welding; for socket-welding fittings, see pages 352 and 353.

Templates for drilling... page 554
Description of materials... pages 1 to 9
For dimensions of ring joint and special facings,
see pages 561 to 563.

600-Pound Flanged and 900-Pound Screwed and Butt-Welding Alloy Forged Steel Gate Valves Wedge Disc—Outside Screw and Yoke



Cross Section, Screwed

WORKING PRESSURES			
Temp. Deg. F.	Pounds, Non-Shock		
	Screwed or Butt-Welding Valves	With 1/4-inch Male Facing	With Ring Joint Facing
Class "X" for Oil or Oil Vapor			
Class "XR" for Steam or Water			
100	3000	1200	1440
150	2850	1180	1400
200	2700	1160	1350
250	2550	1120	1300
300	2400	1080	1250
350	2250	1040	1200
400	2100	1000	1150
450	1950	960	1100
500	1800	920	1050
550	1680	880	1000
600	1560	840	950
650	1440	800	900
700	1320	760	850
750	1200	720	800
Class "X" for Oil or Oil Vapor			
800	1100	680	750
850	1000	640	700
900	900	600	650
950	795	530	600
1000	570	380	400

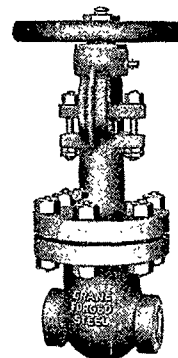
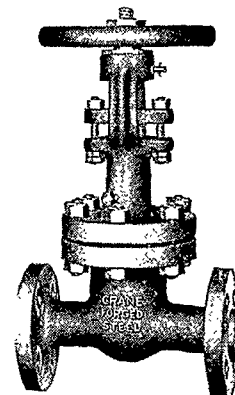
TEST PRESSURES

Screwed or Butt-Welding Valves
Shell — 3100 pounds hydrostatic
Seat — 3100 pounds hydrostatic

Flanged Valves
Shell — 2000 pounds hydrostatic
Seat — 1550 pounds hydrostatic

Seats are tested 100 pounds air-under-water

Sizes 1 1/4-inch and smaller have the yoke and bonnet forged integral, as shown. Larger sizes have the yoke and bonnet forged separately (not shown).

Screwed
No. 80 X, No. 80 XRFlanged
No. 79 X, No. 79 XR

Class "X": Class "X" valves are recommended for oil or oil vapor service up to 1000° F. The disc, body seat rings, and stem are Exelloy; the gland is No. 48 Nickel Alloy.

Class "XR": Class "XR" valves are recommended for steam or water service up to 750° F. The stem and disc are Exelloy; the body seat rings, No. 49 Nickel Alloy; and the gland, Cast Manganese Bronze.

Body and bonnet: The body and bonnet are forged No. 4 Carbon-Molybdenum Steel, with a male and female joint. The bolt-studs are Triplex Steel.

Stuffing box: The deep stuffing box has a two-piece ball-type gland and flange, and is lantern type. The valves, when wide open, can be repacked while under pressure.

Flange dimensions, facing, and drilling: The end flanges conform to the 600-Pound American Standard (B16-1939). They have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

When so ordered, flanged valves can be furnished with ring joint, female, tongue, or groove facing; see the Crane Discount Sheet for prices.

List prices include drilling to the 600-Pound Standard, and spot facing. No deduction is made if valves are ordered faced only.

List Prices, Each

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 80 X or XR, Screwed		65.00	65.00	80.00	105.00	115.00	152.00
No. 79 X or XR, Flanged, F.D. & S.F.		80.00	80.00	100.00	130.00	148.00	190.00

Butt-welding valves: Butt-welding valves (not illustrated) can be made to order; prices on application. They have the same general dimensions as the flanged valves, their end to end being the same as the face to face. Orders must specify the diameter of bore (inside diameter of pipe).

Dimensions, in Inches

Size	1/2	3/4	1	1 1/4	1 1/2	2
End to end, Screwed	3 3/4	3 3/4	4 1/2	5 1/2	6	7 1/2
*Face to face, Flanged	7 3/8	7 1/2	8 1/2	9	9 1/2	11 1/2
Center to top, open	12 1/2	12 1/2	14	14 3/4	17	20 1/4
Diameter of wheel	6	6	7	7	8	9
Diameter of flange	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
*Thickness of flange	9/16	5/8	1 1/16	1 3/16	7/8	1
Diameter of male face	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8
Diameter of bolt circle	2 5/8	3 1/4	3 1/2	3 3/8	4 1/2	5
No. and dia. of bolts	4—1/2	4—5/8	4—5/8	4—5/8	4—3/4	8—5/8

*Face to face dimensions include the 1/4-inch male face; thickness of flange dimensions do not. Face to face dimensions conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, No. B16.10-1939. 1/2 and 3/4-inch valves are not included in the Standard.

Cast Steel Wedge Gate Valves

23

Working Pressures, Pounds per Square Inch, Non-Shock--Valves Shown on Pages 302 to 307

Fluid	Temp.	Carbon Steel Valves	No. 4 Carbon-Molybdenum Alloy Steel Valves						No. 2 Nickel-Chrome Alloy Steel Valves				No. 5 Chrome-Molybdenum Alloy Steel Valves (Made to order)						
	Deg. Fahr.	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	
	Flanged Valves with Standard Facings Other Than Ring Joint																		
Steam, Water, *Gas, or *Air (Class XR)	100	230	600	800	1200	1800	3000	5000	1200	1800	3000	5000	600	800	1200	1800	3000	5000	
	150	220	590	775	1180	1770	2950	4905	1180	1770	2950	4905	590	775	1180	1770	2950	4905	
	200	210	580	750	1160	1740	2900	4810	1160	1740	2900	4810	580	750	1160	1740	2900	4810	
	250	200	560	725	1120	1680	2800	4645	1120	1680	2800	4645	560	725	1120	1680	2800	4645	
	300	190	540	700	1080	1620	2700	4480	1080	1620	2700	4480	540	700	1080	1620	2700	4480	
	350	180	520	675	1040	1560	2600	4315	1040	1560	2600	4315	520	675	1040	1560	2600	4315	
Oil or Oil Vapor (Class X)	400	170	500	650	1000	1500	2500	4150	1000	1500	2500	4150	500	650	1000	1500	2500	4150	
	450	160	480	625	960	1440	2400	3985	960	1440	2400	3985	480	625	960	1440	2400	3985	
	500	150	460	600	920	1380	2300	3820	920	1380	2300	3820	460	600	920	1380	2300	3820	
	550	140	440	575	880	1320	2200	3655	880	1320	2200	3655	440	575	880	1320	2200	3655	
	600	130	420	550	840	1260	2100	3490	840	1260	2100	3490	420	550	840	1260	2100	3490	
	650	120	400	525	800	1200	2000	3325	800	1200	2000	3325	400	525	800	1200	2000	3325	
Steam (Class U)	700	110	380	500	760	1140	1900	3160	760	1140	1900	3160	380	500	760	1140	1900	3160	
	750	100	360	475	720	1080	1800	2995	720	1080	1800	2995	360	475	720	1080	1800	2995	
	800	†92	340	450	680	1020	1700	2830	680	1020	1700	2830	340	450	680	1020	1700	2830	
	850	†82	320	425	640	960	1600	2665	640	960	1600	2665	320	425	640	960	1600	2665	
	900	†70	300	400	600	900	1500	2500	600	900	1500	2500	310	410	620	930	1550	2580	
	950	†55	265	350	530	795	1325	2205	530	795	1325	2205	300	400	600	900	1500	2500	
Oil or Oil Vapor (Class X)	1000	†40	190	250	380	570	950	1580	380	570	950	1580	200	275	400	600	1000	1675	
			Flanged Valves with Ring Joint Facing Butt-Welding and Screwed End Valves						Flanged Valves with Ring Joint Facing										
Steam, Water, *Gas, or *Air (Class XR)	100	275	720	960	1440	2160	3600	6000	1440	2160	3600	6000	720	960	1440	2160	3600	6000	
	150	255	700	925	1400	2100	3500	5825	1400	2100	3500	5825	700	925	1400	2100	3500	5825	
	200	240	675	900	1350	2025	3375	5625	1350	2025	3375	5625	680	900	1360	2040	3400	5660	
	250	225	650	875	1300	1950	3250	5425	1300	1950	3250	5425	660	875	1320	1980	3300	5495	
	300	210	625	825	1250	1875	3125	5200	1250	1875	3125	5200	640	850	1280	1920	3200	5330	
	350	195	600	800	1200	1800	3000	5000	1200	1800	3000	5000	620	825	1240	1860	3100	5165	
Oil or Oil Vapor (Class X)	400	180	575	775	1150	1725	2875	4800	1150	1725	2875	4800	600	800	1200	1800	3000	5000	
	450	165	550	725	1100	1650	2750	4575	1100	1650	2750	4575	575	775	1150	1725	2875	4800	
	500	150	525	700	1050	1575	2625	4375	1050	1575	2625	4375	550	725	1100	1650	2750	4575	
	550	140	500	675	1000	1500	2500	4175	1000	1500	2500	4175	525	700	1050	1575	2625	4375	
	600	130	475	625	950	1425	2375	3950	950	1425	2375	3950	500	675	1000	1500	2500	4175	
	650	120	450	600	900	1350	2250	3750	900	1350	2250	3750	475	625	950	1425	2375	3950	
Steam (Class U)	700	110	425	575	850	1275	2125	3550	850	1275	2125	3550	450	600	900	1350	2250	3750	
	750	100	400	525	800	1200	2000	3325	800	1200	2000	3325	425	575	850	1275	2125	3550	
	800	†92	375	500	750	1125	1875	3125	750	1125	1875	3125	400	525	800	1200	2000	3325	
	850	†82	350	475	700	1050	1750	2925	700	1050	1750	2925	375	500	750	1125	1875	3125	
	900	†70	325	425	650	975	1625	2700	650	975	1625	2700	350	475	700	1050	1750	2925	
	950	†55	300	400	600	900	1500	2500	600	900	1500	2500	325	425	650	975	1625	2700	
Oil or Oil Vapor (Class X)	1000	†40	200	275	400	600	1000	1675	400	600	1000	1675	300	400	600	900	1500	2500	
	1050								270	405	675	1125	225	275	425	650	1075	1775	
	1100								180	270	450	750	150	200	275	425	700	1175	

*Recommendations for gas or air depend upon kind of gas, service conditions, etc. See paragraph below.

†These ratings are for oil refinery service and apply to sizes 12-inch and smaller only.

‡The American Standard also includes an 85-pound rating at 800° F. and a 70-pound rating at 850° F., for steam other than in refineries and for sizes 24-inch and smaller.

These ratings apply to the Crane Cast Steel Wedge Gate Valves shown on pages 302 to 307.

Seating materials: Class "XR" valves have Exelloy to No. 40 Nickel Alloy seating surfaces and are for steam or water up to 750° F. max. Class "U" have Stellite seating surfaces, for steam up to 1100° F. max. Class "X" have Exelloy to Exelloy seating surfaces, for oil or oil vapor up to 1100° F. max.

Flange facings: Unless otherwise ordered, flanged end 150 and 300-Pound Valves regularly are furnished with 1/8-inch raised faces, and 400-Pound and higher pressure valves, with 1/4-inch male faces.

Air or gas: Regular valves trimmed for steam or water are suitable for ordinary air or natural gas

service. For unusual gases, such as those with extreme volatility or of corrosive, lethal, explosive, or inflammable character, special consideration must be given to the design of piping systems; recommendations will be furnished on request.

Cold service: For temperatures between 0° and 100° F., the ratings for 100° F. apply. For sub-zero service, materials with suitable impact resistance must be used; recommendations on request.

Standards: Crane pressure-temperature ratings agree with those in the American Steel Flange Standard, No. B16-1939; the A.P.I. Standard No. 600A-39 and Supplement No. 1, Adopted 1940; and the A.P.I. Standard No. 5-G-3, 1940.

Cast Steel Wedge Gate Valves

Crane Cast Steel Outside Screw and Yoke Wedge Gate Valves are exceptionally sturdy, rugged, and durable. Carefully selected materials of superior quality combined with designs of outstanding merit assure the highest utility. The valves are particularly well suited for high-pressure, high-temperature services

and have a wide application in long-distance pipe lines, in modern industrial plants and central power stations, and in oil refineries.

The Crane line is complete and includes valves in a wide range of sizes, in seven pressure classes (150,

Pressure Class	Test Pressures		Working Pressures
	Hydrostatic Shell Test	Hydrostatic Seat Test	
150-Pound	*460 & 350 pounds	350 pounds	For working pressures, see page 301.
300-Pound	1000 pounds	775 pounds	
400-Pound	1340 pounds	1000 pounds	
600-Pound	2000 pounds	1550 pounds	
900-Pound	2700 pounds	2250 pounds	
1500-Pound	4500 pounds	3700 pounds	

*460 pounds for 12" and smaller; 350 pounds for larger.

All valves are tested 100 pounds air under water

300, 400, 600, 900, 1500, and 2500-Pound), and with flanged, screwed, or butt-welding ends. Made of Carbon or Alloy Steels, the valves are furnished with trim materials especially suited for the recommended services, assuring maximum valve performance. The general design of Crane Cast Steel Wedge Gate Valves

is described on the next page and material specifications are shown in the table below.

List prices and dimensions are shown on pages 304 and 305 (prices and dimensions of 2500-Pound Valves are furnished on application).

Specification of Materials

150-Pound Valves are regularly made of Crane Carbon Steel, 300 and 400-Pound Valves are regularly made of Crane No. 4 Carbon-Molybdenum Steel, and 600, 900, 1500, and 2500-Pound Valves are made either of Crane No. 4 Carbon-Molybdenum or of Crane No. 2 Nickel-Chrome Steel. The valves are furnished with various trim as indicated below.

Orders should specify both the catalog number and the letter suffix; the catalog numbers of the valves are listed on page 304.

For extremely severe operating conditions, valves can be made of Crane No. 5 Chrome-Molybdenum Steel. They are made to order only; see the Crane Discount Sheet for prices.

Kind of Trim	Names of Parts		150 Pound Valves	300 Pound Valves	400 Pound Valves	600 Pound Valves	900 Pound Valves	1500 Pound Valves	2500 Pound Valves	
Class "X" Oil or Oil Vapor †1000° F. Max.	Body and Bonnet	Flanged	Carbon Steel	No. 4 Carbon Molybdenum Steel	†No. 2 Nickel-Chrome Steel					
		Welding or Screwed End			No. 4 Carbon-Molybdenum Steel					
	Disc	6" and smaller						Exelloy	Exelloy or Exelloy-Faced Alloy Steel	
		8" and smaller				Exelloy				
		12" and smaller	Exelloy							
		Larger sizes	Exelloy-Faced Carbon Steel	Exelloy-Faced Alloy Steel						
	Body Seat Rings		Exelloy							
	Stem		Exelloy							
	Bonnet Gasket		Corrugated Soft Iron			Soft Steel Ring Joint Gasket				
	Bonnet Bolt-Studs		Triplex Steel							
Class "XR" Steam or Water 750° F. Max.	Body and Bonnet		Carbon Steel	No. 4 Carbon-Molybdenum Steel						
	Disc	6" and smaller							Exelloy	2500-Pound Valves with "XR" trim are not regularly furnished.
		8" and smaller				Exelloy				
		12" and smaller	Exelloy							
		Larger sizes	Exelloy-Faced Carbon Steel	Exelloy-Faced Alloy Steel						
	Body Seat Ring		No. 49 Nickel Alloy							
	Stem		Exelloy							
	Bonnet Gasket		Cranite			Soft Steel Ring Joint Gasket				
	Bonnet Bolt-Studs		Triplex Steel							
	Class "U" Steam or Water 1000° F. Max.	Body and Bonnet		150-Pound Valves with "U" trim are not listed.	No. 4 Carbon-Molybdenum Steel					
Disc		Stellite-Faced Alloy Steel								
Body Seat Rings		Stellite-Faced Alloy Steel								
Stem		Exelloy								
Bonnet Gasket		†Soft Iron	Soft Steel Ring Joint Gasket							
Bonnet Bolt-Studs		Templex Steel								

†Valves with No. 2 Nickel-Chrome Steel bodies and "X" trim are suitable for temperatures up to 1100° F.

‡Corrugated Soft Iron.

Cast Steel Wedge Gate Valves

23

Features: Crane Cast Steel Outside Screw and Yoke Wedge Gate Valves of all pressure classes feature straight-through ports, especially designed to minimize turbulence, erosion, and resistance to flow.

Shoulder-type screwed-in body seat rings assure tightness and security. Long, close-fitting disc guides maintain accurate seating of the disc and lessen wear. The disc-stem connection, in the shape of a tee-head, prevents lateral strains on the stem.

Bonnet joint: The bonnet joint of the 150-Pound Valves has a plain face, accurately machined and fitted with a gasket. On the 300-Pound Valves, the male and female bonnet joint is self-centering. All other valves have a ring-type joint for maximum strength and tightness.

Triplex or Templex Steel through bolt-studs produce a tight, strong bonnet joint.

Ball-bearing yoke: The 400, 600, 900, 1500, and 2500-Pound Valves, in the larger sizes, have a ball-bearing yoke to facilitate operation.

Stuffing box: The stuffing box on all valves is deep, assuring tightness and long packing life. The stuffing box is the lantern type on all except the 150-Pound Valves. The valves, when wide open, can be repacked while under pressure.

Gland: All valves have a two-piece ball-type gland which exerts an even pressure on the packing without binding the stem.

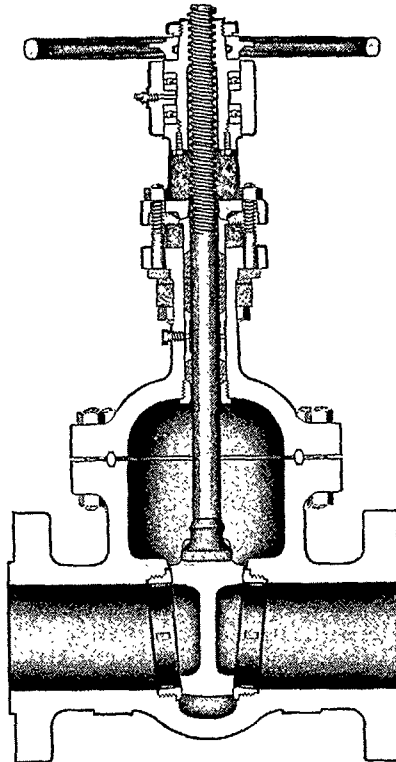
Drilling: Flanged valves of each pressure class are furnished with the end flanges faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made if flanged valves are ordered faced only.

Flange facings: The 150 and 300-Pound Flanged Valves are regularly furnished with an American Standard $\frac{1}{16}$ -inch raised face on the end flanges; the 400, 600, 900, 1500, and 2500-Pound Flanged Valves regularly have a $\frac{1}{4}$ -inch male face (large male).

When so ordered, valves can be furnished with other types of facing; such as ring joint, female, tongue, groove, etc.: see the Crane Discount Sheet for prices.

Finish of flange faces: The $\frac{1}{16}$ -inch raised faces and the $\frac{1}{4}$ -inch male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the raised or male faces, when specified; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.



Outside Screw and Yoke
Wedge Gate Valve

By-passes: Valves can be furnished with a by-pass. See page 306 for prices.

Gearing: Larger size valves can be made with gears to facilitate operation; prices on application.

Motor or cylinder operation: These valves can be equipped with an electric, air, or gas motor; or an operating cylinder; prices on application. See pages 171 to 173 for description.

Standards: In design and materials Crane Cast Steel Gate Valves exceed the requirements of Standards issued by the American Standards Association and the American Petroleum Institute.

End flanges on flanged valves conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939, for their respective pressure class.

All flanged and butt-welding valves conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, B16.10-1939, for their respective pressure class. (This Standard does not include $\frac{1}{4}$ -inch 300-Pound Valves, or butt-welding valves larger than 8-inch.)

All flanged end valves with Exelloy ("X") trimmings conform to the API Standard for Flanged Steel Outside-Screw-and-Yoke Wedge Gate Valves, No. 600A-39. (This Standard does not include sizes $3\frac{1}{2}$ and 5-inch, sizes larger than 12-inch, or the 300-Pound Valves in the $\frac{1}{4}$ -inch size.)

150, 300, 400, and 600-Pound Flanged Valves with Exelloy ("X") trimmings conform also to the API Standard for Pipe Line Valves, No. 5-G-1, September, 1938, for 230, 500, 670, and 1000 pounds working pressures, respectively, at atmospheric temperatures. (This Standard does not include sizes $3\frac{1}{2}$ -inch and 5-inch, or sizes smaller than 2-inch or larger than 12-inch.)

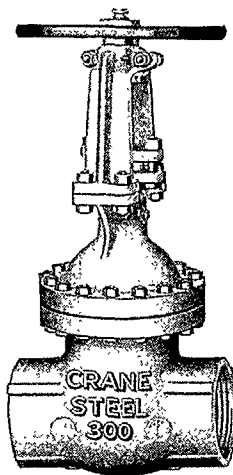
Material Regularly Furnished Unless Otherwise Ordered

Body and Bonnet		150 Pound	300 & 400 Pound	600, 900, 1500, and 2500-Pound
For Steam or Water	Screwed	Crane Carbon Steel	Crane No. 4 Carbon- Molyb- denum Alloy Steel	Crane No. 4 Carbon- Molybdenum Alloy Steel
	Welding			
For Oil or Oil Vapor	Flanged			
	Screwed	Crane Carbon Steel	Crane No. 4 Carbon- Molyb- denum Alloy Steel	Crane No. 2 Nickel- Chrome Alloy Steel
For Oil or Oil Vapor	Welding			
	Flanged			

Recommendations for Valve Seating Materials

Steam or Water	750° F. Max.	(XR) Exelloy to No. 49 Nickel Alloy
	1100° F. Max.	(U) Stellite to Stellite
Oil or Oil Vapor	1100° F. Max.	(X) Exelloy to Exelloy

Cast Steel Wedge Gate Valves

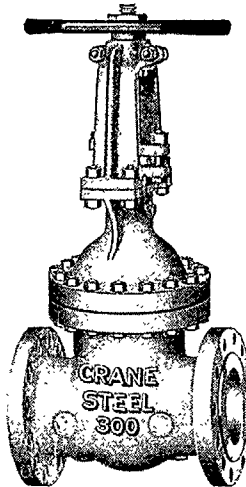


Outside Screw and Yoke
Screwed

For Oil or Oil Vapor
No. 46 X, 150-Pound
No. 32 X, 300-Pound
No. 62 X, 400-Pound
No. 74 X, 600-Pound

For Steam or Water
No. 46 XR, 150-Pound
No. 32 XR, 300-Pound
No. 62 XR, 400-Pound
No. 74 XR, 600-Pound

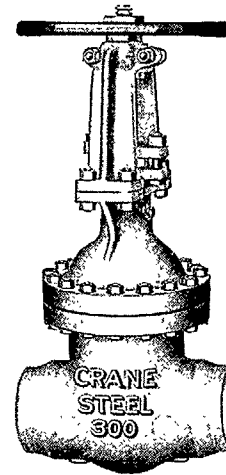
See page 302 for speci-
fication of materials.



Outside Screw and Yoke
Flanged

For Oil or Oil Vapor
No. 47 X, 150-Pound
No. 33 X, 300-Pound
No. 61 X, 400-Pound
No. 76 X, 600-Pound
No. 83 X, 900-Pound
No. 87 X, 1500-Pound

For Steam or Water
No. 47 XR, 150-Pound
Nos. 33 XR or U, 300-Pound
Nos. 61 XR or U, 400-Pound
Nos. 76 XR or U, 600-Pound
Nos. 83 XR or U, 900-Pound
Nos. 87 XR or U, 1500-Pound



Outside Screw and Yoke
Butt-Welding

For Oil or Oil Vapor
No. 47½ X, 150-Pound
No. 33½ X, 300-Pound
No. 61½ X, 400-Pound
No. 76½ X, 600-Pound
No. 83½ X, 900-Pound
No. 87½ X, 1500-Pound

For Steam or Water
No. 47½ XR, 150-Pound
Nos. 33½ XR or U, 300-Pound
Nos. 61½ XR or U, 400-Pound
Nos. 76½ XR or U, 600-Pound
Nos. 83½ XR or U, 900-Pound
Nos. 87½ XR or U, 1500-Pound

BALL-BEARING YOKE

The following valves are reg-
ularly equipped with a ball-bear-
ing yoke, to
facilitate opera-
tion:

400-Pound
(8" and larger)
600 and 900
Pound
(6" and larger)
1500 and 2500
Pound
(5" and larger)

The 300-Pound
Valves in sizes
14" and larger
can be made
with a ball-bear-
ing yoke when
so ordered;
prices on appli-
cation.

When ordering,
specify the
catalog number
and suffix.

List Prices, Each

Size Inches	Screwed End Valves				Flanged End Valves, F.D. & S.F., or Butt-Welding End Valves					
	150 Pound	300 Pound	400 Pound	*600 Pound	150 Pound	300 Pound	400 Pound	*600 Pound	900 Pound	1500 Pound
1						135.00		170.00		275.00
1¼		128.00		*		145.00		185.00	†Use 1500 Pound Valves	305.00
1½	†	138.00			†	145.00		200.00		340.00
2	110.00	156.00			115.00	165.00		225.00		435.00
2½	125.00	185.00			115.00	165.00		270.00		550.00
3	140.00	209.00	Use 600 Pound Valves	257.00	130.00	195.00		330.00	575.00	735.00
3½	165.00	250.00		314.00	145.00	220.00		385.00	650.00	850.00
4	190.00	270.00	410.00	494.00	200.00	285.00	430.00	520.00	750.00	1015.00
5	255.00	395.00	550.00	770.00	265.00	410.00	570.00	800.00	1020.00	1615.00
6	300.00	490.00	685.00	1015.00	315.00	505.00	710.00	1050.00	1390.00	2115.00
8					435.00	745.00	1130.00	1520.00	2090.00	3270.00
10					590.00	1040.00	1550.00	2260.00	2960.00	5090.00
12					790.00	1400.00	2050.00	3000.00	4050.00	7400.00
14					1140.00	1990.00	2700.00	4030.00	5800.00	10840.00
16					1525.00	2550.00	3575.00	5250.00	7300.00	
18					2055.00	3310.00	5200.00	6600.00	10125.00	
20					2570.00	4335.00	7125.00	10000.00		
24					3950.00	6375.00	10500.00	16500.00		

*For smaller sizes, use the Cast and Forged Steel Valves shown on pages 298 to 300.

†Can be made to order; prices on application.

‡900-Pound Forged Steel Butt-Welding Valves 2" and smaller can be made to order; see page 300.

§When 3" 300 and 600-Pound Flanged Valves with ring joint facing are to be bolted to Cranelap joints, orders must specify. A groove of special pitch diameter is required; see page 562 for dimensions.

BUTT-WELDING VALVES

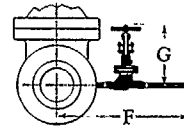
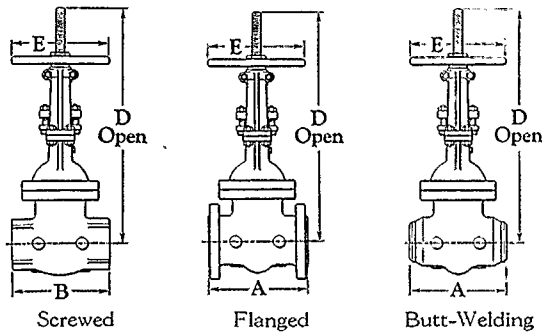
Unless other-
wise ordered,
150 and 300 -
Pound Butt-
Welding Valves
sizes 12 - inch
and smaller are
bored to match
the inside diam-
eter of Standard
pipe (heaviest
weight on 8, 10,
or 12-inch size).

For sizes larger
than 12-inch of
150 and 300-
Pound Valves
and for all sizes
of 400, 600, 900,
1500, and 2500-
Pound Valves,
orders must
specify diameter
of bore (I.D. of
pipe).

Cast Steel Wedge Gate Valves

Dimensions, in Inches

23

By-Pass for Gate Valves
(Side Mounting illustrated)Clearance dimensions
F and G are identical
for bottom mounting

Face to face: 150 and 300-Pound Flanged Valves are regularly furnished with a $\frac{1}{8}$ -inch raised face, and 400, 600, 900, 1500, and 2500-Pound Flanged Valves are regularly furnished with $\frac{1}{4}$ -inch high large male facing; face to face dimensions include these facings.

Class	Size of Valve	A	B	D	E	F	G	Size of By-Pass
150 Pound	1½	7½	6¼	17½	8			
	2	7	5½	16¼	8			
	2½	7½	5⅞	17½	8			
	3	8	6⅞	21	9			
	3½	8½	6½	22½	9			
	4	9	6⅞	26	10			
	5	10	7¾	31	12			
	6	10½	8½	34½	12			
	8	11½		42½	14			
	10	13		51½	18			
	12	14		59¼	20	26¾	10⅞	1
	14	15		70¼	22	29½	11½	1¼
300 Pound	1½	6½	5½	15	7			
	2	7½	6¼	17½	8			
	2½	8½	7	18¼	8			
	3	9½	8	21¼	9			
	3½	11⅞	9	25	10			
	4	12	11	31	12			
	5	15	13½	34½	14	21¾	12	¾
	6	15⅞	15⅞	38½	16	22½	12	¾
	8	16½		48	20	23¾	12	¾
	10	18		59	24	28	13¾	1
	12	19¾		66¼	24	29½	13¾	1
	14	30		74¾	27	33¼	14½	1¼
400 Pound	1½	16	13	31½	12			
	2	18	15	35	14	23	12	¾
	2½	19½	17	40¼	16	24	12	¾
	3	23½		50½	20	25¼	12	¾
	3½	26½		59¾	24	29½	13¾	1
	4	30		67¾	24	31½	13¾	1
	5	32½		74¾	27	33¼	14½	1¼
	6	35½		80¾	27	35	14½	1¼
	8	38½		91¼	30	38½	18¼	1½
	10	41½		100½	36	39¾	18¼	1½
	12	48½		120¾	36	47½	20¼	2
	14							
600 Pound	1	8½		15	7			
	1¼	9		15	7			
	1½	9½		17½	8			
	2	11½		18¼	8			
	2½	13	9	22¼	9			
	3	14	11	25¾	10			
	3½	15	13	32	14			
	4	17	13	32	14			
	5	20	15	36¾	16	23	12	¾
	6	22	17	42¾	20	24¼	12	¾
	8	26		52¼	24	25¼	12	¾
	10	31		62¼	27	30	13¾	1
900 Pound	1	10		16	8			
	1¼	11		16½	8			
	1½	12		20	9			
	2	14½		23¼	10			
	2½	16½		27½	12			
	3	18½		29	14			
	3½	19½		34	16			
	4	21½		34	16	25¾	15¾	¾
	5	26½		38¾	20	27	15¾	¾
	6	27¾		47	24	28	15¾	¾
	8	32¾		55	27	30½	15¾	¾
	10	39		65	36	35¼	18½	1
1500 Pound	1	10		16	8			
	1¼	11		16½	8			
	1½	12		20	9			
	2	14½		23¼	10			
	2½	16½		27½	12			
	3	18½		29	14			
	3½	19½		34	16			
	4	21½		34	16	25¾	15¾	¾
	5	26½		38¾	20	27	15¾	¾
	6	27¾		47	24	28	15¾	¾
	8	32¾		55	27	30½	15¾	¾
	10	39		65	36	35¼	18½	1
	12	44½		78¾	36	37	18½	1
	14	49½		82¾	36	40	20¼	1¼

Dimensions of 2500-Pound Valves on application.

Description pages 301 to 304

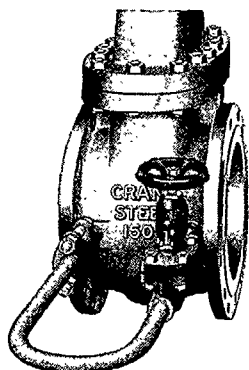
Welding bevel details page 647

Location of by-passes page 646

Templates for drilling and flange dimensions pages 553 to 555

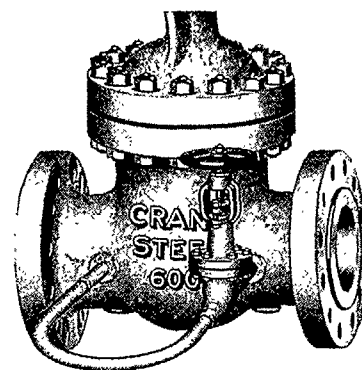
Taps and drains for valves page 646

By-Passes for Cast Steel Wedge Gate Valves



Built-Up By-Pass
For 150-Pound Wedge Gate Valves

When so ordered, Crane Cast Steel Wedge Gate Valves can be furnished with a Built-Up By-Pass, suitable for "warming up" on steam line service or for equalizing the pressure around main control valves used on steam or other fluids.



Built-Up By-Pass
For 300 to 1500-Pound Wedge Gate Valves

Construction: The Crane Built-Up By-Pass is designed to provide maximum strength, durability, and flexibility with a minimum of additional weight on the main valve.

For valves in the 300 to 1500-pound pressure classes, the by-pass is furnished with a forged steel bolted bonnet outside screw and yoke welding end globe valve. All connections in the by-pass are welded in the factory to insure a permanently tight and strong assembly.

The by-pass on 150-Pound valves is made up with screwed connections and forged steel flange unions. The forged steel screwed end globe valve in the by-pass has an outside screw and yoke, a bolted bonnet, and a bolted gland; for further description of this valve, see page 314. See table of construction, below.

Pipe bends are used on all pressure classes to provide the necessary flexibility and to compensate for expansion strains resulting from unequal temperatures or fluctuating operating conditions.

List prices: Extra list prices, shown in the table below, include the Built-Up By-Pass completely assembled and attached to either of the sides or to the bottom of the main valve.

Unless otherwise specified, by-passes will be attached to the side of the main valve, with the stems of the main valve and the by-pass valve parallel and pointing vertically upward.

Special by-passes: By-passes of other designs or specifications can be made to order; prices on application. Inquiries should be accompanied by complete description, drawings, or specifications.

Extra List Prices for Built-Up By-Pass

Size of Main Valve	Size of By-Pass	Pressure Class of Main Valve					
		150-Pound Each	300-Pound Each	400-Pound Each	600-Pound Each	900-Pound Each	1500-Pound Each
4	3/4	.....	.....	.....	.....	315.00	.....
5	3/4	.....	158.00	210.00	210.00	315.00	.....
6	3/4	.....	158.00	210.00	210.00	315.00	315.00
8	3/4	.....	158.00	210.00	210.00	315.00	315.00
10	1	.....	176.00	235.00	235.00	375.00	375.00
12	1	154.00	176.00	235.00	235.00	375.00	375.00
14	1 1/4	184.00	210.00	280.00	280.00	430.00	430.00
16	1 1/4	184.00	210.00	280.00	280.00	430.00	.....
18	1 1/2	223.00	255.00	340.00	340.00	525.00	.....
20	1 1/2	223.00	255.00	340.00	340.00	.....	.....
24	2	273.00	312.00	415.00	415.00	.....	.....

Specifications of Materials and Construction

The globe valve supplied in the by-pass has a plug type disc and is suitable for steam, water, or general service. It is trimmed with the same material as

the main valve; that is, with Class "XR" trimmings for temperatures up to 750° F. and with Class "U" trimmings for temperatures from 750 to 1000° F.

Pressure Class	150-Pound	300, 400, 600, 900, and 1500-Pound
By-Pass Valve	1 to 2-inch, Forged Steel Screwed End Globe	3/4 to 2-inch, Forged Steel Welding End Globe
Piping Material	Seamless Carbon Steel	Seamless Carbon-Molybdenum Steel
Piping Connections	Screwed, with Flange Unions	Welded

For dimensions of by-passes, see page 305.

Taps and drains for valves.... page 646

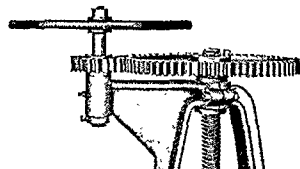
Location of by-passes ... page 646

Gearing for Cast Steel Wedge Gate Valves

23

Prices and dimensions on application.

Larger sizes of gate valves or gate valves used for unusually high pressures frequently require gearing in order to facilitate operation. Under other conditions, where valves are inaccessibly installed, gearing can be used effectively to provide for more convenient operation. Prices are furnished on application.



Style P
Spur Gearing
For O.S. & Y. Gate Valves

Bevel gearing: On orders for gate valves with bevel gearing, Style "N", with the pinion shaft extending at right angles to the run of the valve will be supplied unless otherwise specified.

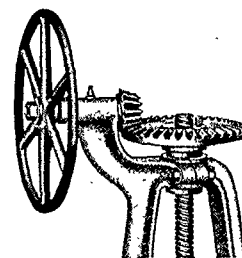
When so ordered, gate valves with bevel gearing, having the pinion shaft extending parallel to the run of the valve, can be furnished. In this position the bevel gearing will be known as Style "O".

When bevel gearing is ordered separately for use on circular bonnet valves (300-Pound or heavier), Style "N" gearing will regularly be supplied. For assembly on the valve in positions other than with the pinion shaft at right angles to the run, the bonnet of the valve must be unbolted and turned to suit the condition desired.

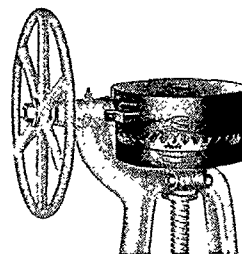
Spur gearing: Style "P" spur gearing is regularly mounted with the pinion shaft at one side of the valve and the handwheel above the gearing.

Gear covers: Gear covers can be supplied for geared steel valves, to prevent obstruction of or damage to the gears and also to guard against injury of the operator.

Ordering: Orders for geared gate valves must specify the Style of gearing (and on bevel gearing, the position of the pinion shaft). When ordering gearing separately, also indicate the size, catalog number, and complete marking of the valve.



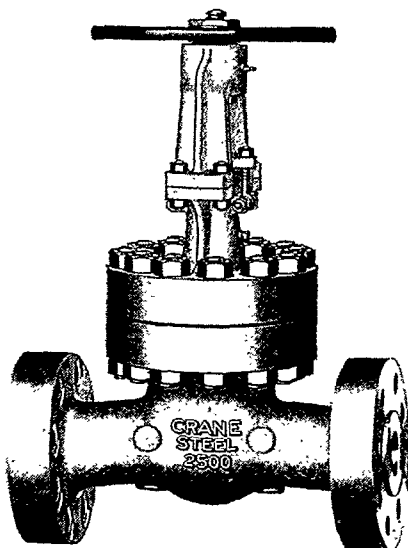
Style N
Bevel Gearing
For O.S. & Y. Gate Valves



Gear Covers
For Spur or Bevel
Geared Steel O.S. & Y.
Wedge Gate Valves

2500-Pound Alloy Cast Steel Wedge Gate Valves

Prices and dimensions on application.



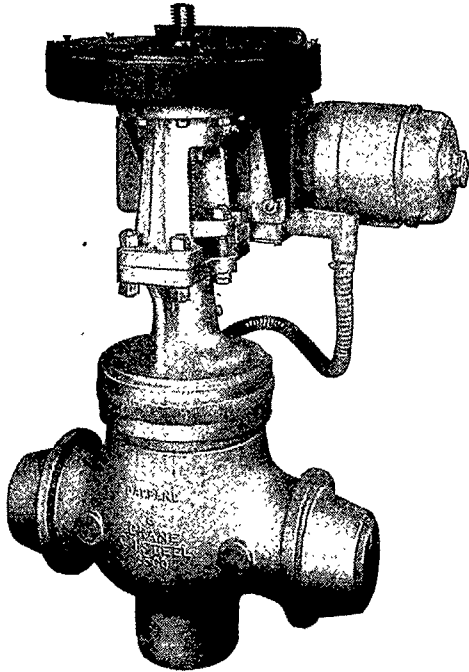
2500-Pound
Alloy Cast Steel Wedge Gate Valve
Outside Screw and Yoke
Flanged or Butt-Welding
(Flanged illustrated)

Crane 2500-Pound Alloy Cast Steel Outside Screw and Yoke Wedge Gate Valves are available in the 1½, 2, 2½, 3, 4, 5, 6, 8, 10, and 12-inch sizes, with either flanged or butt-welding ends. In these valves are many outstanding features of design necessary for safe, reliable service under the severe operating conditions of the high pressures and elevated temperatures for which they are recommended.

Some of the more important developments in the Crane 2500-Pound Valves are: straight-through port design—eliminates excessive turbulence; shoulder-type body seat rings—provide tightness and security at this point; long, machined disc guides—assure accurate seating with minimum wear; tee-head disc-stem connection—prevents lateral strains on the stem; ring-type bonnet joint with high tensile bolting—makes the joint strong and tight; ball-bearing yoke sleeve on sizes 5-inch and larger—facilitates operation; and deep, lantern-type stuffing box with ball-type gland—assures tightness with minimum wear.

It is recommended that 2500-Pound Alloy Steel Gate Valves be equipped with a by-pass on sizes 4-inch and larger; sizes 8-inch and larger should have gearing.

Working pressures page 301
General description pages 302 and 303
Specifications of Materials page 302
Description of Materials pages 1 to 9



Welded Bonnet Valves

Crane Cast Steel Wedge Gate Valves can be supplied with the Welded Bonnet Joint as shown in the illustration at the left. Made to carefully analyzed designs and welded by Crane qualified operators under accurately controlled shop conditions, these valves represent the ultimate in valve manufacture. By cutting off the bottom pocket, inspection of the internal parts can be made without disturbing the bonnet joint; the pocket cap can be re-welded in place after inspection has been completed. Prices and complete information will be supplied on application.

Socket-Welding Valves

The illustration at the right shows a 300-Pound Cast Steel Wedge Gate Valve with ends for socket-welding. The Globe and Angle Valves shown on pages 322 to 325 and the Swing Check Valves shown on pages 332 to 335 also can be furnished with socket-welding ends.

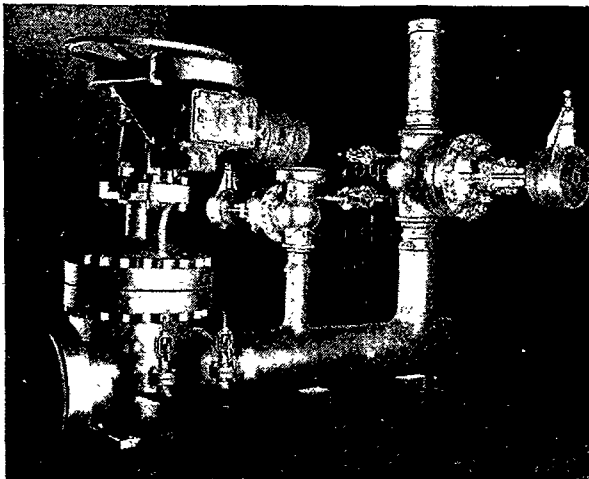
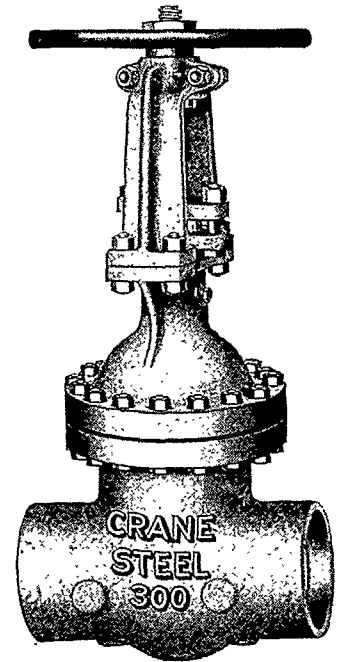


Illustration at left:

1500-Pound shop fabricated
valve and header assembly

Cast and Forged Steel Globe and Angle Valves

24

The Crane line of Steel Globe and Angle Valves can be classified into two general groups. The first group covers valves 2-inch and smaller, of forged steel, cast steel, or bar stock; these are frequently considered general utility valves and are used in a wide variety of services, often at pressures and temperatures lower than the recommended maximum. The second group covers cast steel valves ranging in size as large as 8-inch, all made similar in design and available in each of the American Standard pressure classes; the sizes range below 2-inch in some of the pressure classes.

Sizes 2-Inch and Smaller

Bar Stock Valves.....	page 310
600-Pound Cast Steel, for Locomotive Service.....	page 311
600-Pound Forged Steel, O.S. & Y. with Screwed Gland.....	page 312
600-Pound Forged Steel, Inside Screw.....	page 313
600-Pound Forged Steel, O.S. & Y.	pages 314 and 315
600 and 900-Pound Forged Steel, O.S. & Y.	pages 316 and 317
1500-Pound Forged Steel, O.S. & Y.	page 318
6000-Pound Hydraulic.....	page 319

Cast Steel Valves, 150, 300, 400, 600, 900, and 1500-Pound

Pressure-Temperature Ratings.....	page 321
Description and Specification of Materials.....	pages 322 and 323
List Prices.....	page 324
Dimensions.....	page 325
Gearing.....	page 326
2500-Pound.....	page 326

* * * * *

The Cast and Forged Steel Globe and Angle Valves listed above comprise only a part of the complete line of Crane steel products.

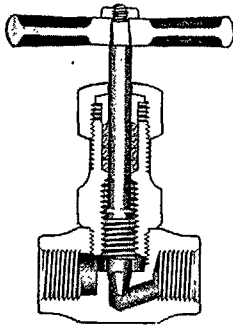
Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

Steel Globe and Angle for Chlorine Service.....	page 457
Steel Gate Valves.....	pages 297 to 308
Steel Check Valves.....	pages 327 to 336
Steel Stop-Check Valves.....	pages 370 to 374
Steel Blow-Off Valves.....	page 377
Steel Safety Valves.....	pages 391 and 392
Steel Relief Valves.....	pages 403 to 407
Steel Steam Traps.....	page 416
Steel Sediment Separators.....	page 423
Steel Flanged Fittings.....	pages 343 to 350
Steel Welding Fittings.....	pages 351 to 360
Steel Flanges.....	pages 361 to 367
Steel Screwed Fittings.....	pages 337 to 342
Steel Bushings.....	page 227
Steel Plugs.....	page 228
Wrought Couplings.....	page 229
Wrought Steel Nipples.....	pages 230 and 231
Forged Steel Unions.....	pages 247 and 248
Forged Steel Flange Unions.....	pages 252 and 253

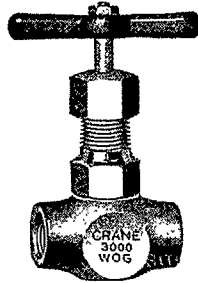
High Pressure Steel, Exelloy, or 18-8 Mo Bar Stock Valves

WORKING PRESSURE — 3000 pounds cold water, oil, or gas, non-shock

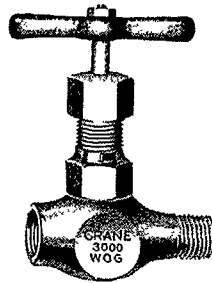
Air Tested



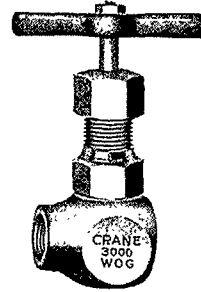
Cross Section
Globe, Female
Steel, Exelloy,
or 18-8 Mo



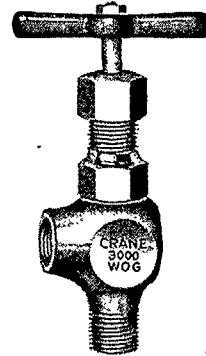
Globe, Female
No. 222 H, Steel
No. 222 X, Exelloy
No. 222 SS, 18-8 Mo



Globe, Male and Female
No. 222 1/2 H, Steel
No. 222 1/2 X, Exelloy
No. 222 1/2 SS, 18-8 Mo



Angle, Female
No. 223 H, Steel
No. 223 X, Exelloy
No. 223 SS, 18-8 Mo



Angle, Male and Female
No. 223 1/2 H, Steel
No. 223 1/2 X, Exelloy
No. 223 1/2 SS, 18-8 Mo

List Prices, Each

Size		Inches	1/8	1/4	3/8	1/2	3/4	1
Steel Valves	Globe	No. 222 H, Female	4.00	4.00	4.75	6.25	17.25	24.00
		No. 222 1/2 H, Male and Female	4.80	4.80	5.75	7.50	20.75	
	Angle	No. 223 H, Female	4.00	4.00	4.75	6.25	17.25	24.00
		No. 223 1/2 H, Male and Female	6.75	6.75	8.00	10.50	25.00	
Exelloy Valves	Globe	No. 222 X, Female	6.50	6.50	7.50	10.00	34.00	47.50
		No. 222 1/2 X, Male and Female	8.00	8.00	9.50	12.50	42.50	
	Angle	No. 223 X, Female	6.50	6.50	7.50	10.00	34.00	47.50
		No. 223 1/2 X, Male and Female	11.25	11.25	13.25	17.50	51.00	
18-8 Mo Valves	Globe	No. 222 SS, Female	8.75	8.75	10.00	13.50	37.50	53.50
		No. 222 1/2 SS, Male and Female	11.00	11.00	12.50	16.75	46.75	
	Angle	No. 223 SS, Female	8.75	8.75	10.00	13.50	37.50	53.50
		No. 223 1/2 SS, Male and Female	14.75	14.75	17.00	22.50	56.00	

Service recommendations: Made of three different metals with female or male and female ends, these neat, small, rugged valves find wide application in almost every industry. They are ideal for use on orifice meters, regulator leads, by-passes, gauges, ammonia lines, and many similar services.

The Exelloy Valves are particularly suitable for handling oil or gas containing sulphur compounds, or for installations where steel valves do not have sufficient resistance to atmospheric corrosion.

The 18-8 Mo Alloy Valves are especially suited for oil and gasoline containing hydrogen sulphide and sulphur dioxide when moisture is apt to be present.

Construction: The body and bonnet are made from solid bar stock. The thread chambers are extra long. The plug type disc is exceptionally resistant to wear

and to foreign matter, and permits accurate flow regulation. The disc is integral with the stem.

The stuffing box is deep, has a gland, and is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

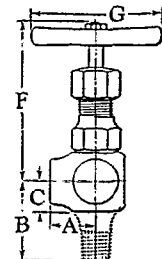
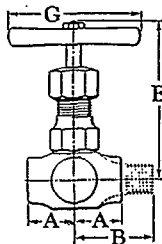
Materials: The Steel Valves have a steel body, bonnet, packing nut, and gland, and an Exelloy stem. In the Exelloy Valves, all of these parts are made of Exelloy; and in the 18-8 Mo Alloy Valves, of Crane 18-8 Mo Chrome-Nickel-Molybdenum Alloy Steel. All valves have a malleable iron tee handle.

Exelloy is a specially heat-treated chromium iron having a chromium content of about 12 per cent. Crane 18-8 Mo Alloy is a steel having a minimum content of 18 per cent chromium and 8 per cent nickel, with 2 to 4 per cent molybdenum.

Crane Co. is licensed under patent No. 1,587,614 to manufacture valves and fittings made from 18-8 chromium-nickel alloy with 2 to 4% molybdenum.

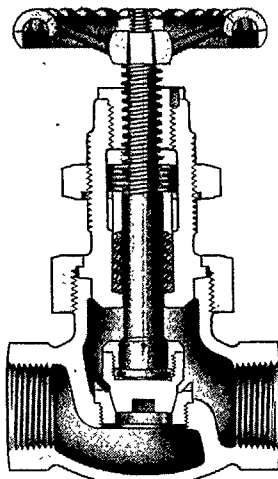
Dimensions, in Inches

Size	1/8	1/4	3/8	1/2	3/4	1
A	31/32	31/32	13/32	1 1/4	1 5/8	2 1/8
B	1 1/2	1 5/8	1 7/8	2 1/8	2 5/8	
C	9/16	9/16	1 1/16	1 3/16	1	1 1/4
E — Open	3 3/8	3 3/8	3 7/8	4 13/16	6 3/8	7 5/8
F — Open	3 7/16	3 7/16	3 15/16	4 7/8	6 3/8	7 5/8
G	2 9/16	2 9/16	2 9/16	3 9/16	4 3/4	4 3/4
Diameter of seat opening	1/8	3/16	1/4	5/16	7/16	9/16



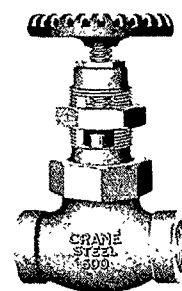
600-Pound Alloy Cast Steel Globe Valves Outside Screw and Yoke

24



Cross Section
No. 496 P, Globe

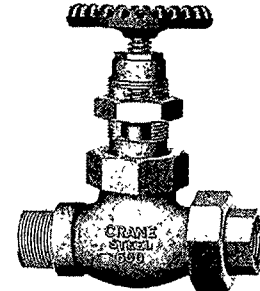
*All valves shown
on this page are
made to order only.*



No. 496 P, Globe
Female Inlet
Female Outlet



No. 1880 P, Globe
Female Inlet
Female Union Outlet



No. 1884 P, Globe
Male Inlet
Female Union Outlet

WORKING PRESSURE — 600 pounds steam, 750° F.
HYDROSTATIC TEST PRESSURES — 1500 pounds, body; 1100 pounds, seat
Valves are tested at the seat with 100 pounds air under water.

On the No. 496 P and No. 1880 P Valves both ends are the same pipe size. On the No. 1884 P Valves the male end is one pipe size larger than the female union end.

Prices on application.

These new Crane Valves are patterned after the A.A.R. 300-Pound O. S. & Y. Brass Valves. They are especially recommended for service on railroad locomotives using high pressure superheated steam. The valves are liberally reinforced and are ruggedly constructed to withstand steam pressures as high as 600 pounds with temperatures up to 750° F.

The valves are available with a female inlet and either a plain female or female union outlet, or with a male inlet and a female union outlet.

Materials and construction: The body and bonnet on these valves are well-proportioned and unusually strong. They are made from Crane No. 4 Carbon-Molybdenum Steel, an alloy particularly suitable for service on elevated pressures and temperatures. The stem is made of Exelloy. Stem threads, long and accurately cut, are on the outside where they do not come in contact with the fluid in the line. They can be easily lubricated when necessary.

The valves have a malleable iron handwheel.

Plug type seat and disc: The plug type disc and seat, excellent for throttling services, have wide,

carefully finished seating surfaces which are unusually resistant to foreign matter and to wiredrawing.

The disc is made of Crane No. 49 Nickel Alloy, and the body seat ring, of Exelloy. The combination is ideal for steam.

Yoke bushing: The yoke bushing, made of Crane No. 48 Nickel Alloy, is long and heavy with liberal stem-thread engagement. Screwed into the yoke and locked with a set screw, it is sturdy and secure.

Stuffing box: The stuffing box is deep and is filled with high grade packing. It is equipped with a Crane No. 48 Nickel Alloy gland.

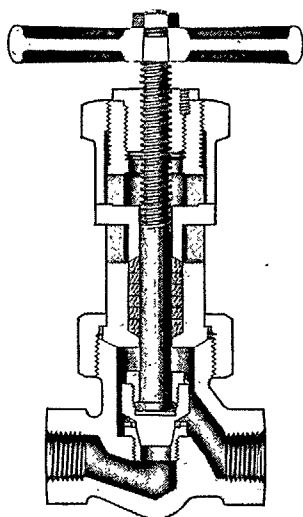
Repacking: These valves, when wide open, can be repacked while under pressure.

Interchangeability: The body seat ring, tail-piece, union ring, and wheel on all sizes, and the stem, disc, disc stem ring, and union bonnet ring on sizes $\frac{3}{4}$ -inch and larger (1 x $\frac{3}{4}$ -inch and larger on male inlet valves) are interchangeable with the corresponding parts of the 300-Pound A.A.R. Brass Globe and Angle Valves for Steam Locomotives shown on pages 44 and 45.

Dimensions, in Inches

Size	Inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 496 P or No. 1880 P Female Inlet Valves	Center to female end	$19\frac{1}{16}$	$17\frac{7}{8}$	$21\frac{1}{4}$	$29\frac{1}{16}$	$213\frac{1}{16}$	$33\frac{3}{8}$
	Center to union end, No. 1880 P	$29\frac{1}{16}$	3	$37\frac{1}{16}$	$315\frac{1}{16}$	$45\frac{5}{16}$	$5\frac{1}{8}$
	Center to top, open	$51\frac{1}{16}$	6	$71\frac{1}{16}$	$8\frac{1}{8}$	$9\frac{3}{4}$	$105\frac{5}{8}$
	Diameter of wheel	$31\frac{1}{16}$	$35\frac{3}{8}$	$41\frac{1}{16}$	$43\frac{3}{4}$	$53\frac{3}{8}$	6
Size	Inches	$\frac{3}{4} \times \frac{1}{2}$	$1 \times \frac{3}{4}$	$1\frac{1}{4} \times 1$	$1\frac{1}{2} \times 1\frac{1}{4}$	$2 \times 1\frac{1}{2}$	$2\frac{1}{2} \times 2$
No. 1884 P Male Inlet Valves	Center to male end	$29\frac{1}{16}$	$31\frac{3}{8}$	$31\frac{1}{4}$	$313\frac{1}{16}$	$45\frac{5}{16}$	$4\frac{7}{8}$
	Center to union end	$29\frac{1}{16}$	3	$37\frac{1}{16}$	$315\frac{1}{16}$	$45\frac{5}{16}$	$5\frac{1}{8}$
	Center to top, open	$51\frac{1}{16}$	6	$71\frac{1}{16}$	$8\frac{1}{8}$	$9\frac{3}{4}$	$105\frac{5}{8}$
	Diameter of wheel	$31\frac{1}{16}$	$35\frac{3}{8}$	$41\frac{1}{16}$	$43\frac{3}{4}$	$53\frac{3}{8}$	6

600-Pound Forged Steel Globe and Angle Valves Union Bonnet—Outside Screw and Yoke



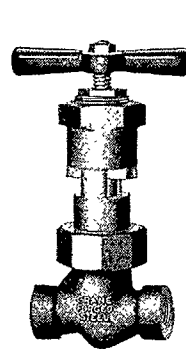
Cross Section
Globe, Screwed
With Plug Type Disc

WORKING PRESSURES

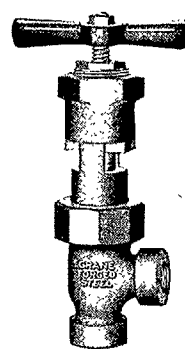
Temperature Deg. F.	Pounds Non-Shock
Class "X" for Oil or Oil Vapor	
100	2000
150	1900
200	1800
250	1700
300	1600
350	1500
400	1400
450	1300
500	1200
Class "XR" for Steam or Water	
550	1120
600	1040
650	960
700	880
750	800
Class "X" for Oil or Oil Vapor	
800	740
850	670
900	600
950	530
1000	380

TEST PRESSURES

Shell — 2100 pounds hydrostatic
Seat — 2100 pounds hydrostatic
Seat is tested 100 pounds air-under-water



Globe, Screwed
No. 216 X
No. 216 XR



Angle, Screwed
No. 217 X
No. 217 XR

List Prices and Dimensions

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4
No. 216 X or XR, or No. 217 X or XR	Each	11.35	11.35	13.50	15.75	20.75	29.75
End to end, Globe	Inches	3	3	3 1/2	4 1/2	5 1/4	6
Center to end, Angle	Inches	1 1/2	1 1/2	1 3/4	2 1/4	2 5/8	3
Center to top of stem, open	Globe	Inches	6 1/4	6 1/4	7 5/8	9 3/8	10 7/8
	Angle	Inches	6 1/4	6 1/4	7 3/4	9 1/8	10 3/4
End to end of tee handle	Inches	4 1/8	4 1/8	4 3/4	5 3/8	7	7

Service recommendations: These valves are strong, compact, and rugged. They are well suited for service on high pressures at high temperatures and for high-pressure hydraulic service.

The "X" trimmed valves are recommended for oil or oil vapor service, 1000° F. maximum temperature; the "XR" trimmed valves are recommended for steam, water, or general service, 750° F. maximum temperature.

Plug type disc and seat: The valves have a plug type seat and disc, making them ideal for severe service, such as for throttling, for soot blower, blow-off, boiler feed, drip, and drain lines. The disc and seat offer unusual resistance to wear and to the cutting action of foreign matter. In addition, the long tapered seating surfaces permit accurate regulation of flow when throttling.

The disc stem ring connection is tack-welded for greater strength.

The "X" trimmed valves have an Exelloy disc and seat; the "XR" trimmed valves have a Crane No. 49

Nickel Alloy disc and an Exelloy body seat ring.

Stem: The stem in all of these valves is made of Exelloy. The stem threads are on the outside where they are not affected by the fluid in the line and where they can be easily lubricated when necessary.

Body and bonnet: In these valves the body and the yoke-type union bonnet are made from forged carbon steel. The bonnet joint has ground seats and is securely and tightly made up with a heavy forged steel union ring. All of these parts have generous metal sections to assure liberal safety.

Tee handle: The malleable iron tee handle, of ample size, permits easy operation.

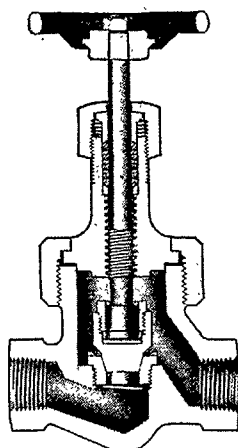
Gland: Valves for oil or oil vapor have a No. 48 Nickel Alloy gland. Valves for steam or water have a cast manganese bronze gland.

Stuffing box: The stuffing box is exceptionally large and deep; it is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

600-Pound Forged Steel Globe and Angle Valves Inside Screw

24



Cross Section, Globe
Union Bonnet

HYDROSTATIC TEST PRESSURE

Shell and seat — 2100 pounds

Valve seat tested 100 pounds air-under-water.

WORKING PRESSURES

Temp. Deg. F.	Pounds Non-Shock	Temp. Deg. F.	Pounds Non-Shock
Class "X", for Oil or Oil Vapor only			
100	2000	500	1200
150	1900	550	1120
200	1800	600	1040
250	1700	650	960
300	1600	700	880
350	1500	750	800
400	1400	800	740
450	1300		

These are new, small, rugged Inside Screw Globe and Angle Valves, made with a plug type disc and seat.

Service recommendations: The valves are suited for use where strong, durable inside screw valves are wanted. They are recommended for cold oil and for hot oil and oil vapor on temperatures up to 800° F.

Body and bonnet: The body and bonnet are forged carbon steel. Heavy metal sections assure liberal safety.

Bonnet joint: Bonnet joints are fitted with a corrugated soft iron gasket. Sizes $\frac{1}{4}$ to $\frac{3}{4}$ -inch have a union bonnet, the ring being forged steel; sizes 1 to 2-inch have a compact bolted bonnet, male and female type, equipped with Triplex Steel studs. Both types are strong and can be easily taken apart.

Plug type disc and seat: The plug type disc and seat are made of Exelloy. Their wide, carefully finished seating surfaces are unusually resistant to foreign matter and to wiredrawing; they are ideal for throttling services. The seat ring is screwed into the body.

Stem: The stem, made of Exelloy, is of generous diameter with long thread engagement in the bonnet. The stem

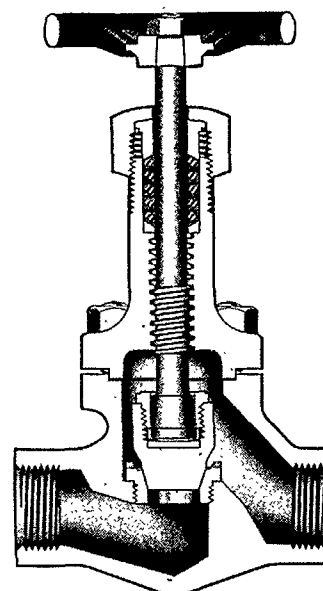
end is retained in the disc by a disc stem ring, screwed into the disc and lock-welded.

Stuffing box:

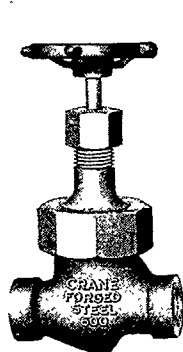
The stuffing box, equipped with a gland, is exceptionally wide and deep. It is filled with cut ring packing.

Handwheel: Wheels are malleable iron. For easier handling, valves $\frac{1}{4}$ -inch and smaller have a new dish design wheel, made with small gripping knobs on the outer edge.

Repacking: These valves, when wide open, can be repacked while under pressure.



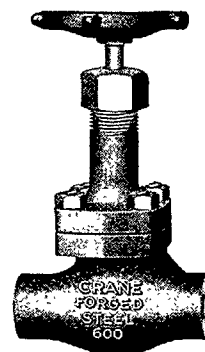
Cross Section, Globe
Bolted Bonnet



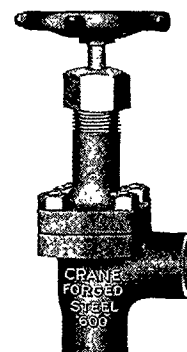
Union Bonnet
Globe, Screwed
No. 3620 X



Union Bonnet
Angle, Screwed
No. 3621 X



Bolted Bonnet
Globe, Screwed
No. 3624 X



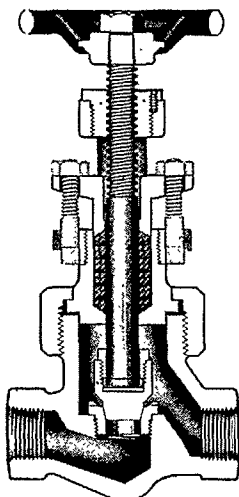
Bolted Bonnet
Angle, Screwed
No. 3625 X

List Prices and Dimensions

Union Bonnet Valves						Bolted Bonnet Valves					
Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	Size	Inches	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 3620 X, Globe	*Each	9.25	9.25	11.00	12.75	No. 3624 X, Globe	Each	16.25	22.50	33.00	45.00
No. 3621 X, Angle	Each	9.25	9.25	11.00	12.75	No. 3625 X, Angle	Each	16.25	22.50	33.00	45.00
Dimensions, in Inches	Center to end	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$2\frac{1}{4}$	Dimensions, in Inches	Center to end	$2\frac{9}{16}$	$3\frac{1}{8}$	$3\frac{1}{2}$	$4\frac{3}{16}$
	Center to top, open	Globe	$4\frac{3}{4}$	$5\frac{3}{16}$	$6\frac{7}{16}$		Center to top, open	Globe	$8\frac{3}{4}$	$10\frac{3}{4}$	$10\frac{5}{16}$
		Angle	$4\frac{3}{4}$	$5\frac{1}{16}$	$6\frac{1}{4}$			Angle	$7\frac{5}{8}$	$9\frac{5}{16}$	$9\frac{1}{8}$
	Diameter of wheel	$2\frac{1}{2}$	$2\frac{1}{2}$	3	$3\frac{1}{2}$		Diameter of wheel	4	5	6	7

Description of materials . . . pages 1 to 9

600-Pound Forged Steel Globe and Angle Valves Outside Screw and Yoke



Cross Section, Globe
Union Bonnet

Low in cost and high in quality, these new, small Crane 600-Pound Forged Steel Outside Screw and Yoke Valves are compact, rugged, and durable.

The line includes union bonnet valves with screwed ends in sizes $\frac{1}{4}$ to $\frac{3}{4}$ -inch or socket-welding ends in sizes $\frac{1}{4}$ and $\frac{3}{8}$ -inch; and bolted bonnet valves with screwed, socket-welding, or flanged ends in sizes $\frac{1}{2}$ to 2-inch.

Two classes of trim materials are available: Class "X", for oil or oil vapor up to 1000° F.; and Class "XR", for steam and water up to 750° F.

Service recommendations: The valves are ideal for a wide variety of services in oil refineries, oil and gas fields, central power stations, and industrial plants, on high pressure hydraulic lines and on high pressure-temperature steam or oil lines.

Body, bonnet, and yoke: The body, bonnet, and yoke are forged carbon steel; heavy metal sections assure generous strength. On union bonnet valves the bonnet and yoke are separate pieces, joined by long, fine threads. On bolted bonnet valves the bonnet and yoke are forged integral.

Bonnet joint: The bonnet joint is equipped with a corrugated soft iron gasket, assuring tightness and ease of maintenance. Union bonnet valves have a forged steel union ring. Bolted bonnet valves have a male and female joint fitted with Triplex Steel studs. Both types of joints are unusually strong and can be easily dismantled and reassembled.

Plug type disc and seat: These valves have a Crane plug type disc and seat, well known for ability to maintain tightness and for effectiveness on throttling services. The wide, tapered seating sur-

HYDROSTATIC TEST PRESSURES
Screwed and Socket-Welding Flanged
Shell — 2100 pounds Shell — 2000 pounds
Seat — 2100 pounds Seat — 1550 pounds
Valve seat tested 100 pounds air-under-water

WORKING PRESSURES				
Temp. Deg. F.	Pounds, Non-Shock			
	Screwed or Socket- Welding Valves	Flanged With $\frac{1}{4}$ -inch Male Facing	Ring Joint Facing	Valves
Class "X", for Oil or Oil Vapor				
Class "XR", for Steam or Water				
100	2000	1000	1200	
150	1900	960	1150	
200	1800	930	1100	
250	1700	900	1050	
300	1600	870	1000	
350	1500	840	950	
400	1400	810	900	
450	1300	780	850	
500	1200	750	800	
550	1120	720	760	
600	1040	690	720	
650	960	660	680	
700	880	630	640	
750	800	600	600	
Class "X", for Oil or Oil Vapor				
800	740	550	550	
850	670	490	490	
900	600	420	420	
950	530	330	330	
1000	380	240	240	

Air and gas ratings, page 321.

faces offer excellent resistance to foreign matter and to wire-drawing. In "X" trimmed valves, the disc and seat are Exelloy; in "XR" trimmed valves, the seat is Exelloy and the disc is Crane No. 40 Nickel Alloy. The seating surfaces are carefully ground and then are lapped together by hand to obtain a fine, mirror-like finish. The body seat ring has heavy metal sections, with a long thread engagement in the body.

Stem: The Exelloy stem has precision cut lifting threads to assure smooth operation. The portion passing through the stuffing box is polished to reduce friction and to prolong the life of the packing.

Disc-stem connection: A shoulder-seating screwed-in disc stem ring retains the stem shoulder within the disc; the disc swivels on the end of the stem, preventing scoring or galling of the seating surfaces. As a precaution against loosening, the disc stem ring is lock-welded to the disc.

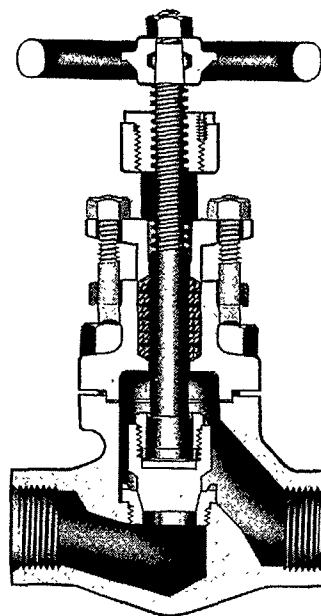
Yoke bushing: The yoke bushing is long and heavy, with liberal stem-thread engagement; screwed into the yoke and locked with a set screw, it is sturdy and secure. Made from a selected bearing material — Crane No. 48 Nickel Alloy with high melting point for oil or oil vapor, or Crane Cast Manganese Bronze for steam or water —, it is unusually serviceable.

Bolted gland: The bolted gland eliminates the danger of weakening — by threading — the yoke legs. Cadmium-plated steel tee-head bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place. The packing load can be adjusted easily, and the bolts can be quickly removed when necessary. Lugs on the bonnet anchor the bolts; they will not come off in service.

Stuffing box: An unusually wide and deep stuffing box provides liberal packing space for a tight seal. It is filled with high quality cut ring packing.

Handwheel: Wheels of tough, durable malleable iron are held in place by a wheel nut. For easier handling, valves 1-inch and smaller have a new dished design wheel, made with small rounded gripping knobs.

Repacking: These valves, when wide open, can be repacked while under pressure.



Cross Section, Globe
Bolted Bonnet

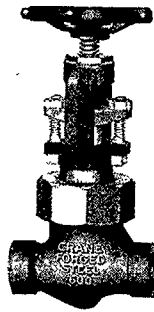
600-Pound Forged Steel Globe and Angle Valves Outside Screw and Yoke

24

Union Bonnet Valves

List Prices, Each, and Dimensions

Size	Inches	1/4	3/8	1/2	3/4
Globe	No. 3640 X or XR, Screwed	12.50	12.50	14.75	17.25
	No. 3648 X or XR, Socket-Welding	17.25	17.25		
Angle	No. 3641 X or XR, Screwed	12.50	12.50	14.75	17.25
	No. 3649 X or XR, Socket-Welding	17.25	17.25		
Dimensions, in Inches	Center to end	1 1/2	1 1/2	1 3/4	2 1/4
	Center to top, open	Globe	6 1/2	6 1/2	7 5/16
		Angle	6 3/8	6 3/8	7
	Depth of socket	7/16	9/16		
	Diameter of wheel	3	3	3 1/2	4

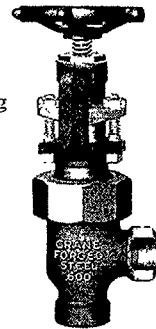


Angle, Screwed
(Not illustrated)
No. 3641 X
No. 3641 XR

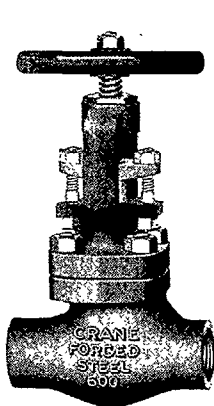
Angle, Socket-Welding
No. 3649 X
No. 3649 XR

Globe, Screwed
No. 3640 X
No. 3640 XR

Globe, Socket-Welding
(Not illustrated)
No. 3648 X
No. 3648 XR



Bolted Bonnet Valves

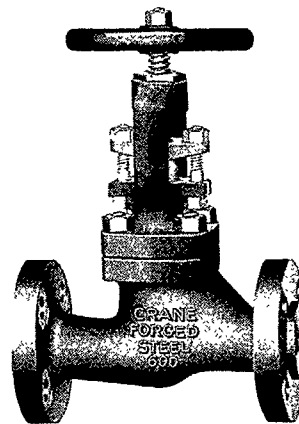
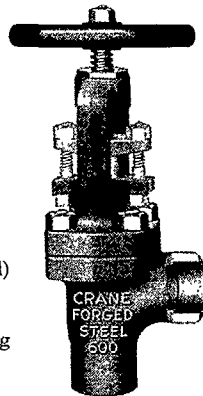


Globe
Screwed
No. 3644 X
No. 3644 XR

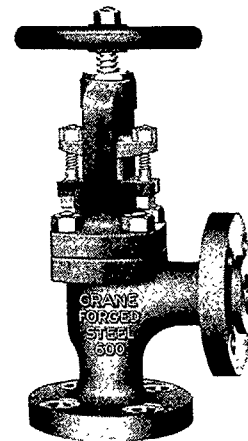
Socket-Welding
(Not illustrated)
No. 3652 X
No. 3652 XR

Angle
Screwed
(Not illustrated)
No. 3645 X
No. 3645 XR

Socket-Welding
No. 3653 X
No. 3653 XR



Globe, Flanged
No. 3656 X or 3656 XR



Angle, Flanged
No. 3657 X or 3657 XR

Flange dimensions, facing, and drilling: The end flanges conform to the 600-Pound American Standard, (B16e-1939).

They have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "ser-rated" finish.

Prices include drilling to the 600-Pound Standard, and spot facing; no deduction is made when ordered faced only.

Face to face: Flanged valves conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged Valves, No. B16.10-1939. This Standard does not include 1/2-inch 600-Pound Valves.

List Prices, Each, and Dimensions

Size		Inches							
		1/2	3/4	1	1 1/4	1 1/2	2		
Globe	No. 3644 X or XR, Screwed	16.50	19.25	22.75	32.75	45.00	60.50		
	No. 3652 X or XR, Socket-Welding	24.00	28.75	34.00	44.00	57.00	73.50		
	No. 3656 X or XR, Flanged, F.D. & S. F.	31.50	38.00	45.00	55.00	69.00	86.50		
Angle	No. 3645 X or XR, Screwed	16.50	19.25	22.75	32.75	45.00	60.50		
	No. 3653 X or XR, Socket-Welding	24.00	28.75	34.00	44.00	57.00	73.50		
	No. 3657 X or XR, Flanged, F.D. & S.F.	31.50	38.00	45.00	55.00	69.00	86.50		
Dimensions, in Inches	Screwed or Socket-Welding Valves	Center to end		1 13/16	2 3/16	2 9/16	3 1/8	3 1/2	4 3/16
		Center to top, open	Globe	7 5/16	8 7/8	9 3/8	11	11 15/16	14
		Angle	6 3/4	8	8 1/4	9 9/16	10 1/8	11 15/16	
	Depth of socket		5/8	1 1/16	3/4	13/16	7/8	1	
	Flanged Valves	*Center to face		3 1/4	3 3/4	4 1/4	4 1/2	4 3/4	5 3/4
		Center to top, open	Globe	7 3/8	9	9 3/4	11 3/16	12 3/16	14 9/16
		Angle	6 11/16	8	8 5/16	9 5/8	10 5/16	12 1/16	
	Diameter of wheel		3 1/2	4	5	6	7	9	
	Diameter of flange		3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2	
	*Thickness of flange		9/16	5/8	1 1/16	1 3/16	7/8	1	
	Diameter of male face		1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8	
	Diameter of bolt circle		2 5/8	3 1/4	3 1/2	3 3/8	4 1/2	5	
	No. and dia. of bolts		4-1 1/2	4-5/8	4-5/8	4-5/8	4-3/4	8-5/8	

*Center to face dimension includes the 1/4-inch male face; thickness of flange does not.

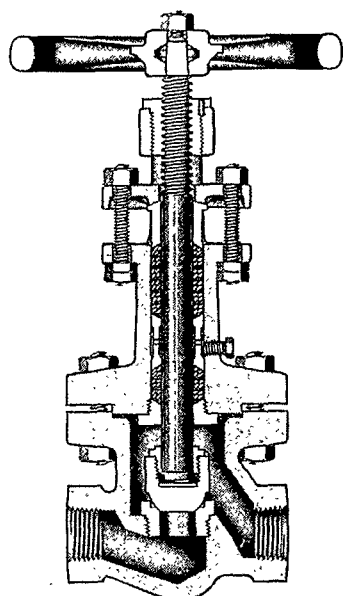
For working pressures and description, see the preceding page.

Dimensions of ring joint and special facings... pages 561 and 562

Templates for drilling... page 554

600-Pound Flanged and 900-Pound Screwed and Butt-Welding Alloy Forged Steel Globe and Angle Valves

Bolted Bonnet—Outside Screw and Yoke



Cross Section
Globe, Screwed
"X" Trimmed
With Ball to Flat Seat

Service recommendations:

These valves are exceptionally massive and rugged, and have many of the refinements usually found only in larger size high-pressure valves. They are ideal for the severe services encountered in modern power plants and oil refineries, and for high-pressure hydraulic installations.

Class "X" trim: Class "X" trimmed valves are recommended for oil or oil vapor service on temperatures up to 1000° F. They have a ball shaped face on the disc and a flat, angular shaped face on the body seat ring. This construction produces a line bearing seating contact, avoiding any danger of jamming caused by the coking action of hot oil. Both the disc and the body seat ring are made of Exelloy.

Classes "XR" and "U" trim: Classes "XR" and "U" trimmed valves are recommended for steam or water service, the former up to 750° F. and the latter up to 1000° F. They have a plug type disc and seat, which offers excellent resistance to wear and to foreign matter. The disc taper assists in maintaining tightness and permits accurate regulation of flow when throttling.

In the "XR" trimmed valves, the disc is made of Crane No. 49 Nickel Alloy and the body seat ring, of

Air or gas service . . . page 321

HYDROSTATIC TEST PRESSURES

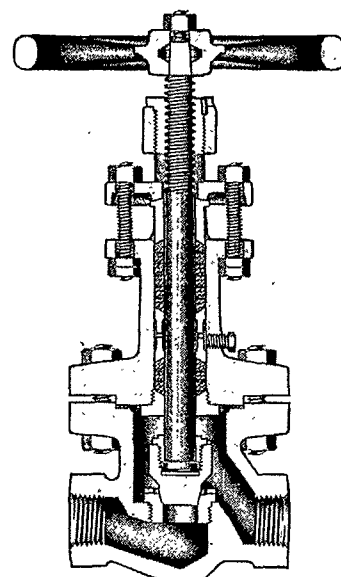
Screwed or Butt-Welding Valves
Shell and Seat — 3100 pounds

Flanged Valves
Shell — 2000 pounds
Seat — 1550 pounds

Seats are tested 100 pounds air-under-water.

WORKING PRESSURES

Temp. Deg. F.	Pounds, Non-Shock		
	Screwed or Butt- Welding Valves	Flanged Valves With 1/4-inch Male Facing	With Ring Joint Facing
Class "X" for Oil or Oil Vapor Class "XR" for Steam or Water			
100	3000	1200	1440
150	2850	1180	1400
200	2700	1160	1350
250	2550	1120	1300
300	2400	1080	1250
350	2250	1040	1200
400	2100	1000	1150
450	1950	960	1100
500	1800	920	1050
550	1680	880	1000
600	1560	840	950
650	1440	800	900
700	1320	760	850
750	1200	720	800
Class "X" for Oil or Oil Vapor Class "U" for Steam or Water			
800	1100	680	750
850	1000	640	700
900	900	600	650
950	795	530	600
1000	570	380	400



Cross Section
Globe, Screwed
"XR" or "U" Trimmed
With Plug Type Disc and Seat

Exelloy. In the "U" trimmed valves, both of these parts are Stellite-faced alloy steel.

Body and bonnet: The body and bonnet are forged No. 4 Carbon-Molybdenum Steel and

have a male and female joint. Triplex Steel bolt-studs are used in "X" and "XR" trimmed valves, and Templex Steel bolt-studs are used in "U" trimmed valves.

Stem: The stem in all of these valves is made of Exelloy. The stem threads are on the outside where they are not affected by the fluid in the line and where they can be easily lubricated when necessary.

Gland: The valves have a two-piece ball-type gland and flange which assures an even pressure on the packing and eliminates the possibility of binding the stem. Valves for oil or oil vapor have a No. 48 Nickel Alloy gland. Valves for steam or water have a Crane Cast Manganese Bronze gland.

Stuffing box: The stuffing box is of the lantern type and is extra deep. Packing is used both above and below the lantern, assuring tightness. The lantern provides space for a cooling chamber, and the cooling chamber is tapped and fitted with a steel plug.

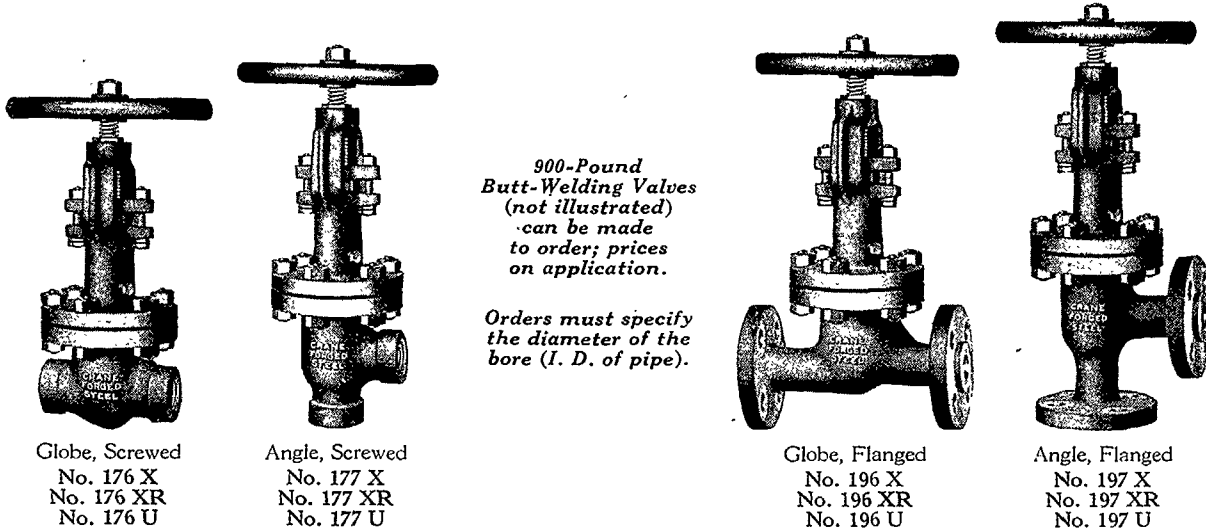
Repacking: These valves, when wide open, can be repacked while under pressure.

Description of materials . . . pages 1 to 9

600-Pound Flanged and 900-Pound Screwed and Butt-Welding Alloy Forged Steel Globe and Angle Valves Bolted Bonnet—Outside Screw and Yoke

24

For working pressures, see the preceding page.



List Prices and Dimensions

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2
Screwed	No. 176 X, XR, or U, Globe	Each	40.00	51.00	64.00	70.00	90.00	125.00
	No. 177 X, XR, or U, Angle	Each	40.00	51.00	64.00	70.00	90.00	125.00
Flanged	No. 196 X, XR, or U, Globe, F.D. & S.F.	Each	66.00	66.00	84.00	95.00	123.00	163.00
	No. 197 X, XR, or U, Angle, F.D. & S.F.	Each	66.00	66.00	84.00	95.00	123.00	163.00
Dimensions In Inches	End to end, Globe, Screwed		3 1/2	4 1/2	5 1/4	6	7	8 1/2
	Center to end, Angle, Screwed		1 3/4	2 1/4	2 5/8	3	3 1/2	4 1/4
	*Face to face, Globe, Flanged		7 3/8	7 1/2	8 1/2	9	9 1/2	11 1/2
	*Center to face, Angle, Flanged		3 11/16	3 3/4	4 1/4	4 1/2	4 3/4	5 3/4
	Center to top of stem, open	Globe, Screwed	9	11 1/2	13 1/4	13 3/8	18	19 5/8
		Angle, Screwed	8 7/8	11 1/8	13	13 5/8	17 3/4	19
		Globe, Flanged	11 3/4	11 3/4	13 5/8	14 5/8	18 5/8	20 5/8
		Angle, Flanged	11 1/4	11 1/4	13 1/16	13 3/4	18 1/2	19 1/2
	Diameter of wheel	Screwed Valves	4 1/2	5 1/2	8	8	9	10
		Flanged Valves	5 1/2	5 1/2	8	8	9	10
	Flange dimensions	Diameter of flange	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
		*Thickness of flange	9/16	5/8	1 1/16	1 3/16	7/8	1
		Diameter of male face	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8
		Diameter of bolt circle	2 5/8	3 1/4	3 1/2	3 7/8	4 1/2	5
		No. and dia. of bolts	4—1 1/2	4—5/8	4—5/8	4—5/8	4—3/4	8—5/8

*Face to face and center to face dimensions include the 1/4-inch male face; thickness of flange dimensions do not. Face to face and center to face dimensions conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, No. B16.10-1939. 1/2-inch 600-Pound Globe and Angle Valves are not included in this Standard.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the 600-Pound American Standard (B16-1939). Flanges have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

When so ordered, flanged valves can be furnished with ring joint, female, tongue; or groove facing; see the Crane Discount Sheet for prices.

Drilling: Flanged valves are furnished with the end flanges faced, drilled, and spot faced (F.D. &

S.F.) unless otherwise ordered. List prices include drilling to the 600-Pound American Standard, and spot facing. No deduction is made if valves are ordered faced only.

Butt-welding valves: Butt-welding valves (900-pound pressure class) can be made to order; prices on application. They have the same general dimensions as the flanged end valves, their end to end and center to end being the same as the face to face and center to face of the flanged valves. Orders for butt-welding valves must specify the diameter of the bore (inside diameter of pipe).

Templates for drilling . . . page 554

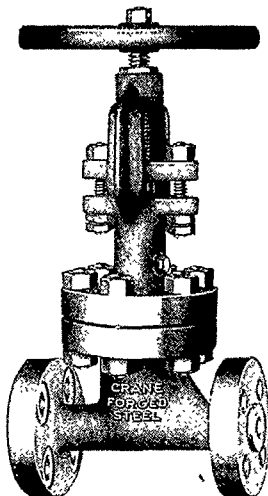
Dimensions of ring joint and special facings . . . pages 561 and 562

1500-Pound Flanged and Butt-Welding Alloy Forged Steel Globe and Angle Valves

Bolted Bonnet—Outside Screw and Yoke

TEST PRESSURES

Shell — 4500 pounds hydrostatic
Seat — 3700 pounds hydrostatic; also air tested

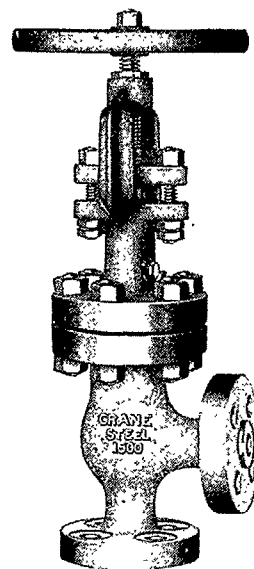


Globe, Flanged

- No. 193 X, Ball to Flat Seat
Oil or Oil Vapor, 1000° F. Max.
No. 193 XR, Plug Type Disc and Seat
Steam or Water, 750° F. Max.
No. 193 U, Plug Type Disc and Seat
Steam or Water, 1000° F. Max.

WORKING PRESSURES

Temp. Deg. F.	Butt- Welding Valves	Flanged Valves With 1/4-inch Male Facing	With Ring Joint Facing
Class "X" for Oil or Oil Vapor			
Class "XR" for Steam or Water			
100	3600	3000	3600
150	3500	2950	3500
200	3375	2900	3375
250	3250	2800	3250
300	3125	2700	3125
350	3000	2600	3000
400	2875	2500	2875
450	2750	2400	2750
500	2625	2300	2625
550	2500	2200	2500
600	2375	2100	2375
650	2250	2000	2250
700	2125	1900	2125
750	2000	1800	2000
Class "X" for Oil or Oil Vapor			
Class "U" for Steam or Water			
800	1875	1700	1875
850	1750	1600	1750
900	1625	1500	1625
950	1500	1325	1500
1000	1000	950	1000



Angle, Flanged

- No. 195 X, Ball to Flat Seat
Oil or Oil Vapor, 1000° F. Max.
No. 195 XR, Plug Type Disc and Seat
Steam or Water, 750° F. Max.
No. 195 U, Plug Type Disc and Seat
Steam or Water, 1000° F. Max.

List Prices and Dimensions

Size		Inches	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	
No. 193 X, XR, or U, Globe, F.D. & S.F.	Each	85.00	97.75	125.75	157.00		
No. 195 X, XR, or U, Angle, F.D. & S.F.	Each	85.00	97.75	125.75	157.00		
Dimensions In Inches	*Face to face, Globe, Flanged	9	10	11	12		
	*Center to face, Angle, Flanged	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6		
	Center to top of stem, open (Approx.)	$15\frac{3}{4}$	$18\frac{1}{2}$	$20\frac{1}{4}$	23		
	Diameter of wheel, Globe or Angle	7	9	10	12		
	Flange dimensions	Diameter of flange	$5\frac{1}{8}$	$5\frac{7}{8}$	$6\frac{1}{4}$	7	
		*Thickness of flange	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	
		Diameter of male face	$11\frac{11}{16}$	2	$2\frac{1}{2}$	$2\frac{7}{8}$	
		Diameter of bolt circle	$3\frac{1}{2}$	4	$4\frac{3}{8}$	$4\frac{7}{8}$	
		No. and dia. of bolts	$4-\frac{3}{4}$	$4-\frac{7}{8}$	$4-\frac{7}{8}$	$4-1$	

*Face to face and center to face dimensions include the 1/4-inch male face; thickness of flange dimensions do not. Face to face and center to face dimensions conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, No. B16.10-1939. The Standard does not include the 3/4-inch size valves.

Construction and materials: These valves are similar in design, construction, and materials to those shown on pages 316 and 317 except that they are heavier and more massive, and have a ring type bonnet joint instead of a male and female joint. The angle valves are made with a cast steel body and a forged steel bonnet.

Flange dimensions and facing: End flanges conform to the 1500-Pound American Standard (B16-1939). They have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "seriated" finish. When so ordered, the valves can be furnished with ring joint, female, tongue, or groove facing; see the Crane Discount Sheet for prices.

Drilling: End flanges are faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List

prices include drilling to the 1500-Pound American Standard, and spot facing. No deduction is made if valves are ordered faced only.

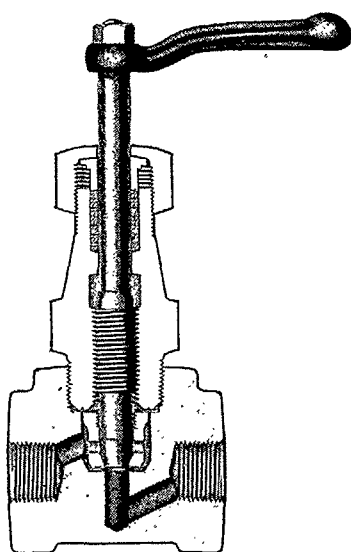
Butt-welding valves: Butt-welding valves (not illustrated) can be made to order; prices on application. They have the same general dimensions as the flanged valves, their end to end and center to end being the same as the face to face and center to face of the flanged end. Orders must specify the diameter of bore (inside diameter of pipe).

6000-Pound Hydraulic Forged Steel Globe and Angle Valves Plug Type Disc

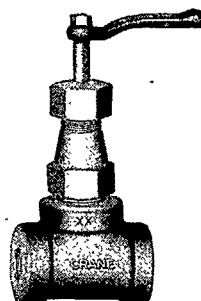
24

WORKING PRESSURE
6000 pounds cold water or oil, non-shock

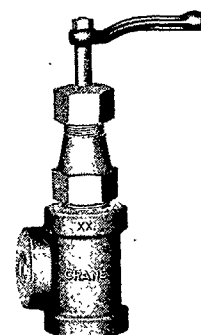
TEST PRESSURE
6500 pounds hydrostatic



Cross Section
No. 225 H, Globe



No. 225 H, Globe
Screwed



No. 226 H, Angle
Screwed

List Prices, Each, and Dimensions, in Inches

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 225 H, Globe or No. 226 H, Angle		21.00	21.00	23.00	27.00	33.00	45.00	130.00	175.00
End to end, Globe		2 7/8	2 7/8	3 1/4	4 1/4	5	6 1/2	7 1/2	9
Center to end, Angle		1 7/16	1 7/16	1 5/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/2
Center to top, open, Globe or Angle		6 5/8	6 5/8	7 1/2	9 7/8	11	13	14 1/4	16
Center to end of handle		3 1/8	3 1/8	3 1/2	4 5/8	5	5 3/4		
Diameter of wheel								12	14

Service recommendations: These valves have very heavy metal sections and are exceptionally rugged. They are recommended for severe and extremely high pressure service on hydraulic lines not subject to shock.

Plug type disc and seat: The plug type disc and seat are unusually resistant to wiredrawing and to foreign matter. The wide tapered seating surface permits easy flow regulation when throttling.

The seat bushing is made of Exelloy and can be easily renewed. The disc is made of brass.

Body and bonnet: The body is made from a solid steel forging. On sizes 1-inch and smaller, the bonnet is screwed into the body as illustrated in the cross section. On larger sizes the bonnet and body are bolted together (not illustrated).

Disc-stem connection: The disc and stem are made in one piece for sizes 1-inch and smaller, as shown in the cross section, and in two pieces with a swivel type connection, for sizes 1 1/4-inch and larger (not illustrated).

The stem in all sizes is made of brass.

Handle or wheel: Sizes 1 1/4-inch and smaller have a lever handle; larger sizes have a wheel.

Stuffing box: These valves have a deep stuffing box, filled with high grade packing. It is equipped with a gland.

Repacking: The valves, when wide open, can be repacked while under pressure.

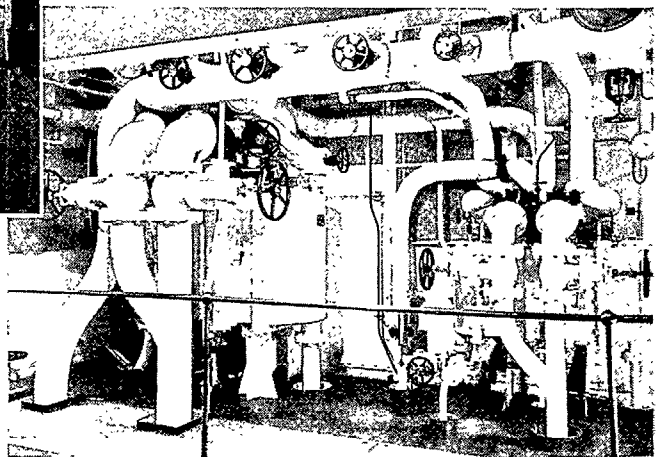
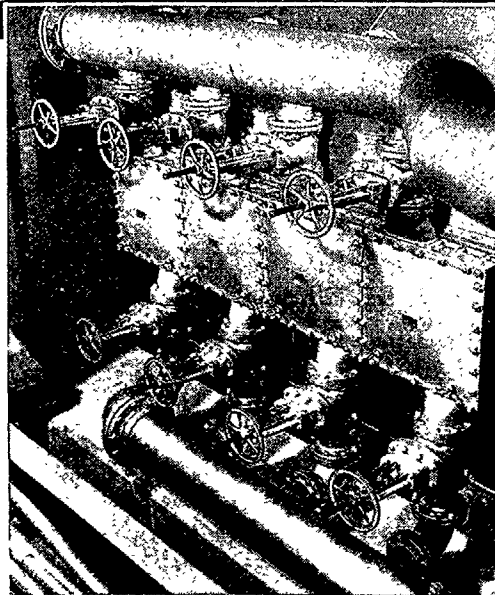
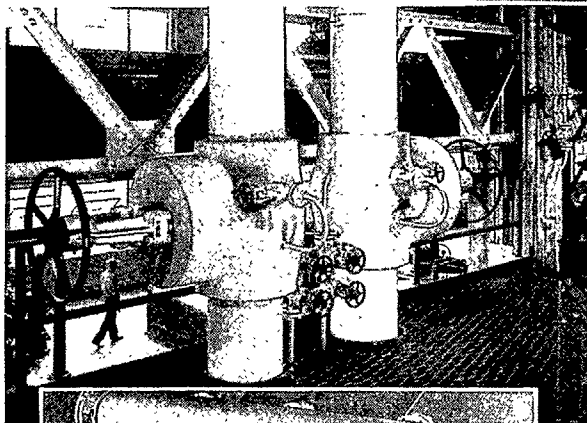
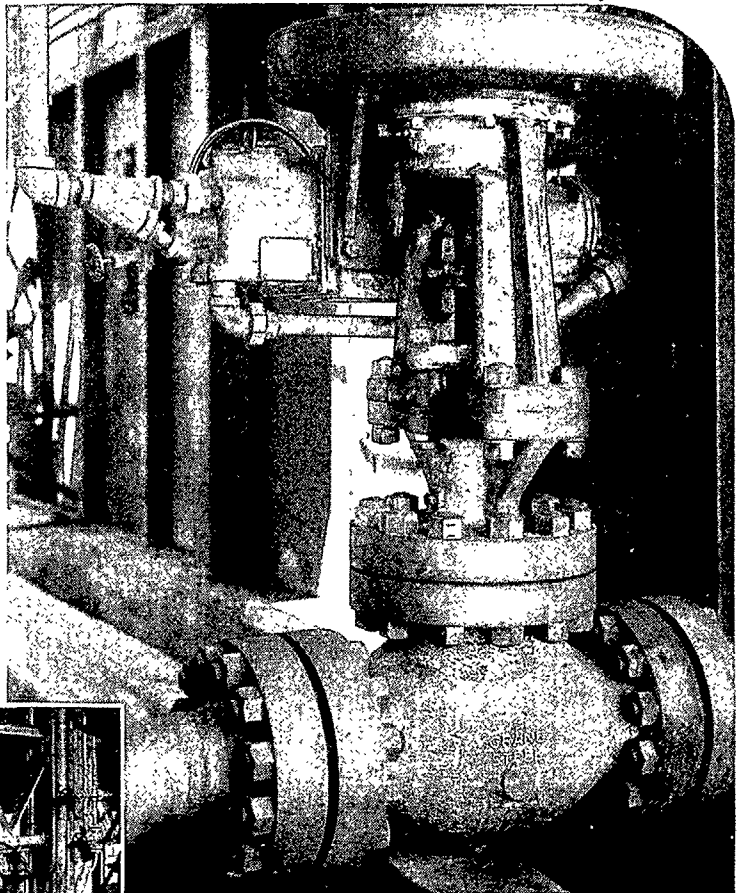
Seat opening: The diameter of the port opening in these valves is slightly smaller than the inside diameter of Double Extra Strong Pipe.

24

A Crane air-motor operated alloy steel globe valve with Crane forged steel welding neck flanges on a high pressure-temperature line in an oil refinery.



In an automotive power plant — main steam lines, equipped with large Crane cast steel gate valves and by-passes.



Air conditioning system piping on a passenger liner, designed with Crane marine-approved valves and fittings.



Crane gate valves and fittings in water lines on generator air coolers in electric light and power plant.

Cast Steel Globe and Angle Valves

Working Pressures, Pounds per Square Inch, Non-Shock — For Valves Shown on Pages 322 to 326

Fluid	Temp.	Carbon Steel Valves	No. 4 Carbon-Molybdenum Alloy Steel Valves						No. 2 Nickel-Chrome Alloy Steel Valves				No. 5 Chrome-Molybdenum Alloy Steel Valves (Made to order)						
	Deg. Fahr.	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	
		Flanged Valves with Standard Facings Other Than Ring Joint																	
Steam, Water, *Gas, or *Air (Class XR)	100	230	600	800	1200	1800	3000	5000	1200	1800	3000	5000	600	800	1200	1800	3000	5000	
	150	220	590	775	1180	1770	2950	4905	1180	1770	2950	4905	590	775	1180	1770	2950	4905	
	200	210	580	750	1160	1740	2900	4810	1160	1740	2900	4810	580	750	1160	1740	2900	4810	
	250	200	560	725	1120	1680	2800	4645	1120	1680	2800	4645	560	725	1120	1680	2800	4645	
	300	190	540	700	1080	1620	2700	4480	1080	1620	2700	4480	540	700	1080	1620	2700	4480	
Oil or Oil Vapor (Class X)	350	180	520	675	1040	1560	2600	4315	1040	1560	2600	4315	520	675	1040	1560	2600	4315	
	400	170	500	650	1000	1500	2500	4150	1000	1500	2500	4150	500	650	1000	1500	2500	4150	
	450	160	480	625	960	1440	2400	3985	960	1440	2400	3985	480	625	960	1440	2400	3985	
	500	150	460	600	920	1380	2300	3820	920	1380	2300	3820	460	600	920	1380	2300	3820	
	550	140	440	575	880	1320	2200	3655	880	1320	2200	3655	440	575	880	1320	2200	3655	
Steam (Class U)	600	130	420	550	840	1260	2100	3490	840	1260	2100	3490	420	550	840	1260	2100	3490	
	650	120	400	525	800	1200	2000	3325	800	1200	2000	3325	400	525	800	1200	2000	3325	
	700	110	380	500	760	1140	1900	3160	760	1140	1900	3160	380	500	760	1140	1900	3160	
	750	100	360	475	720	1080	1800	2995	720	1080	1800	2995	360	475	720	1080	1800	2995	
	800	92	340	450	680	1020	1700	2830	680	1020	1700	2830	340	450	680	1020	1700	2830	
Oil or Oil Vapor (Class X)	850	82	320	425	640	960	1600	2665	640	960	1600	2665	320	425	640	960	1600	2665	
	900	70	300	400	600	900	1500	2500	600	900	1500	2500	310	410	620	930	1550	2580	
	950	55	265	350	530	795	1325	2205	530	795	1325	2205	300	400	600	900	1500	2500	
	1000	40	190	250	380	570	950	1580	380	570	950	1580	200	275	400	600	1000	1675	
		Flanged Valves with Ring Joint Facing Butt-Welding and Screwed End Valves						Flanged Valves with Ring Joint Facing											
Steam, Water, *Gas, or *Air (Class XR)	100	275	720	960	1440	2160	3600	6000	1440	2160	3600	6000	720	960	1440	2160	3600	6000	
	150	255	700	925	1400	2100	3500	5825	1400	2100	3500	5825	700	925	1400	2100	3500	5825	
	200	240	675	900	1350	2025	3375	5625	1350	2025	3375	5625	680	900	1360	2040	3400	5660	
	250	225	650	875	1300	1950	3250	5425	1300	1950	3250	5425	660	875	1320	1980	3300	5495	
	300	210	625	825	1250	1875	3125	5200	1250	1875	3125	5200	640	850	1280	1920	3200	5330	
Oil or Oil Vapor (Class X)	350	195	600	800	1200	1800	3000	5000	1200	1800	3000	5000	620	825	1240	1860	3100	5165	
	400	180	575	775	1150	1725	2875	4800	1150	1725	2875	4800	600	800	1200	1800	3000	5000	
	450	165	550	725	1100	1650	2750	4575	1100	1650	2750	4575	575	775	1150	1725	2875	4800	
	500	150	525	700	1050	1575	2625	4375	1050	1575	2625	4375	550	725	1100	1650	2750	4575	
	550	140	500	675	1000	1500	2500	4175	1000	1500	2500	4175	525	700	1050	1575	2625	4375	
Steam (Class U)	600	130	475	625	950	1425	2375	3950	950	1425	2375	3950	500	675	1000	1500	2500	4175	
	650	120	450	600	900	1350	2250	3750	900	1350	2250	3750	475	625	950	1425	2375	3950	
	700	110	425	575	850	1275	2125	3550	850	1275	2125	3550	450	600	900	1350	2250	3750	
	750	100	400	525	800	1200	2000	3325	800	1200	2000	3325	425	575	850	1275	2125	3550	
	800	92	375	500	750	1125	1875	3125	750	1125	1875	3125	400	525	800	1200	2000	3325	
Oil or Oil Vapor (Class X)	850	82	350	475	700	1050	1750	2925	700	1050	1750	2925	375	500	750	1125	1875	3125	
	900	70	325	425	650	975	1625	2700	650	975	1625	2700	350	475	700	1050	1750	2925	
	950	55	300	400	600	900	1500	2500	600	900	1500	2500	325	425	650	975	1625	2700	
	1000	40	200	275	400	600	1000	1675	400	600	1000	1675	300	400	600	900	1500	2500	
	1050								270	405	675	1125	225	275	425	650	1075	1775	
1100								180	270	450	750	150	200	275	425	700	1175		

Recommendations for gas or air depend upon kind of gas, service conditions, etc. See paragraph below.

These ratings are for oil refinery service; the American Standard also includes an 85-pound rating at 800° F. and a 70-pound rating at 850° F., for steam other than in refineries.

These ratings apply to the Crane Cast Steel Globe and Angle Valves shown on pages 322 to 326.

Seating materials: Class "XR" valves have Exelloy to No. 49 Nickel Alloy seating surfaces and are for steam or water up to 750° F. max. Class "U" have Stellite seating surfaces, for steam up to 100° F. max. Class "X" have Exelloy to Exelloy seating surfaces, for oil or oil vapor up to 1100° F. max.

Flange facings: Unless otherwise ordered, flanged end 150 and 300-Pound Valves regularly are furnished with 1/8-inch raised faces, and 400-Pound and higher pressure valves, with 1/4-inch male faces.

Air or gas: Regular valves trimmed for steam or water are suitable for ordinary air or natural gas

service. For unusual gases, such as those with extreme volatility or of corrosive, lethal, explosive, or inflammable character, special consideration must be given to the design of piping systems; recommendations will be furnished on request.

Cold service: For temperatures between 0° and 100° F., the ratings for 100° F. apply. For sub-zero service, materials with suitable impact resistance must be used; recommendations on request.

Standards: Crane pressure-temperature ratings agree with those in the American Steel Flange Standard, No. B16-1939; the A.P.I. Standard No. 600A-39 and Supplement No. 1, Adopted 1940; and the A.P.I. Standard No. 5-G-3, 1940.

Cast Steel Globe and Angle Valves

24

Crane Cast Steel Globe and Angle Valves are rugged and substantial in construction. Made from carefully selected materials and of improved designs, they possess the necessary qualifications to meet the most severe demands of present day installations.

Recognizing the service requirements they must satisfy—accurate control and regulation of flow—extreme care has been exercised in their design, particularly in the case of the disc and seat. For steam and general service, the wide bearing of the plug type disc is exceptionally well fitted. Oil services are more efficiently served by a ball-shaped disc contacting a beveled seat in a line bearing.

To avoid the difficulties attending the operation

Pressure Class	Test Pressures		Working Pressures
	Hydrostatic Shell Test	Hydrostatic Seat Test	
150-Pound	460 pounds	350 pounds	For working pressures, see page 321.
300-Pound	1000 pounds	775 pounds	
400-Pound	1340 pounds	1000 pounds	
600-Pound	2000 pounds	1550 pounds	
900-Pound	2700 pounds	2250 pounds	
1500-Pound	4500 pounds	3700 pounds	

All valves are tested 100 pounds air under water

of the larger size or higher pressure valves when used under maximum working pressures, these valves are regularly furnished with gearing. In addition to facilitating operation, the gearing assures accurate regulation of flow.

The valves are available in a wide range of sizes, in seven pressure classes

(150, 300, 400, 600, 900, 1500, and 2500-Pound) and with flanged, screwed, or butt-welding ends, as required. Prices and dimensions for the 2500-Pound Valves are furnished on application.

Made of Carbon or Alloy Steels and supplied with various kinds of trim, the valves are suitable for a variety of services. They are particularly suited for the severe services so common in modern industrial and power plants, and in oil refineries.

Specification of Materials

150-Pound Valves are regularly made of Crane Carbon Steel, 300 and 400-Pound Valves are regularly made of Crane No. 4 Carbon-Molybdenum Steel, and 600, 900, 1500, and 2500-Pound Valves are regularly made of Crane No. 4 Carbon-Molybdenum or of Crane No. 2 Nickel-Chrome Steel. The valves are furnished with various trim as indicated below.

Orders should include both the catalog number and the letter suffix; catalog numbers are listed on page 324.

For extremely severe operating conditions, valves can be made of Crane No. 5 Chrome-Molybdenum Steel. They are made to order only; see the Crane Discount Sheet for prices.

Trim	Names of Parts		150 Pound Valves	300 Pound Valves	400 Pound Valves	600 Pound Valves	900 Pound Valves	1500 Pound Valves	2500 Pound Valves	
Class "X" Oil or Oil Vapor †1000° F. Max.	Body and Bonnet	Flanged	Carbon Steel	No. 4 Carbon- Molybdenum Steel	No. 2 Nickel-Chrome Steel					
		Welding or Screwed			No. 4 Carbon-Molybdenum Steel					
	Disc	Exelloy							‡Exelloy	
	Body Seat Rings	Exelloy								
	Stem	Exelloy								
	Bonnet Gasket	Corrugated Soft Iron			Soft Steel Ring Joint Gasket					
	Bonnet Bolt-Studs	Triplex Steel (150-Pound Valves are furnished with studs.)								
Class "XR" Steam or Water 750° F. Max.	Body and Bonnet	#Steel	No. 4 Carbon-Molybdenum Steel						2500-Pound Valves with "XR" trim are not regularly furnished.	
	Disc	No. 49 Nickel-Alloy								
	Body Seat Ring	Exelloy								
	Stem	Exelloy								
	Bonnet Gasket	Cranite			Soft Steel Ring Joint Gasket					
	Bonnet Bolt-Studs	Triplex Steel (150-Pound Valves are furnished with studs.)								
Class "U" Steam or Water 1000° F. Max.	Body and Bonnet	Not listed	No. 4 Carbon-Molybdenum Steel							
	Disc		Stellite-Faced Alloy Steel							
	Body Seat Ring		Stellite-Faced Alloy Steel							
	Stem		Exelloy							
	Bonnet Gasket		§Soft Iron			Soft Steel Ring Joint Gasket				
	Bonnet Bolt-Studs		Templex Steel							

†Valves with No. 2 Nickel-Chrome Steel bodies and "X" trim are suitable for temperatures up to 1100° F.

‡Exelloy or Exelloy-Faced Alloy Steel.

§Corrugated Soft Iron.

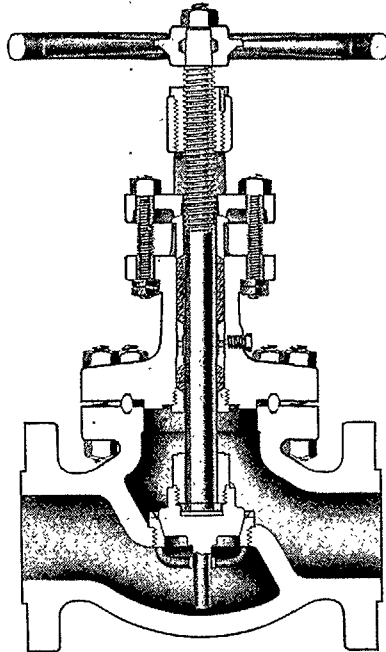
#150-Pound Valves are furnished with a carbon steel body and bonnet

List prices page 324

Description of materials pages 1 to 9

Dimensions page 325

Cast Steel Globe and Angle Valves



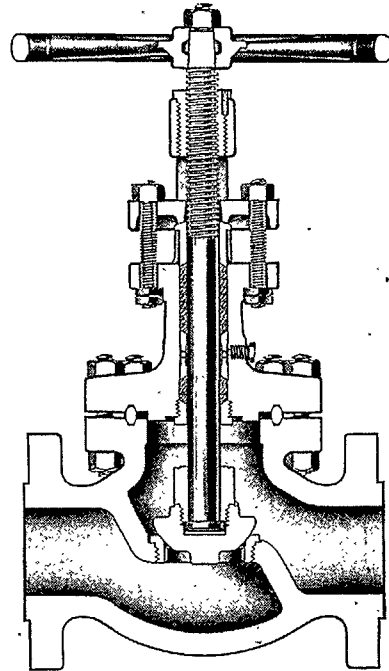
Plug Type Disc

Crane Cast Steel Globe and Angle Valves embody the many refinements in design and materials that are necessary in valves used on severe services.

Disc and seat: "XR" and "U" trimmed valves (for steam, water, or general service) in sizes 6-inch and smaller are regularly furnished with a plug type disc and seat, as illustrated at the left; the 8-inch size is regularly furnished with a flat disc and seat (not illustrated).

All sizes of "X" trimmed valves (for oil or oil vapor service) are furnished with a 35° taper seat and a ball shaped seating face on the disc, as illustrated at the right.

Body seat ring: All valves have the shoulder-type screwed-in body seat ring for utmost tightness and security.



Ball Type Disc

Bonnet joint: A ring-type bonnet joint holds pressure easily on the 400, 600, 900, 1500, and 2500-Pound Valves, assuring tightness and maximum strength. On 150 and 300-Pound Valves, a close-fitting male and female bonnet joint retains the gasket and accurately centers the working parts. Triplex studs or bolt-studs of Triplex or Templex Steel produce a tight, strong bonnet joint.

Stuffing box: The stuffing box on all valves is deep, assuring tightness and long packing life. The stuffing box is the lantern-type on all except the 150-Pound Valves. When wide open, the valves can be repacked while under pressure.

Gland: A two-piece ball-type gland assures even pressure on the packing without binding on the stem.

Drilling: Flanged valves of each pressure class are furnished with the end flanges faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made if flanged valves are ordered faced only.

Flange facings: The 150 and 300-Pound Flanged Valves are regularly furnished with an American Standard 1/8-inch raised face on the end flanges; the 400, 600, 900, 1500, and 2500-Pound Flanged Valves regularly have a 1/4-inch male face (large male).

When so ordered, valves can be furnished with other types of facings, such as ring joint, female, tongue, groove, etc.; see the Crane Discount Sheet for prices.

Finish of flange faces: The 1/8-inch raised faces and the 1/4-inch male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the raised or

male faces, when specified; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

American Standard: In design and materials, Crane Cast Steel Globe and Angle Valves exceed the requirements of Standards issued by the American Standards Association.

The dimensions and drilling of the end flanges on flanged valves conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939, for their respective pressure class. This Standard does not include the 3 1/2-inch size in the 900-Pound class.

Flanged and butt-welding valves conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, B16-10-1939, for their respective pressure class. This Standard does not include the 3 1/2-inch size in the 600 and 900-Pound classes.

Material Regularly Furnished Unless Otherwise Ordered

Body and Bonnet		150 Pound	300 and 400 Pound	600, 900, 1500, and 2500-Pound
For Steam or Water	Screwed	Crane Carbon Steel	Crane No. 4 Carbon-Molybdenum Alloy Steel	Crane No. 4 Carbon-Molybdenum Alloy Steel
	Welding			
For Oil or Oil Vapor	Flanged			
	Screwed			
	Welding			Crane No. 2 Nickel-Chrome Alloy Steel
	Flanged			

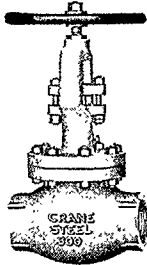
Recommendations for Valve Seating Materials

Steam or Water	750° F. Max.	(XR) Exelloy to No. 49 Nickel Alloy
	1100° F. Max.	(U) Stellite to Stellite
Oil or Oil Vapor	1100° F. Max.	(X) Exelloy to Exelloy

Cast Steel Globe and Angle Valves

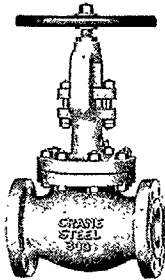
24

When ordering, specify catalog number and suffix.



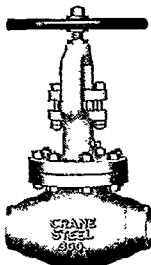
Globe, Screwed

For Oil or Oil Vapor
No. 142 X, 150-Pound
No. 150 X, 300-Pound
No. 160 X, 400-Pound
No. 170 X, 600-Pound
For Steam or Water
No. 142 XR, 150-Pound
No. 150 XR, 300-Pound
No. 160 XR, 400-Pound
No. 170 XR, 600-Pound



Globe, Flanged

For Oil or Oil Vapor.
No. 143 X, 150-Pound
No. 151 X, 300-Pound
No. 161 X, 400-Pound
No. 171 X, 600-Pound
No. 183 X, 900-Pound
No. 189 X, 1500-Pound
For Steam or Water
No. 143 XR, 150-Pound
Nos. 151 XR or U, 300-Pound
Nos. 161 XR or U, 400-Pound
Nos. 171 XR or U, 600-Pound
Nos. 183 XR or U, 900-Pound
Nos. 189 XR or U, 1500-Pound



Globe
Butt-Welding

For Oil or Oil Vapor
No. 143½ X, 150-Pound
No. 151½ X, 300-Pound
No. 161½ X, 400-Pound
No. 171½ X, 600-Pound
No. 183½ X, 900-Pound
No. 189½ X, 1500-Pound
For Steam or Water
No. 143½ XR, 150-Pound
Nos. 151½ XR or U, 300-Pound
Nos. 161½ XR or U, 400-Pound
Nos. 171½ XR or U, 600-Pound
Nos. 183½ XR or U, 900-Pound
Nos. 189½ XR or U, 1500-Pound

List Prices, Each, Globe or Angle

Size Inches	150 Pound	300 Pound	400 Pound	*600 Pound	*900 Pound	*1500 Pound
Screwed						
2	145.00	165.00	Use 600 Pound Valves	*	*	
2½	165.00	190.00		260.00		
3	190.00	220.00		320.00		
3½	220.00	260.00		380.00		
4	250.00	295.00	440.00	525.00		
5	335.00	400.00	575.00			
6	400.00	495.00	†1000.00			
Flanged, F.D. & S.F., or Butt-Welding						
1½			Use 600 Pound Valves	200.00	*	*
2	155.00	175.00		230.00	*	400.00
2½	175.00	200.00		280.00	*	580.00
3	200.00	†230.00		†340.00	620.00	†1050.00
3½	230.00	270.00		400.00	700.00	
4	260.00	310.00	460.00	550.00	†1080.00	†1300.00
5	350.00	420.00	600.00	†1100.00	†1250.00	†1900.00
6	420.00	520.00	†1030.00	†1380.00	†1750.00	†2500.00
8	630.00	†1030.00	†1500.00			

*For valves smaller than those listed, refer to the note on the top of the opposite page.

†When 3-inch 300 and 600-Pound Flanged Valves with ring joint facing are to be bolted to Cranelap joints, orders must so specify. A groove of special pitch diameter is required; see page 362 for dimensions.

‡Ball-bearing yoke; gearing: Crane Cast Steel Globe and Angle Valves are regularly furnished with a ball-bearing yoke and spur or bevel gears on the following sizes and pressure classes:

300-Pound.....8" 600-Pound....5 and 6"
400-Pound.....6 and 8" 900-Pound....4, 5, and 6"
1500-Pound....3, 4, 5, and 6"

For description, see page 326. Orders must state whether spur or bevel gears are wanted.

When specified, valves can be furnished without gears (plain bearing yoke); prices on application.

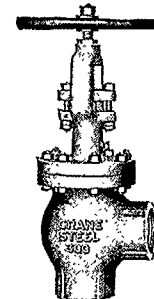
Butt-welding valves: Unless otherwise ordered, 150 and 300-Pound Butt-Welding Valves are bored to match the inside diameter of Standard pipe (the heaviest weight on the 8-inch size). For all other pressure classes, orders must specify the diameter of the bore (I.D. of pipe).

Prices of flanged valves include facing, drilling, and spot facing to the corresponding pressure class of the American Standard. No deduction will be made if valves are ordered faced only.

For
specification
of materials,
see page 322.

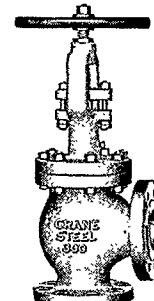
For Oil or Oil Vapor
No. 145½ X, 150-Pound
No. 153½ X, 300-Pound
No. 163½ X, 400-Pound
No. 173½ X, 600-Pound
No. 185½ X, 900-Pound
No. 190½ X, 1500-Pound

For Steam or Water
No. 145½ XR, 150-Pound
Nos. 153½ XR or U, 300-Pound
Nos. 163½ XR or U, 400-Pound
Nos. 173½ XR or U, 600-Pound
Nos. 185½ XR or U, 900-Pound
Nos. 190½ XR or U, 1500-Pound



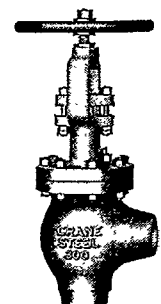
Angle, Screwed

For Oil or Oil Vapor
No. 144 X, 150-Pound
No. 152 X, 300-Pound
No. 162 X, 400-Pound
No. 172 X, 600-Pound
For Steam or Water
No. 144 XR, 150-Pound
No. 152 XR, 300-Pound
No. 162 XR, 400-Pound
No. 172 XR, 600-Pound



Angle, Flanged

For Oil or Oil Vapor
No. 145 X, 150-Pound
No. 153 X, 300-Pound
No. 163 X, 400-Pound
No. 173 X, 600-Pound
No. 185 X, 900-Pound
No. 190 X, 1500-Pound
For Steam or Water
No. 145 XR, 150-Pound
Nos. 153 XR or U, 300-Pound
Nos. 163 XR or U, 400-Pound
Nos. 173 XR or U, 600-Pound
Nos. 185 XR or U, 900-Pound
Nos. 190 XR or U, 1500-Pound



Angle
Butt-Welding

Cast Steel Globe and Angle Valves

NOTE

For smaller size 600, 900, and 1500-Pound Valves, refer to the following:

600-Pound Valves: For 600-Pound Valves in sizes smaller than those listed on the preceding page, use the forged steel valves shown on pages 314 and 315.

900-Pound Screwed Valves: 900-Pound Screwed Valves are available in sizes $\frac{1}{2}$ to 2-inch in the forged steel line shown on page 317.

900-Pound Flanged Valves: For sizes $\frac{3}{4}$ to $1\frac{1}{2}$ -inch, use the 1500-Pound Forged Steel Valves shown on page 318. For sizes 2 and $2\frac{1}{2}$ -inch, use the 1500-

Pound Alloy Cast Steel Valves shown on the preceding page.

900-Pound Butt-Welding Valves: For sizes $\frac{1}{2}$ to 2-inch, use the forged steel valves shown on page 317; for the $2\frac{1}{2}$ -inch size, use the 1500-Pound Alloy Cast Steel Valve shown on the preceding page.

1500-Pound Flanged and Butt-Welding Valves: For sizes smaller than 2-inch, use the forged steel valves shown on page 318.

* * * * *

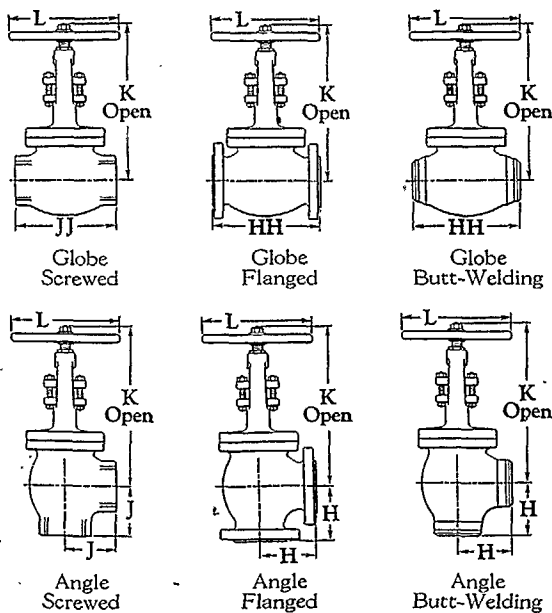
By-passes: Crane Cast Steel Globe and Angle Valves can be equipped with a by-pass; prices on request.

Motor operation: To facilitate operation, the

valves can be equipped with an electric, air, or gas motor; prices are furnished on application.

See pages 172 and 173 for complete details.

Dimensions, in Inches



Center to face: 150 and 300-Pound Flanged Valves are regularly furnished with a $\frac{1}{16}$ -inch raised face. 400, 600, 900, 1500, and 2500-Pound Flanged Valves are regularly furnished with a $\frac{1}{4}$ -inch high large male face. The center to face and face to face dimensions shown in the table include this facing.

Flanged and butt-welding valves conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, B16.10-1939. The $3\frac{1}{2}$ -inch size 600 and 900-Pound Valves are not included in this Standard.

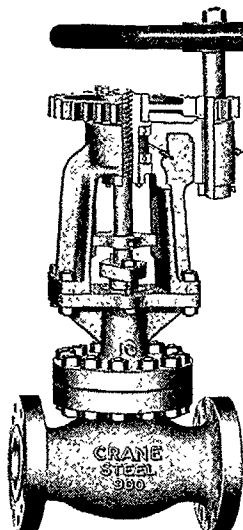
Description.....pages 321 to 324
Templates for drilling.....pages 553 to 555
Flange dimensions.....pages 553 to 555
Special facings.....pages 560 to 563
Welding bevel details.....page 647
Gearing.....page 326
Taps and drains for valves.....page 646

Pressure Class	Size of Valve	HH	JJ	H	J	K		L
						Globe	Angle	
150 Pound	2	8	8	4	4	13 $\frac{3}{4}$	12 $\frac{1}{2}$	8
	2 $\frac{1}{2}$	8 $\frac{1}{2}$	8 $\frac{1}{2}$	4 $\frac{1}{4}$	4 $\frac{1}{4}$	14 $\frac{1}{2}$	13	8
	3	9 $\frac{1}{2}$	9 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	16 $\frac{1}{2}$	15	9
	3 $\frac{1}{2}$	10 $\frac{1}{2}$	10 $\frac{1}{2}$	5 $\frac{1}{4}$	5 $\frac{1}{4}$	17 $\frac{1}{4}$	15 $\frac{1}{2}$	9
	4	11 $\frac{1}{2}$	11 $\frac{1}{2}$	5 $\frac{3}{4}$	5 $\frac{3}{4}$	19 $\frac{3}{4}$	17 $\frac{3}{4}$	10
	5	14	14	7	7	23	20 $\frac{3}{4}$	10
	6	16	16	8	8	24 $\frac{1}{2}$	21 $\frac{3}{4}$	12
	8	19 $\frac{1}{2}$	19 $\frac{1}{2}$	9 $\frac{3}{4}$	9 $\frac{3}{4}$	26	23 $\frac{1}{2}$	16
300 Pound	2	10 $\frac{1}{2}$	9 $\frac{1}{2}$	5 $\frac{1}{4}$	4 $\frac{3}{4}$	17 $\frac{3}{4}$		9
	2 $\frac{1}{2}$	11 $\frac{1}{2}$	10 $\frac{3}{4}$	5 $\frac{3}{4}$	5 $\frac{3}{8}$	19		10
	3	12 $\frac{1}{2}$	11 $\frac{3}{4}$	6 $\frac{1}{4}$	5 $\frac{7}{8}$	20 $\frac{1}{2}$		10
	3 $\frac{1}{2}$	13 $\frac{1}{4}$	12 $\frac{1}{4}$	6 $\frac{5}{8}$	6 $\frac{1}{8}$	22 $\frac{1}{2}$		12
	4	14	13	7	6 $\frac{1}{2}$	24 $\frac{3}{4}$		14
	5	15 $\frac{3}{4}$	15	7 $\frac{7}{8}$	7 $\frac{1}{2}$	26 $\frac{1}{2}$		16
	6	17 $\frac{1}{2}$	16 $\frac{1}{2}$	8 $\frac{3}{4}$	8 $\frac{1}{4}$	29 $\frac{3}{4}$		18
	8	22		11		*35 $\frac{1}{2}$		*24
400 Pound	4	16	13	8	6 $\frac{1}{2}$	25 $\frac{1}{4}$		14
	5	18	15	9	7 $\frac{1}{2}$	28 $\frac{1}{2}$		18
	6	19 $\frac{1}{2}$	16 $\frac{1}{2}$	9 $\frac{3}{4}$	8 $\frac{1}{4}$	*31 $\frac{1}{4}$		*20
	8	23 $\frac{1}{2}$		11 $\frac{3}{4}$		*38 $\frac{1}{4}$		*27
600 Pound	1 $\frac{1}{2}$	9 $\frac{1}{2}$		4 $\frac{3}{4}$		17 $\frac{3}{4}$		9
	2	11 $\frac{1}{2}$		5 $\frac{3}{4}$		19		10
	2 $\frac{1}{2}$	13	10 $\frac{3}{4}$	6 $\frac{1}{2}$	5 $\frac{3}{8}$	21 $\frac{1}{4}$		12
	3	14	11 $\frac{3}{4}$	7	5 $\frac{7}{8}$	23 $\frac{1}{2}$		12
	3 $\frac{1}{2}$	15	12 $\frac{1}{4}$	7 $\frac{1}{2}$	6 $\frac{1}{8}$	25		14
	4	17	13	8 $\frac{1}{2}$	6 $\frac{1}{2}$	27 $\frac{1}{2}$		18
	5	20		10		*30 $\frac{3}{4}$		*20
	6	22		11		*35		*24
900 Pound	3	15		7 $\frac{1}{2}$		24		12
	3 $\frac{1}{2}$	17		8 $\frac{1}{2}$		29 $\frac{1}{2}$		20
	4	18		9		*29 $\frac{1}{2}$		*20
	5	22		11		*34 $\frac{1}{4}$		*24
	6	24		12		*37 $\frac{3}{4}$		*27
1500 Pound	2	14 $\frac{1}{2}$		7 $\frac{1}{4}$		25 $\frac{1}{4}$		14
	2 $\frac{1}{2}$	16 $\frac{1}{2}$		8 $\frac{1}{4}$		28 $\frac{1}{4}$		18
	3	18 $\frac{1}{2}$		9 $\frac{1}{4}$		*33 $\frac{1}{2}$		*24
	4	21 $\frac{1}{2}$		10 $\frac{3}{4}$		*37 $\frac{1}{2}$		*27
	5	26 $\frac{1}{2}$		13 $\frac{1}{4}$		*41 $\frac{3}{4}$		*30
	6	27 $\frac{3}{4}$		13 $\frac{7}{8}$		*45 $\frac{3}{4}$		*30

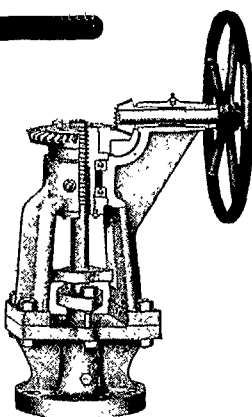
*These dimensions apply only to valves without gearing; for dimensions of geared valves, see page 326.

Gearing for Cast Steel Globe and Angle Valves

24



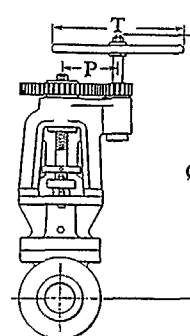
Spur Gearing with Ball-Bearing Yoke Sleeve for Steel Globe and Angle Valves (Gearing, Bonnet, and Yoke are shown turned 90° from position regularly furnished).



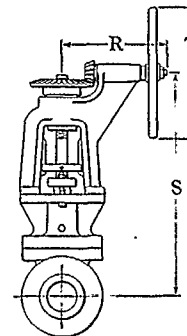
Bevel Gearing with Ball-Bearing Yoke Sleeve for Steel Globe and Angle Valves

To avoid the difficulty encountered in opening or closing large size or high pressure globe and angle valves when used under the maximum recommended working pressures, these valves are regularly equipped with a ball-bearing yoke sleeve and either bevel or spur gearing.

In addition to facilitating operation, the gearing provides closer control of flow under the severest service conditions.



Spur Geared



Bevel Geared

Dimensions, in Inches

Valve Class	Size	Spur		Bevel		T
		P	Q	R	S	
300-Pound	8	9 3/8	44	15	38	20
	6	8 5/8	40 1/4	13 1/4	34 1/2	18
400-Pound	8	10 3/4	48 1/2	17 1/4	41 3/4	24
	5	8 5/8	40 1/2	13 1/4	34 3/4	18
600-Pound	6	9 3/8	43 1/4	15	37 1/4	20
	4	8 5/8	39 3/4	13 1/4	34	18
900-Pound	5	9 3/8	42 3/4	15	36 3/4	20
	6	10 3/4	47 1/4	17 1/4	40 1/2	24
1500-Pound	3	9 3/8	42 1/2	15	36 1/2	20
	4	10 3/4	47 1/2	17 1/4	40 3/4	24
	5	10 3/8	52 1/2	20 3/8	45 1/2	27
2500-Pound	6	14 1/8	56	24 5/8	48 3/4	27
	On application					

Bevel gearing: Globe and angle valves equipped with bevel gearing will have the pinion shaft extending at right angles to the run of the valve with the handwheel on the left side when facing the port opening from above the valve seat.

Spur gearing: Spur gearing will have the pinion shaft, extending upward, parallel to the main valve stem, with the handwheel above the gearing and on the left side when facing the port opening from above the valve seat.

Ordering: Orders should specify whether bevel or spur gears are wanted. Gearing can be placed in positions other than those mentioned above, but orders for such valves must clearly indicate what is wanted.

List prices . . . page 324

Dimensions not shown are the same as for valves without gears; see page 325.

2500-Pound Alloy Cast Steel Globe and Angle Valves

Prices and dimensions on application.

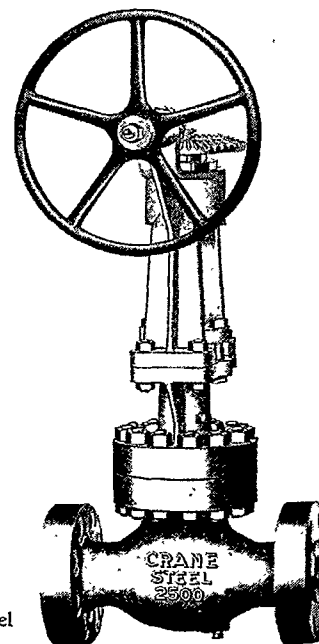
Crane 2500-Pound Alloy Cast Steel Globe and Angle Valves are available in the 1 1/2, 2, 2 1/2, 3, 4, 5, and 6-inch sizes, with either flanged or butt-welding ends. In addition, the Globe Valves are made in the 3/4, 1, and 1 1/4-inch sizes, with either butt or socket-welding ends.

For steam, water, and general services, the globe and angle valves are supplied with Class "U" trimming; the disc is of the plug type, piston guided construction. For oil or oil vapor service, Class "X" trimming is recommended; the valves will have a 35° taper seat and a ball shaped seating face on the disc.

Globe and angle valves in sizes 3-inch and larger are regularly equipped with a ball-bearing yoke and gearing, to facilitate operation.

Working pressures page 321
General description pages 322 and 323
Specifications of materials page 322
Description of materials pages 1 to 9

2500-Pound Alloy Cast Steel Globe Valve



Cast and Forged Steel Check Valves

The Crane line of Steel Check Valves can be classified into two general groups. The first group covers valves 2-inch and smaller, of forged or cast steel; these are frequently considered general utility valves and are used in a wide variety of services, often at pressures and temperatures lower than the recommended maximum. The second group covers cast steel valves ranging in size as large as 12-inch, all made similar in design and available in each of the American Standard pressure classes; the sizes range below 2-inch in some of the pressure classes.

25

Sizes 2-Inch and Smaller

600-Pound Forged Steel, Screwed, Flanged, or Socket-Welding.....	pages 328 and 329
600-Pound Cast Steel, Vertical, Screwed.....	page 329
600-Pound Forged Steel, Flanged.....	page 330
900-Pound Forged Steel, Screwed or Butt-Welding.....	page 330
6000-Pound Hydraulic, Screwed.....	page 331

Cast Steel Valves, 150, 300, 400, 600, 900, and 1500-Pound

Pressure-Temperature Ratings.....	page 332
Description and Specification of Materials.....	pages 333 and 334
List Prices.....	page 335
Dimensions.....	page 335
Lever and Weight.....	page 336
2500-Pound.....	page 336

* * * * *

The Cast and Forged Steel Check Valves listed above comprise only a part of the complete line of Crane steel products.

Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

Steel Gate Valves.....	pages 297 to 307
Steel Globe and Angle Valves.....	pages 309 to 326
Steel Stop-Check Valves.....	pages 370 to 374
Steel Blow-Off Valves.....	page 377

Steel Safety Valves.....	pages 391 and 392
Steel Relief Valves.....	pages 403 to 407
Steel Steam Traps.....	page 416
Steel Sediment Separators.....	page 423

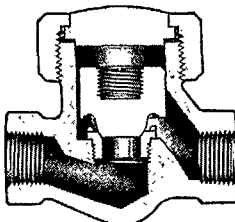
Steel Flanged Fittings.....	pages 343 to 350
Steel Welding Fittings.....	pages 351 to 360
Steel Flanges.....	pages 361 to 367
Steel Screwed Fittings.....	pages 337 to 342
Steel Bushings.....	page 227
Steel Plugs.....	page 228

Wrought Couplings.....	page 229
Wrought Steel Nipples.....	pages 230 and 231
Forged Steel Unions.....	pages 247 and 248
Forged Steel Flange Unions.....	pages 252 and 253

600-Pound Forged Steel Check Valves

General Description

25



Cross Section
Horizontal Check
Union Cap

This is a new line of Crane 600-Pound Forged Steel Horizontal Check Valves, made to withstand severe service on high pressure, high temperature steam and oil lines.

Rugged and durable, the valves have been carefully designed to assure maximum strength and long life. Their Exelloy seat and disc make them suitable for oil or oil vapor service on temperatures up to 1000° F. and for steam, water, and general service on temperatures up to 750° F.

The valves are available with a union cap and screwed ends in sizes $\frac{1}{4}$ to $\frac{3}{4}$ -inch or socket-welding ends in sizes $\frac{1}{4}$ and $\frac{3}{8}$ -inch; and with a bolted cap and screwed, socket-welding, or flanged ends in sizes $\frac{1}{2}$ to 2-inch.

Body and cap: The body and cap are forged carbon steel. Unusual compactness and heavy metal sections provide a high margin of safety.

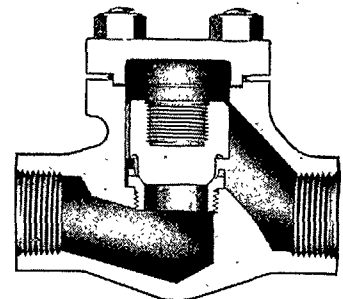
Description of materials... pages 1 to 9

HYDROSTATIC TEST PRESSURES			
Screwed and Socket-Welding		Flanged	
Shell — 2100 pounds		Shell — 2000 pounds	
Seat — 2100 pounds		Seat — 1550 pounds	
Valve seat tested 100 pounds air-under-water.			

WORKING PRESSURES

Temp. Deg. F.	Pounds, Non-Shock		
	Screwed or Socket- Welding Valves	Flanged Valves With $\frac{1}{4}$ -inch Male Facing	With Ring Joint Facing
Class "X", for Steam, Water, Oil, or Oil Vapor			
100	2000	1000	1200
150	1900	960	1150
200	1800	930	1100
250	1700	900	1050
300	1600	870	1000
350	1500	840	950
400	1400	810	900
450	1300	780	850
500	1200	750	800
550	1120	720	760
600	1040	690	720
650	960	660	680
700	880	630	640
750	800	600	600
Class "X", for Oil or Oil Vapor			
800	740	550	550
850	670	490	490
900	600	420	420
950	530	330	330
1000	380	240	240

Air and gas ratings, page 332.



Cross Section
Horizontal Check
Bolted Cap

Cap joint: The cap joint in both the union cap valves and the bolted cap valves is furnished with a corrugated soft iron gasket; tightness and ease of maintenance are assured.

On union cap valves, a large, strong forged carbon steel union ring reinforces the joint. On bolted cap valves, maximum compactness has been secured through the use of studs instead of through-bolts; the studs are made of Triplex Steel, and the joint is the male and female type. Cap joints, even on the larger sizes, can be easily and quickly dismantled and reassembled.

Disc and seat: Both the disc and the seat are made of wear-resisting Exelloy, an ideal material for seating surfaces in check valves.

The disc, of the lifting type, has a ball shaped face which seats against a flat, angular shaped face on the body seat ring, forming what is virtually a line bearing seating contact. The top of the disc is a piston and fits snugly into the upper part of the valve body. This construction not only serves to guide the disc accurately throughout its entire travel but also effectively cushions the disc, preventing destructive hammering. To facilitate regrounding when necessary, the top of the disc is tapped with pipe threads so that a nipple can be inserted.

The seat ring has long thread engagement with the body. Shoulder-seated and screwed in under machine power, it will not loosen in service.

Union Cap Horizontal Check Valves

These Union Cap 600-Pound Forged Steel Horizontal Check Valves, as described above, are made of high quality materials, are carefully designed, and are exceptionally strong and rugged. Their compactness



No. 3670 X
Screwed
Union Cap, Horizontal Check



No. 3678 X
Socket-Welding
Union Cap, Horizontal Check

and durability fit them for a wide variety of services in oil refineries, oil and gas fields, central power stations, and in general industrial installations.

The valves are furnished with an Exelloy seat and disc and are recommended for oil or oil vapor service on temperatures up to 1000° F. and for steam or water service on temperatures up to 750° F. For working pressures, refer to the table shown above.

List Prices, Each, and Dimensions

Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$
No. 3670 X, Screwed		9.25	9.25	11.00	12.75
No. 3678 X, Socket-Welding		14.00	14.00		
Dimensions, in Inches	End to end	3	3	3 $\frac{1}{2}$	4 $\frac{1}{2}$
	Center to top	2	2	2 $\frac{3}{8}$	3
	Depth of socket	$\frac{7}{16}$	$\frac{9}{16}$		

600-Pound Forged Steel Check Valves

Bolted Cap Horizontal Check Valves

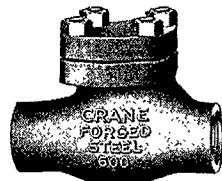
These Bolted Cap 600-Pound Forged Steel Horizontal Check Valves, described on the preceding page, are recommended for oil or oil vapor on temperatures up to 1000° F., and for steam or water up to 750° F. Working pressures are shown on the preceding page.

Flange dimensions, facing, and drilling: End flanges conform to the 600-Pound American Standard (B16-1939). They have a male face $\frac{1}{4}$ -inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

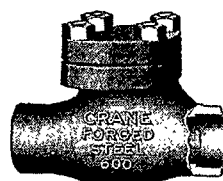
When so ordered, flanged valves can be furnished with ring joint, female, tongue, or groove facing; see the Crane Discount Sheet for prices.

Prices include drilling to the 600-Pound Standard, and spot facing. No deduction is made if valves are ordered faced only.

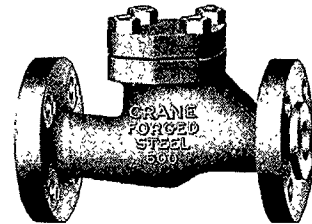
Templates for drilling.... page 554



Bolted Cap
Horizontal Check
No. 3674 X, Screwed



Bolted Cap
Horizontal Check
No. 3682 X, Socket-Welding



Bolted Cap, Horizontal Check
No. 3686 X, Flanged

List Prices and Dimensions

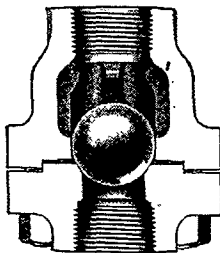
Size	Inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 3674 X, Screwed	Each	12.00	14.00	17.00	24.25	36.50	49.00
No. 3682 X, Socket-Welding	Each	20.00	23.25	28.25	36.50	49.00	64.50
No. 3686 X, Flanged, F.D. & S.F.	Each	28.00	32.50	39.50	49.00	62.00	80.00
Dimensions, in Inches	End to end, Scrd. or Socket-Welding	$3\frac{5}{8}$	$4\frac{3}{8}$	$5\frac{1}{8}$	$6\frac{1}{4}$	7	$8\frac{3}{8}$
	Depth of Socket	$\frac{5}{8}$	$1\frac{1}{16}$	$\frac{3}{4}$	$1\frac{3}{16}$	$\frac{7}{8}$	1
	*Face to face, Flanged	$6\frac{1}{2}$	$7\frac{1}{2}$	$8\frac{1}{2}$	9	$9\frac{1}{2}$	$11\frac{1}{2}$
	Center to top	$2\frac{1}{2}$	$3\frac{1}{16}$	$3\frac{11}{16}$	$4\frac{1}{8}$	$5\frac{1}{8}$	6
	to top	$2\frac{9}{16}$	$3\frac{1}{4}$	$4\frac{1}{16}$	$4\frac{5}{16}$	$5\frac{3}{8}$	$6\frac{9}{16}$
	Diameter of flange	$3\frac{3}{4}$	$4\frac{5}{8}$	$4\frac{7}{8}$	$5\frac{1}{4}$	$6\frac{1}{8}$	$6\frac{1}{2}$
	*Thickness of flange	$\frac{9}{16}$	$\frac{5}{8}$	$1\frac{1}{16}$	$1\frac{3}{16}$	$\frac{7}{8}$	1
	Diameter of male face	$1\frac{3}{8}$	$1\frac{11}{16}$	2	$2\frac{1}{2}$	$2\frac{7}{8}$	$3\frac{5}{8}$
	Diameter of bolt circle	$2\frac{5}{8}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{7}{8}$	$4\frac{1}{2}$	5
	No. and dia. of bolts	$4-1\frac{1}{2}$	$4-5/8$	$4-5/8$	$4-5/8$	$4-3/4$	$8-5/8$

*The face to face dimensions include the $\frac{1}{4}$ " male faces; the thickness of flange dimensions do not

Socket-welding valves: Socket-welding valves are designed especially for socket welding. For socket-welding fittings, see pages 352 and 353.

Dimensions of ring joint and special facings.... pages 561 and 562

Cast Steel Vertical Ball Check Valves



Cross Section
Vertical Ball Check
Screwed

TEST PRESSURES

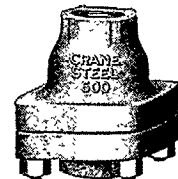
Shell—2100 pounds hydrostatic
Seat—2100 pounds hydrostatic

These new Crane 600-Pound Vertical Ball Check Valves are especially designed for oil or oil vapor service on temperatures up to 1000° F. They have heavy metal sections, are unusually compact, and are sturdily constructed.

Materials and construction: The body is made in two parts, of cast carbon steel, held together by Triplex Steel studs; the joint is male and female, and is fitted with a corrugated soft iron gasket. The ball disc is solid Exelloy, uniform in diameter and highly polished. Ribs in the outlet half of the body guide the ball.

WORKING PRESSURES

Temp. Deg. F.	Pounds Non- Shock	Temp. Deg. F.	Pounds Non- Shock
Class "XS" For Oil or Oil Vapor			
100	2000	600	1040
150	1900	650	960
200	1800	700	880
250	1700	750	800
300	1600	800	740
350	1500	850	670
400	1400	900	600
450	1300	950	530
500	1200	1000	380
550	1120		



Vertical Ball Check
No. 3692 XS, Screwed

These valves are for use in vertical lines with upward flow or in horizontal lines

These valves are made with the seat integral with the body. When so ordered, renewable seat valves can be furnished; prices on application.

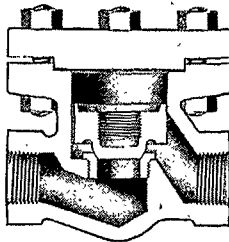
List Prices and Dimensions

Size	Inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 3692 XS	Each	13.00	14.50	18.00	23.50	30.00	42.00
End to end	Inches	$3\frac{3}{8}$	$3\frac{11}{16}$	$4\frac{1}{8}$	$4\frac{7}{8}$	$5\frac{5}{8}$	$6\frac{7}{8}$
Width over all	Inches	$2\frac{15}{16}$ sq.	$3\frac{1}{8}$ sq.	$3\frac{3}{8}$ sq.	$4\frac{1}{16}$ sq.	$5\frac{7}{8}$ dia.	$6\frac{5}{8}$ dia.

600-Pound Flanged and 900-Pound Screwed and Butt-Welding Alloy Forged Steel Check Valves

Bolted Cap

25



Cross Section
Horizontal, Screwed

Service recommendations: The valves shown on this page are recommended for oil, oil vapor, steam, or water service up to 1000° F. Both the disc and body seat ring are made of Exelloy.

Body and cap: The body and cap are unusually massive and rugged. They are forged from No. 4 Carbon-Molybdenum Alloy Steel. The male and female cap joint is equipped with through bolt-studs made of Triplex Steel.

Disc and seat construction: The disc has a ball shaped face which seats against a flat, angular shaped face on the body seat ring. This construction is ideal for check valves of the lift type, producing virtually a line bearing seating contact. The top of the disc is a piston, fitting snugly into the upper part of the body. It forms a dashpot and effectively cushions the disc when in service.

Flange dimensions and facing: The dimensions and drilling of the end flanges on flanged valves conform to the 600-Pound American Standard (B16-1939). Flanges have a male face 1/4-inch high (large male), finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

When so ordered, flanged valves can be furnished

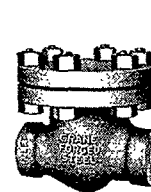
WORKING PRESSURES

Temp. Deg. F.	Pounds, Non-Shock		
	Screwed or Butt-Welding Valves	Flanged Valves With 1/4-inch Male Facing	With Ring Joint Facing
For Oil, Oil Vapor, Steam, or Water			
100	3000	1200	1440
150	2850	1180	1400
200	2700	1160	1350
250	2550	1120	1300
300	2400	1080	1250
350	2250	1040	1200
400	2100	1000	1150
450	1950	960	1100
500	1800	920	1050
550	1680	880	1000
600	1560	840	950
650	1440	800	900
700	1320	760	850
750	1200	720	800
800	1100	680	750
850	1000	640	700
900	900	600	650
950	795	530	600
1000	570	380	400

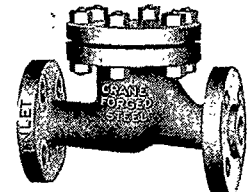
TEST PRESSURES

Screwed or Butt-Welding Valves
Shell — 3100 pounds hydrostatic
Seat — 3100 pounds hydrostatic
Seat — air tested

Flanged Valves
Shell — 2000 pounds hydrostatic
Seat — 1550 pounds hydrostatic
Seat — air tested



Horizontal
Screwed
No. 178 X



Horizontal
Flanged
No. 198 X

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 178 X, Screwed	Each	28.00	37.00	48.00	54.00	73.00	107.00
No. 198 X, Flanged, F.D. & S.F.	Each	52.00	52.00	68.00	79.00	106.00	145.00
Dimensions, in Inches	End to end, Screwed	3 1/2	4 1/2	5 1/4	6	7	8 1/2
	*Face to face, Flanged	7 3/8	7 1/2	8 1/2	9	9 1/2	11 1/2
	Center to top	Screwed		3 3/8	3 3/4	4 3/8	5 1/4
		Flanged		4	4	4 3/4	5 3/8
	Diameter of flange	3 3/4	4 5/8	4 7/8	5 1/4	6 1/8	6 1/2
	*Thickness of flange	9/16	5/8	1 1/16	1 3/16	7/8	1
	Diameter of male face	1 3/8	1 11/16	2	2 1/2	2 7/8	3 5/8
	Diameter of bolt circle	2 5/8	3 1/4	3 1/2	3 3/8	4 1/2	5
No. and dia. of bolts		4—1/2	4—5/8	4—5/8	4—5/8	4—3/4	8—5/8

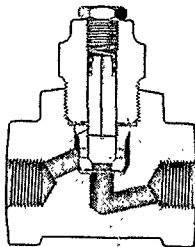
*Face to face dimensions include the 1/4-inch male face; thickness of flange dimensions do not.

with ring joint, female, tongue, or groove facing: see the Crane Discount Sheet for prices.

Drilling: Flanged valves are furnished with the end flanges faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the 600-Pound American Standard, and spot facing. No deduction is made if valves are ordered faced only.

Butt-welding valves: Butt-welding valves (not illustrated) can be made to order; prices on application. They have the same general dimensions as the flanged end valves, their end to end dimension being the same as the face to face dimension of the flanged valves. Orders for butt-welding valves must specify the diameter of the bore (inside diameter of pipe).

6000-Pound Hydraulic Forged Steel Check Valves



Cross Section
No. 227 H

WORKING PRESSURE
6000 pounds cold water or oil, non-shock

TEST PRESSURE
6500 pounds hydrostatic



No. 227 H
Horizontal
Screwed

List Prices, Each, and Dimensions, in Inches

Size	Inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
No. 227 H, Horizontal		21.00	23.00	27.00	33.00	45.00
End to end		$2\frac{7}{8}$	$2\frac{7}{8}$	$3\frac{7}{8}$	$4\frac{1}{2}$	$5\frac{3}{8}$
Center to top		$2\frac{9}{16}$	$2\frac{9}{16}$	$3\frac{3}{8}$	$4\frac{1}{8}$	$4\frac{1}{8}$

Service recommendations: These valves are recommended for severe and extremely high pressure service on hydraulic lines not subject to shock. They have very heavy metal sections and are exceptionally rugged.

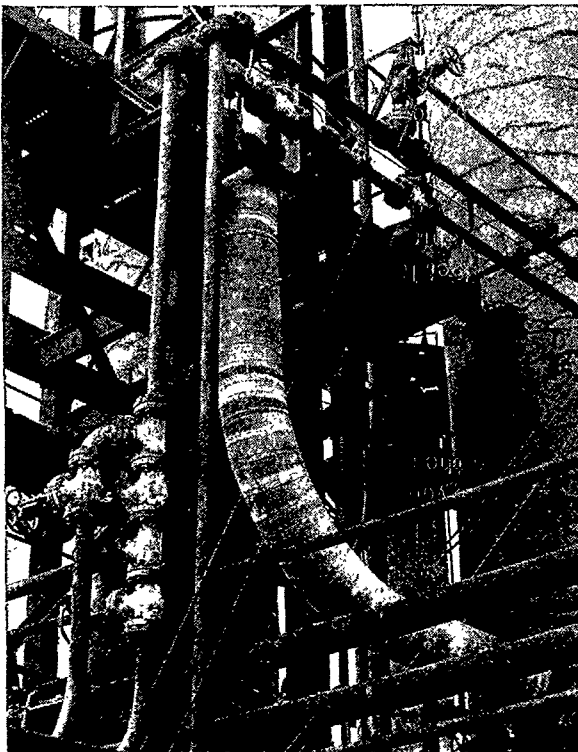
Body and cap: The body is made of a solid steel forging. Sizes 1-inch and smaller have a screwed cap as illustrated. The $1\frac{1}{4}$ -inch size has a bolted cap (not illustrated).

Disc and seat: The disc is made of brass and is accurately guided, assuring square seating. The seat bushing, made of Exelloy, is easily renewed.

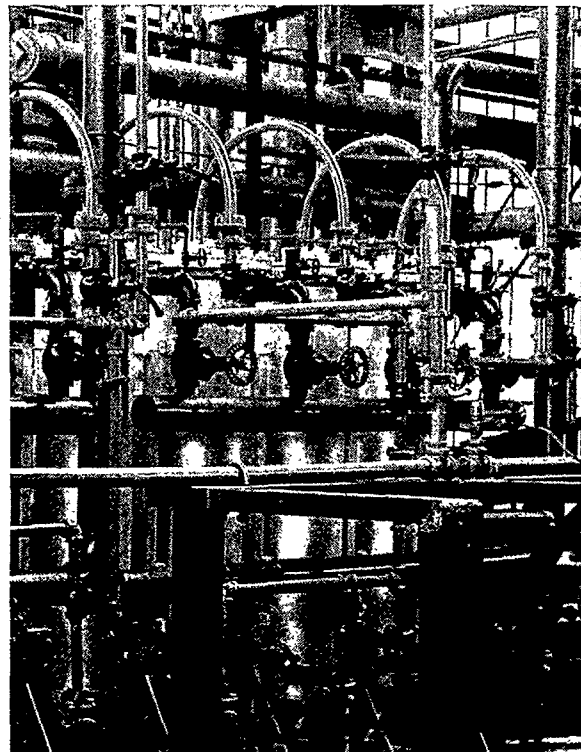
The valves have a small spring between the disc and cap.

Seat opening: The diameter of the port opening in these valves is slightly smaller than the inside diameter of Double Extra Strong Pipe.

* * * * *



Severe services, tough materials — Crane Steel Valves



An unusual assortment of Crane Valves and Fittings

Cast Steel Swing Check Valves

Working Pressures, Pounds per Square Inch, Non-Shock — For Valves Shown on Pages 333 to 336

Fluid	Temp.	Carbon Steel Valves	No. 4 Carbon-Molybdenum Alloy Steel Valves							No. 2 Nickel-Chrome Alloy Steel Valves				No. 5 Chrome-Molybdenum Alloy Steel Valves (Made to order)					
	Deg. Fahr.	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	
			Flanged Valves with Standard Facings Other Than Ring Joint																
Steam, Water, Oil, Oil Vapor, *Gas, or *Air (Class X)	100	230	600	800	1200	1800	3000	5000	1200	1800	3000	5000	600	800	1200	1800	3000	5000	
	150	220	590	775	1180	1770	2950	4905	1180	1770	2950	4905	590	775	1180	1770	2950	4905	
	200	210	580	750	1160	1740	2900	4810	1160	1740	2900	4810	580	750	1160	1740	2900	4810	
	250	200	560	725	1120	1680	2800	4645	1120	1680	2800	4645	560	725	1120	1680	2800	4645	
	300	190	540	700	1080	1620	2700	4480	1080	1620	2700	4480	540	700	1080	1620	2700	4480	
	350	180	520	675	1040	1560	2600	4315	1040	1560	2600	4315	520	675	1040	1560	2600	4315	
	400	170	500	650	1000	1500	2500	4150	1000	1500	2500	4150	500	650	1000	1500	2500	4150	
	450	160	480	625	960	1440	2400	3985	960	1440	2400	3985	480	625	960	1440	2400	3985	
	500	150	460	600	920	1380	2300	3820	920	1380	2300	3820	460	600	920	1380	2300	3820	
	550	140	440	575	880	1320	2200	3655	880	1320	2200	3655	440	575	880	1320	2200	3655	
Steam, Oil, or Oil Vapor (Class X)	600	130	420	550	840	1260	2100	3490	840	1260	2100	3490	420	550	840	1260	2100	3490	
	650	120	400	525	800	1200	2000	3325	800	1200	2000	3325	400	525	800	1200	2000	3325	
	700	110	380	500	760	1140	1900	3160	760	1140	1900	3160	380	500	760	1140	1900	3160	
	750	100	360	475	720	1080	1800	2995	720	1080	1800	2995	360	475	720	1080	1800	2995	
	800	†92	340	450	680	1020	1700	2830	680	1020	1700	2830	340	450	680	1020	1700	2830	
	850	†82	320	425	640	960	1600	2665	640	960	1600	2665	320	425	640	960	1600	2665	
	900	†70	300	400	600	900	1500	2500	600	900	1500	2500	310	410	620	930	1550	2580	
	950	†55	265	350	530	795	1325	2205	530	795	1325	2205	300	400	600	900	1500	2500	
	1000	†40	190	250	380	570	950	1580	380	570	950	1580	200	275	400	600	1000	1675	
		Flanged Valves with Ring Joint Facing Butt-Welding and Screwed End Valves							Flanged Valves with Ring Joint Facing										
Steam, Water, Oil, Oil Vapor, *Gas, or *Air (Class X)	100	275	720	960	1440	2160	3600	6000	1440	2160	3600	6000	720	960	1440	2160	3600	6000	
	150	255	700	925	1400	2100	3500	5825	1400	2100	3500	5825	700	925	1400	2100	3500	5825	
	200	240	675	900	1350	2025	3375	5625	1350	2025	3375	5625	680	900	1360	2040	3400	5660	
	250	225	650	875	1300	1950	3250	5425	1300	1950	3250	5425	660	875	1320	1980	3300	5495	
	300	210	625	825	1250	1875	3125	5200	1250	1875	3125	5200	640	850	1280	1920	3200	5330	
	350	195	600	800	1200	1800	3000	5000	1200	1800	3000	5000	620	825	1240	1860	3100	5165	
	400	180	575	775	1150	1725	2875	4800	1150	1725	2875	4800	600	800	1200	1800	3000	5000	
	450	165	550	725	1100	1650	2750	4575	1100	1650	2750	4575	575	775	1150	1725	2875	4800	
	500	150	525	700	1050	1575	2625	4375	1050	1575	2625	4375	550	725	1100	1650	2750	4575	
	550	140	500	675	1000	1500	2500	4175	1000	1500	2500	4175	525	700	1050	1575	2625	4375	
Steam, Oil, or Oil Vapor (Class X)	600	130	475	625	950	1425	2375	3950	950	1425	2375	3950	500	675	1000	1500	2500	4175	
	650	120	450	600	900	1350	2250	3750	900	1350	2250	3750	475	625	950	1425	2375	3950	
	700	110	425	575	850	1275	2125	3550	850	1275	2125	3550	450	600	900	1350	2250	3750	
	750	100	400	525	800	1200	2000	3325	800	1200	2000	3325	425	575	850	1275	2125	3550	
	800	†92	375	500	750	1125	1875	3125	750	1125	1875	3125	400	525	800	1200	2000	3325	
	850	†82	350	475	700	1050	1750	2925	700	1050	1750	2925	375	500	750	1125	1875	3125	
	900	†70	325	425	650	975	1625	2700	650	975	1625	2700	350	475	700	1050	1750	2925	
	950	†55	300	400	600	900	1500	2500	600	900	1500	2500	325	425	650	975	1625	2700	
	1000	†40	200	275	400	600	1000	1675	400	600	1000	1675	300	400	600	900	1500	2500	
	1050								270	405	675	1125	225	275	425	650	1075	1775	
1100								180	270	450	750	150	200	275	425	700	1175		

*Recommendations for gas or air depend upon kind of gas, service conditions, etc. See paragraph below.

†These ratings are for oil refinery service; the American Standard also includes an 85-pound rating at 800° F. and a 70-pound rating at 850° F., for steam other than in refineries.

These ratings apply to the Crane Cast Steel Swing Check Valves shown on pages 333 to 336.

Seating materials: Cast Steel Swing Check Valves are furnished with Class "X" trimming. Class "X" trimmed valves have Exelloy to Exelloy seating surfaces suitable for steam, water, oil, or oil vapor up to 1100° F. max.

Flange facings: Unless otherwise ordered, flanged end 150 and 300-Pound Valves regularly are furnished with $\frac{1}{16}$ -inch raised faces, and 400-Pound and higher pressure valves, with $\frac{1}{4}$ -inch male faces.

Air or gas: Regular valves with Class "X" trim are suitable for ordinary air or natural gas service.

For unusual gases, such as those with extreme volatility or of corrosive, lethal, explosive, or inflammable character, special consideration must be given to the design of piping systems; recommendations will be furnished on request.

Cold service: For temperatures between 0° and 100° F., the ratings for 100° F. apply. For sub-zero service, materials with suitable impact resistance must be used; recommendations on request.

Standards: Crane pressure-temperature ratings agree with those in the American Steel Flange Standard, No. B16-1939; the A.P.I. Standard No. 600A-39 and Supplement No. 1, Adopted 1940; and the A.P.I. Standard No. 5-G-3, 1940.

Cast Steel Swing Check Valves

25

Pressure Class	Test Pressures		Working Pressures [§]
	Hydrostatic Shell Test	Hydrostatic Seat Test	
150-Pound	460 pounds	350 pounds	For working pressures, see page 332.
300-Pound	1000 pounds	775 pounds	
400-Pound	1340 pounds	1000 pounds	
600-Pound	2000 pounds	1550 pounds	
900-Pound	2700 pounds	2250 pounds	
1500-Pound	4500 pounds	3700 pounds	

All valves tested 100 pounds air-under-water

Crane Cast Steel Swing Check Valves are unusually strong and rugged in construction. Advanced designing, careful selection of materials, accurate machining, and experienced workmanship in assembly are processes of production which enable these valves to meet effectively the severe demands of modern installations.

Low working stresses, secured through the careful distribution of metal and by the use of heavy metal sections, assure a maximum of safety over the recommended pressures and temperatures.

The valves are well suited for services such as are found in modern industrial and power plants, long distance pipe lines, and in oil refineries.

The line is complete and includes valves in a wide range of sizes, in seven pressure classes (150, 300, 400, 600, 900, 1500, and 2500-Pound), and with flanged, screwed, or butt-welding ends, as required. Prices and dimensions for the 2500-Pound Valves are furnished on application.

Swing Check Valves are used to prevent the reversal of flow in horizontal or vertical pipe lines. In vertical lines, or for any angle from horizontal to vertical, they should be used for upward flow only.

Specification of Materials

150-Pound Valves are regularly made of Crane Carbon Steel; 300 and 400-Pound Valves are regularly made of Crane No. 4 Carbon-Molybdenum Steel, and 600, 900, 1500, and 2500-Pound Valves are regularly made of Crane No. 4 Carbon-Molybdenum or of Crane No. 2 Nickel-Chrome Steel. The valves are furnished with "X" trim; for complete specifications, see the table below.

For extremely severe operating conditions, valves can be made of Crane No. 5 Chrome-Molybdenum Steel. They are made to order only; see the Crane Discount Sheet for prices.

Orders for these valves should specify the catalog number and suffix. Catalog numbers are shown on page 334.

Trim	Names of Parts		150 Pound Valves	300 Pound Valves	400 Pound Valves	600 Pound Valves	900 Pound Valves	1500 Pound Valves	2500 Pound Valves	
Class "X" Oil, Oil Vapor, Steam, or Water †1000° F. Max.	Body and Cap	Flanged	Carbon Steel	No. 4 Carbon- Molybdenum Steel	No. 2 Nickel-Chrome Steel					
		Welding or Screwed			No. 4 Carbon-Molybdenum Steel					
	Disc	8" and smaller	Exelloy			Exelloy				
		10 and 12"	Exelloy-Faced Carbon Steel	Exelloy-Faced Alloy Steel						
	Body Seat Ring			Exelloy						
	Hinge			Alloy Steel						
	Cap Gasket			Corrugated Soft Iron		‡Soft Steel Ring Joint Gasket				
	§Cap Bolt-Studs			Triplex						

†Valves with No. 2 Nickel-Chrome Steel bodies are suitable for temperatures up to 1100° F.

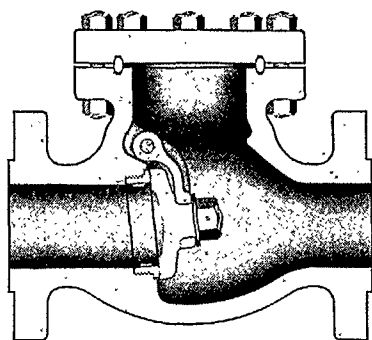
‡600-Pound valves, sizes ½, ¾, and 1-inch, have a corrugated soft iron cap gasket (male and female).

§150-Pound Valves in all sizes and 600-Pound Valves in sizes ½, ¾, and 1-inch use Triplex Steel cap studs.

Cast Steel Swing Check Valves

See page 333 for specifications of materials.

25



Cross Section

The Crane line of Cast Steel Swing Check Valves embodies the many refinements in design and materials necessary to withstand severe service.

Design: On flanged and butt-welding valves the full port area is maintained without pockets, from the inlet port to the valve seat, to avoid turbulence. On the outlet side of the valve seat, the body is of generous proportions, allowing full swing of the disc and minimizing erosion and flow resistance.

Body seat ring: A shoulder-type screwed-in body seat ring provides maximum tightness and security.

Cap joint: The 150 and 300-Pound Valves, and sizes 1-inch and smaller of the 600-Pound Valves, have a male and female type cap joint. The 400, 600 (sizes larger than 1-inch), 900, 1500, and 2500-Pound Valves have the ring-type cap joint.

Cap studs and bolt-studs: Valves of the 300-Pound and higher pressure classes, except $\frac{1}{2}$, $\frac{3}{4}$, and 1-inch 600-Pound, have through bolt-studs of Crane Triplex Steel. 150-Pound Valves and the $\frac{1}{2}$, $\frac{3}{4}$, and 1-inch 600-Pound Valves have Triplex Steel studs. Both types provide an unusually strong and tight cap joint.

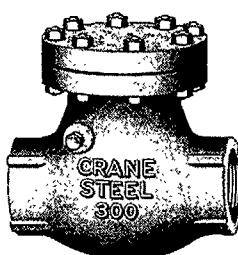
Drilling: Flanged valves of each pressure class are furnished with the end flanges faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made for valves ordered faced only.

Flange facings: The 150 and 300-Pound Flanged Valves are regularly furnished with an American Standard $\frac{1}{8}$ -inch raised face on the end flanges; the 400, 600, 900, 1500, and 2500-Pound Flanged Valves regularly have a $\frac{1}{4}$ -inch male face (large male).

When so ordered, valves can be furnished with other types of facings, such as ring joint, female, tongue, groove, etc.; see the Crane Discount Sheet for prices.

Finish of flange faces: The $\frac{1}{8}$ -inch raised faces and the $\frac{1}{4}$ -inch male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

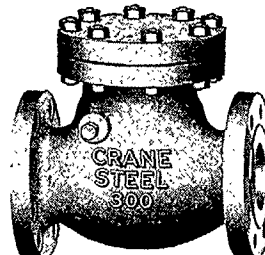
A smooth finish can be furnished on raised or male faces, when specified; see the Crane Discount Sheet



Screwed

For Oil, Oil Vapor, Steam, or Water

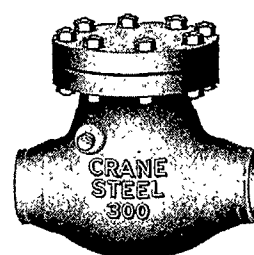
No. 148 X, 150-Pound
No. 158 X, 300-Pound
No. 168 X, 400-Pound
No. 174 X, 600-Pound



Flanged

For Oil, Oil Vapor, Steam, or Water

No. 147 X, 150-Pound
No. 159 X, 300-Pound
No. 169 X, 400-Pound
No. 175 X, 600-Pound
No. 187 X, 900-Pound
No. 199 X, 1500-Pound



Butt-Welding

For Oil, Oil Vapor, Steam, or Water

No. 147 $\frac{1}{2}$ X, 150-Pound
No. 159 $\frac{1}{2}$ X, 300-Pound
No. 169 $\frac{1}{2}$ X, 400-Pound
No. 175 $\frac{1}{2}$ X, 600-Pound
No. 187 $\frac{1}{2}$ X, 900-Pound
No. 199 $\frac{1}{2}$ X, 1500-Pound

for prices. The smooth finish is recommended when a metallic gasket is used.

Standards: In design and materials, Crane Cast Steel Swing Check Valves exceed the requirements of Standards issued by the American Standards Association and the American Petroleum Institute.

End flanges on flanged valves conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16e-1939, for their respective pressure class. This Standard does not include the 3 $\frac{1}{2}$ -inch size on 900 or 1500-Pound Valves.

150, 300, 400, and 600-Pound Flanged and Butt-Welding Valves conform to the American Standard for Face-to-Face Dimensions of Ferrous Flanged and Welding End Valves, B16.10-1939, for their respective pressure class. This Standard does not include 8, 10, and 12-inch 150-Pound Valves, 1 $\frac{1}{4}$ and 1 $\frac{1}{2}$ -inch 300-Pound Valves, 5-inch 400-Pound Valves, 3 $\frac{1}{2}$ and 5-inch 600-Pound Valves, or butt-welding valves in the 10 and 12-inch sizes.

150, 300, 400, and 600-Pound Flanged Valves conform also to the American Petroleum Institute Standard for Pipe Line Valves, No. 5-G-1, Second Edition, September, 1938, for 230, 500, 670, and 1000 pounds working pressures, respectively, at atmospheric temperature. This Standard does not include 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 3 $\frac{1}{2}$, and 5-inch valves; also 150-Pound Valves larger than 6-inch are not included.

Material Regularly Furnished Unless Otherwise Ordered

Body and Cap		150 Pound	300 and 400 Pound	600, 900, 1500, and 2500-Pound
For Steam or Water	Screwed Welding	Crane Carbon Steel	Crane No. 4 Carbon-Molybdenum Alloy Steel	Crane No. 4 Carbon-Molybdenum Alloy Steel
	Flanged			
For Oil or Oil Vapor	Screwed Welding			
	Flanged			
				Crane No. 2 Nickel-Chrome Alloy Steel

Valve Seating Materials

Exelloy to Exelloy seating surfaces ("X" trim) are recommended for oil, oil vapor, steam, or water service up to 1100° F.

Cast Steel Swing Check Valves

List Prices, Each

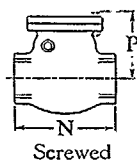
Size Inches	Screwed End Valves				Flanged End Valves, F.D. & S.F. or Butt-Welding End Valves					
	150 Pound	300 Pound	400 Pound	600 Pound	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound
1/2				75.00						
3/4				85.00						
1				100.00						
1 1/4		100.00	Use 600 Pound Valves	115.00		105.00	Use 600 Pound Valves	125.00		
1 1/2		110.00		130.00		115.00		140.00	Use 1500 Pound Valves	250.00
2	105.00	125.00		160.00	110.00	130.00		170.00		310.00
2 1/2	120.00	140.00		210.00	125.00	145.00		220.00		380.00
*3	135.00	160.00		240.00	140.00	*165.00		*250.00	440.00	500.00
3 1/2	165.00	190.00		275.00	170.00	200.00		290.00	500.00	600.00
4	180.00	210.00	285.00	360.00	185.00	220.00	300.00	380.00	600.00	700.00
5	245.00	285.00	380.00		250.00	300.00	400.00	520.00	770.00	1000.00
6	290.00	350.00	465.00		300.00	370.00	490.00	700.00	980.00	1300.00
8					440.00	550.00	740.00	1000.00	1450.00	1900.00
10					630.00	770.00	1000.00	1350.00	2000.00	2800.00
12					850.00	1050.00	1350.00	1750.00	2700.00	3800.00

*When 3-inch 300 and 600-Pound Flanged Valves with ring joint facing are to be bolted to Cranelap joints, orders must so specify. A groove of special pitch diameter is required; see page 562 for dimensions.

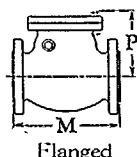
Drilling: Flanged valves are furnished with the end flanges faced, drilled, and spot faced (F.D. & S.F.), unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made if flanged valves are ordered faced only.

Butt-welding valves: Unless otherwise ordered, 150 and 300-Pound Butt-Welding Valves are bored to match the inside diameter of Standard pipe (the heaviest weight on the 8, 10, and 12-inch sizes). For all other pressure classes, orders must specify the diameter of the bore (I.D. of pipe).

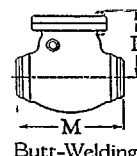
When ordering, specify the catalog number and suffix; see the preceding page.



Screwed



Flanged



Butt-Welding

Dimensions, in Inches

Class	Size	M	N	P	Class	Size	M	N	P	Class	Size	M	P
150 Pound	2	8	8	5	400 Pound	4	16	13	10	900 Pound	3	15	9 1/2
	2 1/2	8 1/2	8 1/2	5 1/2		5	18	15	12		3 1/2	17	11
	3	9 1/2	9 1/2	6		6	19 1/2	16 1/2	12 1/2		4	18	11
	3 1/2	10 1/2	10 1/2	6 1/2		8	23 1/2		14 1/2		5	22	13 1/4
	4	11 1/2	11 1/2	7		10	26 1/2		*		6	24	13 3/4
	5	13	13	8		12	30		*		8	29	16 1/2
	6	14	14	9	600 Pound	1 1/2		4 5/8	3 1/2	1500 Pound	10	33	*
	8	19 1/2	19 1/2	10 1/4		3/4		6	4		12	38	*
	10	*		*		1		7	4 1/2		1 1/2	12	8 1/4
	12	*		*		1 1/4	9	7 1/2	6 1/4		2	14 1/2	9 3/4
300 Pound	1 1/4	8	7 1/2	6		1 1/2	9 1/2	8 1/2	6 3/4		2 1/2	16 1/2	10 1/2
	1 1/2	9	8 1/2	6 1/4		2	11 1/2	9 1/2	7		3	18 1/2	11 1/4
	2	10 1/2	9 3/4	6 3/4		2 1/2	13	10 3/4	8 1/4		3 1/2	19 1/2	12 1/2
	2 1/2	11 1/2	10 3/4	8		3	14	11 3/4	9		4	21 1/2	13 1/4
	3	12 1/2	11 3/4	8 1/2		3 1/2	15	12 1/4	9 3/4		5	26 1/2	15 1/4
	3 1/2	13 1/4	12 1/4	9 1/4		4	17	13	10 1/4		6	27 3/4	15 3/4
	4	14	13	9 3/4		5	20		12 3/4		8	32 3/4	18 1/4
	5	15 3/4	15	10 3/4		6	22		13 1/2		10	39	*
	6	17 1/2	16 1/2	11 1/4		8	26		15 1/4		12	44 1/2	*
	8	21		14		10	31		18 3/4	2500 Pound	On application		
	10	24 1/2		15		12	33		21 1/2				
	12	28		16 3/4									

*These dimensions will be furnished on application.

Face to face: 150 and 300-Pound Flanged Valves regularly have a 1/16-inch raised face; and 400, 600, 900, 1500, and 2500-Pound Flanged Valves regularly

have a 1/4-inch high large male face. Face to face dimensions (dimension "M") shown in the above table include these facings.

Templates for drilling and flange dimensions... pages 553 to 555

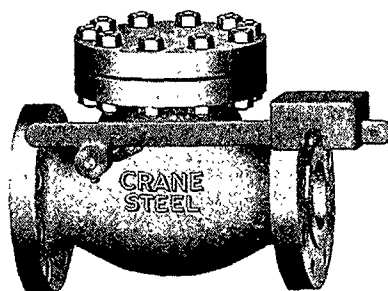
Description... pages 333 and 334

Welding bevel details... page 647

Special facings... pages 560 to 563

Cast Steel Swing Check Valves With Outside Lever and Weight

25



Cast Steel Swing Check Valve
With Outside Lever and Weight

When so ordered, Crane Cast Steel Swing Check Valves can be furnished with an outside lever and an adjustable weight. Such valves are ideally suited for certain services for which regular valves are not entirely satisfactory.

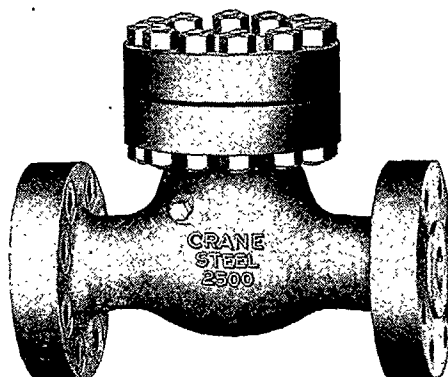
With the lever and weight mounted so that the weight assists the disc in closing, the valves close the instant the flow stops. Valves so fitted are especially recommended for liquid lines where a sudden reversal of flow may accumulate considerable momentum before an ordinary valve disc would close, resulting in dangerous or damaging shock. By clos-

ing instantly and preventing reversal of flow, they eliminate shock.

With the lever and weight mounted so that the weight balances the weight of the disc, the valve becomes more sensitive to low inlet velocities. The floating or feathering action of the disc causes the valve to open with a minimum of pressure, and resistance to flow past the disc is minimized.

Orders for valves with outside lever and weight must specify whether the weight is to balance the disc or to assist it in closing. Prices on application.

2500-Pound Alloy Cast Steel Swing Check Valves



2500-Pound
Alloy Cast Steel Swing Check Valve

Crane 2500-Pound Alloy Cast Steel Swing Check Valves with flanged or butt-welding ends are available in the 4, 5, 6, 8, and 10-inch sizes.

The valves are recommended for the extreme pressures and temperatures encountered in modern central power stations and oil refineries. They are regularly furnished with Class "X" trimming (Exelloy to Exelloy) and are suitable for oil, oil vapor, steam, water, or general service.

These are extremely heavy valves. They are

ruggedly constructed and are amply proportioned throughout.

In these valves, the full port area is maintained without pockets, from the inlet flange to the valve seat, to avoid turbulence. On the outlet side of the valve seat, the body is of generous proportions, allowing full swing of the disc and minimizing erosion and flow resistance.

Prices and dimensions will be furnished on application.

Working pressures.....page 332
General description.....pages 333 and 334

Specification of materials.....page 333
Description of materials.....pages 1 to 9

Forged and Cast Steel Screwed Fittings

Crane Forged and Cast Steel Screwed Fittings are available in a wide range of straight and reducing sizes for a variety of service requirements. Forged Steel Fittings are regularly made in the 2000, 3000, and 6000-Pound W.O.G. pressure classes. Cast Steel Fittings are regularly made in the 1000 and 2000-Pound W.O.G. pressure classes. Special fittings and fittings for higher pressures can be furnished to order; fittings shown in this section include:

90° Elbows	Tees
90° Street Elbows	Crosses
45° Elbows	Couplings
Caps	Reducers

26

Forged Steel Fittings

2000-Pound W.O.G.	page 338
3000-Pound W.O.G.	page 339
6000-Pound W.O.G.	page 340
9000-Pound W.O.G.	page 340

Cast Steel Fittings

1000-Pound W.O.G.	page 341
2000-Pound W.O.G.	page 341

* * * * *

The Cast and Forged Steel Screwed Fittings listed above comprise only a part of the complete line of Crane steel products.

Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

Steel Bushings.	page 227
Steel Plugs.	page 228
Wrought Couplings.	page 229
Wrought Steel Nipples.	pages 230 and 231
Forged Steel Unions.	pages 247 and 248
Forged Steel Flange Unions.	pages 252 and 253
Steel Flanged Fittings.	pages 343 to 350
Steel Welding Fittings.	pages 351 to 360
Steel Flanges.	pages 361 to 367
Steel Gate Valves.	pages 297 to 307
Steel Globe and Angle Valves.	pages 309 to 326
Steel Check Valves.	pages 327 to 336
Steel Stop-Check Valves.	pages 370 to 374
Steel Blow-Off Valves.	page 377
Steel Safety Valves.	pages 391 and 392
Steel Relief Valves.	pages 403 to 407
Steel Steam Traps.	page 416
Steel Sediment Separators.	page 423

How to read reducing fittings. page 644

Fabricated Piping. pages 597 to 619

Valves and Fittings for Marine Service. pages 459 to 478

2000-Pound W.O.G. Forged Steel Fittings



No. 2120 D
90° Elbow



No. 2121 D
45° Elbow



No. 2124 D
Tee

A new line of fittings

Light in weight, but unusually strong and rugged!

These new Crane 2000-Pound W.O.G. Forged Steel Fittings, although light in weight, are strong, tough, and durable.

They are more compact than ordinary forged steel or high-pressure malleable iron fittings. Liberally reinforced at points subjected to greatest strain, they have an ample factor of safety over the recommended working pressures.

The fittings are designed for services that are beyond the temperature range of malleable iron fittings but where the massiveness of the usual heavier type forged steel fitting is not required. In addition, they will be found ideal for use on many relatively low pressure installations where the extra strength and safety afforded by steel fittings are desired.

The fittings are recommended for high pressure cold water, oil, or gas lines and for high pressure steam, oil, or oil vapor lines operated at elevated temperatures.

WORKING PRESSURES For Steam, Water, Oil, Oil Vapor, Gas, or Air

Temp. Deg. F.	Pounds Non- Shock	Temp. Deg. F.	Pounds Non- Shock
100	2000	600	1040
150	1900	650	960
200	1800	700	880
250	1700	750	800
300	1600	800	740
350	1500	850	670
400	1400	900	600
450	1300	950	530
500	1200	1000	380
550	1120	....	...

List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 2120 D, 90° Elbows	Black, Each	.55	.55	.55	.65	.75	.90	1.20	1.50	1.90
No. 2121 D, 45° Elbows	Black, Each	.68	.68	.68	.78	.90	1.08	1.44	1.80	2.28
No. 2124 D, Tees	Black, Each	.80	.80	.80	.95	1.10	1.35	1.75	2.30	2.90

Design: Crane 2000-Pound W.O.G. Forged Steel Fittings are a departure from the usual screwed fitting design. In place of the conventional narrow, high band ordinarily used for end reinforcement, these fittings have a low but exceptionally long band. It completely surrounds the thread chamber, extending beyond the last thread. This design not only provides the requisite strength but also makes the fittings more compact and neater in appearance, and permits a better wrench grip.

Construction: The fittings are forged solid, and the openings are drilled. They have ample metal sections throughout and are unusually rugged and durable. Their long thread lengths and the fact that the metal in the fittings expands and contracts in unison with steel pipe, assure tight joints even on lines subjected to great temperature changes.

Material: High grade carbon steel billets, purchased under rigid specifications and carefully inspected and tested for quality, are used for forging stock. The material has been especially selected for its strength, toughness, and resistance to temperature and shock.

Threading: The threads are long and are accurately cut to gauge. The openings are chamfered to permit easy entrance of the pipe. All openings are in true alignment.

Reducing fittings: Reducing 90° Elbows, 45° Elbows, and Tees (any reduction) can be made to order from straight size blanks. List prices of reducing fittings are 15% higher than those which apply to straight sizes shown in the table above.

Galvanized fittings: Galvanized 2000-Pound W.O.G. Forged Steel Fittings can be made to order. List prices are 100% higher than those which apply to black fittings shown in the table above.

Other fittings; larger sizes: When larger sizes or other types of fittings (90° Street Elbows, Crosses, Couplings, and Reducers) are required, Crane 3000-Pound W.O.G. Forged Steel Fittings are recommended; see page 339.

Crane Cast Steel Screwed Fittings are made in sizes as large as 12 inches, and for 1000 and 2000 pounds cold water, oil, and gas working pressures. They are shown on page 341.

Dimensions, in Inches

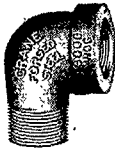
Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Center to end, 90° Elbows and Tees	13/16	13/16	31/32	1 1/8	1 5/16	1 1/2	1 3/4	2	2 3/8
Center to end, 45° Elbows	1 1/16	1 1/16	1 3/16	7/8	1	1 1/8	1 5/16	1 7/16	1 11/16
*Normal thread engagement	1/4	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4

*For explanation, see page 591.

3000-Pound W.O.G. Forged Steel Fittings



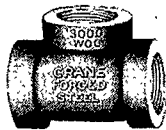
No. 300 D
90° Elbow



No. 303 D
90° Street Elbow



No. 302 D
45° Elbow



No. 304 D
Tee

WORKING PRESSURES

For Steam, Water, Oil,
Oil Vapor, Gas, or Air

Temp. Deg. F.	Pounds Non-Shock	Temp. Deg. F.	Pounds Non-Shock
100	3000	600	1560
150	2850	650	1440
200	2700	700	1320
250	2550	750	1200
300	2400	800	1100
350	2250	850	1000
400	2100	900	900
450	1950	950	795
500	1800	1000	570
550	1680	....	...

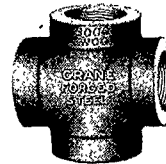
Cast Steel Screwed Fittings for
1000 and 2000 pounds cold service
are shown on page 341.



No. 305 D
Cap



No. 313 D
Coupling



No. 307 D
Cross



No. 323 D
Reducer

26

List Prices, Black, Each

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 300 D, 90° Elbows		.55	.55	.55	.65	.75	.90	1.20	1.50	1.90	2.90	5.00	12.50	12.50
No. 302 D, 45° Elbows		.68	.68	.68	.78	.90	1.08	1.44	1.80	2.28	3.48	6.00	14.00	14.00
No. 303 D, 90° Street Elbows			.75	.85	.85	1.05	1.40	2.00	2.50	3.15				
No. 304 D, Tees		.80	.80	.80	.95	1.10	1.35	1.75	2.30	2.90	4.40	7.50	17.00	17.00
No. 305 D, Caps		*See Note			.45	.65	.90	1.00	1.30	2.00	3.65	4.35		
No. 307 D, Crosses		1.10	1.10	1.10	1.30	1.50	1.90	2.80	3.50	5.00	7.30	10.00	23.00	23.00
No. 313 D, Couplings		*See Note			.45	.55	.70	.85	1.15	1.60	2.75	3.85	4.80	
No. 323 D, Reducers (Any reduction)			.55	.55	.70	1.00	1.20	1.35	1.60	1.85	2.75	3.75	5.50	6.75

Reducing fittings: Reducing Elbows, Tees, and Crosses can be made to order from straight sizes (any reduction), at an advance of 15% over the list prices of straight fittings shown in the table above.

***Note:** For smaller size Caps, use Plain Caps, page 185. For smaller size Couplings, use Extra Heavy Plain Couplings, page 220.

Galvanized fittings: Galvanized fittings can be made to order, at an advance of 100% over the list prices of the black fittings.

Service recommendations: These fittings are unusually strong and rugged. They are ideal for high pressure hydraulic lines and for high pressure-temperature service. Their long thread lengths and the

fact that the metal in the fittings expands and contracts in unison with steel pipe, assure tight joints even on lines subjected to great temperature change.

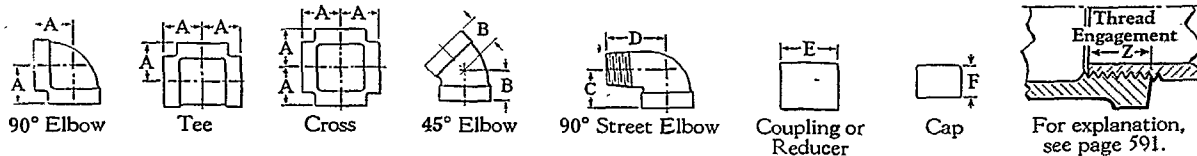
Material and construction: The fittings are forged solid from a special grade of steel, selected for its strength, toughness, and resistance to temperature and shock.

The openings are drilled. The ends, except on Caps, Couplings, and Reducers, are reinforced with heavy bands, assuring generous strength.

Threading: The threads are long and are accurately cut to gauge. The openings are chamfered to permit easy entrance of the pipe. All openings are in true alignment.

Dimensions, in Inches

Dimensions of reducing sizes are the same as those of the straight size corresponding to the largest opening.



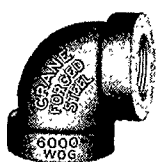
Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A—Center to end	15/16	15/16	11/16	1 1/4	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/2	4 1/2
B—Center to end, 45° Elbows	13/16	13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 13/16	2 3/4
C—Center to end, 90° Street Elbows		25/32	15/16	1 1/4	1 7/16	1 5/8	1 7/8	2 1/8	2 1/2				
D—Center to end, 90° Street Elbows		1 1/4	1 1/2	1 3/4	2	2 5/16	2 5/8	2 13/16	3 5/16				
E—End to end, Couplings and Reducers	1 1/8	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	2 7/8	3 5/8	4 1/8	4 1/8	4 5/8	4 5/8
F—Height, Caps				1 1/4	1 1/4	1 1/2	1 5/8	1 5/8	2	2 3/8	2 1/2		
Z—Thread engagement	1/4	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1	1 1/16	1 1/8

6000-Pound W.O.G. Forged Steel Fittings

WORKING PRESSURES

For Steam, Water, Oil,
Oil Vapor, Gas, or Air

Temp. Deg. F.	Pounds Non-Shock	Temp. Deg. F.	Pounds Non-Shock
100	6000	600	3120
150	5700	650	2880
200	5400	700	2640
250	5100	750	2400
300	4800	800	2200
350	4500	850	2000
400	4200	900	1800
450	3900	950	1590
500	3600	1000	1140
550	3360	....	....



No. 310 D
90° Elbow



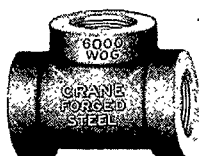
No. 312 D
45° Elbow



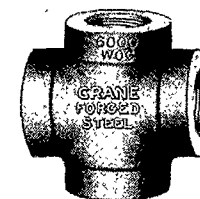
No. 333 D
Coupling



No. 341 D
Reducer



No. 314 D
Tee



No. 317 D
Cross

SERVICE RECOMMENDATIONS

These fittings are the same as the 3000-Pound Forged Steel Fittings shown on page 339 except they are much heavier.

The fittings are recommended for the extreme pressures and temperatures encountered in some steam plants and oil refineries and for high hydraulic pressures. They are exceptionally massive and rugged.

List Prices, Black, Each

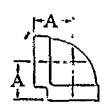
Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 310 D, 90° Elbows		.55	.55	.65	.75	.90	1.20	1.50	1.90	2.90	5.00	12.50	12.50	
No. 312 D, 45° Elbows		.68	.68	.78	.90	1.08	1.44	1.80	2.28	3.48	6.00	14.00	14.00	
No. 314 D, Tees		.80	.80	.95	1.10	1.35	1.75	2.30	2.90	4.40	7.50	17.00	17.00	
No. 317 D, Crosses		1.10	1.10	1.30	1.50	1.90	2.80	3.50	5.00	7.30	10.00	23.00	23.00	
No. 333 D, Couplings		.60	.60	.60	.60	.65	.85	1.05	1.30	1.75	2.40	4.75	8.50	10.90
No. 341 D, Reducers (Any reduction)			.75	.75	.90	1.25	1.50	1.70	2.10	2.50	3.60	5.75	9.50	11.75

Reducing fittings: Reducing Elbows, Tees, and Crosses can be made to order from straight sizes (any reduction) at an advance of 15% over the list prices of straight fittings shown in the table above.

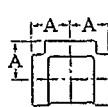
Galvanized fittings: Galvanized 6000-Pound W.O.G. Forged Steel Fittings can be made to order. List prices are 100% higher than those which apply to black fittings shown in the table above.

Dimensions, in Inches

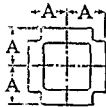
Dimensions of reducing sizes are the same as those of the straight size corresponding to the largest opening.



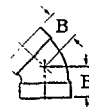
90° Elbow



Tee



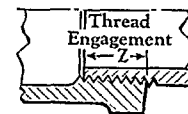
Cross



45° Elbow



Coupling or
Reducer



For explanation, see
page 591.

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
A—Center to end	15/16	1 1/16	1 1/4	1 1/2	1 5/8	1 7/8	2 1/8	2 1/2	3 1/4	3 3/4	4 1/2	4 1/2	
B—Center to end, 45° Elbows	13/16	7/8	1	1 1/8	1 5/16	1 1/2	1 11/16	2	2 1/4	2 1/2	2 13/16	2 13/16	
E—End to end, Couplings and Reducers	1 1/8	1 3/8	1 5/8	1 7/8	2 1/8	2 3/8	2 7/8	3 3/8	4 1/8	4 1/2	4 5/8	4 5/8	
Z—Thread engagement	1/4	3/8	3/8	1/2	5/16	1 1/16	1 1/16	1 1/16	3/4	15/16	1	1 1/16	1 1/8

9000-Pound W.O.G. Forged Steel Fittings



Forged Steel Screwed Fittings, sizes 1/4 to 3-inch, for working pressures as high as 2700 pounds steam or hot oil at 900° F., or 9000 pounds cold water, oil, or gas, non-shock, can be made to order. Prices, dimensions, and ratings at other temperatures will be furnished on application.



1000 and 2000-Pound W.O.G. Cast Steel Fittings



90° Elbow
No. 760 D, 1000-Pound
No. 260 D, 2000-Pound

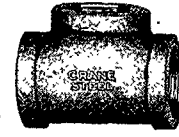


45° Elbow
No. 762 D, 1000-Pound
No. 262 D, 2000-Pound

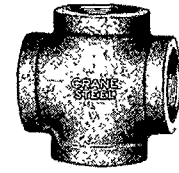
WORKING PRESSURES

For Steam, Water, Oil, Oil Vapor, Gas, or Air

1000-Pound Fittings				2000-Pound Fittings			
Temp. Deg. F.	Pounds Non- Shock	Temp. Deg. F.	Pounds Non- Shock	Temp. Deg. F.	Pounds Non- Shock	Temp. Deg. F.	Pounds Non- Shock
100	1000	600	520	100	2000	600	1040
150	950	650	480	150	1900	650	960
200	900	700	440	200	1800	700	880
250	850	750	400	250	1700	750	800
300	800	800	370	300	1600	800	740
350	750	850	335	350	1500	850	670
400	700	900	300	400	1400	900	600
450	650	950	265	450	1300	950	530
500	600	1000	190	500	1200	1000	380
550	560	....	...	550	1120	....	...



Tee
No. 764 D, 1000-Pound
No. 264 D, 2000-Pound



Cross
No. 766 D, 1000-Pound
No. 266 D, 2000-Pound

TEST PRESSURES

1000-Pound Fittings — 1000 pounds hydrostatic

2000-Pound Fittings — 2000 pounds hydrostatic

List Prices

Size		Inches	2½	3	3½	4	5	6	8	10	12	*5¾/16	*6⅝
1000-Pound	No. 760 D, 90° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00	14.75	32.30
	No. 762 D, 45° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00		
	No. 764 D, Tees	Each	7.10	9.00	11.50	12.75	20.25	25.00	51.00	91.00	138.00	22.00	48.50
	No. 766 D, Crosses	Each	9.50	12.00	15.50	17.00	27.00	33.00	68.00	122.00	184.00		
2000-Pound	No. 260 D, 90° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00	14.75	32.30
	No. 262 D, 45° Elbows	Each	4.75	6.00	7.75	8.50	13.50	16.50	34.00	61.00	92.00		
	No. 264 D, Tees	Each	7.10	9.00	11.50	12.75	20.25	25.00	51.00	91.00	138.00	22.00	48.50
	No. 266 D, Crosses	Each	9.50	12.00	15.50	17.00	27.00	33.00	68.00	122.00	184.00		

Reducing fittings: Reducing Elbows, Tees, and Crosses can be made to order. Reducing sizes use the same list prices as straight size fittings but are sold at an advance in price; see the Crane Discount Sheet for prices.

***Casing sizes:** Orders for casing fittings must specify the outside diameter of the casing, the number of threads per inch, and the style of the casing.

Service recommendations: Crane 1000 and 2000-Pound W.O.G. Cast Steel Fittings are recommended for services that are beyond the pressure-temperature range of malleable or cast iron fittings, or where stronger, more rugged fittings are desired. They are well suited for service on steam, hot oil, gas, and water lines.

Material and construction: The fittings are made of Crane Carbon Steel. They are cast from special

patterns and are not to be compared with cast steel fittings made from patterns designed for cast iron fittings. Metal sections are ample throughout, and heavy bands reinforce the ends of the fittings. The 2000-Pound Fittings are unusually massive.

Threading: Threads are long and are accurately cut to gauge; all openings are in true alignment. Openings are chamfered to permit easy entrance of the pipe.

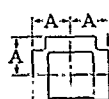
Alloy steel: Fittings made of Crane No. 4 Carbon-Molybdenum Alloy Cast Steel or of Crane No. 5 Chrome-Molybdenum Alloy Cast Steel to withstand elevated temperatures, corrosion, and erosion can be made to order. Prices on application.

Smaller sizes: For smaller sizes, use the forged steel fittings shown on pages 338 to 340.

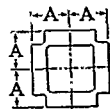
Dimensions, in Inches—1000 and 2000-Pound Fittings



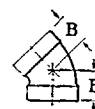
90° Elbow



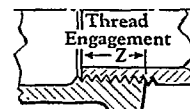
Tee



Cross



45° Elbow



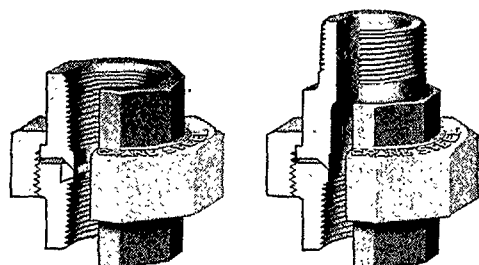
For explanation, see page 591.

Size	2½	3	3½	4	5	6	8	10	12	*5¾/16	*6⅝
A—Center to end	3¼	3¾	4⅞	4½	5½	6¼	7¾	9¼	11½	5½	16⅞
B—Center to end, 45° Elbows	2¼	2½	2⅞	2⅓/16	3⅓/16	3½	4⅓/16	5⅓/16	6		
Z—Thread engagement	1⅓/16	1	1⅓/16	1⅓/8	1¼	1⅓/16	1⅓/16	1⅓/8	1¼		

*These are casing sizes.

†When 6⅝-inch fittings are threaded for 6⅝-inch A. P. I. Casing, dimension "A", will be 6¼ inches.

Forged Steel Ground Joint Unions

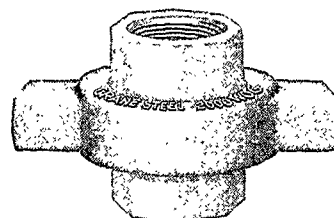


Female Union
Brass to Steel Seat

Male and Female Union
Steel to Steel Seat

Forged Steel Ground Joint Unions are furnished with either female or male and female ends. The unions have a brass to steel or a steel to steel seat. For very high pressures, the No. 246 X Union with steel to Exelloy seat is recommended. For prices and complete description, see page 247.

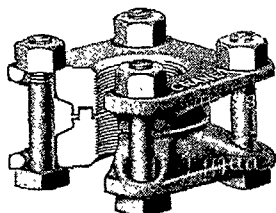
Forged Steel Ground Joint Hammer Lug Unions



Female Union
With Single Hammer Lugs

Forged Steel Ground Joint Hammer Lug Unions are available with either single or double hammer lugs. Single hammer lug unions have a brass to steel or a steel to steel seat. Double hammer lug unions have a brass to steel seat. For prices and complete description, see page 248.

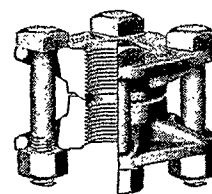
Forged Steel Tongue and Groove Flange Unions



Flange Union
With Cranite Gasket

Forged Steel Tongue and Groove Flange Unions are rugged and serviceable. They are the gasket type. For prices and complete description, see page 252.

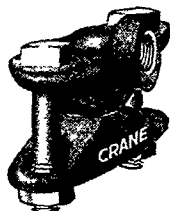
Forged Steel Ground Joint Flange Unions



Flange Union
Steel to Steel Seat

Forged Steel Ground Joint Flange Unions are furnished in the 2000, 6000, and 9000-Pound W.O.G. pressure classes. For prices and complete description, see page 253.

Forged Steel Combination Elbows



Combination Elbow

Forged Steel Combination Elbows are ideal for making strong, compact connections where space is limited. They can be used in place of screwed fittings or in place of a flanged elbow. For prices and complete description, see page 252.

Steel Bushings and Plugs



Face
Bushing



Hexagon
Bushing



Square Head
Plug

The Crane line of steel bushings and plugs includes face bushings, regular type hexagon bushings, long pattern hexagon bushings, and square or hexagon head plugs. For prices and complete description, see pages 227 and 228.

Cast Steel Flanged Fittings

The Crane line of Cast Steel Flanged Fittings, embracing a wide range of sizes and types in 150, 300, 400, 600, 900, 1500, and 2500-Pound pressure classes, is described in detail on the pages that follow. Special fittings will be made to order; fittings listed in this section include:

90° Elbows	Crosses
90° Long Radius Elbows	Laterals
90° Base Elbows	Taper Reducers
45° Elbows	Eccentric Reducers
Tees	Return Bends

27

Pressure-Temperature Ratings.....page 344

General Description.....page 345

List Prices

150, 300, and 400-Pound.....page 346

600, 900, and 1500-Pound.....page 347

Dimensions

150 and 300-Pound.....page 348

400, 600, 900, 1500, and 2500-Pound.....page 349

* * * * *

The Cast Steel Flanged Fittings listed above comprise only a part of the complete line of Crane steel products.

Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

Steel Flanges.....pages 361 to 367
Steel Welding Fittings.....pages 351 to 360
Forged Steel Flange Unions.....pages 252 and 253
Forged Steel Unions.....pages 247 and 248

Steel Screwed Fittings.....pages 337 to 342
Steel Bushings.....page 227
Steel Plugs.....page 228
Wrought Couplings.....page 229
Wrought Steel Nipples.....pages 230 and 231

Steel Gate Valves.....pages 297 to 307
Steel Globe and Angle Valves.....pages 309 to 326
Steel Check Valves.....pages 327 to 336
Steel Stop-Check Valves.....pages 370 to 374

Steel Blow-Off Valves.....page 377
Steel Safety Valves.....pages 391 and 392
Steel Relief Valves.....pages 403 to 407
Steel Steam Traps.....page 416
Steel Sediment Separators.....page 423

How to read reducing fittings.....page 644

Fabricated Piping.....pages 597 to 619

Valves and Fittings for Marine Service.....pages 459 to 478

Cast Steel Flanged Fittings

Working Pressures, Pounds per Square Inch, Non-Shock — For Fittings Shown on Pages 345 to 349

Fluid	Temp.	Carbon Steel Fittings	No. 4 Carbon-Molybdenum Alloy Steel Fittings						No. 2 Nickel-Chrome Alloy Steel Fittings				No. 5 Chrome-Molybdenum Alloy Steel Fittings (Made to order)						
	Deg. Fahr.	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	
			Flanged Fittings with Standard Facings Other Than Ring Joint																
Steam, Water, Oil, Oil Vapor, Gas, or Air	100	230	600	800	1200	1800	3000	5000	1200	1800	3000	5000	600	800	1200	1800	3000	5000	
	150	220	590	775	1180	1770	2950	4905	1180	1770	2950	4905	590	775	1180	1770	2950	4905	
	200	210	580	750	1160	1740	2900	4810	1160	1740	2900	4810	580	750	1160	1740	2900	4810	
	250	200	560	725	1120	1680	2800	4645	1120	1680	2800	4645	560	725	1120	1680	2800	4645	
	300	190	540	700	1080	1620	2700	4480	1080	1620	2700	4480	540	700	1080	1620	2700	4480	
	350	180	520	675	1040	1560	2600	4315	1040	1560	2600	4315	520	675	1040	1560	2600	4315	
	400	170	500	650	1000	1500	2500	4150	1000	1500	2500	4150	500	650	1000	1500	2500	4150	
	450	160	480	625	960	1440	2400	3985	960	1440	2400	3985	480	625	960	1440	2400	3985	
	500	150	460	600	920	1380	2300	3820	920	1380	2300	3820	460	600	920	1380	2300	3820	
	550	140	440	575	880	1320	2200	3655	880	1320	2200	3655	440	575	880	1320	2200	3655	
Steam, Oil, or Oil Vapor	600	130	420	550	840	1260	2100	3490	840	1260	2100	3490	420	550	840	1260	2100	3490	
	650	120	400	525	800	1200	2000	3325	800	1200	2000	3325	400	525	800	1200	2000	3325	
	700	110	380	500	760	1140	1900	3160	760	1140	1900	3160	380	500	760	1140	1900	3160	
	750	100	360	475	720	1080	1800	2995	720	1080	1800	2995	360	475	720	1080	1800	2995	
	800	†*92	340	450	680	1020	1700	2830	680	1020	1700	2830	340	450	680	1020	1700	2830	
	850	†*82	320	425	640	960	1600	2665	640	960	1600	2665	320	425	640	960	1600	2665	
	900	*70	300	400	600	900	1500	2500	600	900	1500	2500	310	410	620	930	1550	2580	
	950	*55	265	350	530	795	1325	2205	530	795	1325	2205	300	400	600	900	1500	2500	
	1000	*40	190	250	380	570	950	1580	380	570	950	1580	200	275	400	600	1000	1675	
				Flanged Fittings with Ring Joint Facing															
Steam, Water, Oil, Oil Vapor, Gas, or Air	100	275	720	960	1440	2160	3600	6000	1440	2160	3600	6000	720	960	1440	2160	3600	6000	
	150	255	700	925	1400	2100	3500	5825	1400	2100	3500	5825	700	925	1400	2100	3500	5825	
	200	240	675	900	1350	2025	3375	5625	1350	2025	3375	5625	680	900	1360	2040	3400	5660	
	250	225	650	875	1300	1950	3250	5425	1300	1950	3250	5425	660	875	1320	1980	3300	5495	
	300	210	625	825	1250	1875	3125	5200	1250	1875	3125	5200	640	850	1280	1920	3200	5330	
	350	195	600	800	1200	1800	3000	5000	1200	1800	3000	5000	620	825	1240	1860	3100	5165	
	400	180	575	775	1150	1725	2875	4800	1150	1725	2875	4800	600	800	1200	1800	3000	5000	
	450	165	550	725	1100	1650	2750	4575	1100	1650	2750	4575	575	775	1150	1725	2875	4800	
	500	150	525	700	1050	1575	2625	4375	1050	1575	2625	4375	550	725	1100	1650	2750	4575	
	550	140	500	675	1000	1500	2500	4175	1000	1500	2500	4175	525	700	1050	1575	2625	4375	
Steam, Oil, or Oil Vapor	600	130	475	625	950	1425	2375	3950	950	1425	2375	3950	500	675	1000	1500	2500	4175	
	650	120	450	600	900	1350	2250	3750	900	1350	2250	3750	475	625	950	1425	2375	3950	
	700	110	425	575	850	1275	2125	3550	850	1275	2125	3550	450	600	900	1350	2250	3750	
	750	100	400	525	800	1200	2000	3325	800	1200	2000	3325	425	575	850	1275	2125	3550	
	800	†*92	375	500	750	1125	1875	3125	750	1125	1875	3125	400	525	800	1200	2000	3325	
	850	†*82	350	475	700	1050	1750	2925	700	1050	1750	2925	375	500	750	1125	1875	3125	
	900	*70	325	425	650	975	1625	2700	650	975	1625	2700	350	475	700	1050	1750	2925	
	950	*55	300	400	600	900	1500	2500	600	900	1500	2500	325	425	650	975	1625	2700	
	1000	*40	200	275	400	600	1000	1675	400	600	1000	1675	300	400	600	900	1500	2500	
	1050								270	405	675	1125	225	275	425	650	1075	1775	
1100								180	270	450	750	150	200	275	425	700	1175		

*These ratings are for oil refinery service and apply to sizes 12-inch and smaller only.

†The American Standard also includes an 85-pound rating at 800° F. and a 70-pound rating at 850° F., for steam other than in refineries and for sizes 24-inch and smaller.

These ratings apply to the Crane Cast Steel Flanged Fittings shown on pages 345 to 349.

Flanged facings: Unless otherwise ordered, 150 and 300-Pound Flanged Fittings regularly are furnished with $\frac{1}{8}$ -inch raised faces, and 400-Pound and higher pressure flanged fittings, with $\frac{1}{4}$ -inch male faces.

Cold service: For temperatures between 0° and

100° F., the ratings for 100° F. apply. For sub-zero service, materials with suitable impact resistance must be used; recommendations on request.

Standards: Crane pressure-temperature ratings agree with those in the American Steel Flange Standard, No. B16e-1939; the A.P.I. Standard No. 600A-39 and Supplement No. 1, Adopted 1940; and the A.P.I. Standard No. 5-G-3, 1940.

Cast Steel Flanged Fittings



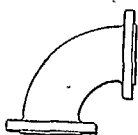
90° Elbow

Straight

- No. 525 D, 150-Pound
No. 401 D, 300-Pound
No. 601 D, 400-Pound
No. 845 D, 600-Pound
No. 1245 D, 900-Pound
No. 1545 D, 1500-Pound

Reducing

- No. 545 D, 150-Pound
No. 421 D, 300-Pound
No. 621 D, 400-Pound
No. 841 D, 600-Pound
No. 1241 D, 900-Pound
No. 1541 D, 1500-Pound



90° Long Radius Elbow

- No. 551 D, 150-Pound
No. 427 D, 300-Pound



45° Elbow

- No. 527 D, 150-Pound
No. 403 D, 300-Pound
No. 603 D, 400-Pound
No. 846 D, 600-Pound
No. 1246 D, 900-Pound
No. 1546 D, 1500-Pound

90° Base Elbow
With Round Base

- No. 550 D, 150-Pound
No. 425½ D, 300-Pound
No. 625 D, 400-Pound
No. 854 D, 600-Pound
No. 1254 D, 900-Pound
No. 1554 D, 1500-Pound



Return Bend

- No. 553 D, 150-Pound
No. 429 D, 300-Pound

Pressure Class	Hydrostatic Test Pressures	Working Pressures
150-Pound	*460 and 350 pounds	For working pressures, see page 344.
300-Pound	1000 pounds	
400-Pound	1340 pounds	
600-Pound	2000 pounds	
900-Pound	2700 pounds	
1500-Pound	4500 pounds	

*460 pounds for 12" and smaller; 350 pounds for larger.

Crane Cast Steel Flanged Fittings are available in a complete assortment of types and a wide range of straight and reducing sizes. They are made in a variety of materials and with various flange facings, providing fittings for every service requirement.

The Crane line includes flanged fittings in the 150, 300, 400, 600, 900, 1500, and 2500-Pound pressure classes. Prices and dimensions are shown on pages 346 to 349 (prices for the 2500-Pound on application).

Materials: The 150-Pound Flanged Fittings are regularly made of Crane Carbon Steel. All other fittings are made of Crane No. 4 Carbon-Molybdenum Steel, unless otherwise ordered.

When so specified, 600, 900, 1500, and 2500-Pound Fittings can be made of Crane No. 2 Nickel-Chrome Steel without additional charge.

Fittings made of Crane No. 5 Chrome-Molybdenum Steel can also be supplied to order; see the Crane Discount Sheet for prices.

Base elbows: Base elbows have a round base flange, plain faced. The base flange is not drilled unless so ordered.

The base is suitable only for support in compression and is not to be installed for service as an anchor or support in tension or shear.

Special fittings: Special Angle Elbows, Base Tees, Tees with Anchorage Base, and other unusual fittings can be made to order; prices on application. Inquiries should be accompanied by drawings.

American Standard: Crane Cast Steel Flanged Fittings conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939, for their respective pressure class. This Standard does not include Return Bends, 3½-inch fittings in the 900 and 1500-Pound classes, or ½ and ¾-inch 45° Laterals in the 1500-Pound class.



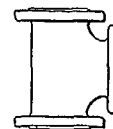
Taper Reducer

- No. 547 D, 150-Pound
No. 423 D, 300-Pound
No. 623 D, 400-Pound
No. 853 D, 600-Pound
No. 1253 D, 900-Pound
No. 1553 D, 1500-Pound



†Eccentric Reducer

- No. 548 D, 150-Pound
No. 423½ D, 300-Pound
No. 624 D, 400-Pound
No. 855 D, 600-Pound
No. 1255 D, 900-Pound
No. 1555 D, 1500-Pound



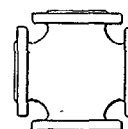
Tees

Straight

- No. 531 D, 150-Pound
No. 412 D, 300-Pound
No. 605 D, 400-Pound
No. 847 D, 600-Pound
No. 1247 D, 900-Pound
No. 1547 D, 1500-Pound

Reducing

- No. 531 D, 150-Pound
No. 407 D, 300-Pound
No. 607 D, 400-Pound
No. 848 D, 600-Pound
No. 1248 D, 900-Pound
No. 1548 D, 1500-Pound



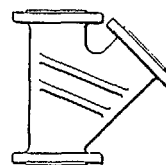
Crosses

Straight

- No. 537 D, 150-Pound
No. 413 D, 300-Pound
No. 613 D, 400-Pound
No. 849 D, 600-Pound
No. 1249 D, 900-Pound
No. 1549 D, 1500-Pound

Reducing

- No. 539 D, 150-Pound
No. 415 D, 300-Pound
No. 615 D, 400-Pound
No. 850 D, 600-Pound
No. 1250 D, 900-Pound
No. 1550 D, 1500-Pound



45° Laterals

Straight

- No. 541 D, 150-Pound
No. 417 D, 300-Pound
No. 617 D, 400-Pound
No. 851 D, 600-Pound
No. 1251 D, 900-Pound
No. 1551 D, 1500-Pound

Reducing

- No. 543 D, 150-Pound
No. 419 D, 300-Pound
No. 619 D, 400-Pound
No. 852 D, 600-Pound
No. 1252 D, 900-Pound
No. 1552 D, 1500-Pound

†Eccentric reducers are made to order only; prices on application.

Cast Steel Flanged Fittings

Drilling: Fittings are furnished with end flanges faced, drilled, and spot faced, unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made if fittings are ordered faced only.

Flange facing and finish: The 150 and 300-Pound Fittings are regularly furnished with an American Standard $\frac{1}{16}$ -inch raised face on the end flanges; the 400, 600, 900, 1500, and 2500 Pound Fittings regularly have a $\frac{1}{4}$ -inch male face (large male).

When so ordered, other facings can be furnished, such as ring joint, female, etc.; see the Crane Discount Sheet for prices.

Raised and male faces are furnished

with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish (recommended when a metallic gasket is used) can be furnished, when specified; see the Crane Discount Sheet for prices.

List prices of reducing fittings: Prices of Reducing Tees, Crosses, and 45° Laterals shown in the tables apply to any reduction.

The list prices of 90° Reducing Elbows and of Taper Reducers apply only to the reductions shown in the table at the right; other reductions or other reducing sizes are made to order, prices on application.

Reducing fitting prices are governed by the size of the largest opening.

Sizes of Reducing Elbows and Taper Reducers Available

Size	Pressure Class	
2 x 1½		
2½ x 2		
3 x 2½		
3 x 2		
3½ x 3		
4 x 3		
4 x 2½		
4 x 2		
5 x 4		
5 x 3		
6 x 5		
6 x 4		
6 x 3		
8 x 6		
8 x 5		
8 x 4		
10 x 8		
10 x 6		
12 x 10		
12 x 8		

†Does not include 3½ x 3".

27

For catalog numbers, description, etc., see page 345.

For Galvanized Fittings, see page 572.

List Prices—150, 300, and 400-Pound Fittings (F.D. & S.F.), Each

Class	Size Inches	Elbows			90° Base Elbows		Tees		Crosses or 45° Laterals		Taper Reducers (See sizes above)	Return Bends	
		90° or 45°	90° Reduc- ing (See sizes above)	90° Long Radius	Price with Base Faced Only	Extra to Drill & Spot Face Base	Straight	Reduc- ing (Any reduc- tion)	Straight	Reduc- ing (Any reduc- tion)		Size by Center to Center Inches	†150 Pound
†150 or 300 Pound	1	10.00					15.00		20.00			2 x 7	18.25
	1¼	11.00					16.00	18.00	21.00	23.50		3 x 7½	23.00
	1½	12.00					17.00	19.00	23.00	26.00		3 x 8	23.75
	2	13.00	16.00	17.00			18.00	20.25	25.00	28.25	13.00	3 x 9	24.50
	2½	15.00	18.00	19.00			20.00	22.50	29.00	33.00	15.00	4 x 9	31.00
	*3	17.00	20.00	22.00			23.00	26.00	33.00	37.00	17.00	4 x 10	32.50
	3½	20.00	24.00	26.00			26.00	29.50	38.00	43.00	20.00	4 x 11	33.75
	4	22.00	26.00	29.00	32.00	3.00	29.00	33.00	42.00	47.50	22.00	4 x 12	35.00
	5	27.00	32.00	39.00	41.00	3.00	37.00	42.00	51.00	58.00	27.00	4 x 13	36.25
	6	33.00	39.00	48.00	50.00	3.00	46.00	52.00	63.00	71.50	33.00	4 x 14	37.50
	8	48.00	56.00	70.00	70.00	6.00	65.00	74.00	91.00	103.00	48.00	4 x 18	44.00
	10	67.00	79.00	92.00	97.00	8.00	90.00	102.00	127.00	144.00	67.00	6 x 12	51.50
	12	84.00	100.00	115.00	120.00	10.00	110.00	125.00	160.00	182.00	84.00	6 x 15	57.50
	14	108.00		157.00	160.00	12.00	147.00	168.00	205.00	234.00			†300 Pound
†400 Pound For smaller sizes, use 600 Pound.	16	140.00		205.00	205.00	15.00	190.00	217.00	265.00	302.00		2 x 7½	18.75
	18	180.00		270.00	270.00	15.00	245.00	280.00	340.00	388.00		3 x 8½	24.00
	20	225.00		350.00	350.00	15.00	320.00	365.00	430.00	490.00		3 x 12	26.50
	24	355.00		545.00	550.00	15.00	490.00	560.00	675.00	770.00		4 x 10	32.50
	4	31.00	37.00		44.75	4.00	45.50	51.50	63.00	71.50	31.00	4 x 11	33.75
	5	40.00	47.00		59.50	4.00	57.00	65.00	79.00	90.00	40.00	4 x 11½	34.50
	6	48.00	57.00		71.50	4.00	68.00	77.00	94.00	107.00	48.00	4 x 12	35.00
	8	72.00	85.00		104.00	8.00	101.00	115.00	141.00	160.00	72.00	4 x 16½	41.75
	10	100.00	120.00		142.00	10.75	141.00	160.00	196.00	223.00	100.00	4 x 17	42.50
	12	133.00	160.00		187.00	13.25	187.00	213.00	260.00	296.00	133.00	4 x 17½	43.25
	14	175.00			249.00	16.00	247.00	281.00	344.00	392.00		4 x 18	44.00
	16	230.00			326.00	20.00	324.00	369.00	452.00	515.00		6 x 14	56.00
	18	290.00			410.00	20.00	409.00	466.00	570.00	650.00		6 x 15	57.50
	20	370.00			525.00	20.00	521.00	594.00	728.00	830.00		6 x 16½	61.00
	24	565.00			800.00	20.00	795.00	908.00	1110.00	1268.00		6 x 17	62.00

*When 3" 300-Pound Flanged Fittings with ring joint facing are to be bolted to Cranelap Joints, orders must specify. A groove of special pitch diameter is required; see page 562 for dimensions.
†150-Pound Fittings are Carbon Steel; 300 and 400-Pound are No. 4 Carbon-Molybdenum Steel.

6 x 18 64.00
8 x 17½ 90.00

Cast Steel Flanged Fittings

List Prices, Continued—600, 900, and 1500-Pound Fittings (F.D. & S.F.), Each

Class	Size Inches	Elbows		90° Base Elbows		Tees		Crosses or 45° Laterals		Taper Reducers (See p. 346 for sizes)
		90° or 45°	90° Reducing (See p. 346 for sizes)	Price with Base Faced Only	Extra to Drill & Spot Face Base	Straight	Reducing (Any reduc- tion)	Straight	Reducing (Any reduc- tion)	
†600 Pound	1/2	12.00				17.50		24.50		
	3/4	13.00				19.00	21.50	26.50	30.00	
	1	14.50				21.50	24.50	30.00	34.00	
	1 1/4	15.50				23.00	26.00	31.50	35.50	
	1 1/2	17.00				25.00	28.50	34.50	39.00	
	2	19.00	23.00			28.00	31.50	39.00	44.00	19.00
	2 1/2	22.00	26.50			32.50	36.50	45.00	51.00	22.00
	*3	25.00	30.00			37.00	41.75	51.00	58.00	25.00
	3 1/2	29.00	35.00			43.00	48.50	60.00	68.00	29.00
	4	34.00	41.00	50.00	4.80	51.00	58.00	71.00	80.50	34.00
	5	47.75	57.50	72.75	4.80	72.25	82.25	100.50	114.50	47.75
	6	61.00	73.50	93.00	4.80	91.00	104.00	126.00	143.00	61.00
	8	89.00	107.00	132.00	9.50	135.50	154.50	188.00	214.00	89.00
	10	140.00	168.00	197.00	13.00	209.00	238.00	292.00	333.00	140.00
	12	182.00	218.00	254.00	16.00	276.00	315.00	385.00	439.00	182.00
	14	231.00		316.00	19.00	346.00	395.00	482.00	550.00	
	16	325.00		445.00	24.00	485.00	554.00	675.00	771.00	
†900 Pound For smaller sizes, use 1500 Pound.	18	406.00		Prices on Application		572.00	652.00	798.00	910.00	
	20	518.00				729.00	831.00	1019.00	1162.00	
	24	791.00				1113.00	1271.00	1554.00	1775.00	
	3	35.75				56.50	64.00	78.50	89.00	
	3 1/2	44.25				70.50	80.00	97.50	111.00	
	4	54.00	65.00	81.00	6.00	84.50	96.00	117.00	133.00	54.00
	5	77.50	93.00	116.50	6.00	122.00	139.00	168.00	191.00	77.50
	6	100.00	120.00	150.00	6.00	155.00	176.00	215.00	244.00	100.00
	8	177.00	213.00	262.00	12.00	276.00	314.00	381.00	434.00	177.00
	10	263.00	316.00	373.00	16.00	415.00	472.00	574.00	654.00	263.00
†1500 Pound	12	360.00	432.00	505.00	20.00	565.00	643.00	785.00	894.00	360.00
	14	450.00		620.00	24.00	705.00	802.00	975.00	1110.00	
	16	585.00		800.00	30.00	918.00	1043.00	1270.00	1445.00	
	18	730.00		Prices on Application		1029.00	1173.00	1436.00	1638.00	
	20	932.00				1312.00	1495.00	1834.00	2091.00	
	24	1423.00				2000.00	2287.00	2797.00	3195.00	
	1/2	14.00				20.50		27.50		
	3/4	15.00				22.50	25.50	29.50	33.50	
	1	16.50				25.25	29.00	33.50	38.00	
	1 1/4	18.00				27.75	31.50	38.50	44.00	
	1 1/2	20.25				31.00	35.00	43.00	49.00	
	2	24.00	29.00			37.00	42.00	51.00	58.00	24.00
	2 1/2	29.25	35.00			46.00	52.00	63.50	72.00	29.25
	3	44.75	54.00			71.00	81.00	98.00	110.00	44.75
	3 1/2	55.25				88.00	100.00	122.00	140.00	
	4	67.50	81.00	101.00	7.50	105.50	120.00	146.00	165.00	67.50
	5	97.00	117.00	145.00	7.50	154.00	175.00	210.00	240.00	97.00
	6	125.00	150.00	188.00	7.50	194.00	220.00	269.00	305.00	125.00
	8	221.00	265.00	328.00	15.00	345.00	395.00	476.00	540.00	221.00
	10	329.00		467.00	20.00	519.00	590.00	717.00	820.00	
	12	450.00		631.00	25.00	707.00	805.00	981.00	1120.00	
	14	565.00		780.00	30.00	890.00	1010.00	1230.00	1400.00	

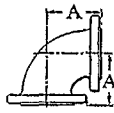
Prices of 2500-Pound Flanged Fittings are furnished on application.

*When 3-inch 600-Pound flanged fittings with ring joint facing are to be bolted to Cranelap Joints, orders must so specify. A groove of special pitch diameter is required; see page 562 for dimensions.

†These fittings are No. 4 Carbon-Molybdenum Steel; No. 2 Nickel-Chrome Steel furnished when ordered; see page 345.

Cast Steel Flanged Fittings

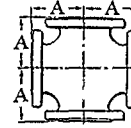
Dimensions, in Inches



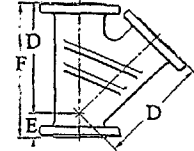
90° Elbow



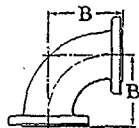
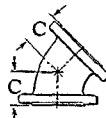
Tee



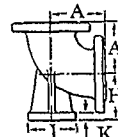
Cross



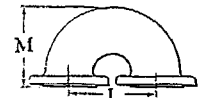
45° Lateral

90° Long
Radius Elbow

45° Elbow



90° Base Elbow

Taper
Reducer

Return Bend

Class	Size	A	B	C	D	E	F	G	H	J	K
150 Pound	1	3 1/2	5	1 3/4	5 3/4	1 3/4	7 1/2				
	1 1/4	3 3/4	5 1/2	2	6 1/4	1 3/4	8				
	1 1/2	4	6	2 1/4	7	2	9				
	2	4 1/2	6 1/2	2 1/2	8	2 1/2	10 1/2	5	4 1/8	4 5/8	1 1/2
	2 1/2	5	7	3	9 1/2	2 1/2	12	5 1/2	4 1/2	4 5/8	1 1/2
	3	5 1/2	7 3/4	3	10	3	13	6	4 7/8	5	9/16
	3 1/2	6	8 1/2	3 1/2	11 1/2	3	14 1/2	6 1/2	5 1/4	5	9/16
	4	6 1/2	9	4	12	3	15	7	5 1/2	6	5/8
	5	7 1/2	10 1/4	4 1/2	13 1/2	3 1/2	17	8	6 1/4	7	11/16
	6	8	11 1/2	5	14 1/2	3 1/2	18	9	7	7	11/16
	8	9	14	5 1/2	17 1/2	4 1/2	22	11	8 3/8	9	15/16
	10	11	16 1/2	6 1/2	20 1/2	5	25 1/2	12	9 3/4	9	15/16
	12	12	19	7 1/2	24 1/2	5 1/2	30	14	11 1/4	11	1
	14	14	21 1/2	7 1/2	27	6	33	16	12 1/2	11	1
	16	15	24	8	30	6 1/2	36 1/2	18	13 3/4	11	1
	18	16 1/2	26 1/2	8 1/2	32	7	39	19	15	13 1/2	1 1/8
	20	18	29	9 1/2	35	8	43	20	16	13 1/2	1 1/8
	24	22	34	11	40 1/2	9	49 1/2	24	18 1/2	13 1/2	1 1/8
300 Pound	1	4	5	2 1/4	6 1/2	2	8 1/2	4 1/2			
	1 1/4	4 1/4	5 1/2	2 1/2	7 1/4	2 1/4	9 1/2	4 1/2			
	1 1/2	4 1/2	6	2 3/4	8 1/2	2 1/2	11	4 1/2			
	2	5	6 1/2	3	9	2 1/2	11 1/2	5	4 1/2	5 1/4	3/4
	2 1/2	5 1/2	7	3 1/2	10 1/2	2 1/2	13	5 1/2	4 3/4	5 1/4	3/4
	3	6	7 3/4	3 1/2	11	3	14	6	5 1/4	6 1/8	13/16
	3 1/2	6 1/2	8 1/2	4	12 1/2	3	15 1/2	6 1/2	5 5/8	6 1/8	13/16
	4	7	9	4 1/2	13 1/2	3	16 1/2	7	6	6 1/2	7/8
	5	8	10 1/4	5	15	3 1/2	18 1/2	8	6 3/4	7 1/2	1
	6	8 1/2	11 1/2	5 1/2	17 1/2	4	21 1/2	9	7 1/2	7 1/2	1
	8	10	14	6	20 1/2	5	25 1/2	11	9	10	1 1/4
	10	11 1/2	16 1/2	7	24	5 1/2	29 1/2	12	10 1/2	10	1 1/4
	12	13	19	8	27 1/2	6	33 1/2	14	12	12 1/2	1 7/16
	14	15	21 1/2	8 1/2	31	6 1/2	37 1/2	16	13 1/2	12 1/2	1 7/16
	16	16 1/2	24	9 1/2	34 1/2	7 1/2	42	18	14 3/4	12 1/2	1 7/16
	18	18	26 1/2	10	37 1/2	8	45 1/2	19	16 1/4	15	1 5/8
	20	19 1/2	29	10 1/2	40 1/2	8 1/2	49	20	17 7/8	15	1 5/8
	24	22 1/2	34	12	47 1/2	10	57 1/2	24	20 3/4	17 1/2	1 5/8

Size	L	M
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150-Pound
Return Bends

2	7	6
3	7 1/2	7
3	8	7 1/4
3	9	7 3/4
4	9	8 5/8
4	10	9 1/8
4	11	9 5/8
4	12	10 1/8
4	13	10 5/8
4	14	11 1/8
4	18	13 1/8
6	12	11 1/4
6	15	12 3/4

300-Pound
Return Bends

2	7 1/2	6 5/8
3	8 1/2	8
3	12	9 3/4
4	10	9 5/8
4	11	10 1/8
4	11 1/2	10 3/8
4	12	10 5/8
4	16 1/2	12 7/8
4	17	13 1/8
4	17 1/2	13 3/8
4	18	13 5/8
6	14	13
6	15	13 1/2
6	16 1/2	14 1/4
6	17	14 1/2
6	18	15
8	17 1/2	16

Dimensions, in Inches (Cont.)

Class	Size	A	C	D	E	F	G	H	J	K	Class	Size	A	C	D	E	F	G
400 Pound	4	8	5½	16	4½	20½	8¼	6	6½	7½	2500 Pound	½	5¾					
	5	9	6	16¾	5	21¾	9¼	6¾	7½	1		¾	5¾					
	6	9¾	6¼	18¾	5¼	24	10	7½	7½	1		1	6¼	4				
	8	11¾	6¾	22¼	5¾	28	12	9	10	1¼		1¼	6¾	4¼				
	10	13¼	7¾	25¾	6¼	32	13½	10½	10	1¼		1½	7¾	4¾				
	12	15	8¾	29¾	6½	36¼	15¼	12	12½	1¼		2	8¾	5¾	15¼	5¼	20½	9½
	14	16¼	9¼	32¾	7	39¾	16½	13½	12½	1¼		2½	10	6¼	17¼	5¾	23	10½
	16	17¾	10¼	36¼	8	44¼	18½	14¾	12½	1¼		3	11¾	7¼	19¾	6¾	26½	11¾
	18	19¼	10¾	39¼	8½	47¾	19½	16¼	15	1½		4	13¼	8½	23	7¾	30¾	13½
	20	20¾	11¼	42¾	9	51¾	21	17¾	15	1½		5	15¾	10	27¼	9¼	36½	15¾
	24	24¼	12¾	50¼	10½	60¾	24½	20¾	17½	1½		6	18	11½	31¼	10½	41¾	18
												8	20½	12¾	35¼	11¾	47	20½
600 Pound	½	3¼	2	5¾	1¾	7½	5				1500 Pound	10	25	16	43¼	14¾	58	25½
	¾	3¾	2½	6¾	2	8¾	5					12	28	17¾	49¼	16¼	65½	29
	1	4¼	2½	7¼	2¼	9½	5											
	1¼	4½	2¾	8	2½	10½	5											
	1½	4¾	3	9	2¾	11¾	5											
	2	5¾	4¼	10¼	3½	13¾	6	4¾	6½	13¼								
	2½	6½	4½	11½	3½	15	6¾	5¼	6½	13¼								
	3	7	5	12¾	4	16¾	7¼	5¾	6½	7½								
	3½	7½	5½	14	4½	18½	7¾	6½	6½	7½								
	4	8½	6	16½	4½	21	8¾	7	7½	1								
	5	10	7	19½	6	25½	10¼	8¼	10	1¼								
	6	11	7½	21	6½	27½	11¼	9	10	1¼								
900 Pound	8	13	8½	24½	7	31½	13¼	11	12½	1¼								
	10	15½	9½	29½	8	37½	15¾	12½	12½	1¼								
	12	16½	10	31½	8½	40	16¾	13¼	15	1½								
	14	17½	10¾	34¼	9	43¼	17¾	14¾	15	1½								
	16	19½	11¾	38½	10	48½	19¾	16	15	1½								
	18	21½	12¼	42	10½	52½	21¾											
	20	23½	13	45½	11	56½	23¾											
	24	27½	14¾	53	13	66	27¾											
	3	7½	5½	14½	4½	19	7¾	5¾	6½	7½								
	3½	8½	6	16½	4½	21	8¾											
	4	9	6½	17½	5½	23	9¼	7	7½	1								
	5	11	7½	21	6½	27½	11¼	8¼	10	1¼								
1500 Pound	6	12	8	22½	6½	29	12¼	9	10	1¼								
	8	14½	9	27½	7½	35	14¾	11	12½	1¼								
	10	16½	10	31½	8½	40	16¾	12½	12½	1¼								
	12	19	11	34½	9	43½	17¾	13¼	15	1½								
	14	20¼	11½	36½	9½	46	19	14¾	15	1½								
	16	22¼	12½	40¾	10½	51¼	21	16	15	1½								
	18	24	13¼	45½	12	57½	24½											
	20	26	14½	50¼	13	63¼	26½											
	24	30½	18	60	15½	75½	30½											
	½	4¼	3															
	¾	4½	3¼															
	1	5	3½	9	2½	11½	5											
	1¼	5½	4	10	3	13	5¾											
	1½	6	4¼	11	3½	14½	6¼											
	2	7¼	4¾	13¼	4	17¼	7¼	5½	6½	7½								
	2½	8¼	5¼	15¼	4½	19¾	8¼	6	6½	7½								
	3	9¼	5¾	17¼	5	22¼	9¼	6½	7½	1								
	3½	9¾	6¼	18¼	5½	23¾	9¾											
	4	10¾	7¼	19¼	6	25¼	10¾	7¾	10	1¼								
	5	13¼	8¾	23¼	7½	30¾	13¾	9	10	1¼								
	6	13¾	9¾	24¾	8½	33	14½	9¾	12½	1¼								
	8	16¾	10¾	29¾	9½	39	17	11½	12½	1¼								
	10	19½	12	36	10¼	46¼	20¼	13¾	15	1½								
	12	22¼	13¼	40¾	12	52¾	23	15½	15	1½								
	14	24¾	14¼	44	12½	56½	25¾	17¼	17½	1½								
	16	27¼	16¼	48¼	14¾	63	28¼	18¾	17½	1½								
	18	30¼	17¾	53¼	16½	69¾	31½											
	20	32¾	18¾	57¾	17¾	75½	34											
	24	38¼	20¾	67¼	20½	87¾	39¾											

Center to Face

The 150 and 300-Pound Fittings are regularly furnished with an American Standard ½-inch raised face on the end flanges; the 400, 600, 900, 1500, and 2500-Pound Fittings regularly have a ¼-inch high large male facing. Center to face and face to face dimensions include the facing.

Special Angle Elbows

The center to face dimensions of 45° elbows are used for special angle elbows of 1° to 45°; for angles greater than 45° and up to 90°, use the center to face dimensions of 90° elbows.

Reducing Fittings

Center to face dimensions of reducing fittings correspond to those of straight fittings of the same size as the largest opening.

American Standard

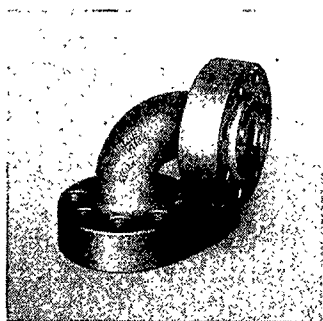
Crane Cast Steel Flanged Fittings conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1039, for their respective working pressures.

The American Standard does not include Return Bends, 3½-inch fittings in the 900 and 1500-Pound pressure classes, or ½ and ¾-inch 45° Laterals in the 1500-Pound pressure class.

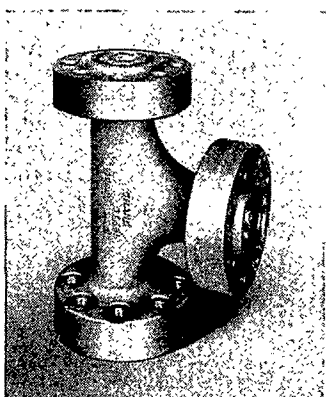
List prices.....pages 346 and 347
Description.....page 345
Drilling templates.....pages 553 to 555
Flange dimensions.....pages 553 to 555
Special facings.....pages 560 to 563

4000-Pound Pressure Class

27



90° Elbow



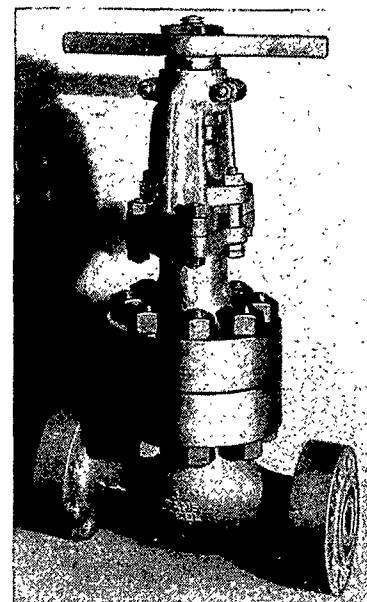
Tee

For pressures and temperatures beyond the scope of the 1500 and 2500-Pound Pressure Classes, Crane Co. is equipped to supply valves, fittings, and flanges in the 4000-Pound Pressure Class.

These products are generally made of Crane No. 5 Chrome-Molybdenum Alloy Cast Steel, and finished with ring joint facing. When so desired, they can be supplied in other alloys, such as Crane No. 4 Carbon-Molybdenum Alloy Cast Steel, or furnished with other types of facings.

Inquiries should be accompanied by complete specifications including operating pressures and temperatures, and plans of proposed installation.

Prices, description, dimensions, and complete information furnished on application.



Globe Valve

The illustrations on this page are actual photographs of Crane Valves and Fittings with flanged ends and ring joint facing supplied for a 4000-Pound installation. They are made of Crane No. 5 Chrome-Molybdenum Alloy Cast Steel, and are recommended for operating service at 4000 pounds pressure at 900° F. temperature.



Group of Fittings for 4000-Pound Pressure Class

Steel Welding Fittings

Socket-Welding Fittings

Description.....pages 352 and 353
 List Prices.....page 353
 Dimensions.....page 353
 Pressure-Temperature Ratings.....page 353

Butt-Welding Fittings

Description.....pages 354 to 356
 List Prices.....pages 354 to 356
 Dimensions.....page 357
 Pressure-Temperature Ratings.....pages 358 and 359

The Crane line of Steel Welding Fittings — comprising two types, socket-welding and butt-welding, — includes all of the popular kinds of fittings in a wide range of sizes, and in both Standard and Extra Strong weights. The uniformly superior quality distinguishing all Crane products has been maintained.

Wherever the user of welding fittings demands easy installation — wherever maintenance costs are carefully considered — wherever quality, completeness, and adaptability are of prime importance — Crane Steel Welding Fittings are chosen.

Socket-Welding Fittings: Crane Forged Steel Socket-Welding Fittings (see pages 352 and 353), introduced only a little more than two years ago, have been enthusiastically received. Designed especially for welding, they are easy and economical to use. They are ideal when welding fittings are wanted for use in small pipe lines.

These fittings are of high quality throughout; they are forged solid from high grade steel or are machined from hot rolled bar stock, depending upon the type of fitting; openings are drilled and the ends are bored to slip over pipe.

An extensive series of tests have proved their strength and ruggedness. They are stronger than Grade A Seamless Steel Pipe and as strong as or stronger than Grade B. Where codes permit the use of Grade B Pipe for pressures and temperatures higher than those shown in the table on page 353, fittings of a corresponding size and weight may also be used with equal safety. Carbon steel fittings are for use with carbon steel pipe, and carbon-molybdenum steel fittings, with carbon-molybdenum steel pipe.

Butt-Welding Fittings: Butt-Welding Fittings (see pages 354 to 357), recommended for general all-around welding service, are designed to combine serviceability with ease of installation; the use of these fittings reduces the welder's task to its simplest form — that of making circumferential butt-welds. The materials from which the fittings are made are especially selected to assure strength, resistance to piping strains and temperature, and easy weldability.

Crane Steel Butt-Welding Fittings are fully as strong as or stronger than Grade A Seamless Steel Pipe of corresponding thickness. They can be used for any pressure or temperature for which the pipe is used, with equal safety; see pages 358 and 359. The fittings have a uniform circular section of full diameter, uniform center to end dimensions, and accurately beveled, true, round ends.

Other welding end products: Crane Co. manufactures a complete welding line — not the fittings only! Real advantages accrue to the user by being able to secure welding valves and other accessories for welded piping, as well as fittings and flanges, from one reliable source — and all of the highest quality. A uniformly satisfactory installation is within reach when Crane welding materials are used.

Forged Steel Flanges — Welding Neck, Slip-On Welding, and Cranelap (for use with Cranelap Welding Nipples) — are available in a full range of sizes in all pressure classes; see pages 361 to 367. Steel Gate, Globe, Angle, and Check Valves with welding ends also are available in a complete range of sizes and in all pressure classes; see pages 297 to 336.

In addition, Crane Fabricating Shops are unusually well equipped, as explained on page 600, to supply pre-fabricated piping, assembled in units for final erection with a minimum of field effort.

Wrought iron fittings: Butt-welding elbows, reducers, and shaped nipples made of wrought iron can be supplied when desired; prices on application.

American Standard: Crane Steel Butt-Welding Fittings conform to the American Standard for Steel Butt-Welding Fittings, B16.9-1940. This Standard includes the following types and sizes of fittings:

90° Elbows, sizes 1 to 12-inch

45° Elbows, sizes 1 to 12-inch

Tees, sizes 1 to 12-inch — Center to end of run only for straight sizes and for reductions on outlet to one size less than half the run size.

Caps, sizes 1 to 24-inch

Reducers, sizes 12-inch and smaller — For reductions to one size less than half the run size.

Return Bends, in the following sizes:

1 x 3"	2 x 6"	3½ x 10½"	6 x 18"
1¼ x 3¾	2½ x 7½	4 x 12	8 x 24
1½ x 4½	3 x 9	5 x 15	10 x 30
			12 x 36

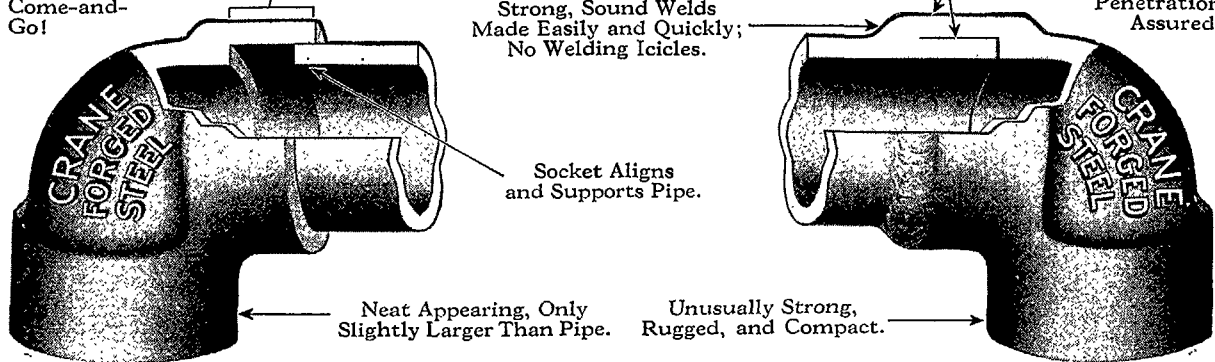
Lapped Joint Stub Ends (Cranelap Welding Nipples), sizes 1 to 24-inch.

Forged Steel Socket-Welding Fittings

Deep Socket Saves Time! Accurate Measuring and Cutting of Pipe Unnecessary. Ample Come-and-Go!

Strong, Sound Welds Made Easily and Quickly; No Welding Icicles.

Socket Wall Especially Proportioned to Pipe Thickness. Uniform Heat Distribution and Proper Penetration Assured.



On installations where the pipe need not butt against the shoulder, the deep socket compensates for inaccuracies in measuring and cutting the pipe.

On installations where the pipe must butt against the shoulder, free, uninterrupted flow is assured. The fitting and the pipe have the same inside diameter

Crane Forged Steel Socket-Welding Fittings, introduced only a short time ago, have been popularly received and are now rapidly becoming standard wherever small welded piping is desirable. Of a new and special design with many unusual features that make them easy and economical to use, the fittings are ideal for small size welded lines.

They are forged solid from high grade steel or are machined from hot rolled bar stock, depending upon the type of fitting; openings are drilled and the ends are bored to slip over pipe.

Advantages: The socket type weld has advantages over the butt weld that recommend it strongly for fittings for small size pipe lines. The pipe used with it does not require beveling. Since the pipe end slips into and is supported by, the socket, the joint is self-aligning; tack welding and special clamps to line up and hold the joint are unnecessary. Because the weld metal is deposited on the outer surface of the pipe, there is no danger of forming welding icicles which would clog the line and restrict flow.

Deep socket: Crane Forged Steel Socket-Welding Fittings have an exceptionally deep socket. This is

Size of Fitting	Depth of Socket
1/4"	7/16"
3/8"	9/16"
1/2"	5/8"
3/4"	11/16"
1"	3/4"
1 1/4"	13/16"
1 1/2"	7/8"
2"	1"

an outstanding feature of the Crane line; their design was carefully studied and developed to secure fittings that were especially suitable for welding. The depth of the socket is the same on each size, regardless of the type of fitting; see tabulation at left.

The unusual depth provides liberal come-and-go. On installations where the pipe need not butt against the shoulder at the back of the socket, it is unnecessary for the welder to cut the pipe to accurate length or even to cut it off square. The socket is deep enough to compensate for variations in pipe lengths, eliminating the need for careful measuring and cutting. This feature alone saves an appreciable

amount of the welder's time, speeds up installation, and thereby reduces costs.

In addition, the Crane socket assures a high salvage value. When Crane fittings are cut out of a line at the weld, they need not be discarded. Ample socket depth remains; the fittings are ready for further use.

Accurately proportioned socket wall: Another outstanding feature is the thickness of the socket wall. Especially proportioned, it bears the correct relationship to the pipe for assembly by welding; the fittings do not have an unnecessarily heavy band at the end of each opening, as is the case where socket type fittings are made from ordinary screwed fitting blanks. Strong, sound welds can be made more easily and in less time than when a heavy band requiring an excessive amount of weld metal is used. In addition, uniform heat distribution and proper heat penetration, recognized factors in good welding technique, are assured.

With the thinner socket wall, welders naturally tend to deposit the metal in the form of a 30-60° triangle, rather than the conventional 45°, a practice which is gaining wide acceptance as being productive of a superior weld.

Inside diameter same as pipe: 90° Elbows, 45° Elbows, and Tees have the same inside diameter as Standard or Extra Strong pipe, depending upon the weight of fitting ordered. On installations where the pipe is butted against the shoulder at the back of the socket, the fittings permit free, uninterrupted flow of the fluid in the line.

Durability: Crane Forged Steel Socket-Welding Fittings have been made compact and light in weight without sacrificing strength, ruggedness, or durability. The metal sections are ample throughout; the long, low band forming the socket wall extends beyond the shoulder at the back of the bore, leaving no weak corner. Exhaustive tests show conclusively that the fittings are as strong as or stronger than pipe. Being only slightly larger than pipe, the fittings, when welded in place, make an exceptionally neat appearing, workmanlike installation.

Forged Steel Socket-Welding Fittings



90° Elbow
No. 3120 D
Standard
No. 3140 D
Extra Strong



45° Elbow
No. 3121 D
Standard
No. 3141 D
Extra Strong



Tee
No. 3124 D
Standard
No. 3144 D
Extra Strong

Working pressures
are shown in table
at lower left.

For additional
description, see
pages 351 and 352.



Cap
No. 3127 D
Extra Strong



Coupling
No. 3128 D
Extra Strong



Reducer
No. 3129 D
Extra Strong

Caps, Couplings, and Reducers may be used
with either Standard or Extra Strong Pipe.

List Prices, Each (Carbon Steel)

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
90° Elbows	No. 3120 D, for use with Standard Pipe	.55	.55	.65	.75	.90	1.20	1.50	1.90
	No. 3140 D, for use with Extra Strong Pipe	.55	.55	.65	.75	.90	1.20	1.50	1.90
45° Elbows	No. 3121 D, for use with Standard Pipe	.68	.68	.78	.90	1.08	1.44	1.80	2.28
	No. 3141 D, for use with Extra Strong Pipe	.68	.68	.78	.90	1.08	1.44	1.80	2.28
Tees	No. 3124 D, for use with Standard Pipe	.80	.80	.95	1.10	1.35	1.75	2.30	2.90
	No. 3144 D, for use with Extra Strong Pipe	.80	.80	.95	1.10	1.35	1.75	2.30	2.90
Caps	No. 3127 D, for use with Standard or Extra Strong Pipe	.35	.35	.45	.65	.90	1.00	1.30	2.00
Couplings	No. 3128 D, for use with Standard or Extra Strong Pipe	.40	.40	.40	.45	.55	.70	.85	1.15
*Reducers	No. 3129 D, for use with Standard or Extra Strong Pipe	.55	.70	1.00	1.20	1.35	1.60	1.85	

*Reducers: The list prices of Reducers apply to one size reductions only. Reducers having a reduction of two or more sizes can be made to order; see the Crane Discount Sheet for prices.

Reducing Elbows and Tees: Socket Welding Reducing 90° Elbows, Reducing 45° Elbows, and Reducing Tees can be supplied when ordered. See the Crane Discount sheet for prices.

Construction: 90° Elbows, 45° Elbows, and Tees are forged solid. Caps, Couplings, and Reducers are machined from hot rolled bar stock.

All fittings have the ends bored to slip over steel pipe.

Standard Fittings are drilled to match the inside diameter of Standard pipe; Extra Strong Fittings, to match the inside diameter of Extra Strong pipe.

Material: The fittings are made from a high grade carbon steel, having unusual strength and toughness. It is particularly suitable for fusion welding.

Carbon-Molybdenum Steel: Fittings for higher pressures and temperatures are made to order of Crane No. 4 Carbon-Molybdenum Steel. This material has excellent strength retention at elevated temperatures and hardens only to a negligible degree after welding. For prices, see the Crane Discount Sheet.

WORKING PRESSURES

(For Steam, Water, Oil, Oil Vapor, Gas, or Air)

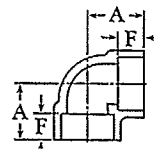
These fittings are stronger than Grade A Seamless Steel Pipe and at least as strong as Grade B. Where codes permit the use of Grade B Pipe for pressures and temperatures higher than those shown in the adjoining table, fittings of a corresponding size and weight may be used, with equal safety.

Carbon steel fittings should be used with carbon steel pipe, and carbon-molybdenum steel fittings, with carbon-molybdenum steel pipe.

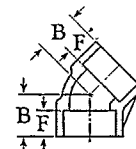
Pounds per Square Inch — Non-Shock				
Temp.	Crane Carbon Steel Fittings		No. 4 Carbon-Molybdenum Steel Fittings (Made to order)	
Deg. F.	Stand-ard	Extra Strong	Stand-ard	Extra Strong
100	2000	3000	2000	3000
150	1900	2850	1900	2850
200	1800	2700	1800	2700
250	1700	2550	1700	2550
300	1600	2400	1600	2400
350	1500	2250	1500	2250
400	1400	2100	1400	2100
450	1300	1950	1300	1950
500	1200	1800	1200	1800
550	1120	1680	1150	1725
600	1040	1560	1100	1650
650	960	1440	1050	1575
700	880	1320	1000	1500
750	800	1200	950	1425
800	740	1100	900	1350
850	670	1000	850	1275
900	600	900	800	1200
950	530	795	640	960
1000	380	570	540	810

DIMENSIONS, IN INCHES

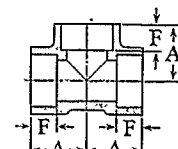
(For Standard and Extra Strong Fittings)



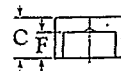
90° Elbow



45° Elbow



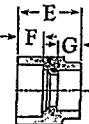
Tee



Cap



Coupling



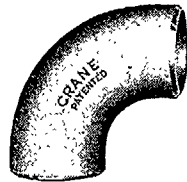
Reducer

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	13/16	31/32	1 1/8	1 5/16	1 1/2	1 3/4	2	2 3/8
B	1 1/16	1 3/16	7/8	1 1/8	1 5/16	1 7/16	1 11/16	
C	3/4	7/8	1	1 1/8	1 5/16	1 3/4	1 1/2	
D	1 3/8	1 5/8	1 3/4	1 7/8	2	2 1/8	2 1/4	2 3/4
E		1 3/8	1 1/2	1 5/8	1 3/4	2	2 1/8	2 1/4
F	7/16	9/16	5/8	1 1/16	3/4	1 1/16	7/8	1
G	Depth same as "F", depending on pipe size; e.g. 1/4" has socket 7/16" deep.							

Steel Butt-Welding Fittings

For use with Standard or Extra Strong Pipe

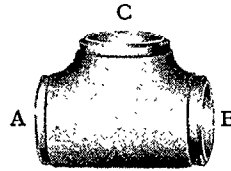
For pressure-temperature ratings, see pages 358 and 359.



90° Elbow
No. 352 E
Standard
No. 452 E
Extra Strong



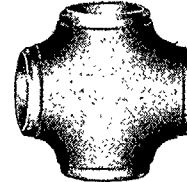
45° Elbow
No. 354 E
Standard
No. 454 E
Extra Strong



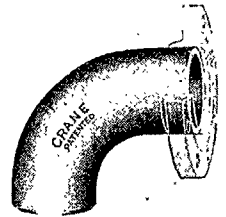
Tee
No. 353 E
Standard
No. 453 E
Extra Strong



Cap
No. 357 E
Standard
No. 457 E
Extra Strong



Cross
Made to order.
Prices
on
application.



90° Elbow
Long tangent
on one end
No. 458 E
Extra Strong

28

List Prices, Each

Size of pipe Inches	Standard					Extra Strong					
	No. 352 E 90° Elbows	No. 354 E 45° Elbows	No. 353 E, Tees Straight	*Reduc- ing	No. 357 E Caps	No. 452 E 90° Elbows	No. 454 E 45° Elbows	No. 453 E, Tees Straight	*Reduc- ing	No. 457 E Caps	No. 458 E 90° Elbows
3/4	1.00	1.08	2.15	2.70	1.70	1.50	1.35	2.15	2.70	2.10	Prices do not include flange
1	1.20	1.26	2.90	3.60	1.70	1.75	1.60	2.90	3.60	2.10	
1 1/4	1.40	1.53	3.65	4.55	1.70	2.15	1.95	3.65	4.55	2.10	
1 1/2	1.70										
2	2.10	1.90	5.00	6.25	1.85	2.65	2.40	5.00	6.25	2.25	4.65
2 1/2	3.40	3.05	7.30	9.10	2.00	4.25	3.80	7.30	9.10	2.50	7.45
3	4.90	4.40	9.50	11.85	2.40	6.15	5.55	12.00	15.00	3.30	10.80
3 1/2	6.35	5.70	12.50	15.60	3.20	7.95	7.15	16.00	20.00	4.25	14.00
4	7.65	6.90	13.00	16.25	3.70	9.55	8.60	17.00	21.25	4.90	16.70
5	10.85	9.80	24.00	30.00	4.90	13.55	12.20	30.00	37.50	5.85	23.70
6	15.80	14.25	28.00	35.00	5.95	19.75	17.80	35.00	43.75	7.50	34.50
8	30.00	27.00	45.00	56.25	10.10	37.50	33.75	58.00	72.50	12.20	65.50
10	53.40	48.00	76.00	95.00	14.60	67.00	60.50	97.00	120.00	18.50	117.00
12	80.70	72.75	110.00	137.50	20.85	101.00	91.00	135.00	168.00	25.00	177.00
14 OD	120.00	108.00	Made to order; prices on application.		24.00	150.00	135.00	Made to order; prices on application.		30.00	.....
16 OD	175.00	158.00			28.00	219.00	197.00			34.50	.....
18 OD	235.00	212.00			32.00	294.00	265.00			38.50	.....
20 OD	270.00	245.00			35.50	340.00	310.00			45.00	.....
24 OD	340.00	315.00			41.75	410.00	370.00†			49.00	.....

Thickness: Standard fittings in sizes 12-inch and smaller are made for use with Standard pipe (heaviest weight on 8, 10, and 12-inch sizes); and in sizes 14-inch and larger, for use with O.D. pipe 3/8-inch thick. Extra Strong fittings in sizes 12-inch and smaller are made for use with Extra Strong pipe; and in sizes 14-inch and larger, for use with O.D. pipe 1/2-inch thick.

90° Elbows with long tangent: No. 458 E 90° Elbows have a long tangent on one end to permit welding on a Slip-On Welding Flange; this end is not beveled. The other end is beveled.

Caps: No. 357 E and No. 457 E Caps do not conform to the A.S.M.E. Boiler Code. Caps which meet the requirements of this Code are made to order only; prices on application.

***Tees:** The list prices of Reducing Tees apply only to the list of sizes shown in the table at the right. Other reductions and sizes 14-inch O.D. and larger can be made to order; prices on application.

Reducing Tees are made reducing on the outlet only. When a reduction on the run is necessary, the use of

a Welding Reducer is recommended. For Welding Reducers, see page 355.

American Standard: These fittings, in the sizes and types included in the Standard, conform to the American Standard for Steel Butt-Welding Fittings, B16.9-1940; see page 351.

List of Sizes of Reducing Tees
Standard and Extra Strong

A	B	C	A	B	C	A	B	C	A	B	C
1	x 1	x 3/4	2 1/2	x 2 1/2	x 2	4	x 4	x 3 1/2	8	x 8	x 6
1	x 1	x 1/2	2 1/2	x 2 1/2	x 1 1/2	4	x 4	x 3	8	x 8	x 5
1 1/4	x 1 1/4	x 1	2 1/2	x 2 1/2	x 1 1/4	4	x 4	x 2 1/2	8	x 8	x 4
1 1/4	x 1 1/4	x 3/4	2 1/2	x 2 1/2	x 1	4	x 4	x 2	8	x 8	x 3 1/2
1 1/4	x 1 1/4	x 1/2	3	x 3	x 2 1/2	4	x 4	x 1 1/2	10	x 10	x 8
1 1/2	x 1 1/2	x 1 1/4	3	x 3	x 2	5	x 5	x 4	10	x 10	x 6
1 1/2	x 1 1/2	x 1	3	x 3	x 1 1/2	5	x 5	x 3 1/2	10	x 10	x 5
1 1/2	x 1 1/2	x 3/4	3	x 3	x 1 1/4	5	x 5	x 3	10	x 10	x 4
1 1/2	x 1 1/2	x 1/2	3 1/2	x 3 1/2	x 3	5	x 5	x 2 1/2	12	x 12	x 10
2	x 2	x 1 1/2	3 1/2	x 3 1/2	x 2 1/2	5	x 5	x 2	12	x 12	x 8
2	x 2	x 1 1/4	3 1/2	x 3 1/2	x 2	6	x 6	x 5	12	x 12	x 6
2	x 2	x 1	3 1/2	x 3 1/2	x 1 1/2	6	x 6	x 4	12	x 12	x 5
2	x 2	x 3/4				6	x 6	x 3 1/2			
						6	x 6	x 3			
						6	x 6	x 2 1/2			

General description . . . page 351

†Furnished only in short radius type.

Dimensions . . . page 357

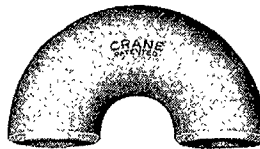
Steel Butt-Welding Fittings

For use with Standard or Extra Strong Pipe

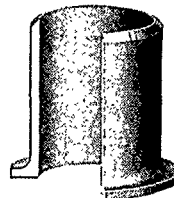
For pressure-temperature ratings, see pages 358 and 359.

Return Bends

Size, Inches		List Price, Each	
Size of pipe	Center to center	No. 355 E Standard	No. 455 E Extra Strong
1	3	2.65	3.30
1 1/4	2 1/2	2.80	3.50
1 1/4	3 3/4	3.10	3.85
1 1/2	3	3.40	4.30
1 1/2	4 1/2	3.75	4.75
2	4	4.20	5.30
2	6	4.65	5.85
2 1/2	7 1/2	7.50	9.35
3	6	9.80	12.30
3	9	10.80	13.55
3 1/2	10 1/2	14.00	17.60
4	8	15.30	19.00
4	12	17.00	21.00
5	15	23.90	29.70
6	18	34.80	43.50
8	24	66.00	82.50
10	30	117.50	147.40
12	36	177.50	222.20



Return Bend
No. 355 E, Standard
No. 455 E, Extra Strong

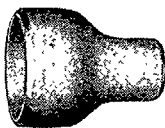


Cranelap Welding Nipple
No. 574, Standard
No. 497 E, Extra Strong

Cranelap Welding Nipples

Size of pipe		List Price, Each	
Size of pipe Inches	Length of nipple Inches	No. 574 Standard	No. 497 E Extra Strong
1	4	3.55	3.80
1 1/4	4	4.00	4.25
1 1/2	4	4.45	4.70
2	6	5.75	6.25
2 1/2	6	6.50	7.15
3	6	7.30	8.25
3 1/2	6	8.10	9.40
4	6	9.30	10.90
5	8	10.75	13.50
6	8	12.75	16.35
8	8	16.00	24.00
10	10	22.75	35.75
12	10	30.75	48.75
14 OD	12	53.00	72.00
16 OD	12	72.00	93.00
18 OD	12	92.00	114.00
20 OD	12	113.00	136.00
24 OD	12	138.00	162.00

Concentric and Eccentric Reducers



Concentric Reducer
No. 359 E Standard
No. 459 E Extra Strong



Eccentric Reducer
No. 360 E Standard
No. 460 E Extra Strong

Size of pipe			List Price, Ea.			Size of pipe			List Price, Ea.			Size of pipe			List Price, Ea.		
Inches	Concentric or Eccentric		Inches	Concentric or Eccentric		Inches	Concentric or Eccentric		Inches	Concentric or Eccentric		Inches	Concentric or Eccentric		Inches	Concentric or Eccentric	
	Stand-ard	Extra Strong		Stand-ard	Extra Strong		Stand-ard	Extra Strong		Stand-ard	Extra Strong		Stand-ard	Extra Strong		Stand-ard	Extra Strong
1 x 3/4	1.50	2.75	3 x 2 1/2	3.00	5.25	6 x 5	8.00	14.00	14 x 12	40.00	70.00	14 x 12	40.00	70.00	14 x 12	40.00	70.00
1 x 1/2	1.50	2.75	3 x 2	3.00	5.25	6 x 4	8.00	14.00	14 x 10	40.00	70.00	14 x 10	40.00	70.00	14 x 10	40.00	70.00
1 x 3/8	1.50	2.75	3 x 1 1/2	3.25	5.70	6 x 3 1/2	9.00	15.75	14 x 8	45.00	78.75	14 x 8	45.00	78.75	14 x 8	45.00	78.75
1 1/4 x 1	2.00	3.50	3 x 1 1/4	3.25	5.70	6 x 3	9.00	15.75	14 x 6	50.00	87.50	14 x 6	50.00	87.50	14 x 6	50.00	87.50
1 1/4 x 3/4	2.00	3.50	3 1/2 x 3	3.50	6.00	6 x 2 1/2	9.00	15.75	16 x 14	70.00	105.00	16 x 14	70.00	105.00	16 x 14	70.00	105.00
1 1/4 x 1/2	2.50	4.50	3 1/2 x 2 1/2	3.50	6.00	8 x 6	12.00	26.25	16 x 12	70.00	105.00	16 x 12	70.00	105.00	16 x 12	70.00	105.00
1 1/2 x 1 1/4	2.00	3.50	3 1/2 x 2	3.50	6.00	8 x 5	15.00	30.60	16 x 10	80.00	122.50	16 x 10	80.00	122.50	16 x 10	80.00	122.50
1 1/2 x 1	2.00	3.50	3 1/2 x 1 1/2	3.75	6.50	8 x 4	15.00	30.60	16 x 8	85.00	140.00	16 x 8	85.00	140.00	16 x 8	85.00	140.00
1 1/2 x 3/4	2.50	4.50	3 1/2 x 1 1/4	3.75	6.50	8 x 3 1/2	15.00	30.60	18 x 16	85.00	148.00	18 x 16	85.00	148.00	18 x 16	85.00	148.00
1 1/2 x 1/2	2.50	4.50	4 x 3 1/2	4.00	7.00	10 x 8	18.00	40.00	18 x 14	85.00	148.00	18 x 14	85.00	148.00	18 x 14	85.00	148.00
2 x 1 1/2	2.25	3.75	4 x 3	4.00	7.00	10 x 6	20.00	44.00	18 x 12	95.00	166.00	18 x 12	95.00	166.00	18 x 12	95.00	166.00
2 x 1 1/4	2.25	3.75	4 x 2 1/2	4.00	7.00	10 x 5	26.00	48.00	18 x 10	105.00	184.00	18 x 10	105.00	184.00	18 x 10	105.00	184.00
2 x 1	2.25	3.75	4 x 2	4.00	7.00	10 x 4	26.00	48.00	20 x 18	90.00	157.50	20 x 18	90.00	157.50	20 x 18	90.00	157.50
2 x 3/4	2.75	4.75	4 x 1 1/2	4.50	8.00	12 x 10	32.00	56.00	20 x 16	90.00	157.50	20 x 16	90.00	157.50	20 x 16	90.00	157.50
2 1/2 x 2	2.50	4.50	5 x 4	6.00	10.50	12 x 8	36.00	63.00	20 x 14	100.00	175.00	20 x 14	100.00	175.00	20 x 14	100.00	175.00
2 1/2 x 1 1/2	2.75	5.00	5 x 3 1/2	6.50	11.50	12 x 6	36.00	63.00	20 x 12	100.00	175.00	20 x 12	100.00	175.00	20 x 12	100.00	175.00
2 1/2 x 1 1/4	2.75	5.00	5 x 3	6.50	11.50	12 x 5	40.00	70.00	24 x 20	140.00	245.00	24 x 20	140.00	245.00	24 x 20	140.00	245.00
2 1/2 x 1	2.75	5.00	5 x 2 1/2	6.50	11.50				24 x 18	155.00	270.00	24 x 18	155.00	270.00	24 x 18	155.00	270.00
			5 x 2	6.50	11.50				24 x 16	170.00	295.00	24 x 16	170.00	295.00	24 x 16	170.00	295.00

Thickness: Standard fittings in sizes 12-inch and smaller are made for use with Standard pipe (heaviest weight on 8, 10, and 12-inch sizes); and in sizes 14-inch and larger, for use with O.D. pipe 3/8-inch thick. Extra Strong fittings in sizes 12-inch and smaller are made for use with Extra Strong pipe; and in sizes 14-inch and larger, for use with O.D. pipe 1/2-inch thick.

Cranelap Welding Nipples: Cranelap Welding Nipples, made of Grade "A" Seamless Steel pipe lapped to the full thickness of the pipe wall, and Cranelap Flanges (see pages 364 and 365) afford an

ideal method of installing flanged equipment in a welded line. The swivel flange eliminates the difficulty of aligning the bolt holes and permits installing the equipment at any angle. Cranelap Welding Nipples can be made to order of heavier pipe; prices on application.

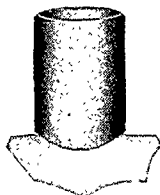
American Standard: These fittings conform to the American Standard for Steel Butt-Welding Fittings, B16.9-1940. The Standard does not include Reducers sizes 14-inch and larger, or Return Bends in the 1 1/4 x 2 1/2, 1 1/2 x 3, 2 x 4, 3 x 6, and 4 x 8-inch sizes; see page 351.

Steel Butt-Welding Fittings

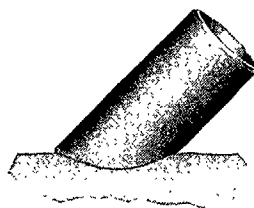
Shaped Welding Nipples

For use with Standard or Extra Strong Pipe

For pressure-temperature ratings, see pages 358 and 359.



Shaped Nipple
90° to Header
No. 350 E, Standard
No. 450 E, Extra Strong



Shaped Nipple
45° to Header
No. 351 E, Standard
No. 451 E, Extra Strong

When ordering, be sure to specify nominal size of header on which Nipple will be used.

List Prices

Size of pipe Inches	Shaped to fit headers (Nominal sizes)	90° to Header		45° to Header	
		No. 350 E Stand- ard Each	No. 450 E Extra Strong Each	No. 351 E Stand- ard Each	No. 451 E Extra Strong Each
1 1/4	1 1/4 to 16"	.70	.90	.80	.95
1 1/2	1 1/2 to 16	.80	1.05	.85	1.15
2	2 to 16	.95	1.25	1.05	1.40
2 1/2	2 1/2 to 16	1.20	1.70	1.35	1.95
3	3 to 20	1.50	2.25	1.80	2.65
3 1/2	3 1/2 to 20	1.85	2.50	2.30	3.10
4	4 to 24	2.20	2.75	2.75	3.50
5	5 to 24	3.70	5.00	4.70	6.40
6	6 to 24	4.50	6.75	6.00	9.00
8	8 to 24	7.50	11.50	10.25	15.50
10	10 to 24	12.00	18.50	17.00	26.00
12	12 to 24	15.75	23.50	23.00	35.00

Shaped Welding Nipples eliminate the use of templates when saddling one pipe upon another; they save time and assure an accurate fit. Both ends are beveled for welding.

Standard Nipples are made for use with Standard pipe (heaviest weight on 8, 10, and 12-inch sizes); and Extra Strong Nipples, for use with Extra Strong pipe.

Reinforcing Welding Saddles



Reinforcing Welding Saddle
No. 358 E

When ordering, be sure to specify nominal size of header on which Saddle will be used.

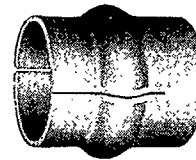
List Prices

Size of pipe (Outlet) Inches	Shaped to fit headers (Nominal sizes)	No. 358 E Reinforcing Welding Saddles Each
2	2 to 24"	4.90
2 1/2	2 1/2 to 24	5.35
3	3 to 24	5.85
3 1/2	3 1/2 to 24	6.80
4	4 to 24	7.80
5	5 to 24	10.75
6	6 to 24	13.65
8	8 to 24	21.50
10	10 to 24	27.25
12	12 to 24	31.00
14 OD	14 to 24	36.00
16 OD	16 to 24	43.00
18 OD	18 to 24	50.00
20 OD	20 to 24	58.00
24 OD	24	70.00

the tensile, bending, and shearing stresses to which it would otherwise be subjected.

General description . . . page 351

Welding Sleeves



Welding Sleeve
No. 361 E

The No. 361 E Welding Sleeves are ideally suited for reinforcing butt-welds in pipe lines. They relieve the weld of any bending stress and of much of the tensile stress to which it would otherwise be subjected, leaving it free to maintain tightness.

The Sleeves are made in two halves, the longitudinal seams being beveled so that they can be welded together easily. To assure a snug fit around the pipe, each half is made slightly less than a semicircle.

The large transverse recess at the center of each Welding Sleeve provides more than ample space for the conventional type of butt-weld, such as is ordinarily made between two lengths of pipe.

List Prices

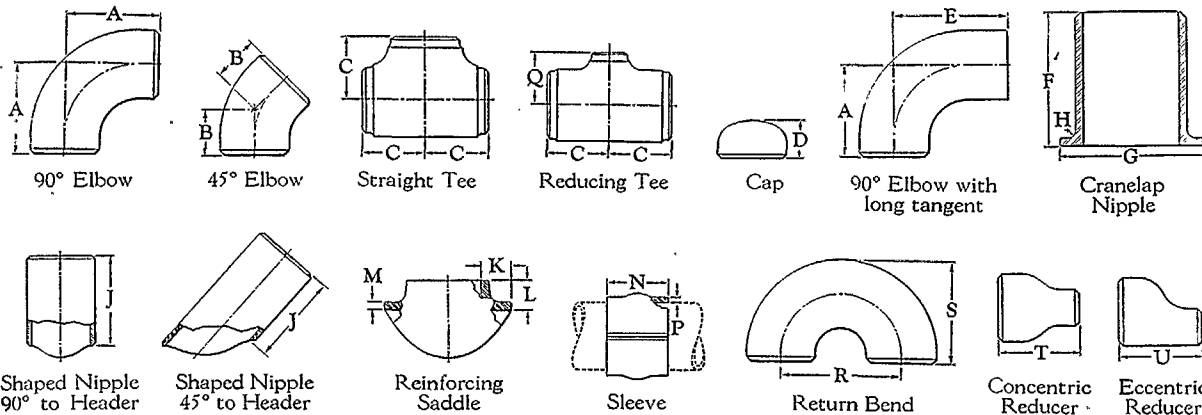
Size of pipe Inches	No. 361 E Welding Sleeves Each
2	4.00
2 1/2	4.60
3	5.00
3 1/2	5.50
4	6.20
5	7.25
6	8.30
8	11.40
10	15.75
12	20.40
14 OD	23.70
16 OD	28.60
18 OD	34.50
20 OD	41.50
24 OD	57.00

Dimensions . . . page 357

Steel Butt-Welding Fittings

Dimensions, in Inches

Standard and Extra Strong Fittings have the same outside dimensions.



28

Elbows, Straight Tees, Caps, Nipples, Saddles, and Sleeves

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P
3/4	1 1/8	...	...	...	...	...	...	...	...	...	...	...	...	...
1	1 1/2	7/8	1 1/2	1 1/2	...	4	2	1/8	...	...	...	...	...	...
1 1/4	1 7/8	1	1 7/8	1 1/2	...	4	2 1/2	3/16	...	...	...	...	...	...
1 1/2	2 1/4	1 1/8	2 1/4	1 1/2	...	4	2 7/8	1/4	6	...	...	...	...	...
2	3	1 5/8	2 1/2	1 1/2	4 1/4	6	3 5/8	5/16	6	1 3/4	1 1/4	1 1/2	3	1 1/4
2 1/2	3 3/4	1 3/4	3	1 1/2	5	6	4 1/8	5/16	6	1 3/4	1 1/2	1 1/2	3	1 1/4
3	4 1/2	2	3 3/8	2	5 3/4	6	5	3/8	6	2	1 3/4	1 1/2	3	1 1/4
3 1/2	5 1/4	2 1/4	3 3/4	2 1/2	6 3/4	6	5 1/2	3/8	6	2	1 3/4	1 1/2	3 1/2	3 3/8
4	6	2 1/2	4 1/8	2 1/2	7 1/2	6	6 3/16	7/16	6	2	2	1 1/2	4	3 3/8
5	7 1/2	3 1/8	4 7/8	3	9	8	7 5/16	7/16	8	2	2	1 1/2	5	3 3/8
6	9	3 3/4	5 5/8	3 1/2	10 3/4	8	8 1/2	1/2	8	2 1/2	2 1/4	1 1/2	6	3 3/8
8	12	5	7	4	13 3/4	8	10 5/8	1/2	8	3	3	5/8	8	1 1/2
10	15	6 1/4	8 1/2	5	17	10	12 3/4	1/2	10	3 1/2	3 1/2	5/8	10	1 1/2
12	18	7 1/2	10	6	20 1/2	10	15	1/2	10	4	4	5/8	12	1 1/2
14 OD	16	7 3/4	...	6 1/2	...	12	16 1/4	1/2	...	4	4	5/8	14	1 1/2
16 OD	18	8 1/2	...	7	...	12	18 1/2	1/2	...	4	4	5/8	16	1 1/2
18 OD	20	9 1/2	...	8	...	12	21	1/2	...	4	4	5/8	18	1 1/2
20 OD	25	...	...	9	...	12	23	1/2	...	5	5	5/8	20	1 1/2
24 OD	30	...	...	10 1/2	...	12	27 1/4	1/2	...	5	5	5/8	24	1 1/2

Return Bends

Size of pipe	R	S
1	3	2 3/16
1 1/4	2 1/2	2 5/16
1 1/2	3 3/4	2 3/4
2	3	2 11/16
2 1/2	4 1/2	3 1/4
3	5	3 7/16
3 1/2	6	4 3/16
4	7 1/2	5 3/16
5	8	6 1/2
6	9	7 1/4
8	10 1/2	8 1/2
10	12	10 5/16
12	14	12 5/16
14	16	14 5/16
16	18	16 5/16
18	20	18 5/16
20	24	20 3/8
24	30	24 3/8
30	36	24 3/8

Reducing Tees

Size	C	Q
1 x 1 x 3/4	1 1/2	1 1/2
1 x 1 x 1/2	1 1/2	1 1/2
1 1/4 x 1 1/4 x 1	1 7/8	1 7/8
1 1/4 x 1 1/4 x 3/4	1 7/8	1 7/8
1 1/4 x 1 1/4 x 1/2	1 7/8	1 7/8
1 1/2 x 1 1/2 x 1 1/4	2 1/4	2 1/4
1 1/2 x 1 1/2 x 1	2 1/4	2 1/4
1 1/2 x 1 1/2 x 3/4	2 1/4	2 1/4
1 1/2 x 1 1/2 x 1/2	2 1/4	2 1/4
2 x 2 x 1 1/2	2 1/2	2 3/8
2 x 2 x 1 1/4	2 1/2	2 1/4
2 x 2 x 1	2 1/2	2
2 x 2 x 3/4	2 1/2	1 3/4
2 1/2 x 2 1/2 x 2	3	2 3/4
2 1/2 x 2 1/2 x 1 1/2	3	2 5/8
2 1/2 x 2 1/2 x 1 1/4	3	2 1/2
2 1/2 x 2 1/2 x 1	3	2 1/4
3 x 3 x 2 1/2	3 3/8	3 1/4
3 x 3 x 2	3 3/8	3
3 x 3 x 1 1/2	3 3/8	2 7/8
3 x 3 x 1	3 3/8	2 3/4
3 1/2 x 3 1/2 x 3	3 3/4	3 5/8
3 1/2 x 3 1/2 x 2 1/2	3 3/4	3 1/2
3 1/2 x 3 1/2 x 2	3 3/4	3 1/4
3 1/2 x 3 1/2 x 1 1/2	3 3/4	3 3/8
4 x 4 x 3 1/2	4 1/8	4
4 x 4 x 3	4 1/8	3 7/8
4 x 4 x 2 1/2	4 1/8	3 3/4
4 x 4 x 2	4 1/8	3 1/2
4 x 4 x 1 1/2	4 1/8	3 3/8
5 x 5 x 4	4 7/8	4 5/8
5 x 5 x 3 1/2	4 7/8	4 1/2
5 x 5 x 3	4 7/8	4 3/8
5 x 5 x 2 1/2	4 7/8	4 1/4
5 x 5 x 2	4 7/8	4 1/8
6 x 6 x 5	5 5/8	5 3/8
6 x 6 x 4	5 5/8	5 1/8
6 x 6 x 3 1/2	5 5/8	5
6 x 6 x 3	5 5/8	4 7/8
6 x 6 x 2 1/2	5 5/8	4 3/4
8 x 8 x 6	7	6 5/8
8 x 8 x 5	7	6 3/8
8 x 8 x 4	7	6 1/8
8 x 8 x 3 1/2	7	6
10 x 10 x 8	8 1/2	8
10 x 10 x 6	8 1/2	7 5/8
10 x 10 x 5	8 1/2	7 1/2
10 x 10 x 4	8 1/2	7 1/4
12 x 12 x 10	10	9 1/2
12 x 12 x 8	10	9
12 x 12 x 6	10	8 5/8
12 x 12 x 5	10	8 1/2

Reducers

Size	T	U	Size	T	U	Size	T	U	Size	T
1 x 3/4	2	2	3 x 2 1/2	3 1/2	3 1/2	6 x 5	5 1/2	5 1/2	14 x 12	
1 x 1/2	2	2	3 x 2	3 1/2	3 1/2	6 x 4	5 1/2	5 1/2	14 x 10	
1 x 3/8	2	2	3 x 1 1/2	3 1/2	3 1/2	6 x 3 1/2	5 1/2	5 1/2	14 x 8	
1 1/4 x 1	2	2	3 x 1 1/4	3 1/2	3 1/2	6 x 3	5 1/2	5 1/2	14 x 6	
1 1/4 x 3/4	2	2	3 1/2 x 3	4	4	6 x 2 1/2	5 1/2	5 1/2	16 x 14	
1 1/4 x 1/2	2	2	3 1/2 x 2 1/2	4	4	8 x 6	6	6	16 x 12	
1 1/2 x 1 1/4	2 1/2	2 1/2	3 1/2 x 2	4	4	8 x 5	6	6	16 x 10	
1 1/2 x 1	2 1/2	2 1/2	3 1/2 x 1 1/2	4	4	8 x 4	6	6	16 x 8	
1 1/2 x 3/4	2 1/2	2 1/2	3 1/2 x 1 1/4	4	4	8 x 3 1/2	6	6	18 x 16	
1 1/2 x 1/2	2 1/2	2 1/2	4 x 3 1/2	5	5	10 x 8	7	7	18 x 14	
2 x 1 1/2	3	3	4 x 3	5	5	10 x 6	7	7	18 x 12	
2 x 1 1/4	3	3	4 x 2 1/2	5	5	10 x 5	7	7	18 x 10	
2 x 1	3	3	4 x 2	5	5	10 x 4	7	7	20 x 18	
2 x 3/4	3	3	4 x 1 1/2	5	5	12 x 10	8	8	20 x 16	
2 1/2 x 2	3 1/2	3 1/2	5 x 4	5	5	12 x 8	8	8	20 x 14	
2 1/2 x 1 1/2	3 1/2	3 1/2	5 x 3 1/2	5	5	12 x 6	8	8	20 x 12	
2 1/2 x 1 1/4	3 1/2	3 1/2	5 x 3	5	5	12 x 5	8	8	24 x 20	
2 1/2 x 1	3 1/2	3 1/2	5 x 2 1/2	5	5				24 x 18	
			5 x 2	5	5				24 x 16	

American Standard: These fittings, in the sizes and types included in the Standard, conform to the American Standard for Steel Butt-Welding Fittings, B16.9-1940; see page 351.

List prices pages 354, 355, and 356
 Dimensions of welding bevel page 647
 General description page 351

Steel Butt-Welding Fittings

Pressure-Temperature Ratings

Based on the Code for Pressure Piping

When computing the thickness of pipe for a given service condition, it is the generally accepted practice among designers to use the formulas provided by the Code for Pressure Piping, the A.S.M.E. Boiler Construction Code, or such other codes as may apply.

For the convenience of users, Crane engineers have calculated the working pressures shown on this and the opposite page. They apply to Grade A Seamless Steel Pipe used in accordance with Section 1 and Section 3 of the Code for Pressure Piping. See the explanation below.

Crane Steel Butt-Welding Fittings, made for use with Standard or Extra Strong Pipe, are as strong as or stronger than Grade A Seamless Steel Pipe. They can, therefore, be used for any pressure or temperature for which Grade A Pipe of corresponding thickness is suitable, with equal safety.

Note: The pressure ratings given in the following tables do not necessarily comply with the rules given in the A.S.M.E. Boiler Construction Code. Where ratings are to comply with these rules, the formulas given in the A.S.M.E. Code should be used.

Code for Pressure Piping: The Code for Pressure Piping, American Tentative Standard B31.1-1935, includes four sections devoted to piping systems: Section 1, Power; Section 2, Gas and Air; Section 3, Oil; and Section 4, District Heating. The tables shown here apply to Power Piping (Section 1) and to Oil Piping (Section 3), the latter being further limited to "Within Refinery Limits".

The formula used for calculating is as follows:

$$P = \frac{2S(t-C)}{D}$$

Where: P = maximum working pressure, psi (gauge)
 S = allowable stress in material, psi
 t = minimum pipe wall thickness, inches
 C = allowance for threading, mechanical strength, and for corrosion, inches
 D = outside diameter of pipe, inches

"S" Value: The stresses permitted by the Code for Grade A Seamless Steel Pipe, A.S.T.M. Specification A 106, are shown in the table at the right.

Wall thickness: The wall thicknesses correspond to those used in Crane Steel Butt-Welding Fittings. To establish the minimum thickness, "t", required

by the formula, the nominal thickness was reduced 12½% to compensate for the tolerance required by the pipe mills.

"C" Value: "C" value for plain end steel pipe is:

Power Piping — ¾ and 1-inch sizes 0.05"
 — 1¼-inch and larger 0.065"
 Oil Piping — All sizes 0.05"

"S" Values, Pounds per Square Inch

Temp. Fahr.	Power Piping	†Oil Piping	Temp. Fahr.	Power Piping	†Oil Piping
100°	13,050	17,400	600°	10,530	14,040
150°	12,800	17,070	650°	10,170	13,560
200°	12,550	16,740	700°	9,600	13,020
250°	12,300	16,410	750°	9,000	12,000
300°	12,050	16,080	800°	7,020	9,840
350°	11,800	15,750	850°	5,800	7,920
400°	11,550	15,420	900°		6,000
450°	11,300	15,080	950°		4,440
500°	11,050	14,740	1000°		3,000
550°	10,800	14,400			

†Apply to Oil Piping Within Refinery Limits.

Other ratings: A simplified method for calculating other ratings is explained on pages 635 to 637.

Standard Grade A Seamless Steel Pipe
For Power Piping, Section 1, Code for Pressure Piping

Size of Pipe	*Wall Thick- ness	Temperature — Degrees Fahrenheit															
		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850
		Working Pressures, Pounds per Square Inch															
¾"	.113"	1215	1190	1165	1145	1120	1095	1075	1050	1030	1005	980	945	890	835	655	540
1	.133	1305	1280	1255	1230	1205	1180	1155	1130	1105	1080	1055	1015	960	900	700	580
1¼	.140	900	885	865	850	830	815	795	780	760	745	725	700	660	620	485	400
1½	.145	850	830	815	800	785	765	750	735	720	700	685	660	625	585	455	375
2	.154	755	740	730	715	700	685	670	655	640	625	610	590	555	520	405	335
2½	.203	1020	995	980	960	940	920	900	880	860	840	820	795	750	700	550	450
3	.216	915	895	880	860	845	825	810	790	775	755	735	710	670	630	490	405
3½	.226	860	845	830	810	795	780	760	745	730	715	695	670	635	595	465	385
4	.237	820	805	790	775	760	745	730	710	695	680	665	640	605	565	440	365
5	.258	745	730	715	700	685	675	660	645	630	615	600	580	545	515	400	330
6	.280	695	690	680	665	650	635	625	610	595	585	570	550	520	485	380	315
8	.322	655	640	630	615	600	590	580	565	555	540	525	510	480	450	350	290
10	.365	615	600	590	580	565	555	545	530	520	510	495	480	450	425	330	275
12	.375	535	525	515	505	495	485	475	465	455	445	430	415	395	370	290	240
14 OD	.375	485	475	465	455	445	435	425	420	410	400	390	375	355	335	260	215
16 OD	.375	420	410	400	395	385	380	370	360	355	345	335	325	305	290	225	185
18 OD	.375	380	370	365	355	350	340	335	330	320	315	305	295	280	260	205	170
20 OD	.375	340	335	325	320	315	305	300	295	285	280	275	265	250	235	185	150
24 OD	.375	275	270	265	260	255	250	245	235	230	225	220	215	200	190	145	120

*These are the nominal wall thicknesses; they correspond to the thickness of Crane Steel Butt-Welding Fittings.

Pressure-Temperature Ratings Based on Code for Pressure Piping

**Extra Strong Grade A Seamless Steel Pipe
For Power Piping, Section 1, Code for Pressure Piping**

Size of Pipe	*Wall Thick- ness	Temperature — Degrees Fahrenheit															
		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850
		Working Pressures, Pounds per Square Inch															
1"	.179"	2115	2075	2035	1990	1950	1910	1870	1830	1790	1750	1705	1650	1555	1460	1135	940
1¼	.191	1605	1575	1545	1515	1480	1450	1420	1390	1360	1330	1295	1250	1180	1110	865	715
1½	.200	1500	1470	1445	1415	1385	1355	1330	1300	1270	1240	1210	1170	1105	1035	805	665
2	.218	1370	1345	1320	1290	1265	1240	1215	1185	1160	1135	1105	1070	1010	945	735	610
2½	.276	1590	1560	1530	1500	1470	1440	1410	1380	1350	1320	1285	1240	1170	1100	855	710
3	.300	1460	1435	1405	1380	1350	1320	1295	1265	1240	1210	1180	1140	1075	1010	785	650
3½	.318	1385	1355	1330	1305	1275	1250	1225	1200	1170	1145	1115	1080	1015	955	745	615
4	.337	1330	1305	1280	1255	1230	1205	1180	1155	1125	1100	1075	1035	980	920	715	590
5	.375	1225	1205	1180	1155	1135	1110	1085	1060	1040	1015	990	955	900	845	660	545
6	.432	1225	1205	1180	1155	1135	1110	1085	1060	1040	1015	990	955	900	845	660	545
8	.500	1120	1100	1080	1060	1035	1015	995	970	950	930	905	875	825	775	605	500
10	.500	900	885	865	850	830	815	795	780	760	745	725	700	660	620	485	400
12	.500	755	740	730	715	700	685	670	655	640	625	610	590	550	520	405	335
14 OD	.500	690	680	665	650	640	625	610	600	585	570	560	540	510	475	370	305
16 OD	.500	600	590	575	565	555	545	530	520	510	495	485	470	440	415	325	265
18 OD	.500	535	525	515	505	495	485	475	465	455	445	430	415	395	370	290	240
20 OD	.500	485	475	465	455	445	435	425	420	410	400	390	375	355	335	260	215
24 OD	.500	405	395	390	380	375	365	360	350	345	335	325	315	300	280	220	180

28

**Standard Grade A Seamless Steel Pipe
For Oil Piping Within Refinery Limits, Section 3, Code for Pressure Piping**

Size of Pipe	*Wall Thick- ness	Temperature — Degrees Fahrenheit																		
		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
		Working Pressures, Pounds per Square Inch																		
3/4"	.113"	1620	1590	1555	1525	1495	1465	1435	1400	1370	1340	1305	1260	1210	1115	915	735	560	415	280
1	.133	1740	1705	1675	1640	1610	1575	1540	1510	1475	1440	1405	1355	1300	1200	985	790	600	445	300
1 1/4	.140	1515	1485	1455	1430	1400	1370	1340	1310	1280	1255	1220	1180	1135	1045	855	690	520	385	260
1 1/2	.145	1390	1365	1340	1315	1285	1260	1235	1205	1180	1150	1125	1085	1040	960	785	635	480	355	240
2	.154	1235	1210	1190	1165	1140	1120	1095	1070	1050	1020	995	965	925	850	700	560	425	315	215
2 1/2	.203	1530	1500	1475	1445	1415	1385	1355	1325	1300	1265	1235	1195	1145	1055	865	695	530	390	265
3	.216	1375	1350	1320	1295	1270	1245	1220	1190	1165	1140	1110	1070	1030	950	775	625	475	350	235
3 1/2	.226	1270	1245	1220	1200	1175	1150	1125	1100	1075	1050	1025	990	950	875	720	580	440	325	220
4	.237	1200	1180	1155	1130	1110	1085	1065	1040	1015	995	970	935	900	830	680	545	415	305	205
5	.258	1095	1075	1055	1035	1015	990	970	950	930	905	885	855	820	755	620	500	380	280	190
6	.280	1010	990	970	950	935	915	895	875	855	835	815	785	755	695	570	460	350	260	175
8	.322	920	905	885	870	850	835	815	800	780	765	745	720	690	635	520	420	320	235	160
10	.365	870	855	835	820	805	790	770	755	735	720	700	680	650	600	490	395	300	220	150
12	.375	750	735	720	705	690	675	665	650	635	620	605	585	560	515	425	340	260	190	130
14 OD	.375	680	665	655	640	625	615	600	590	575	560	550	530	510	470	385	310	235	175	120
16 OD	.375	590	580	570	560	545	535	525	515	500	490	475	460	445	410	335	270	205	150	100
18 OD	.375	520	510	500	490	480	475	465	450	440	430	420	405	390	360	295	240	180	135	90
20 OD	.375	470	460	450	445	435	425	415	405	400	390	380	365	350	325	265	215	160	120	80
24 OD	.375	400	395	385	375	370	360	355	345	340	330	325	310	300	275	225	180	140	100	70

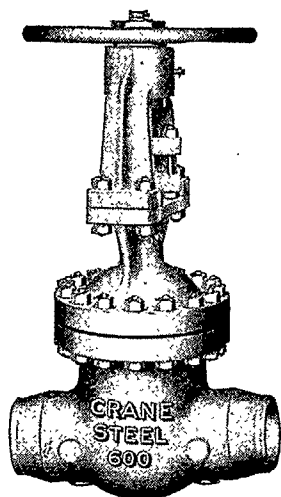
**Extra Strong Grade A Seamless Steel Pipe
For Oil Piping Within Refinery Limits, Section 3, Code for Pressure Piping**

Size of Pipe	*Wall Thickness	Temperature — Degrees Fahrenheit																		
		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
		Working Pressures, Pounds per Square Inch																		
1"	.179"	2820	2765	2710	2660	2605	2550	2500	2445	2390	2335	2275	2195	2110	1945	1565	1285	970	720	490
1¼	.191	2455	2405	2360	2315	2265	2220	2175	2125	2080	2030	1980	1910	1835	1690	1385	1115	850	625	425
1½	.200	2280	2235	2195	2150	2105	2065	2020	1975	1930	1885	1840	1775	1705	1570	1290	1040	785	580	395
2	.218	2055	2015	1975	1935	1895	1860	1820	1780	1740	1700	1655	1600	1535	1415	1160	935	710	525	355
2½	.276	2315	2270	2225	2185	2140	2095	2050	2005	1960	1915	1865	1805	1730	1595	1310	1055	800	590	400
3	.300	2105	2065	2025	1985	1945	1905	1865	1825	1785	1740	1700	1640	1575	1475	1190	960	725	535	365
3½	.318	1985	1945	1910	1870	1835	1795	1760	1720	1680	1640	1600	1545	1485	1370	1120	905	685	505	340
4	.337	1880	1845	1810	1770	1735	1700	1665	1630	1590	1555	1515	1465	1405	1295	1065	855	650	480	325
5	.375	1725	1690	1655	1625	1590	1560	1525	1495	1460	1425	1390	1340	1290	1190	975	785	595	440	295
6	.432	1725	1690	1655	1625	1590	1560	1525	1495	1460	1425	1390	1340	1290	1190	975	785	595	440	295
8	.500	1550	1520	1490	1460	1430	1400	1370	1340	1310	1280	1250	1205	1160	1070	875	705	535	395	265
10	.500	1255	1230	1205	1180	1160	1135	1110	1085	1060	1035	1010	975	935	865	710	570	430	320	215
12	.500	1045	1025	1005	985	965	945	925	905	885	865	840	815	780	720	590	475	360	265	180
14 OD	.500	955	940	920	905	885	865	850	830	810	790	770	745	715	660	540	435	330	245	165
16 OD	.500	835	820	805	790	770	755	740	725	705	690	675	650	625	575	470	380	290	215	145
18 OD	.500	750	735	720	705	690	675	665	650	635	620	605	585	560	515	425	340	260	190	130
20 OD	.500	660	650	635	625	610	600	585	575	560	545	535	515	495	455	375	300	230	170	115
24 OD	.500	555	545	535	525	515	505	495	485	470	460	450	435	415	385	315	255	190	140	95

*These are the nominal wall thicknesses; they correspond to the thickness of Crane Steel Butt-Welding Fittings.

Other Products for Welding

28



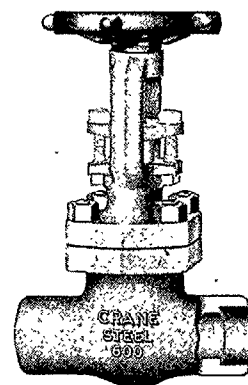
Butt-Welding Gate Valves

See pages 301 to 307.

In close association with the Crane line of Steel Butt-Welding and Socket-Welding Fittings shown on the preceding pages, is the wide variety of Butt-Welding and Socket-Welding Steel Valves and Welding Type Steel Flanges, available in a complete range of sizes and pressures.

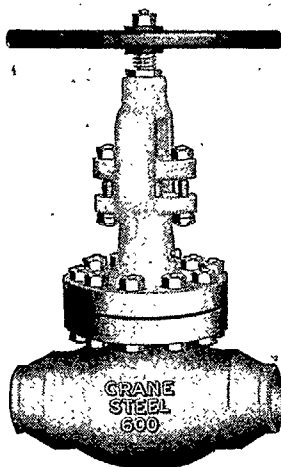
In the line offered by Crane Co. are included materials to satisfy the requirements of every welded installation.

The butt-welding and socket-welding steel valves and the welding type steel flanges illustrated on this page are representative of the products that make up the complete Crane welding line. For prices and details, refer to the pages indicated below the illustrations.



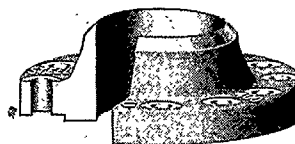
Socket-Welding Gate Valves

See pages 298 and 299.



Butt-Welding Globe and Angle Valves

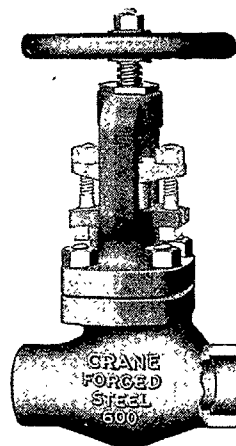
See pages 321 to 326.



Welding Neck Flanges

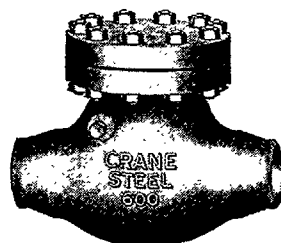


Slip-On Welding Flanges



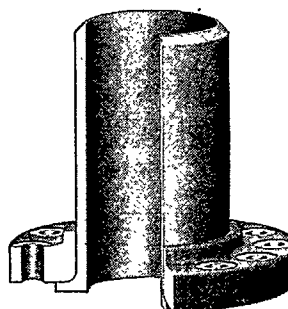
Socket-Welding Globe and Angle Valves

See pages 314 and 315.



Butt-Welding Swing Check Valves

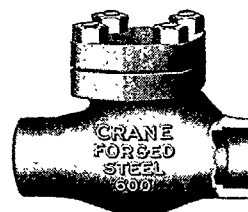
See pages 332 to 336.



Cranelap Flange with Welding Nipple

Welding Neck, Slip-On Welding, and Cranelap Flanges are shown on pages 361 to 367.

Welding Nipples for use in combination with Cranelap Flanges are shown on page 355.



Socket-Welding Horizontal Check Valves

See pages 328 and 329.

Forged Steel Flanges

The Crane line of Forged Steel Flanges includes a complete assortment of types in a wide range of straight and reducing sizes. The flanges are regularly manufactured for the 150, 300, 400, 600, 900, 1500, and 2500-Pound pressure classes. Special flanges can be made to order; flanges listed and described in this section include:

Screwed Flanges	Reducing Screwed Flanges
Blind Flanges	Cranelap Flanges
Welding Neck Flanges	Slip-On Welding Flanges
Reducing Slip-On Welding Flanges	

Pressure-Temperature Ratings.....	page 362
General Description.....	page 363
List Prices	
150 and 300-Pound.....	page 364
400, 600, 900, and 1500-Pound.....	page 365
Dimensions	
150, 300, and 400-Pound.....	page 366
600, 900, 1500, and 2500-Pound.....	page 367

* * * * *

The Forged Steel Flanges listed above comprise only a part of the complete line of Crane steel products.

Other steel products are shown and described in detail in other sections of this catalog. Refer to the following pages:

Steel Welding Fittings.....	pages 351 to 360
Steel Flanged Fittings.....	pages 343 to 349
Steel Screwed Fittings.....	pages 337 to 342
Steel Bushings.....	page 227
Steel Plugs.....	page 228
Wrought Couplings.....	page 229
Wrought Steel Nipples.....	pages 230 and 231
Forged Steel Unions.....	pages 247 and 248
Forged Steel Flange Unions.....	pages 252 and 253
Steel Gate Valves.....	pages 297 to 307
Steel Globe and Angle Valves.....	pages 309 to 326
Steel Check Valves.....	pages 327 to 336
Steel Stop-Check Valves.....	pages 370 to 374
Steel Blow-Off Valves.....	page 377
Steel Safety Valves.....	pages 391 and 392
Steel Relief Valves.....	pages 403 to 407
Steel Steam Traps.....	page 416
Steel Sediment Separators.....	page 423

Forged Steel Flanges

Working Pressures, Pounds per Square Inch, Non-Shock—For Flanges Shown on Pages 363 to 367

Fluid	Temp.	Carbon Steel Flanges						No. 4 Carbon-Molybdenum Alloy Steel Flanges						No. 5 Chrome-Molybdenum Alloy Steel Flanges (Made to order)					
	Deg. F.	150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.	1500 Lb.	2500 Lb.
Flanges with Standard Facings Other Than Ring Joint																			
Steam, Water, Oil, Vapor, Gas, or Air	100	230	500	670	1000	1500	2500	600	800	1200	1800	3000	5000	600	800	1200	1800	3000	5000
	150	220	480	640	960	1440	2400	590	775	1180	1770	2950	4905	590	775	1180	1770	2950	4905
	200	210	465	620	930	1395	2325	580	750	1160	1740	2900	4810	580	750	1160	1740	2900	4810
	250	200	450	600	900	1350	2250	560	725	1120	1680	2800	4645	560	725	1120	1680	2800	4645
	300	190	435	580	870	1305	2175	540	700	1080	1620	2700	4480	540	700	1080	1620	2700	4480
	350	180	420	560	840	1260	2100	520	675	1040	1560	2600	4315	520	675	1040	1560	2600	4315
	400	170	405	540	810	1215	2025	500	650	1000	1500	2500	4150	500	650	1000	1500	2500	4150
	450	160	390	520	780	1170	1950	480	625	960	1440	2400	3985	480	625	960	1440	2400	3985
	500	150	375	500	750	1125	1875	460	600	920	1380	2300	3820	460	600	920	1380	2300	3820
	550	140	360	480	720	1080	1800	440	575	880	1320	2200	3655	440	575	880	1320	2200	3655
Steam	600	130	345	460	690	1035	1725	420	550	840	1260	2100	3490	420	550	840	1260	2100	3490
	650	120	330	440	660	990	1650	400	525	800	1200	2000	3325	400	525	800	1200	2000	3325
	700	110	315	420	630	945	1575	380	500	760	1140	1900	3160	380	500	760	1140	1900	3160
	750	100	300	400	600	900	1500	360	475	720	1080	1800	2995	360	475	720	1080	1800	2995
	800	85	250	335	500	750	1250	(See ratings below)						(See ratings below)					
Steam, Oil, or Vapor	850	70	200	270	400	600	1000	340	450	680	1020	1700	2830	340	450	680	1020	1700	2830
	900	*92	*275	*370	*550	*830	*1380	320	425	640	960	1600	2665	320	425	640	960	1600	2665
	950	*82	*245	*330	*490	*740	*1230	300	400	600	900	1500	2500	310	410	620	930	1550	2580
	1000	*70	*210	*280	*420	*630	*1050	265	350	530	795	1325	2205	300	400	600	900	1500	2500
		*55	*165	*220	*330	*495	*825	190	250	380	570	950	1580	200	275	400	600	1000	1675
Flanges with Ring Joint Facing																			
Steam, Water, Oil, Vapor, Gas, or Air	100	275	600	800	1200	1800	3000	720	960	1440	2160	3600	6000	720	960	1440	2160	3600	6000
	150	255	575	765	1150	1725	2875	700	925	1400	2100	3500	5825	700	925	1400	2100	3500	5825
	200	240	550	730	1100	1650	2750	675	900	1350	2025	3375	5625	680	900	1360	2040	3400	5660
	250	225	525	700	1050	1575	2625	650	875	1300	1950	3250	5425	660	875	1320	1980	3300	5495
	300	210	500	670	1000	1500	2500	625	825	1250	1875	3125	5200	640	850	1280	1920	3200	5330
	350	195	475	635	950	1425	2375	600	800	1200	1800	3000	5000	620	825	1240	1860	3100	5165
	400	180	450	600	900	1350	2250	575	775	1150	1725	2875	4800	600	800	1200	1800	3000	5000
	450	165	425	565	850	1275	2125	550	725	1100	1650	2750	4575	575	775	1150	1725	2875	4800
	500	150	400	530	800	1200	2000	525	700	1050	1575	2625	4375	550	725	1100	1650	2750	4575
	550	140	380	505	760	1140	1900	500	675	1000	1500	2500	4175	525	700	1050	1575	2625	4375
Steam	600	130	360	480	720	1080	1800	475	625	950	1425	2375	3950	500	675	1000	1500	2500	4175
	650	120	340	450	680	1020	1700	450	600	900	1350	2250	3750	475	625	950	1425	2375	3950
	700	110	320	425	640	960	1600	425	575	850	1275	2125	3550	450	600	900	1350	2250	3750
	750	100	300	400	600	900	1500	400	525	800	1200	2000	3325	425	575	850	1275	2125	3550
	800	85	250	335	500	750	1250	(See ratings below)						(See ratings below)					
Steam, Oil, or Vapor	850	70	200	270	400	600	1000	375	500	750	1125	1875	3125	400	525	800	1200	2000	3325
	900	*92	*275	*370	*550	*830	*1380	350	475	700	1050	1750	2925	375	500	750	1125	1875	3125
	950	*82	*245	*330	*490	*740	*1230	325	425	650	975	1625	2700	350	475	700	1050	1750	2925
	1000	*70	*210	*280	*420	*630	*1050	300	400	600	900	1500	2500	325	425	650	975	1625	2700
		*55	*165	*220	*330	*495	*825	200	275	400	600	1000	1675	300	400	600	900	1500	2500
	1050													225	275	425	650	1075	1775
	1100													150	200	275	425	700	1175

Ratings identified by the asterisk (), in so far as steam service is concerned, are limited for use in oil refineries only and apply to sizes 12" and smaller only.

†Ratings identified by the dagger (†), in so far as steam service is concerned, are limited for use in oil refineries only.

These ratings apply to the Crane Forged Steel Flanges shown on pages 363 to 367.

Flange facings: Unless otherwise ordered, 150 and 300-Pound Flanges regularly are furnished with a $\frac{1}{16}$ -inch raised face, and 400-Pound and higher pressure flanges, with a $\frac{1}{4}$ -inch male face or a $\frac{3}{16}$ -inch female face, as ordered.

Cold service: For temperatures between 0° and 100° F., the ratings for 100° F. apply. For sub-zero service, materials with suitable impact resistance

must be used; recommendations on request.

Cranelap Flanges and Joints: These ratings also apply to Cranelap Flanges, the rating being dependent upon the type of facing applied to the lapped pipe end. Ratings for Cranelap Joints are contingent upon the use of pipe having an equal or higher rating.

Standards: Crane pressure-temperature ratings agree with those in the American Steel Flange Standard, No. B16e-1939; the A.P.I. Standard No. 600A-39 and Supplement No. 1, Adopted 1940; and the A.P.I. Standard No. 5-G-3, 1940.

Forged Steel Flanges

For working pressures, see page 362.

A complete line: The Crane line of Forged Steel Flanges includes a complete assortment of types in a wide range of straight and reducing sizes for seven different pressure classes (150, 300, 400, 600, 900, 1500, and 2500-Pound). The flanges are made in a variety of materials and with various flange facings, providing flanges for every service requirement.

Materials: Flanges made of Crane Forged Carbon Steel will be furnished unless otherwise ordered. List prices are shown on the two pages following (list prices of 2500-Pound Flanges are furnished on application).

Flanges made of Crane No. 4 Carbon-Molybdenum or Crane No. 5 Chrome-Molybdenum Forged Steel can be furnished when orders so specify. See the Crane Discount Sheet for prices.

When so ordered, 150 and 300-Pound Forged Carbon Steel Flanges can be furnished heat treated (normalized or annealed) to conform to A.S.T.M. Specification A 105-36; prices on request.

Drilling: Flanges of each pressure class are furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the corresponding pressure class of the American Standard. No deduction is made if flanges are ordered faced only.

Flange facings: The 150 and 300-Pound Forged Steel Screwed, Slip-On Welding, Welding Neck, and Blind Flanges are regularly furnished with an American Standard $\frac{1}{16}$ -inch raised face. In the 400, 600, 900, 1500, and 2500-Pound pressure classes, these flanges are regularly furnished with an American Standard $\frac{1}{4}$ -inch male face (large male) or an American Standard $\frac{3}{16}$ -inch female face (large female); orders must specify which facing is wanted.

When so ordered, the flanges can be furnished with other types of facing, such as ring joint, tongue, groove, etc. See the Crane Discount Sheet for prices.

Finish of flange faces: The $\frac{1}{16}$ -inch raised faces and the $\frac{1}{4}$ -inch large male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

Large female faces have a smooth finish.

A smooth finish can be furnished on the raised or male faces, when so specified. See the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

List prices of reducing flanges: The list prices of Reducing Screwed and Reducing Slip-On Welding Flanges apply to any reduction. The price is governed by the outside diameter of the flange.

Ordering reducing flanges: When ordering reduc-

ing flanges, the reduced size should be designated first, and then the outside diameter of the flange. For example, a 600-Pound Flange to connect a 6-inch pipe to a 10-inch valve or fitting (O.D. of flange, 20 inches) should be ordered,

6" x 20" Reducing Flange.

Reducing Welding Neck Flanges: Reducing Welding Neck Flanges can be made to order. For prices, see the Crane Discount Sheet.

Eccentric Reducing Flanges: Forged Steel Eccentric Reducing Screwed and Slip-On Welding Flanges can be made to order. For prices, see the Crane Discount Sheet.

American Standard: The dimensions and drilling of all flanges conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939, for their respective pressure class.

The American Standard does not include 900 or 1500-Pound Flanges in the $3\frac{1}{2}$ -inch size. Neither does it include 400, 600, 900, or 1500-Pound Slip-On Welding Flanges. Crane flanges of this type have the same dimensions as American Standard Steel Screwed Flanges, being bored instead of threaded.

The American Standard has increased slightly the thickness of 150-Pound loose flanges in sizes 1 to $3\frac{1}{2}$ -inch; see pages 366 and 367 for dimensions.

3-inch 300 and 600-Pound Cranelap Joints: When 3-inch 300 or 600-Pound Flanges with ring joint facing are to be bolted to Cranelap joints, orders must so specify; they require a groove of special pitch diameter. See page 562 for dimensions.

Forged Steel Flanges

For description, see the preceding page.



Screwed Flange

No. 556, 150-Pound
No. 291 E, 300-Pound
No. 651 E, 400-Pound
No. 856 E, 600-Pound
No. 1266 E, 900-Pound
No. 1556 E, 1500-Pound



Reducing Screwed Flange

No. 558 1/2, 150-Pound
No. 292 E, 300-Pound
No. 658 E, 400-Pound
No. 857 E, 600-Pound
No. 1263 E, 900-Pound
No. 1558 E, 1500-Pound



Blind Flange

No. 556 1/2, 150-Pound
No. 297 E, 300-Pound
No. 657 E, 400-Pound
No. 858 E, 600-Pound
No. 1267 E, 900-Pound
No. 1557 E, 1500-Pound

29



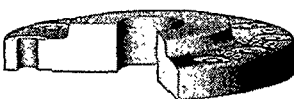
Cranelap Flange

No. 572, 150-Pound
No. 496 E, 300-Pound
No. 664 E, 400-Pound
No. 862 E, 600-Pound
No. 1262 E, 900-Pound
No. 1562 E, 1500-Pound



Slip-On Welding Flange

No. 554, 150-Pound
No. 294 E, 300-Pound
No. 694 E, 400-Pound
No. 854 E, 600-Pound
No. 1294 E, 900-Pound
No. 1594 E, 1500-Pound



Reducing Slip-On Welding Flange

No. 554 1/2, 150-Pound
No. 290 E, 300-Pound
No. 693 E, 400-Pound
No. 853 E, 600-Pound
No. 1295 E, 900-Pound
No. 1595 E, 1500-Pound



Welding Neck Flange

No. 568, 150-Pound
No. 296 E, 300-Pound
No. 656 E, 400-Pound
No. 855 E, 600-Pound
No. 1265 E, 900-Pound
No. 1565 E, 1500-Pound

List Prices, Each—Faced, Drilled, and Spot Faced

Class	Size of Pipe Inches	Straight Size Flanges			Reducing Flanges	
		Screwed, Cranelap, or Slip-On Welding	Welding Neck	Blind	Outside Diameter of Flange Inches	Screwed or Slip-On Welding
150 Pound	1/2	8.00	11.00	11.50		
	3/4	8.00	11.00	11.50		
	1	8.00	11.00	11.50	4 1/4	16.00
	1 1/4	9.00	11.00	11.50	4 5/8	18.00
	1 1/2	10.00	11.00	11.50	5	20.00
	2	11.00	11.00	12.60	6	21.00
	2 1/2	13.00	13.00	14.70	7	24.50
	3	15.00	15.00	17.05	7 1/2	28.00
	3 1/2	19.00	19.00	21.65	8 1/2	35.00
	4	20.00	20.00	23.70	9	37.00
	5	24.00	24.00	28.20	10	44.00
	6	27.00	27.00	31.60	11	49.00
	8	35.00	44.00	42.00	13 1/2	63.00
	10	48.00	62.00	58.00	16	86.00
	12	60.00	96.00	76.00	19	108.00
	14 OD	80.00	130.00	126.00	21	144.00
	16 OD	100.00	165.00	147.00	23 1/2	180.00
	18 OD	125.00	220.00	210.00	25	225.00
300 Pound	20 OD	150.00	290.00	252.00	27 1/2	270.00
	24 OD	240.00	380.00	320.00	32	380.00
	1/2	8.00	11.00	11.50		
	3/4	8.00	11.00	11.50		
	1	8.00	11.00	11.50	4 7/8	16.00
	1 1/4	9.00	11.00	11.50	5 1/4	18.00
	1 1/2	10.00	11.00	11.50	6 1/8	20.00
	2	11.00	11.00	12.60	6 1/2	21.00
	2 1/2	13.00	13.00	14.70	7 1/2	24.50
	*3	15.00	15.00	17.05	8 1/4	28.00
	3 1/2	19.00	19.00	21.65	9	35.00
	4	20.00	20.00	23.70	10	37.00
	5	24.00	24.00	28.20	11	44.00
	6	27.00	27.00	31.60	12 1/2	49.00
	8	35.00	44.00	42.00	15	63.00
	10	48.00	62.00	58.00	17 1/2	86.00
	12	60.00	96.00	76.00	20 1/2	108.00
	14 OD	80.00	130.00	126.00	23	144.00
	16 OD	100.00	165.00	147.00	25 1/2	180.00
	18 OD	125.00	220.00	210.00	28	225.00
	20 OD	150.00	290.00	252.00	30 1/2	270.00
	24 OD	240.00	380.00	320.00	36	380.00

*3" 300-Pound flanges with ring joint facing to bolt against a Cranelap joint must be specially ordered; they require a groove of special pitch diameter. See page 562 for dimensions.

(Continued on the following page)

Galvanized Flanges... page 572

Forged Steel Flanges

List Prices, Each—Faced, Drilled, and Spot Faced (Cont.)

Class	Size of Pipe Inches	Straight Size Flanges			Reducing Flanges	
		Screwed, Cranelap, or Slip-On Welding	Welding Neck	Blind	Outside Diameter of Flange Inches	Screwed or Slip-On Welding
400 Pound For smaller sizes, use 600 Pound.	4	20.00	20.00	23.70	10	37.00
	5	24.00	24.00	28.20	11	44.00
	6	27.00	27.00	31.60	12½	49.00
	8	35.00	44.00	42.00	15	63.00
	10	48.00	62.00	58.00	17½	86.00
	12	60.00	96.00	76.00	20½	108.00
	14 OD	80.00	130.00	126.00	23	144.00
	16 OD	100.00	165.00	147.00	25½	180.00
	18 OD	125.00	220.00	210.00	28	225.00
	20 OD	150.00	290.00	252.00	30½	270.00
600 Pound	24 OD	240.00	380.00	320.00	36	380.00
	½	9.50	16.30	11.50	.....	.....
	¾	9.50	16.30	11.50	.....	.....
	1	10.00	16.30	11.50	4⅞	16.00
	1¼	10.75	16.30	11.50	5¼	18.00
	1½	11.75	16.30	11.50	6⅞	20.00
	2	13.00	16.30	12.60	6½	21.00
	2½	15.00	19.00	14.70	7½	24.50
	*3	18.50	23.00	17.05	8¼	28.00
	3½	22.50	29.00	21.65	9	35.00
	4	33.00	39.00	40.00	10¾	57.00
	5	46.00	53.50	56.00	13	79.00
	6	55.00	63.50	66.00	14	94.00
	8	80.00	90.00	96.00	16½	136.00
	10	125.00	138.00	150.00	20	212.50
	12	150.00	188.00	180.00	22	255.00
	14 OD	180.00	200.00	216.00	23¾	306.00
	16 OD	240.00	270.00	288.00	27	408.00
	18 OD	300.00	330.00	360.00	29¼	510.00
	20 OD	360.00	400.00	432.00	32	612.00
900 Pound For smaller sizes, use 1500 Pound.	24 OD	540.00	590.00	648.00	37	918.00
	3	29.00	35.00	35.00	9½	48.00
	3½	35.00	42.00	42.00	10¾	56.00
	4	51.00	62.00	62.00	11½	81.00
	5	71.00	85.00	85.00	13¾	113.00
	6	86.00	104.00	104.00	15	137.00
	8	155.00	190.00	190.00	18½	245.00
	10	225.00	270.00	270.00	21½	360.00
	12	300.00	360.00	360.00	24	480.00
	14 OD	380.00	560.00	455.00	25¼	610.00
1500 Pound (Prices of 14" OD Flanges on request)	16 OD	460.00	690.00	555.00	27¾	740.00
	18 OD	650.00	925.00	780.00	31	1040.00
	20 OD	795.00	1160.00	955.00	33¾	1275.00
	24 OD	1500.00	2100.00	1800.00	41	2400.00
	½ or ¾	14.00	27.00	17.00	.....	.....
	1	14.00	27.00	17.00	5⅞	22.00
	1¼	14.00	27.00	17.00	6¼	22.00
	1½	16.00	27.00	19.00	7	26.00
	2	22.00	27.00	27.00	8½	35.00
	2½	29.00	35.00	35.00	9⅝	48.00
	3	38.00	46.00	46.00	10½	60.00
	3½	45.00	54.00	54.00	11	72.00
	4	60.00	72.00	72.00	12¼	96.00
	5	105.00	125.00	125.00	14¾	170.00
	6	132.00	160.00	160.00	15½	210.00
	8	220.00	165.00	265.00	19	350.00
	10	365.00	440.00	440.00	23	565.00
	12	550.00	660.00	660.00	26½	800.00

Facings

Screwed, Slip-On Welding, Welding Neck, and Blind Flanges in the 400, 600, 900, and 1500-Pound pressure classes are furnished with either a ¼-inch large male or ⅜-inch large female face; orders should specify which facing is wanted. In the 150 and 300-Pound pressure classes, the flanges are regularly furnished with a ⅜-inch raised face.

Other flange facings such as ring joint, tongue, groove, etc., can be furnished on order; see the Crane Discount Sheet for prices.

Welding Neck Flanges

Unless otherwise ordered, 150 and 300-Pound Welding Neck Flanges in sizes 12-inch and smaller are bored to match the inside diameter of Standard pipe (the heaviest weight on sizes 8, 10, and 12-inch).

For sizes larger than 12-inch on the 150 and 300-Pound Welding Neck Flanges and for all sizes in the 400, 600, 900, and 1500-Pound classes, orders must specify the inside diameter of the bore (I.D. of pipe).

Cranelap Flanges

For information on complete Cranelap Joints, see page 605. Cranelap Flanges also are recommended for use in combination with Cranelap Welding Nipples; see page 355.

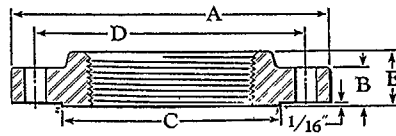
*3-inch Cranelap Joints (300 or 600-Pound)

When 3-inch 300 or 600-Pound Flanges with ring joint facing are to be bolted to Cranelap joints, orders must so specify; they require a groove of special pitch diameter. See page 562 for dimensions.

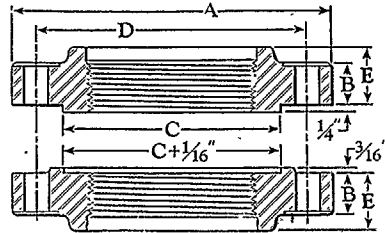
For description,
see page 363.

For dimensions,
see pages 366 and 367.

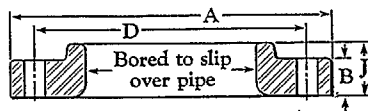
Forged Steel Flanges



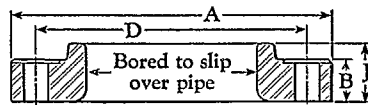
Screwed Flange
150 and 300-Pound



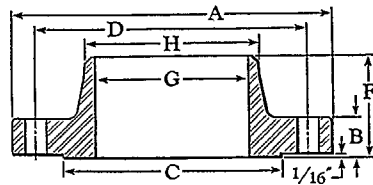
Screwed Flanges
400, 600, 900, 1500, and 2500-Pound



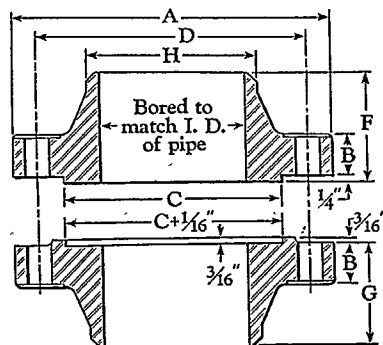
Cranelap Flange
150 and 300-Pound



Cranelap Flange
400, 600, 900, 1500, and 2500-Pound

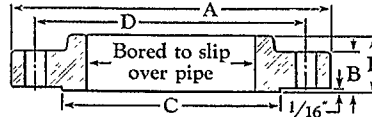


Welding Neck Flange
150 and 300-Pound

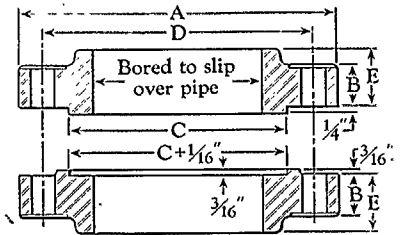


Welding Neck Flanges
400, 600, 900, 1500, and 2500-Pound

Dimensions,
in Inches



Slip-On Welding Flange
150 and 300-Pound



Slip-On Welding Flanges
400, 600, 900, and 1500-Pound

Class	Pipe Size	A	B	C	D	Bolts No.	Dia.	E	F	G	H	J
150 Pound	1/2	3 1/2	7/16	1 3/8	2 3/8	4	1 1/2	5/8	1 7/8	0.62	0.84	5/8
	3/4	3 7/8	1/2	1 11/16	2 3/4	4	1 1/2	5/8	2 1/16	0.82	1.05	5/8
	1	4 1/4	9/16	2	3 1/8	4	1 1/2	3/4	2 3/16	1.05	1.32	1 1/16
	1 1/4	4 9/8	5/8	2 1/2	3 1/2	4	1 1/2	13/16	2 1/4	1.38	1.66	1 3/16
	1 1/2	5	11/16	2 7/8	3 7/8	4	1 1/2	7/8	2 7/16	1.61	1.90	7/8
	2	6	3/4	3 5/8	4 3/4	4	5/8	1	2 1/2	2.07	2.38	1
	2 1/2	7	7/8	4 1/8	5 1/2	4	5/8	1 1/8	2 3/4	2.47	2.88	1 1/8
	3	7 1/2	15/16	5	6	4	5/8	1 3/16	2 3/4	3.07	3.50	1 3/16
	3 1/2	8 1/2	15/16	5 1/2	7	8	5/8	1 1/4	2 13/16	3.55	4.00	1 1/4
	4	9	15/16	6 3/16	7 1/2	8	5/8	1 5/16	3	4.03	4.50	1 5/16
	5	10	15/16	7 5/16	8 1/2	8	3/4	1 7/16	3 1/2	5.05	5.56	1 7/16
	6	11	1	8 1/2	9 1/2	8	3/4	1 9/16	3 1/2	6.07	6.63	1 9/16
	8	13 1/2	1 1/8	10 5/8	11 3/4	8	3/4	1 3/4	4	7.98	8.63	1 3/4
	10	16	1 3/16	12 3/4	14 1/4	12	7/8	1 15/16	4	10.02	10.75	1 15/16
	12	19	1 1/4	15	17	12	7/8	2 3/16	4 1/2	12.00	12.75	2 3/16
	14 OD	21	1 3/8	16 1/4	18 3/4	12	1	2 1/4	5	Bore as ordered	14.00	3 1/8
	16 OD	23 1/2	1 7/16	18 1/2	21 1/4	16	1	2 1/2	5		16.00	3 7/16
	18 OD	25	1 9/16	21	22 3/4	16	1 1/8	2 11/16	5 1/2		18.00	3 13/16
	20 OD	27 1/2	1 11/16	23	25	20	1 1/8	2 7/8	5 11/16		20.00	4 1/16
	24 OD	32	1 7/8	27 1/4	29 1/2	20	1 1/4	3 1/4	6		24.00	4 3/8
300 Pound	1/2	3 3/4	9/16	1 3/8	2 5/8	4	1 1/2	7/8	2 1/16	0.62	0.84	7/8
	3/4	4 9/8	5/8	1 11/16	3 1/4	4	5/8	1	2 1/4	0.82	1.05	1
	1	4 7/8	11/16	2	3 1/2	4	5/8	1 1/16	2 7/16	1.05	1.32	1 1/16
	1 1/4	5 1/4	3/4	2 1/2	3 7/8	4	5/8	1 1/16	2 9/16	1.38	1.66	1 1/16
	1 1/2	6 1/8	13/16	2 7/8	4 1/2	4	3/4	1 3/16	2 11/16	1.61	1.90	1 3/16
	2	6 1/2	7/8	3 5/8	5	8	3/4	1 5/16	2 3/4	2.07	2.38	1 5/16
	2 1/2	7 1/2	1	4 1/8	5 5/8	8	3/4	1 1/2	3	2.47	2.88	1 1/2
	3	8 1/4	1 1/8	5	6 5/8	8	3/4	1 11/16	3 1/8	3.07	3.50	1 11/16
	3 1/2	9	1 3/16	5 1/2	7 1/4	8	3/4	1 3/4	3 3/16	3.55	4.00	1 3/4
	4	10	1 1/4	6 3/16	7 7/8	8	3/4	1 7/8	3 3/8	4.03	4.50	1 7/8
	5	11	1 3/8	7 5/16	9 1/4	8	3/4	2	3 7/8	5.05	5.56	2
	6	12 1/2	1 7/16	8 1/2	10 5/8	12	3/4	2 1/16	3 7/8	6.07	6.63	2 1/16
	8	15	1 5/8	10 5/8	13	12	7/8	2 7/16	4 3/8	7.98	8.63	2 7/16
	10	17 1/2	1 7/8	12 3/4	15 1/4	16	1	2 5/8	4 5/8	10.02	10.75	3 3/4
	12	20 1/2	2	15	17 3/4	16	1 1/8	2 7/8	5 1/8	12.00	12.75	4
	14 OD	23	2 1/8	16 1/4	20 1/4	20	1 1/8	3	5 5/8	Bore as ordered	14.00	4 3/8
	16 OD	25 1/2	2 1/4	18 1/2	22 1/2	20	1 1/4	3 1/4	5 3/4		16.00	4 3/4
	18 OD	28	2 3/8	21	24 3/4	24	1 1/4	3 1/2	6 1/4		18.00	5 3/8
	20 OD	30 1/2	2 1/2	23	27	24	1 1/4	3 3/4	6 3/8		20.00	5 1/2
400 Pound	24 OD	36	2 3/4	27 1/4	32	24	1 1/2	4 3/16	6 5/8		24.00	6
	4	10	1 3/8	6 3/16	7 7/8	8	7/8	2	3 3/4	3 1/2	4.50	2
	5	11	1 1/2	7 5/16	9 1/4	8	7/8	2 1/8	4 1/4	4	5.56	2 3/8
	6	12 1/2	1 5/8	8 1/2	10 5/8	12	7/8	2 1/4	4 5/16	4 1/16	6.63	2 1/4
	8	15	1 7/8	10 5/8	13	12	1	2 11/16	4 7/8	4 5/8	8.63	2 13/16
	10	17 1/2	2 1/8	12 3/4	15 1/4	16	1 1/8	2 7/8	5 1/8	4 7/8	10.75	4
	12	20 1/2	2 1/4	15	17 3/4	16	1 1/4	3 1/8	5 5/8	5 5/8	12.75	4 1/4
	14 OD	23	2 3/8	16 1/4	20 1/4	20	1 1/4	3 5/16	6 1/8	5 7/8	14.00	4 5/8
	16 OD	25 1/2	2 1/2	18 1/2	22 1/2	20	1 3/8	3 11/16	6 1/4	6	16.00	5
	18 OD	28	2 5/8	21	24 3/4	24	1 3/8	3 7/8	6 3/4	6 1/2	18.00	5 3/8
2500 Pound	20 OD	30 1/2	2 3/4	23	27	24	1 1/2	4	6 7/8	6 5/8	20.00	5 3/4
	24 OD	36	3	27 1/4	32	24	1 3/4	4 1/2	7 1/8	6 7/8	24.00	6 1/4

Dimensions, in Inches (Cont.)

Class	Pipe Size	A	B	C	D	Bolts		E	F	G	H	J
						No.	Dia.					
600 Pound	1/2	3 3/4	9/16	1 3/8	2 5/8	4	1 1/2	7/8	2 5/16	2 1/16	0.84	7/8
	3/4	4 5/8	5/8	1 11/16	3 1/4	4	5/8	1	2 1/2	2 1/4	1.05	1
	1	4 7/8	1 1/16	2	3 1/2	4	5/8	1 1/16	2 11/16	2 7/16	1.32	1 1/16
	1 1/4	5 1/4	1 3/16	2 1/2	3 7/8	4	5/8	1 1/8	2 7/8	2 5/8	1.66	1 1/8
	1 1/2	6 1/8	7/8	2 7/8	4 1/2	4	3/4	1 1/4	3	2 3/4	1.90	1 1/4
	2	6 1/2	1	3 5/8	5	8	5/8	1 7/16	3 3/8	2 7/8	2.38	1 7/16
	2 1/2	7 1/2	1 1/8	4 1/8	5 7/8	8	3/4	1 5/8	3 3/8	3 3/8	2.88	1 5/8
	3	8 1/4	1 1/4	5	6 5/8	8	3/4	1 13/16	3 1/2	3 1/4	3.50	1 13/16
	3 1/2	9	1 3/8	5 1/2	7 1/4	8	7/8	1 15/16	3 5/8	3 3/8	4.00	1 15/16
	4	10 3/4	1 1/2	6 3/16	8 1/2	8	7/8	2 1/8	4 1/4	4	4.50	2 1/8
	5	13	1 3/4	7 5/16	10 1/2	8	1	2 3/8	4 3/4	4 1/2	5.56	2 3/8
	6	14	1 7/8	8 1/2	11 1/2	12	1	2 5/8	4 7/8	4 5/8	6.63	2 5/8
	8	16 1/2	2 3/16	10 5/8	13 3/4	12	1 1/8	3	5 1/2	5 1/4	8.63	3
	10	20	2 1/2	12 3/4	17	16	1 1/4	3 3/8	6 1/4	6	10.75	4 3/8
	12	22	2 5/8	15	19 1/4	20	1 1/4	3 5/8	6 3/8	6 1/8	12.75	4 5/8
	14 OD	23 3/4	2 3/4	16 1/4	20 3/4	20	1 3/8	3 11/16	6 3/4	6 1/2	14.00	5
	16 OD	27	3	18 1/2	23 3/4	20	1 1/2	4 3/16	7 1/4	7	16.00	5 1/2
	18 OD	29 1/4	3 1/4	21	25 3/4	20	1 5/8	4 5/8	7 1/2	7 1/4	18.00	6
	20 OD	32	3 1/2	23	28 1/2	24	1 5/8	5	7 3/4	7 1/2	20.00	6 1/2
	24 OD	37	4	27 1/4	33	24	1 7/8	5 1/2	8 1/4	8	24.00	7 1/4
900 Pound	3	9 1/2	1 1/2	5	7 1/2	8	7/8	2 1/8	4 1/4	4	3.50	2 1/8
	3 1/2	10 3/4	1 5/8	5 1/2	8 1/2	8	1	2 5/16	4 1/2	4 1/4	4.00	2 5/16
	4	11 1/2	1 3/4	6 3/16	9 1/4	8	1 1/8	2 3/4	4 3/4	4 1/2	4.50	2 3/4
	5	13 3/4	2	7 5/16	11	8	1 1/4	3 1/8	5 1/4	5	5.56	3 1/8
	6	15	2 3/16	8 1/2	12 1/2	12	1 1/8	3 3/8	5 3/4	5 1/2	6.63	3 3/8
	8	18 1/2	2 1/2	10 5/8	15 1/2	12	1 3/8	4	6 5/8	6 3/8	8.63	4 1/2
	10	21 1/2	2 3/4	12 3/4	18 1/2	16	1 3/8	4 1/4	7 1/2	7 1/4	10.75	5
	12	24	3 1/8	15	21	20	1 3/8	4 5/8	8 1/8	7 7/8	12.75	5 5/8
	14 OD	25 1/4	3 3/8	16 1/4	22	20	1 1/2	5 1/8	8 5/8	8 3/8	14.00	6 1/8
	16 OD	27 3/4	3 1/2	18 1/2	24 1/4	20	1 5/8	5 1/4	8 3/4	8 1/2	16.00	6 1/2
	18 OD	31	4	21	27	20	1 7/8	6	9 1/4	9	18.00	7 1/2
	20 OD	33 3/4	4 1/4	23	29 1/2	20	2	6 1/4	10	9 3/4	20.00	8 1/4
1500 Pound	24 OD	41	5 1/2	27 1/4	35 1/2	20	2 1/2	8	11 3/4	11 1/2	24.00	10 1/2
	1/2	4 3/4	7/8	1 3/8	3 1/4	4	3/4	1 1/4	2 5/8	2 3/8	0.84	1 1/4
	3/4	5 1/8	1	1 11/16	3 1/2	4	3/4	1 3/8	3	2 3/4	1.05	1 3/8
	1	5 7/8	1 1/8	2	4	4	7/8	1 5/8	3 3/8	2 7/8	1.32	1 5/8
	1 1/4	6 1/4	1 1/8	2 1/2	4 3/8	4	7/8	1 5/8	3 3/8	2 7/8	1.66	1 5/8
	1 1/2	7	1 1/4	2 7/8	4 7/8	4	1	1 3/4	3 1/2	3 1/4	1.90	1 3/4
	2	8 1/2	1 1/2	3 3/8	6 1/2	8	7/8	2 1/4	4 1/4	4	2.38	2 1/4
	2 1/2	9 5/8	1 5/8	4 1/8	7 1/2	8	1	2 1/2	4 3/8	4 1/8	2.88	2 1/2
	3	10 1/2	1 7/8	5	8	8	1 1/8	2 7/8	4 7/8	4 5/8	3.50	2 7/8
	3 1/2	11	2	5 1/2	8 1/2	8	1 1/8	3 1/16	5	4 3/4	4.00	3 1/16
	4	12 1/4	2 1/8	6 3/16	9 1/2	8	1 1/4	3 3/16	5 5/8	4 7/8	4.50	3 3/16
	5	14 3/4	2 7/8	7 5/16	11 1/2	8	1 1/2	4 1/8	6 3/8	6 1/8	5.56	4 1/8
	6	15 1/2	3 1/4	8 1/2	12 1/2	12	1 3/8	4 11/16	7	6 3/4	6.63	4 11/16
	8	19	3 5/8	10 5/8	15 1/2	12	1 5/8	5 5/8	8 5/8	8 3/8	8.63	5 5/8
2500 Pound	10	23	4 1/4	12 3/4	19	12	1 7/8	6 1/4	10 1/4	10	10.75	7
	12	26 1/2	4 7/8	15	22 1/2	16	2	7 7/8	11 3/8	11 1/8	12.75	8 5/8
	14 OD	29 1/2	5 1/4	16 1/4	25	16	2 1/4		12	11 3/4	14.00	9 1/2
	1/2	5 1/4	1 3/16	1 3/8	3 1/2	4	3/4	1 9/16	3 1/8	2 7/8	0.84	1 9/16
	3/4	5 1/2	1 1/4	1 11/16	3 3/4	4	3/4	1 11/16	3 3/8	3 1/8	1.05	1 11/16
	1	6 1/4	1 3/8	2	4 1/4	4	7/8	1 1/8	3 3/4	3 1/2	1.32	1 7/8
	1 1/4	7 1/4	1 1/2	2 1/2	5 1/8	4	1	2 1/16	4	3 3/4	1.66	2 1/16
	1 1/2	8	1 3/4	2 7/8	5 3/4	4	1 1/8	2 3/8	4 5/8	4 3/8	1.90	2 3/8
	2	9 1/4	2	3 5/8	6 3/4	8	1	2 3/4	5 1/4	5	2.38	2 3/4
	2 1/2	10 1/2	2 1/4	4 1/8	7 3/4	8	1 1/8	3 1/8	5 5/8	5 5/8	2.88	3 1/8
	3	12	2 5/8	5	9	8	1 1/4	3 3/8	6 1/8	6 5/8	3.50	3 5/8
	4	14	3	6 3/16	10 3/4	8	1 1/2	4 1/4	7 3/4	7 1/2	4.50	4 1/4
	5	16 1/2	3 5/8	7 5/16	12 3/4	8	1 3/4	5 1/8	9 1/4	9	5.56	5 1/8
	6	19	4 1/4	8 1/2	14 1/2	8	2	6	11	10 3/4	6.63	6
	8	21 3/4	5	10 5/8	17 1/4	12	2	7	12 3/4	12 1/2	8.63	7
	10	26 1/2	6 1/2	12 3/4	21 1/4	12	2 1/2	9	16 3/4	16 1/2	10.75	9
	12	30	7 1/4	15	24 3/8	12	2 3/4	10	18 1/2	18 1/4	12.75	10

Facings: Screwed, Slip-On Welding, and Welding Neck Flanges are regularly furnished with a 1/16-inch high raised face in the 150 and 300-Pound pressure classes, and with either large male or large female facing, as ordered, in the 400, 600, 900, 1500 and 2500-Pound pressure classes.

Cranelap joints: Complete dimensions of Cranelap joints (except 2500-Pound) are shown on page 608.

Complete dimensions of 2500-Pound Cranelap Joints will be furnished on application. Requests should be accompanied by detailed specifications, including the thickness of the pipe, the kind of lap, and the type of facing required on the lap.

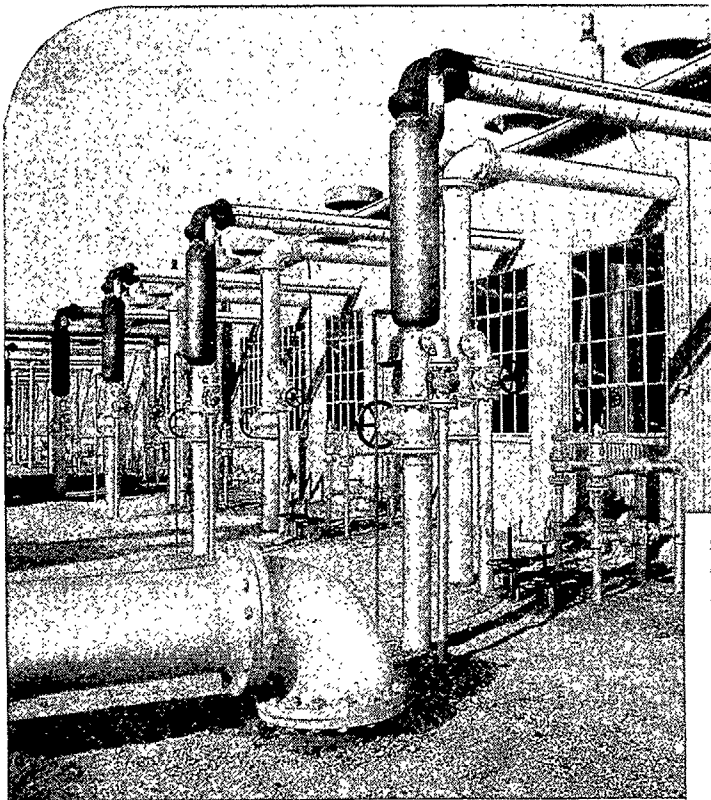
American Standard: The dimensions and drilling of flanges conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16e-1939, for their respective pressure class.

The American Standard does not include 900 or 1500-Pound Flanges in the 3 1/2-inch size. Neither does the Standard include 400, 600, 900, or 1500-Pound Slip-On Welding Flanges. Crane flanges of this type have the same dimensions as American Standard Steel Screwed Flanges, being bored instead of threaded.

The Standard has increased slightly the thickness of 150-Pound loose flanges in sizes 1 to 3 1/2-inch. The table at the right shows the new and old thicknesses, the latter being taken from the former issue of the American Standard, B16e-1932.

Comparison of New and Old Flange Thicknesses (150-Pound)		
Size	New	Old
1	9/16	7/16
1 1/4	5/8	3/4
1 1/2	11/16	9/16
2	3/4	5/8
2 1/2	7/8	1 1/16
3	15/16	3/4
3 1/2	15/16	1 1/16

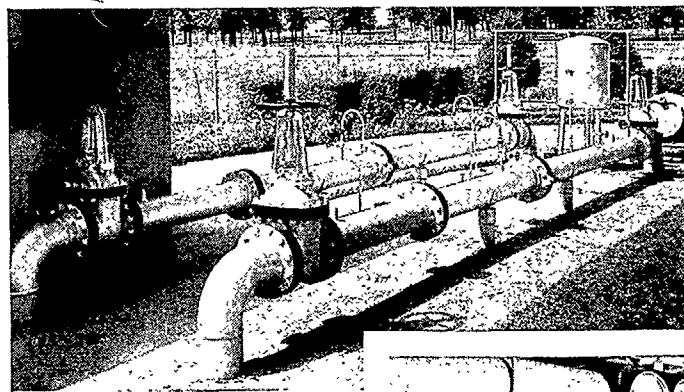
List prices....pages 364 and 365
Description.....page 363
Templates for
drilling.....pages 553 to 555
Special facings..pages 560 to 563
Welding bevel details..page 647



Flanged fittings, flanges, and valves made by Crane in lines between compressors and distillation unit in a natural gasoline plant.



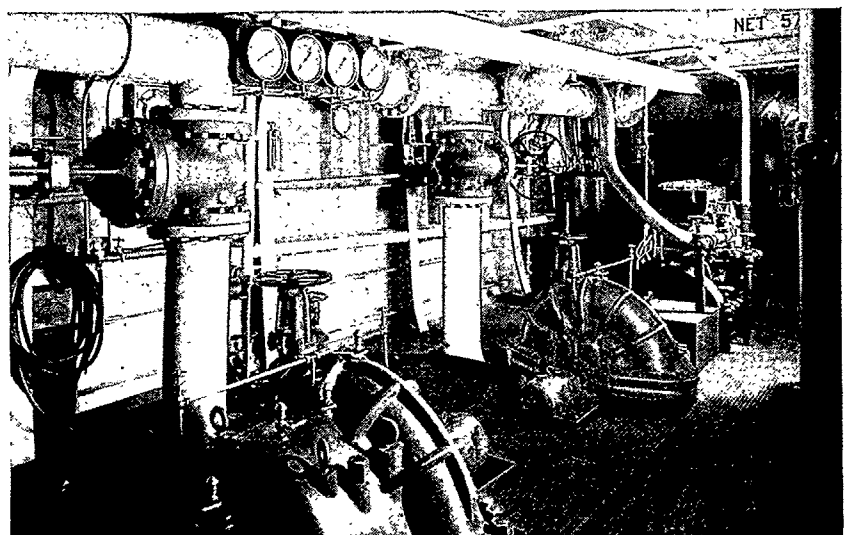
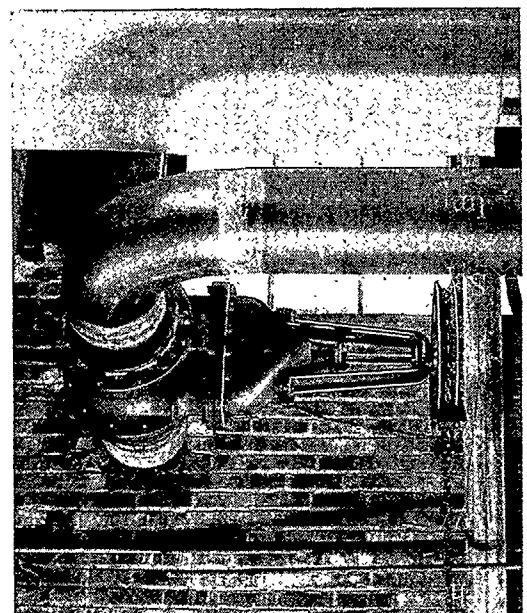
Crane welding ell and chain wheel operated valve on exhaust steam in a rubber plant.



Crane welding fittings, flanges and double disc gate valves in natural gas pipe line.



A municipal fire boat with Crane steel gate valves in water pumping lines, and other Crane marine equipment.



Stop-Check, Blow-Off, Pulp Stock, Back Pressure, and Float Valves

Stop-Check Valves

Service and Features.....	page 370
Installation.....	page 370
General Description.....	page 371
Selecting Proper Size.....	page 371
250-Pound Ferrosteel.....	page 372
300-Pound Cast Steel.....	page 373
400-Pound Cast Steel.....	page 374
600-Pound Cast Steel.....	page 374
900 and 1500-Pound Cast Steel.....	page 374

Blow-Off Valves

250-Pound Ferrosteel.....	page 376
300-Pound Cast Steel.....	page 377
600-Pound Cast Steel.....	page 377

Cast Iron Blow-Off Crosses.....page 376

* Iron Body Pulp Stock Valves.....	page 375
Iron Body Back Pressure Valves.....	pages 378 and 379
Iron Body Exhaust Relief Valves.....	pages 378 and 379

Klipfel Tank Float and Lever Valves.....page 380

Clayton Float Valves.....	page 381
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30

Nearly every piping installation requires the use of at least a few of what are generally called "specialties", or more specifically "special duty valves"—valves which are designed for only one particular service or which automatically perform a special function. The Crane line of such valves includes a wide assortment of types and sizes to fill all normal requirements, and all of these are characteristically Crane in quality.

For greater convenience in catalog use, the Crane line of special duty valves and of specialties has been divided into several groups. In addition to those indexed above, the line includes the following:

Safety and Relief Valves.....	pages 383 to 407
Pressure Regulators and Pressure Reducing Valves.....	pages 410 to 414
Steam Traps.....	pages 415 to 419
Steam and Oil Separators; Sediment Separators.....	pages 420 to 423
Expansion Joints.....	pages 424 to 428
Flexible Joints; Dayton Couplings.....	pages 430 to 433
Water Gauges, Accessories, and Water Columns.....	pages 434 to 436
Whistles; Fusible Plugs; Gauges.....	pages 437 to 439
Lubricators; Oilers; Injectors; Ejectors; Sump Pumps....	pages 440 to 442
Brass Lever-Operated Quick-Opening Valves.....	pages 66 to 69
Brass Chronometer Valves.....	page 476
Brass Butterfly and Throttle Valves.....	page 69
Iron Butterfly and Throttle Valves.....	page 148

Ferrosteel and Cast Steel Stop-Check Valves

Boiler Service and Fundamental Duties

Stop-Check Valves are as essential to the safe operation of a boiler plant as are the safety valves or other safety devices attached to the boiler. They should be installed in the pipe line between each boiler and the main steam header, when more than one boiler is connected to the same header. These valves should always be placed so that the pressure in the boiler is under the disc.

The Stop-Check Valve is intended to perform four important functions in boiler steam piping:

First: To act as an automatic non-return valve, preventing a back flow of steam from the main steam header to the boiler to which it is connected, in the event of a failure in that boiler.

Second: To assist, when ceasing to fire, in cutting out a boiler. In this case the disc will close automatically and prevent header pressure from entering the boiler.

Third: To assist in bringing a boiler into service after it has been shut down. This operation requires considerable care when performed manually, but the Stop-Check Valve performs this function automatically, without pressure fluctuations or disturbance of the water level.

Fourth: To act as a "safety first" valve in preventing back flow of steam from the header into a boiler which has been shut down for inspection or repair should an attendant accidentally open the valve.

30

Features of the Crane Stop-Check Valve

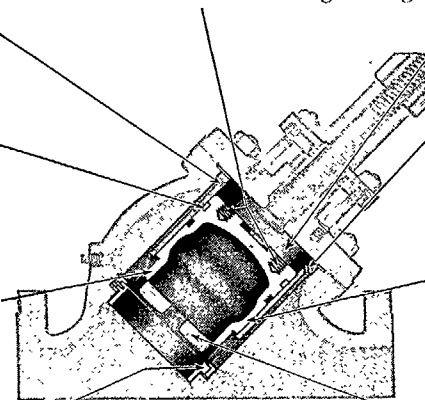
Liner: The liner guides the disc throughout the full travel. It is quickly removable and, being entirely independent of the body, is not subject to distortion by expansion strains.

Piston ring: Contributes to the dashpot effectiveness to avoid rapid disc movements. For conditions of extremely severe pulsations two rings may be installed.

Throttling lip: The long throttling lip on the disc retards the flow when the seating position is approached. Disc chattering is prevented and wiredrawing of the seating surfaces is reduced.

Seat: Flat seats facilitate true seating; they are readily removed and can be easily reconditioned.

Regrinding: Tapped bosses on top of the disc enable nipples or eye-bolts to be inserted to facilitate removal of the disc and regrinding.



Dashpot: Self-contained in liner. An effective cushion for the disc to prevent pipe line vibrations, or hammering on the seat, at low velocities or on pulsating loads.

Dashpot vent: The vent acts as a governor to control the disc speed and assure smooth action.

Disc: The one moving part. Made in one piece and cylindrical in shape it has ample guiding surface. It is light in weight and especially designed to produce a maximum lift at minimum velocities. Free of wing guides which cause "spinning" and rapid wear.

Ports: Large port areas produce only a minimum of pressure drop through the valve. They assure unrestricted movement of the disc.

Recommendations for Installation

Crane 250-Pound Ferrosteel and 300-Pound Cast Steel Stop-Check Valves are available in two styles, each of which can be used in two positions in a boiler installation.

Straight-Way Y-Pattern Valves may be used in horizontal lines (Figure No. 1) or in vertical lines for upward flow (Figure No. 2).

Angle Y-Pattern Valves may be used for upward-to-horizontal flow (Figure No. 3) or for horizontal-to-downward flow (Figure No. 4).

The proper method for draining is shown in the illustrations for each of the four positions.

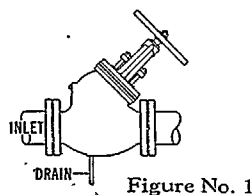


Figure No. 1

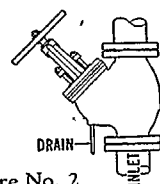


Figure No. 2

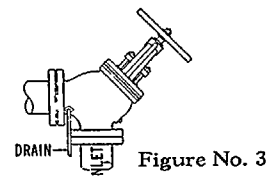


Figure No. 3

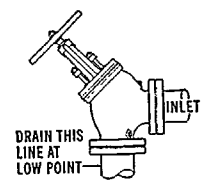


Figure No. 4

Ferrosteel and Cast Steel Stop-Check Valves

General Description

Construction: In design and construction, these valves are unusually simple, strong, and rugged. Made with but one moving part, the disc, and embodying only carefully selected materials, they are exceptionally durable and give long and reliable service.

Because of the simplicity of design, all internal parts are easily accessible, and when the occasion should arise, replacements can be made without removing the valves from the line.

These valves are equipped with a handwheel which permits them to be closed while under pressure, or if they are already closed automatically, to lock the disc in the closed position. No mechanical connection is made between the disc and the stem and, when the stem is raised by the handwheel, only the boiler pressure can lift the disc. This equipment for manual operation is of the outside screw and yoke type, wherein the stem threads are not directly exposed to the high temperature of the steam.

250 and 300-Pound Valves have a male and female bonnet joint, sealed with a Cranite ring gasket, and bolted with studs driven into the body. 400 and 600-Pound Steel Valves have ring joint facing, a soft steel ring joint gasket, and Crane Templex Steel through type bolt-studs. Tightness and liberal strength are assured.

All Cast Steel Valves have a lantern type stuffing box, equipped with a bronze ball type gland and steel gland flange. Packing is installed above and below

the lantern, assuring tight sealing. The lantern provides space for a cooling chamber, which is tapped and fitted with a steel plug. 250-Pound Ferrosteel Valves have an exceptionally deep stuffing box, filled with high grade packing, and fitted with a brass gland and a malleable iron gland flange.

All Stop-Check Valves, when the stem is in the wide open position, can be repacked while under pressure.

The body seat ring is of the shoulder seated type. It is held in place by the removable liner in Ferrosteel Valves and is screwed into the body in Cast Steel Valves.

The piston type disc, operating in the removable liner, is the only pressure actuated part in the valve; see the preceding page for features and full description of the internal parts of the valve.

Code requirements: Crane Ferrosteel and Steel Stop-Check Valves conform to the A.S.M.E. Boiler Construction Code for Non-Return Stop Valves.

Closing tight against boiler test pressures: Because of the exceptional severity of this requirement, only sizes 6-inch and smaller of the 250, 300, and 400-Pound Valves and sizes 5-inch and smaller of the 600-Pound Valves can be closed manually against the boiler test pressures. When the larger size valves are required to comply with this test, they must be so ordered to be especially equipped. Valves with gears, ball-bearing yokes, or toggle operating mechanisms can be furnished on order when so specified; prices on application.

30

Selecting Size of Stop-Check Valve

The many variables affecting the selection of the proper size of a Stop-Check Valve preclude the possibility of establishing a simple rule or formula applicable to all installations. This is particularly true where the pressure drop through the valve is of primary importance.

Velocity: The Stop-Check Valve size determines the velocity which can be used without producing excessive pressure drop. Steam velocities normally used for Stop-Check Valves, in feet per minute, are as follows:

Valve Size	2½ to 5-inch	6 to 12-inch
Peak Load, Max.	10,000	12,000
Normal Load	5,000 to 7,500	7,500 to 9,000
Low Load, Min.	3,000 to 4,500	4,000 to 5,000

Formula: The following formula can be used as a guide for determining the approximate size of a Stop-Check Valve for the ordinary installation.

Determine the generating capacity of the boiler in pounds of steam per hour under normal operating

conditions. Using a velocity ranging from 3000 to 12000 feet per minute, figure the area of the pipe from the following formula:

$$C = \frac{A \times B \times 2.4}{V} \text{ in which}$$

C = Area of pipe in square inches

A = Pounds of steam per hour

B = Volume, in cubic feet, per pound of steam at given pressure and temperature

V = Velocity in feet per minute

The valve size should be the same as the nominal pipe size having the nearest equivalent area in square inches (C).

Caution: This formula determines the approximate valve size, without establishing the pressure drop. Where pressure drop is of vital importance, or for unusual or high pressure installations, Crane engineers will be glad to make specific recommendations and to furnish pressure drop data. Requests should be accompanied by a complete description of the proposed operating conditions and a piping layout.

250-Pound Ferrosteel Stop-Check Valves

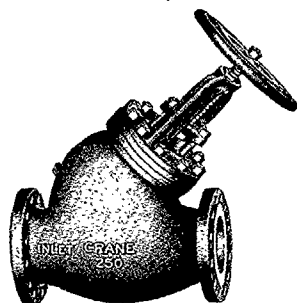
WORKING PRESSURE

250 pounds steam, 500° F. maximum temperature

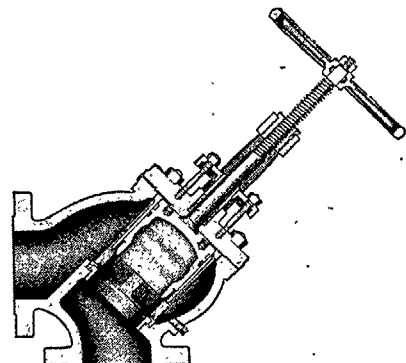
TEST PRESSURES

Shell test — 500 pounds hydrostatic
 Seat test — Sizes 2½ to 6-inch, 375 pounds hydrostatic
 — Sizes 8 and 10-inch, *250 pounds hydrostatic

*8 and 10-inch Valves can be equipped with gears; they would then be given the 375 pound seat test.



No. 28 E, Straight-Way Y-Pattern



Cross Section
 No. 30 E, Angle Y-Pattern

List Prices

Size	Inches	2½	3	4	5	6	8	10
No. 28 E, Flanged, Faced and Drilled	Each	45.00	50.00	60.00	80.00	95.00	145.00	240.00
No. 30 E, Flanged, Faced and Drilled	Each	45.00	50.00	60.00	80.00	95.00	145.00	240.00

Service recommendations: Crane Stop-Check Valves are recommended for use in the pipe line between each boiler and the main steam header, when more than one boiler supplies the same header. For complete explanation of this service, see page 370.

In addition, these valves render excellent service in discharge lines from boiler feed pumps or from other high pressure pumps where a high quality check valve is desired.

Straight-Way Valves may be used in horizontal lines or in vertical lines for upward flow. Angle Valves are suited for horizontal-to-downward flow or for upward-to-horizontal flow. For recommendations on installation, see page 370.

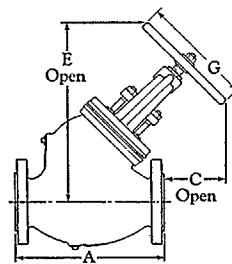
Materials and construction: These valves have Ferrosteel bodies, bonnets, and yokes; the renewable liner is cast iron; the disc and seat rings are brass; and the stem is of cold rolled steel, nickel-plated. For general description of the construction of these valves, see page 371.

Gearing: 8 and 10-inch Valves can be especially equipped with gears to permit manual operation at boiler test pressures. Prices on application.

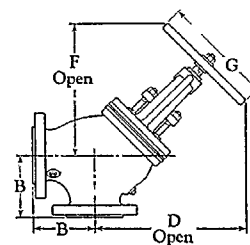
Flange dimensions and drilling: The end flanges on these valves conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). They are furnished faced and drilled unless otherwise ordered. List prices include facing and drilling to this standard, and no deduction is made if valves are ordered faced only.

Flange facing: The valves are regularly furnished with an American Standard ⅛-inch raised face on the end flanges. When so ordered, they can be furnished with male, female, tongue, or groove facing; see page 560 for dimensions and the Crane Discount Sheet for prices.

Flanges have the ⅛-inch raised face finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.



No. 28 E



No. 30 E

Dimensions, in Inches

Size	A	B	C	D	E	F	G
2½	13	5¾	6½	14½	17½	13	9
3	14¾	6¼	7½	16½	19½	14½	10
4	17	7	8	18½	21½	16	10
5	19	7⅞	10½	22	25½	19½	14
6	21½	8¾	12	26	29½	22	16
8	26	10½	16½	33	37	28	20
10	30	12¼	19	39	43½	34	24

†Include the ⅛-inch raised face on the end flanges.

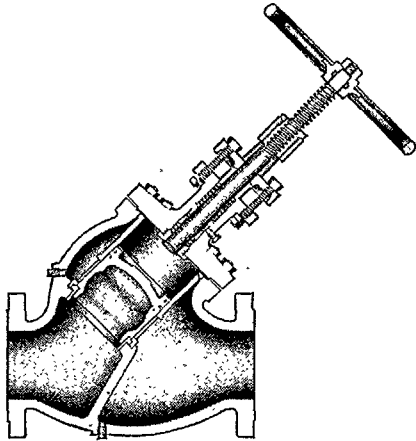
300-Pound Cast Steel Stop-Check Valves

WORKING PRESSURES

Same as Steel Globe and Angle Valves;
see page 321. Max. Temp. 750° F.

TEST PRESSURES

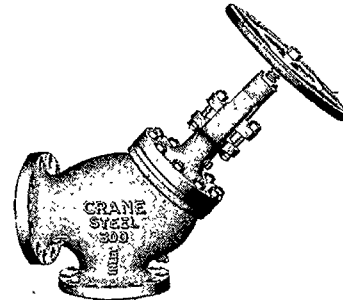
Shell test — 1000 pounds hydrostatic
Seat test — Sizes 2½ to 6-inch, 450 pounds hydrostatic
— Sizes 8 and 10-inch, †300 pounds hydrostatic
— All sizes, 100 pounds air-under-water
†8 and 10-inch Valves can be equipped with gears;
they would then be given the 450 pound seat test.



Cross Section
No. 28 XU, Straight-Way Y-Pattern

Important
The size of a Stop-Check Valve should be based upon the boiler capacity, rather than on the size of the boiler outlet or existing piping. See "Selecting Size of Stop-Check Valve" outlined on page 371.

For general description and features of Crane Stop-Check Valves, see page 370.



No. 30 XU, Angle Y-Pattern

Valves suitable for 1000° F. maximum temperature can be made to order; prices on application.

List Prices

Size	Inches	2½	3	4	5	6	8	10
No. 28 XU, Flanged, F.D. & S.F.	Each	290.00	355.00	475.00	580.00	725.00	1090.00	1640.00
No. 30 XU, Flanged, F.D. & S.F.	Each	290.00	355.00	475.00	580.00	725.00	1090.00	1640.00

Service recommendations: Crane 300-Pound Cast Steel Stop-Check Valves perform all the duties of a non-return boiler stop valve efficiently and completely. For explanation, see page 370.

Wherever check valves of outstanding quality are desired, such as in discharge lines from boiler feed pumps or from other high pressure pumps, these valves render excellent service.

Straight-Way Valves may be used in horizontal lines or in vertical lines for upward flow. Angle Valves may be used for upward-horizontal flow or for horizontal-downward flow. See page 370 for installation.

Materials and construction: These valves have high quality materials throughout. The body, bonnet, and removable liner are Crane No. 4 Carbon-Molybdenum Alloy Steel; the stem and the seat ring are Exelloy; the disc is Stellite faced Alloy Steel; and the yoke bushing is cast manganese bronze. Triplex Steel studs equip the bonnet joint. For general description and construction, see page 371.

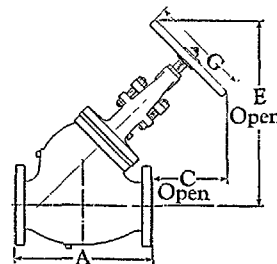
Flange dimensions and drilling: The end flanges on these valves conform to the American Standard for 300-Pound Steel Pipe Flanges and Flanged Fittings, B16-1939. They are furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the 300-Pound American Standard, and spot facing. No deduction is made if valves are ordered faced only.

Flange facing: The valves are regularly furnished with an American Standard ⅛-inch raised face on the end flanges. When so ordered they can be furnished with ring joint, male, female, tongue, groove, or other types of facings; see the Crane Discount Sheet for prices.

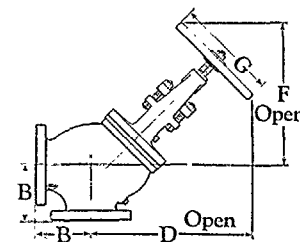
Templates for drilling . . . page 553

Finish of flange faces: The ⅛-inch raised faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish. A smooth finish can be furnished on the raised faces when so ordered; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

***3-inch Cramelap Joints:** When 3-inch 300-Pound Valves with ring joint facing are to be bolted to Cramelap Joints, orders must so specify; they require a groove of special diameter. See page 562 for dimensions.



No. 28 XU



No. 30 XU

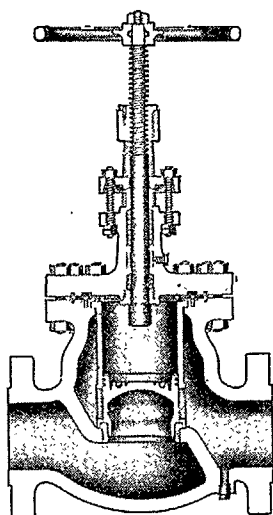
Dimensions, in Inches

Size	A	B	C	D	E	F	G
2½	13	5¾	8¾	16⅞	20	15½	10
3	14¾	6¼	8¾	17⅞	21	16⅞	10
4	17	7	12	22½	26	20⅞	14
5	19	7⅞	13	25	28½	22¼	16
6	21½	8¾	14½	28¼	32¼	25¼	18
8	26	10½	19	36¼	40	31½	20
10	30	12¼	23½	43½	48	38	24

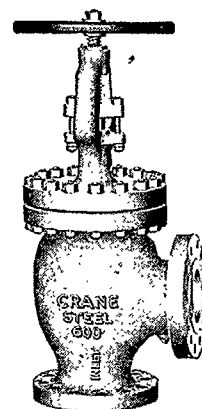
†Include the ⅛-inch raised face on the end flanges.

Dimensions of end flanges . . . page 553

400 and 600-Pound Cast Steel Stop-Check Valves



Cross Section, Globe Pattern
No. 164 U, 400-Pound
No. 179 U, 600-Pound



Angle Pattern
No. 166 U, 400-Pound
No. 180 U, 600-Pound

WORKING PRESSURES

Same as Steel Globe and Angle Valves, see page 321
Maximum Temperature, 1000° F.

TEST PRESSURES

400-Pound Valves

- Shell test — 1340 pounds hydrostatic
- Seat test — Sizes 4 to 6-inch, 600 pounds hydrostatic
- Sizes 8 to 12-inch, *400 pounds hydrostatic
- All sizes, 100 pounds air-under-water

600-Pound Valves

- Shell test — 2000 pounds hydrostatic
- Seat test — Sizes 2½ to 5-inch, 900 pounds hydrostatic
- Sizes 6 and 8-inch, *600 pounds hydrostatic
- Sizes 10 and 12-inch, *400 pounds hydrostatic
- All sizes, 100 pounds air-under-water

*These test pressures apply for wheel operated valves. When equipped with gears, the 600 or 900 pound tests are given.

For proper operation, the valves must be installed with the stem in a vertical position.

Important: It is important that the size of Stop-Check Valves be based upon the boiler capacity. See "Selecting Size of Stop-Check Valves," page 371.

List Prices and Dimensions

Size	Inches	2½	3	4	5	6	8	10	12
No. 164 U or No. 166 U, 400-Pound, F.D. & S.F.	Each			490.00	645.00	750.00	1100.00	1775.00	2925.00
No. 179 U or No. 180 U, 600-Pound, F.D. & S.F.	Each	325.00	370.00	600.00	790.00	920.00	1360.00	2465.00	3650.00
†Face to face, Globe	Inches	13	14	18	20½	23	28	32½	42
†Center to face, Angle	Inches	6½	7	9	10¼	11½	14	16¼	21
Center to top, open, Globe	Inches	24	26¼	28¾	33	37½	47½	56½	66¾
Center to top, open, Angle	Inches	23¾	26	28	32	36	44¾	53½	63½
Diameter of wheel	Inches	10	12	14	16	18	24	27	30

†Face to face and center to face dimensions include the ¼-inch male face on the end flanges.

Materials and construction: The materials from which the parts of these valves are made are of exceptional high quality. Crane No. 4 Carbon-Molybdenum Alloy Steel body, bonnet, and liner; Stellite faced alloy seat and disc; and Exelloy stem. The bonnet joint utilizes a soft steel ring joint gasket and Crane Templex Steel bolt-studs.

The general construction of these valves follows those described on pages 372 and 373, except for the stem position, the bonnet joint, and the materials.

Flange dimensions and drilling: The end flanges conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16e-1939; on 400-

Pound Valves, they conform to the 400-Pound Standard, and on 600-Pound Valves to the 600-Pound. They are furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the 400-Pound or 600-Pound American Standard, respectively, and spot facing. No deduction is made if valves are ordered faced only.

Flange facing: The valves are regularly furnished with an American Standard ¼-inch male face (large male) on the end flanges.

When so ordered, they can be furnished with ring joint, female, tongue, groove, or other types of facing; see the Crane Discount Sheet for prices.

Finish of flange faces: Large male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the male faces, when so ordered; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

†3-inch Cranelap Joints: When 3-inch 600-Pound Valves with ring joint facing are to be bolted to Cranelap Joints, orders must so specify; they require a groove of special diameter. See page 562 for dimensions.

900, 1500, and 2500-Pound Alloy Cast Steel Stop-Check Valves

For these higher pressures, Crane Co. has developed a new "Strut Design Stop-Check Valve" which permits greater efficiencies in valve operation and pressure drop. This design can be supplied also for the 300, 400, and 600-Pound Valves, when a minimum pressure drop is highly desirable.

*These valves are made to order only.
Prices and dimensions on application.*

General description and features....pages 370 and 371
Templates for drilling....page 554

Dimensions of end flanges....page 554

Iron Body Pulp Stock Valves

Brass Trimmed or All-Iron

Patented

60 pounds water working pressure

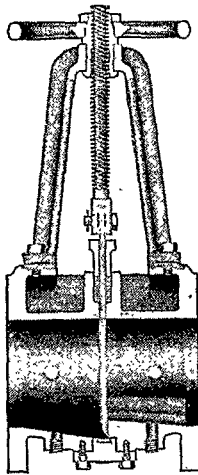
FEATURES

Self-Cleaning — Non-Clogging
Easy Operating
Tapped Openings for Flushing
Cleanout
Full Port Area

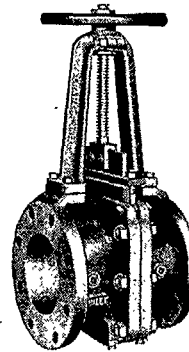
SERVICE RECOMMENDATIONS

Iron Body Pulp Stock Valves are recommended for lines carrying pulp stock in pulp and paper mills. They are especially designed to meet the requirements of this service.

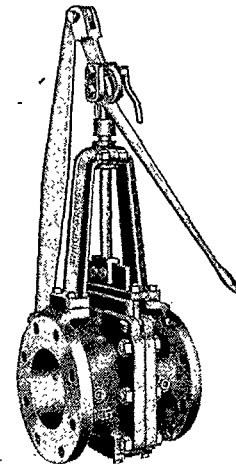
All-iron valves are for use where the liquids would corrode brass but not iron.



Cross Section
Outside Screw, Rising Stem
No. 1425 or No. 1427

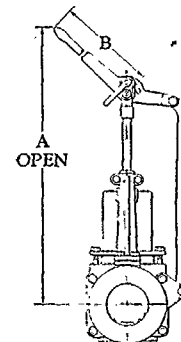


Flanged
Outside Screw, Rising Stem
No. 1425, Brass Trimmed
No. 1427, All-Iron



Flanged, Quick Opening
No. 1429, Brass Trimmed
No. 1431, All-Iron

Size Inches	List Prices, Each Faced and Drilled		Dimensions, in Inches										
	No. 1425 or No. 1429 Brass Trimmed	No. 1427 or No. 1431 All- Iron	Face to face	No. 1425 or No. 1427		No. 1429 or No. 1431		Size of six tapped open- ings in body	Flange Dimensions				
				Center to top, Open	Dia. of wheel	A	B		Dia. of flange	Thick- ness of flange	Dia. of bolt circle	No. of bolts	Dia. of bolts
4	107.00	115.00	9	22¼	10	33¼	12	½	9	1⅝	7½	8	⅝
6	127.50	143.50	10½	27½	10	43¼	23	½	11	1	9½	8	¾
8	149.00	168.00	11½	34⅞	12	57	29	¾	13½	1⅞	11¾	8	¾
10	191.50	218.50	13	41	14	68¾	41	¾	16	1⅜	14¼	12	⅞
12	262.00	295.00	14	47¾	16	80¾	41	¾	19	1¼	17	12	⅞
14	330.00	372.00	15	52⅝	16	90½	41	¾	21	1⅜	18¾	12	1
16	393.50	444.50	16	58¼	18	95	41	¾	23½	1⅞	21¼	16	1



Body: The body is made of cast iron; it is divided on the vertical centerline, and bolted together. A special gasket in the joint prevents leakage. Circular ports at both ends and rectangular shape at the center assure full area through the valve.

Disc: In brass trimmed valves, the disc is brass; in all-iron valves, it is Exelloy. Made in a rectangular shape with a sharp cutting edge at the bottom, the disc is fully guided by machined slots in the body.

Stem: The stem in all these valves is made of Crane Cast Manganese Bronze. It does not come in contact with the fluid in the line.

Seat: A lead filler in the bottom of the valve acts as a seat and protects the cutting edge of the disc at the point of closing.

Self-cleaning; non-clogging: The lower portion of the outlet half of the body has a series of notches, each of which entraps small units of the pulp stock. Large single accumulations of stock are avoided in closing the valve, and the cutting edge of the disc easily shears the successive small units and also any stock lodged at the seat.

Cleanout: The disc-stop holder, which carries the lead seat, is fastened to the valve with cap screws. This holder can be removed to clean out the valve.

Tapped openings: Each valve is made with six tapped and plugged openings, to facilitate flushing the inside of the valve and pipe line when changing the pulp stock from one color to another.

Stuffing box: A rectangular shaped stuffing box, with a brass or malleable iron gland, completely surrounds the valve disc. It is unusually deep and is filled with a special packing which minimizes friction.

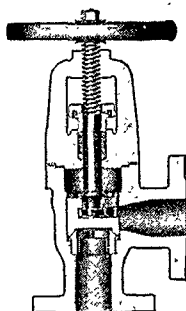
Flange dimensions and facing: The dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: The list prices include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

Face to face: Crane Pulp Stock Valves conform to the American Standard for the Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939). Standard wedge gate valves in use on pulp stock lines can be replaced by these valves without making piping changes.

*Chain Wheels for outside screw valves... page 176
Floor Stands and Extension Stems... pages 168 and 169
Gears, to facilitate operation of large size outside screw valves, can be made to order; prices on application.*

250-Pound Ferrosteel Blow-Off Valves



Angle
No. 390, Screwed
No. 391, Flanged

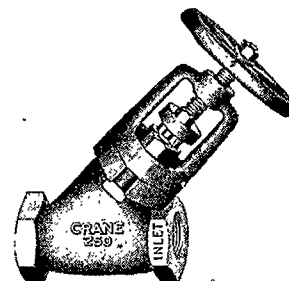
WORKING PRESSURE 250 pounds boiler blow-off service HYDROSTATIC TEST PRESSURES 550 pounds seat — 800 pounds shell

List Prices, Each

Size	Inches	1½	2	2½
Angle	No. 390, Screwed	12.00	15.00	20.00
	No. 391, Flanged, F. & D.	12.00	15.00	20.00
Y-Pattern	No. 393, Screwed	12.00	15.00	20.00
	No. 393½, Flanged, F. & D.	12.00	15.00	20.00

BOILER CODE REQUIREMENTS

Nos. 393 and 393½ Y-Pattern Valves do not comply with the requirements of the 1937 edition of the A.S.M.E. Boiler Code. Nos. 390 and 391 Valves comply with the Code for bottom blow-off, except that the maximum allowable working pressure under the Code is 200 pounds instead of 250.



Y-Pattern
No. 393, Screwed
No. 393½, Flanged

Service recommendations: These valves have been particularly designed for boiler blow-off service, but are also well suited for blow-off service on tanks or receivers where dirty, gritty water is to be handled.

Features of construction: The valves are made with renewable seats and slip-on discs, in order to permit quick repair. Contrary to ordinary globe valve construction, the seating surface in these valves is on the outside of the seat ring where it is protected from the cutting effect of the water passing the seat.

Bonnets are held to the bodies with two bolts, which facilitates dismantling the valves for inspection and repair. The outside screw and yoke construction keeps the stem threads outside the flow of water; it improves the life of the stem threads and prevents the valves from becoming inoperative due to scale and foreign matter jamming the threads.

All parts of these valves are sturdily constructed.

Stuffing boxes are unusually deep and hold ample packing to eliminate frequent repacking.

Materials: Bodies and bonnets are made of Ferrosteel, an exceptionally high grade cast iron; discs and seat rings are of cast iron, which has proven very satisfactory for blow-off service; and stems are of brass. Packing glands are made of brass, while the gland flanges are of malleable iron.

Flange dimensions: End flanges of these valves conform to the American 250-Pound Cast Iron Flange Standard, No. B16b-1928. They have a ¼-inch raised face.

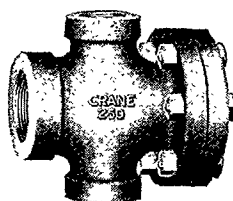
Drilling: These valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered faced only they will be furnished at the same price as for faced and drilled.

Dimensions, in Inches

Size	1½	2	2½
Angle Valves	Center to end, No. 390	4	4½
	Center to face, No. 391	4½	5
	Center to top, open	12½	13¾
	Diameter of wheel	8	9

Size	1½	2	2½
Y-Pattern Valves	End to end, No. 393	7¼	8
	Face to face, No. 393½	9⅞	11
	Center to rim of wheel, open	12¾	14
	Diameter of wheel	8	9

Standard and 250-Pound Cast Iron Blow-Off Crosses



WORKING PRESSURES
Standard 125 pounds steam 250-Pound 250 pounds steam

List Prices, Each

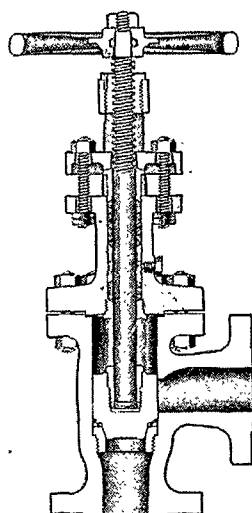
Size	Inches	2½ x 1½	2½ x 2	2½ x 2½	3 x 2	4 x 2	4 x 2½
Blow-Off Cross	Standard	9.00	9.00	9.00	10.00	12.00	12.00
	250-Pound			12.00	13.50	16.00	16.00

Service recommendations: These special fittings are used in boiler blow-off piping to provide a connection when an auxiliary means of feeding the boiler is wanted, and also to provide a readily accessible clean-out. The blind flange is removable for cleaning. The large opening is connected to the boiler

and the reduced openings, which are of one size, are used for blowing down or feeding the boiler.

Flanges: The list prices of the blow-off crosses include the blind flange bolted on. The fitting and the flange are both made of cast iron.

300 and 600-Pound Alloy Cast Steel Angle Blow-Off Valves

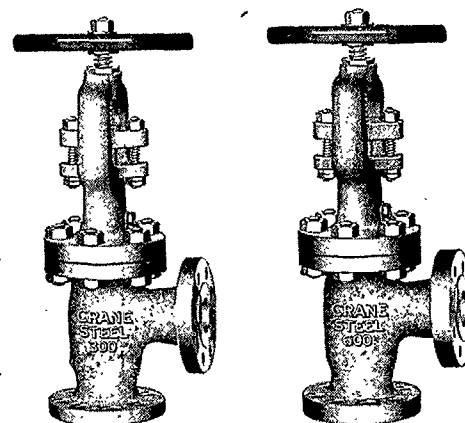


Cross Section

These valves comply with the A.S.M.E. Boiler Construction Code for Bottom Blow-Off for pressures over 250 pounds.

WORKING PRESSURES
Same as Steel Globe and Angle Valves; see page 321.

TEST PRESSURES
300-Pound Valves
Shell test—1000 pounds hydrostatic
Seat test—775 pounds hydrostatic
— 100 pounds air-under-water
600-Pound Valves
Shell test—2000 pounds hydrostatic
Seat test—1550 pounds hydrostatic
— 100 pounds air-under-water



No. 391 U, 300-Pound

No. 191 U, 600-Pound

List Prices and Dimensions

Size	Inches	1½	2	2½
No. 391 U, 300-Pound, F.D. & S.F.	Each	215.00	240.00	290.00
No. 191 U, 600-Pound, F.D. & S.F.	Each	225.00	255.00	310.00
Center to face, 300-Pound	Inches	4½	5½	6¼
Center to face, 600-Pound	Inches	4¾	5¾	6½
Center to top, open	Inches	18½	18¾	21¾
Diameter of wheel	Inches	9	10	10

Service recommendations: Crane 300-Pound and 600-Pound Cast Steel Angle Blow-Off Valves are recommended for severe service on high pressure boilers. They comply with the A.S.M.E. Boiler Construction Code for Bottom Blow-Off for pressures over 250 pounds.

Construction: These valves are outside screw and yoke type and have a bolted bonnet with a male and female joint, fitted with through bolt-studs threaded their entire length. They have a shoulder-type screwed-in body seat ring and a piston-guided disc. The stuffing box is of the lantern type and is extra deep. Packing is used both above and below the lantern, assuring tightness. The lantern provides space for a cooling chamber, and the cooling chamber is tapped and fitted with a steel plug.

These valves, when wide open, can be repacked while under pressure.

Seat and disc: The body seat ring and piston-guided disc are of the plug type. This construction offers unusual resistance to wear and to the cutting action of foreign matter. The piston portion of the disc is machined to provide a suitable fit in the valve body and accurately guides the disc to and from its seat. In addition, the piston serves effectively to throttle the flow from the inlet port when opening or closing the valve, thus affording additional protection to the seating surfaces against the danger of wiredrawing.

Materials: The body and bonnet are made of Crane No. 4 Carbon-Molybdenum Steel; the stem is Inconel. The body seat ring and disc are Stellite

faced alloy steel. The bonnet bolt-studs are made of Crane Triplex Steel, and the bonnet gasket, of Cranite.

Flange dimensions: The end flanges conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939; on 300-Pound Valves, they conform to the 300-Pound Standard, and on 600-Pound Valves, to the 600-Pound.

Drilling: The end flanges on the No. 391 U and No. 191 U Valves are furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the 300-Pound or 600-Pound American Standard, respectively, and spot facing. No deduction is made if valves are ordered faced only.

Flange facings: The 300-Pound Valves are regularly furnished with an American Standard ¼-inch raised face, and the 600-Pound Valves, with a ¼-inch male face (large male) on the end flanges.

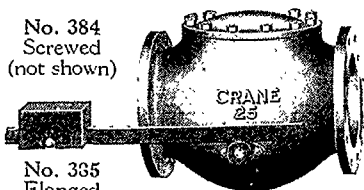
When so ordered they can be furnished with ring joint, male (on 300-Pound Valves), female, tongue, groove, or other types of facings; see pages 560 to 563 for dimensions and the Crane Discount Sheet for prices.

Finish of flange faces: The ¼-inch raised faces and large male faces are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the raised or male faces when so ordered; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

Iron Body Back Pressure Valves

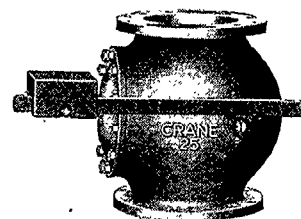
No. 384
Screwed
(not shown)



No. 385
Flanged

No. 385, in Horizontal Position
Only sizes 4-inch and larger can
be used in a horizontal position.

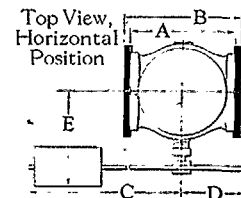
Weighted for back pressures up to 5 pounds.
Service recommendations: These back pressure valves are ideal for use on non-condensing engine installations, where the exhaust steam is largely used for heating, and where the valve, therefore, is not called upon to operate frequently. Valves 4-inch and larger can be used in either horizontal or vertical lines; 3½-inch and smaller are for vertical lines only. A vertical position is preferred, as wear on moving parts is lessened.



No. 385, in Vertical Position
All sizes can be used
in a vertical position.

List Prices, Each, and Dimensions, in Inches

Size	Inches	2	2½	3	3½	4	5	6	8	10	12
No. 384, Screwed		11.00	13.00	15.00	19.00	22.50	33.50	43.00			
No. 385, Flanged, F. & D.						26.00	37.00	47.00	90.00	130.00	200.00
Dimensions in Inches	A	6½	7	8	9	10	11¼	13			
	B					11½	13	14	19½	24½	27½
	C	12½	14¼	16¼	16¼	18¾	20½	24	26¼	33¾	33¾
	D	4	4½	5¼	5¼	7	7½	7½	9¼	13½	13½
	E	6½	6¾	7¾	8	9½	10½	11¾	14	16¾	19



Same dimensions apply
for vertical position.

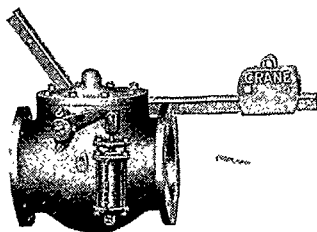
Construction: The valves have iron bodies, caps, and weights; brass seats and discs; and malleable iron levers. The lever and the adjustable weight are mounted on the side of the valve for size 4-inch and larger and on the cap (not illustrated) for sizes 3½-inch and smaller. No dashpot is used.

Flange dimensions and facing: The dimensions

of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

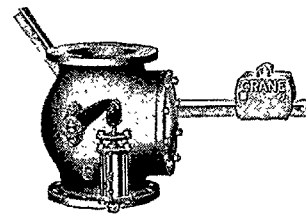
Iron Body Combination Back Pressure and Exhaust Relief Valves



No. 415 H Horizontal

Service recommendations: These valves are ideally suited for either back pressure or exhaust relief service. On condensing engine installations, they protect the condensers by opening automatically and exhausting to the atmosphere when the vacuum is lost. On non-condensing engine installations, they maintain back pressures up to 5 pounds and relieve when the set pressure is exceeded.

Sizes 4, 5, and 6-inch have the lever and weight on cap.



No. 415 V Vertical

List Prices, Each, and Dimensions

Size	Inches	4	5	6	8	10	12
No. 415 H, Flanged F. & D.		64.00	88.00	120.00	195.00	310.00	385.00
No. 415 V, Flanged F. & D.		64.00	88.00	120.00	195.00	310.00	385.00
Face to face	Inches	11½	13	14	19½	24½	27½

Features of design: External dashpots on these valves cushion the disc action and prevent pounding; foreign matter cannot collect in the dashpot and interfere with operation. A sealing lip around the valve seat and ½-inch tapped openings in the body permit water sealing the valves.

Back pressure valves: When the valve is used in a non-condensing engine installation, the weight is mounted as shown in the above illustrations. The adjustment of the weight should not hold more than 5 pounds back pressure. These valves have a more positive action than ordinary valves, and therefore, they may be used on installations where live steam is admitted into exhaust lines as "make up" when the customary volume is insufficient. For this service, ordinary back pressure valves with their large blow-down of pressure are extremely wasteful.

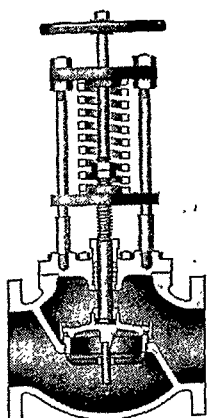
Exhaust relief valves: For use as exhaust relief

valves in condensing engine installations, the weight is placed on the short rising arm of the outside lever. As long as the vacuum is maintained in the condenser, the valves remain closed. If the vacuum is broken, they open and exhaust the engine to the atmosphere until closed by hand.

Flange dimensions and facing: The dimensions of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

Spring Loaded Iron Body Relief and Back Pressure Valves



Cross Section
No. 4387, Horizontal

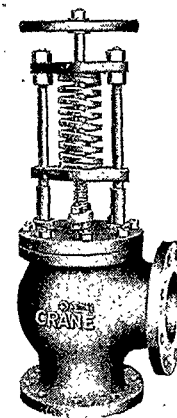
Outside Spring Valves

Service recommendations: These valves are suited for use as back pressure valves between auxiliary engines and condensers, and for use as exhaust relief valves on condensers to protect the equipment if the vacuum is lost. Although they are primarily intended for marine service, they are also suitable for stationary plants wherever valves are required to exhaust into a vacuum, or where back pressures are desired.

Pressure setting: When discharging into a vacuum, these valves may be set for any pressure from 1 to 20 pounds.

For relieving to atmosphere, they may be set for any pressure from 10 to 35 pounds.

Ordering: Orders should specify the pressures on both the inlet and the outlet side of the valves. The desired pressure setting must also be stated. Capacities are furnished on application.



No. 4389
Angle

List Prices and Dimensions

Size	Inches	2½	3	4	5	6	8	10	12
No. 4387 or No. 4389, F. & D.	Each	79.00	88.00	113.00	155.00	183.00	275.00	345.00	475.00
Center to face, Globe or Angle	Inches	4¾	5	6	7	8	9¾	12¼	13¾
Center to top, open	Inches	14	16	21	25½	28	34	40	46
Diameter of wheel	Inches	6	7	9	10	10	12	14	16

Features of design: These valves have adjustable popping chambers which insure high lift discs, large discharging capacities, and definite opening and closing pressures. The blow-down of pressure can be regulated without dismantling the valves.

When desired, the valves can be manually opened and left in that position; turning the handwheel to the left gradually releases the spring tension, and when it is no longer under compression, lifts the disc from its seat.

Stem packing makes these valves suitable for services requiring discharging into a vacuum.

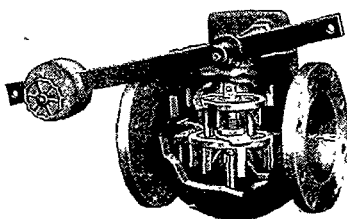
Flange dimensions and facing: The dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges are plain faced, with a smooth finish.

Drilling: List prices of flanged valves include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

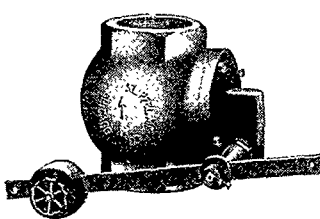
Drilling templates . . . page 551

Klipfel Back Pressure Valves

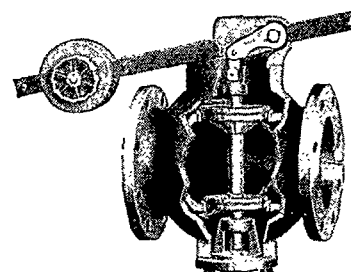
For Non-Condensing Engines



Cross Section — No. 417, Flanged
Sizes 2 to 6-inches, inclusive



No. 416, Screwed
Sizes 2 to 6-inches, inclusive



Cross Section — No. 417½, Flanged
Sizes 8 to 20-inches, inclusive

Service recommendations: These back pressure valves are designed for use on the exhaust lines from engines, turbines, pumps, etc., where it is desired to maintain a back pressure of not less than 1 pound. They should only be used on non-condensing service.

Installation: Although these valves will operate in either horizontal or vertical positions, the horizontal position is recommended wherever possible. When installed horizontally, the inner valve operates more

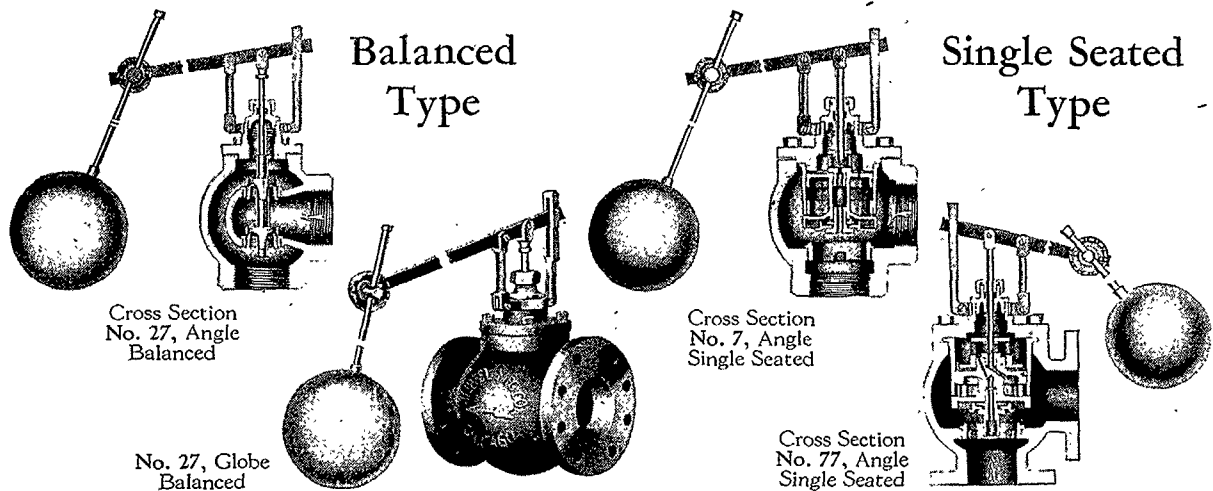
easily, wider pressure adjustment is possible, and the valve has greater sensitiveness and longer life.

Back pressure: These valves are weighted for back pressures as follows:

Size	Vertical	Horizontal
2 and 2½-inch	4 to 20 pounds	1 to 20 pounds
3 to 6-inch	3 to 10 pounds	1 to 10 pounds
8 to 12-inch	2 to 8 pounds	2 to 8 pounds
14 to 20-inch	2 to 6 pounds	2 to 6 pounds

Prices, dimensions, and additional information furnished on request.

Klipfel Tank Float Valves and Lever Valves



30

List Prices, Screwed Ends, Each

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6
No. 27, Globe or Angle, Screwed		30.00	30.00	30.00	35.00	38.00	45.00	50.00	65.00	80.00	95.00	110.00	160.00	190.00
No. 7, Globe or Angle, Screwed				36.00	40.00	45.00	50.00	60.00						
No. 77, Globe or Angle, Screwed									90.00	110.00		155.00	215.00	235.00

List Prices, Flanged Ends, Each

Size	Inches	2	2 1/2	3	3 1/2	4	5	6	8	10	12
No. 27, Globe or Angle, Flanged F. & D.		55.00	70.00	85.00	100.00	115.00	165.00	195.00	305.00	390.00	540.00
No. 77, Globe or Angle, Flanged F. & D.			95.00	115.00		160.00	220.00	240.00	500.00		

Service recommendations: *Balanced float valves* are recommended to control the flow of hot or cold water to open tanks where a perfectly tight seating valve is not required. These valves are suitable for 150 pounds water pressure in the small sizes, decreasing to 25 pounds for the largest sizes.

Single seated float valves are designed to maintain the water level in open tanks where a tight closing valve is needed to prevent waste and overflow. They are suitable for hot or cold water service at pressures up to 150 pounds.

Construction: The internal construction of the No. 27 Valves embodies two discs of identical diameters mounted on a single stem to balance each other when under water pressure. The discs have a close sliding fit in the seat bores, but because they do not seat, they allow a slight leakage when in the closed position. Double seating inner valves can be supplied on special order.

Single seated valves, No. 7 and No. 77, have an internal piston, disc holder, and pilot valve. The lower end of the piston forms a holder in which the composition disc is retained by a disc nut. A pilot valve, actuated by the valve stem, controls the water pressure above the piston. As the stem is loosely attached to the piston, the movements of the float also act directly to operate the main valve.

Tank float valves must be installed with flow passing through in the direction as indicated on the valve. No. 77 has a leather cup piston seal.

Materials: All of these valves, both balanced and single seated types, have bronze bodies for sizes 1 1/2-inch and smaller and semi-steel bodies for sizes 2-inch and larger. Excepting rubber composition discs, internal parts for all valves are bronze. Other materials can be supplied on special order.

Flange dimensions and drilling: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16-1930). Flanges are plain faced, with a smooth finish. The list prices of flanged valves include facing and drilling to this standard. No deduction is made when valves are ordered faced only.

Lever valves: Valves of construction as those illustrated above, but without the float, float rod, and rosette, can be furnished for operation by other suitable mechanism or by hand. Catalog numbers are:

No. 62, lever valve; for No. 27, less float parts.

No. 73, lever valve; for No. 7, less float parts.

No. 773 lever valve; for No. 77, less float parts.

Other types of float valves: For unusual services or irregular installations, other float valves or mechanisms are available; prices and detailed information on application.

No. 777, fitted with a rubber diaphragm, suitable for gritty or sticky fluids. Sizes 3/4 to 4 inches.

No. 177, supplied with a separate pilot valve for remote operation. Sizes 2 to 8 inches.

No. 20 float mechanism alone; consisting of float, shaft, packing box, and lever. Suitable for operating a valve or switch by means of a float installed inside a closed tank.

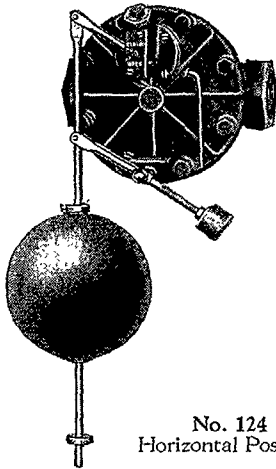
Dimensions on application

Clayton Float Valves

Clayton Float Valves are revolutionary in principle, yet thoroughly proven by use. They are hydraulically operated. The lightest contact of the float ball operates the pilot valve, which diverts and utilizes the line pressure as the closing and opening force. These valves operate positively, never

lingering in a partially open position; they are either wide open or drip tight shut. Both opening and closing speed are hydraulically governed to eliminate line shock.

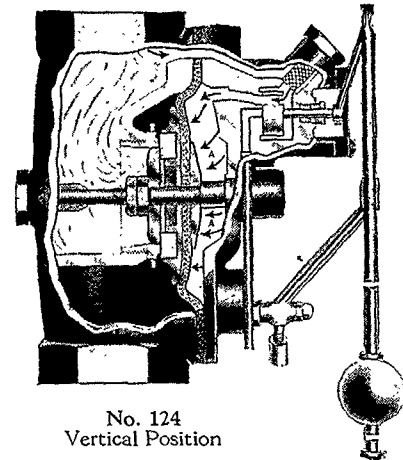
Principle of operation: With the pilot valve in the closed position, full line pressure is admitted to the diaphragm chamber (A), shown in the cut below. Pressure thus exerted on this larger area provides positive closing force in balance with, but always greater than, valve inlet pressure. With the pilot valve in the open position, the diaphragm chamber (A) is drained and the line pressure opens the valve wide.



No. 124
Horizontal Position

FEATURES

Feathertouch control—Positive action
Leak-proof—Variable level control
Selective closing speeds—Wide application
No water hammer or line shock



No. 124
Vertical Position

Service recommendations: Standard Valves handle water of moderate temperatures at pressures from 10 to 150 pounds. Flow capacities are the same as for wide-open globe valves.

Pilot: The small self-lubricated disc-type pilot moves only slightly from wide open to closed position, requiring but a few ounces of pressure to rotate it. It can be mounted on the valve or at a distance; one pilot can control several valves.

Flanges: Flanged valves are regularly furnished faced and drilled to the American Cast Iron Flange Standard, Class 125 (B16a-1939). See page 551 for drilling templates.

Materials: Sizes $\frac{1}{2}$ to $1\frac{1}{2}$ -inch are cast brass with integral seat. Larger sizes are cast iron with renewable brass seat. Diaphragm is long-lived, reinforced rubber. All valves have renewable disc.

Variable levels: High and low levels may be set one inch or many feet apart by merely adjusting the float stops.

Special valves: Valves for pressures under 10 pounds or over 150 pounds; sizes larger than 12-inch; valves for gasoline, chemicals, and other fluids; and $\frac{1}{2}$ to $1\frac{1}{2}$ -inch sizes with renewable seats are made to order; prices and dimensions will be furnished on application.

List Prices, Each, and Dimensions, in Inches—Standard Valves

Size	Screwed End Valves									Flanged End Valves, Faced & Drilled							
	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4	2	$2\frac{1}{2}$	3	4	6	8	10	12
Price	30.00	30.00	35.00	40.00	45.00	55.00	90.00	100.00	120.00	60.00	95.00	105.00	125.00	210.00	340.00	450.00	600.00
Length	$3\frac{7}{8}$	$3\frac{7}{8}$	$5\frac{1}{8}$	$7\frac{1}{4}$	$7\frac{1}{4}$	$7\frac{3}{4}$	$13\frac{1}{4}$	$13\frac{1}{4}$	16	$9\frac{3}{8}$	$13\frac{1}{4}$	$13\frac{1}{4}$	16	20	24	28	32

Optional Equipment

Clayton Remote Control Units eliminate the need of linkage or other mechanical connections between float unit and valve, irrespective of the distance. The list prices shown for these units apply regardless of the size of the valve.

Clayton Float Chamber No. 126 (left) is designed for external installation, as on feed water heaters, closed surge tanks, etc.

Price, Extra.....\$37.50

No. 130—(right) Hand operated pilot. Direct mounting or remote control.

Price, Extra.....\$5.00

No. 132—Solenoid operated pilot, direct mounting or remote control, 110 A.C.

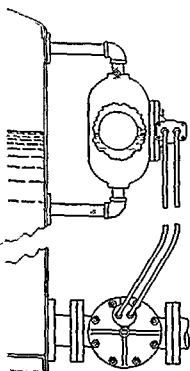
Price, Extra.....\$35.00

Clayton Remote Control No. 128 (right) consists of a standard Clayton pilot and float control mounted on a bracket.

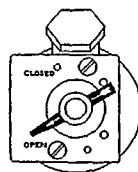
Price, Extra.....\$10.00

Speed Regulation: Any Clayton Float Valve may be furnished with an adjustable opening or closing speed regulator to meet unusual or special service conditions.

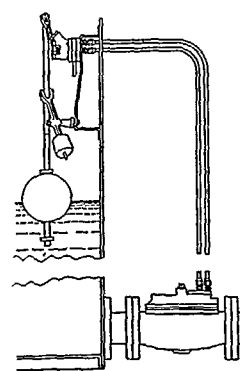
Price, Extra.....\$5.00



No. 126



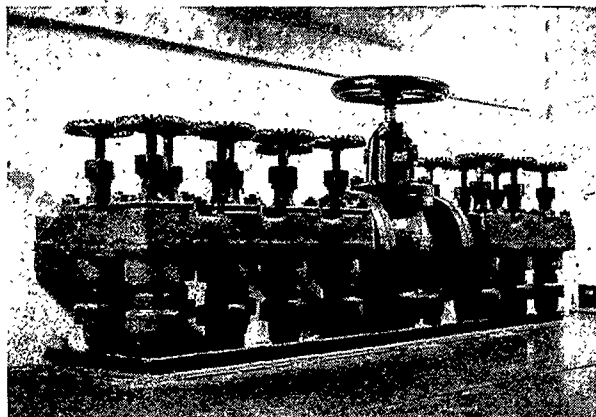
No. 130



No. 128

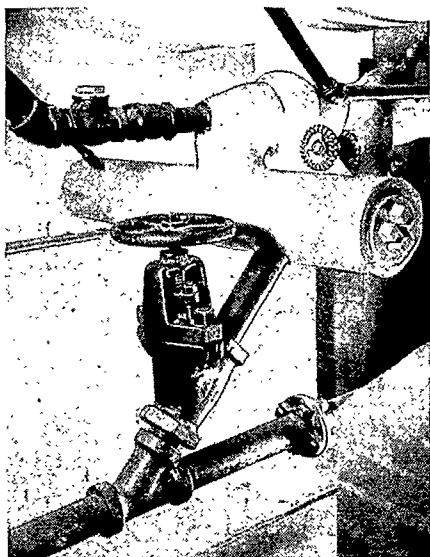


A stop-check valve on boiler lead to main steam header — in the boiler plant of large hospital.



Valve manifold, on a modern towboat, built by Crane. Crane manifold valves are made of brass, iron, or steel.

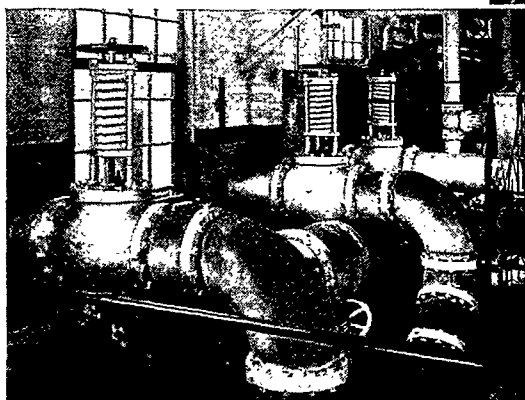
30



Crane Y-pattern blow-off valve in municipal building boiler room.



A Crane cast steel stop-check valve with butt-welding ends, and Crane forged steel valves, fittings, and unions in the power plant of a city railway.



A pulp and paper mill installation showing three Crane spring loaded back pressure and exhaust relief valves.



Safety and Relief Valves

Pop Safety Valves

Brass, for Steam.....	pages 384 and 385
Brass, for Air and Gas.....	pages 386 and 387
Brass, Low Pressure, for Heating Boilers.....	page 388
Brass, Low Pressure, for Kettles, Cookers, Etc.....	page 388
Iron, Low Pressure, for Heating Boilers.....	page 389
Iron, for Air and Gas.....	page 390
Steel, for Steam.....	page 391
Lever and Weight.....	page 393
Crosby Safety Valves, Iron and Steel.....	page 392

Relief Valves

Brass, Small Sizes, for Steam, Water, and Air.....	page 394
Brass, for Water Heaters.....	page 395
Brass, for Vacuum Service.....	page 395
Brass, for Steam, Water, and Oil.....	pages 396 and 397
Brass, for Air and Gas.....	pages 398 and 399
Brass, High Pressure, for Hydraulic Services.....	page 400
Iron, All-Iron, for Ammonia, Etc.....	page 401
Iron, with Inside Spring, for Water and Oil.....	page 402
Iron, with Outside Spring, for Steam, Water, and Oil.....	page 404
Steel, with Inside Spring, for Water and Oil.....	page 403
Steel, with Outside Spring, for Steam, Water, Oil, and Gas.....	page 405
Crosby Relief Valves, Iron and Steel.....	pages 406 and 407

Corrosion-Resistant Alloy Relief Valves.....	page 450
Cast Iron Drip Pan Elbows.....	page 391

Crane Safety and Relief Valves are shown on the pages referred to above. For other Crane special duty valves and for specialties, see pages 369 to 381 and pages 409 to 442.

Brass Pop Safety Valves For Steam

Inside Spring Valves for Saturated Steam

Can be set at any pressure within the following ranges:

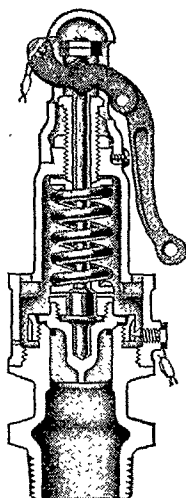
250-Pound Valves — 3 to 250 pounds saturated steam

350-Pound Valves — 251 to 350 pounds saturated steam

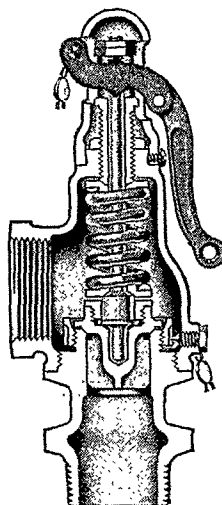
Outside Spring Valves for Superheated Steam

Can be set at any pressure within the following range:

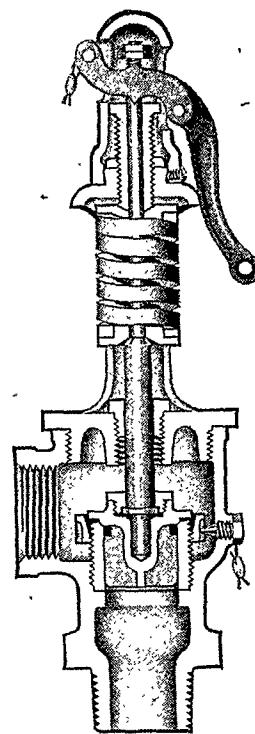
250-Pound Valves — 3 to 250 pounds steam, 550° F. max. temp.



Cross Section
Top Outlet Valve



Cross Section
Side Outlet Valve



Cross Section
Outside Spring Valve

Features of design: These valves are of the single disc type, and, except for the $\frac{3}{8}$ -inch size 250-Pound Valve and the $\frac{1}{2}$ -inch size 350-Pound Valve, are equipped with adjustable blow-back regulating rings. This feature permits readjustment of the blow-back when the set pressure is changed or regulated. Adjustment of the blow-back ring can be made from the outside of the valve without interfering with the pressure setting.

Lifting levers are reversible; they can be arranged as illustrated for pull-up operation, or they can be reversed for push-or-pull-down operation. When installing the valves, ample clearance should be allowed. For convenience, the lifting levers and caps of valves without padlocks can be rotated to any point in a complete circle without disturbing the setting of the valves.

The screwed regulating sleeve adjustment for the main spring permits the set pressure to be increased or decreased 10 per cent. While this feature affords the user a generous latitude in the selection of the set pressure, the maximum variation in the set pressure must be strictly observed as one spring cannot cover the complete range of pressures at which the valve may be set.

To prevent tampering with the adjustments after they have been set for pressure and blow-back at the factory, these valves are equipped with wire seals. As an added precaution against tampering, the valves can be supplied with padlocks on the caps.

Installation: Pop safety valves should be installed in an upright position directly on the apparatus to be protected. If they are installed horizontally or at an angle, the disc may not seat properly, the seating surfaces might be seriously damaged by cutting, and the valve would leak and be wasteful.

Piping should be carefully planned. Outlet piping should be as short as possible, with a minimum number of turns, and never smaller in size than the outlet of the valve. Inlet piping, if any is necessary, should be full size and not longer than an extra heavy fitting of equal nominal pipe size.

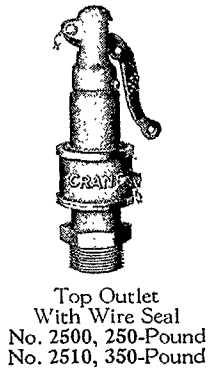
Outside spring valves: These valves are particularly designed for service on superheated steam, where the high temperatures to which they are subjected would have a deteriorating effect on an enclosed spring. The spring, being on the outside, has the benefit of the cooling effect from the surrounding air.

Capacities: Capacities are furnished on application. Inquiries should advise size, catalog number, steam pressure and temperature, and set pressure.

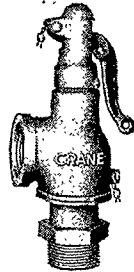
Maintenance: It is recommended that these valves be manually operated at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the boiler, pressure vessel, or line to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new boiler.

Brass Pop Safety Valves For Steam

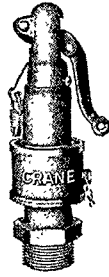
Inside Spring Valves for Saturated Steam



Top Outlet
With Wire Seal
No. 2500, 250-Pound
No. 2510, 350-Pound



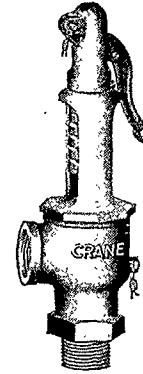
Side Outlet
With Wire Seal
No. 2501, 250-Pound
No. 2511, 350-Pound



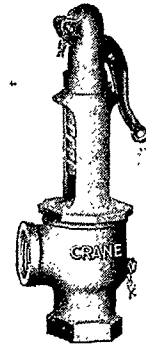
Top Outlet
With Lock
No. 2502, 250-Pound
No. 2512, 350-Pound



Side Outlet
With Lock
No. 2503, 250-Pound
No. 2513, 350-Pound



Male Inlet
Side Outlet
No. 2521
250-Pound



Female Inlet
Side Outlet
No. 2524
250-Pound

Outside Spring Valves for Superheated Steam

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
Inside Spring	250 Pound	No. 2500 Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00
		No. 2501 Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
		No. 2502 Each	14.75	14.75	16.00	19.25	22.00	27.50	38.00
		No. 2503 Each	15.00	15.00	16.50	20.00	23.00	29.00	40.00
	350 Pound	No. 2510 Each	13.50	14.50	17.50	20.00	25.00	35.00	
		No. 2511 Each	13.75	15.00	18.25	21.00	26.50	37.00	
		No. 2512 Each	14.75	16.00	19.25	22.00	27.50	38.00	
		No. 2513 Each	15.00	16.50	20.00	23.00	29.00	40.00	
Outside Spring	250 Pound	No. 2521 Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
		No. 2524 Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00

Pressure Setting

250-Pound Valves can be set at any pressure specified between 3 and 250 pounds.

350-Pound Valves can be set at any pressure specified between 251 and 350 pounds.

Orders must specify the set pressure as well as the catalog number.

Service recommendations: Crane Brass Pop Safety Valves are recommended for use on fire tube boilers, miniature boilers, and on unfired pressure vessels, such as receivers, pipe lines, etc.

For superheated steam service, at temperatures not exceeding 550° F., outside spring valves are advisable, since the springs in these valves are exposed to the cooling effect of the surrounding air, and there-

fore are less subject to the damaging effects of high temperatures.

In Marine services, valves 2-inch and smaller are suitable for the reduced pressures of general services, such as for evaporators or feed water heaters, etc.

Boiler Code requirements: Except for the 3/8-inch size 250-Pound Valves and the 1/2-inch size 350-Pound Valves, all Crane Brass Pop Safety Valves

comply with the A.S. M.E. construction codes for Fire Tube Boilers, for Miniature Boilers, and for Unfired Pressure Vessels. They also comply with the requirements of the A.P.I. Field Boiler Code.

Screwed valves cannot be attached directly to superheaters on A.S. M.E. Code installation.

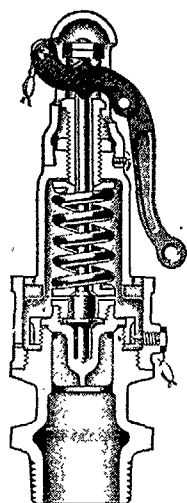
Valves with lock: Prices of valves equipped with lock include one padlock and two keys.

Dimensions, in Inches

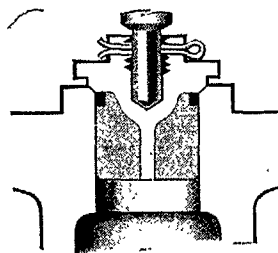
Size (Size of Inlet)	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
250 Pound Inside Spring Valves	Size of outlet, Side Outlet Valves	1/2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
	Height over all	6	6	6 1/2	7 7/8	7 7/8	9 1/8	10 5/8	12 3/4
	Center to top	3 3/4	3 3/4	3 3/4	4 5/8	4 3/8	5 1/4	6 1/8	7 3/4
	Center to end of male inlet	2 1/4	2 1/4	2 3/4	3 1/4	3 1/2	3 3/8	4 1/2	5
	Center to end of side outlet	1 1/8	1 1/8	1 3/8	1 5/8	1 3/4	2 1/8	2 7/16	2 7/8
350 Pound Inside Spring Valves	Size of outlet, Side Outlet Valves		3/4	3/4	1	1 1/2	2	2 1/2	
	Height over all		6 1/8	6 1/2	7 7/8	9 1/8	10 5/8	12 1/4	
	Center to top		3 3/4	3 3/4	4 5/8	5 1/4	6 1/8	7 1/2	
	Center to end of male inlet		2 3/8	2 3/4	3 1/4	3 3/8	4 1/2	4 3/4	
	Center to end of side outlet		1 3/8	1 3/8	1 5/8	2 1/8	2 7/16	2 7/8	
250 Pound Outside Spring Valves	Size of outlet, Side Outlet Valves	1/2	1/2	3/4	1	1 1/4	1 1/2	2	
	Center to top		5 5/8	5 7/8	7	8 1/4	9 5/16	11 1/2	
	Center to end of male inlet		2 5/16	2 7/16	2 7/8	3 3/16	3 11/16	4	4 11/16
	Center to end of female inlet		1 11/16	1 11/16	2	2 3/16	2 5/8	2 7/8	3 7/16
	Center to end of side outlet		1 1/16	1 1/16	1 5/16	1 5/8	2 1/16	2 3/8	

Brass Safety Valves

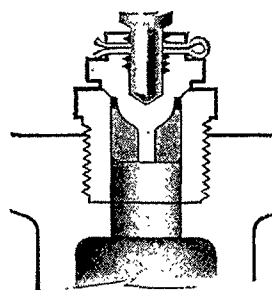
For Air and Gas



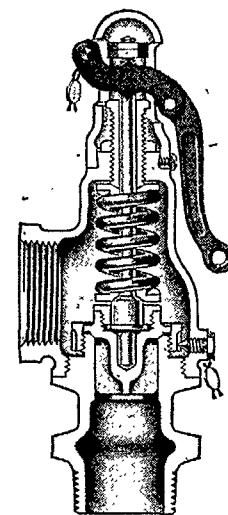
Cross Section
250 and 350-Pound
Top Outlet Valves



Enlarged section showing
seat and disc construction
of all 600-Pound valves.



Enlarged section showing
seat and disc construction
of all 1000-Pound valves.



Cross Section
250 and 350-Pound
Side Outlet Valves

31

A complete line: Crane Brass Safety Valves for Air and Gas are made in a wide range of sizes and for set pressures from 3 to 2500 pounds.

250-Pound	$\frac{3}{8}$ to 2 $\frac{1}{2}$ -inch	3 to 250 pounds
350-Pound	$\frac{1}{2}$ to 2-inch	251 to 350 pounds
600-Pound	$\frac{1}{2}$ to 1 $\frac{1}{2}$ -inch	351 to 600 pounds
1000-Pound	$\frac{1}{4}$ to 1 $\frac{1}{2}$ -inch	601 to 1000 pounds
2500-Pound	$\frac{1}{4}$ to 1-inch	1001 to 2500 pounds

Features of design: These valves are of the single disc type. In the 250 and 350-Pound Pressure Classes, all sizes except the $\frac{3}{8}$ -inch 250-Pound and $\frac{1}{2}$ -inch 350-Pound Valves are equipped with blow-back regulating rings which permits readjustment of the blow-back when the set pressure is changed. The regulating ring is not used in Crane Safety Valves for air or gas in the 600, 1000, and 2500-Pound Classes.

Valves in the 250 and 350-Pound Pressure Classes have closely defined opening and closing pressures and should only be used in connection with receivers and tanks. They should be mounted directly on the pressure vessel without any intervening pipe or fittings between the tank and the safety valve.

All of these valves are equipped with reversible type lifting levers; they can be arranged as illustrated for pull-up operation, or they can be reversed for pull-or-push-down operation. When the valves are installed, ample clearance for the levers should be allowed to permit them to be opened occasionally. For convenience the lifting levers and caps of all valves, excepting those equipped with padlocks, can be rotated without disturbing the set pressure.

The regulating adjustment for the main spring permits the set pressure to be increased or decreased by 10 per cent. These limitations must be strictly observed as one spring cannot cover the complete range of pressures at which the valve may be set.

To prevent tampering with the adjustment of the set pressure of all these valves after they have been adjusted at the factory, a wire seal is inserted in the

pin of the lifting lever. The main spring adjustment cannot be changed without removing the wire seal, lifting lever, and cap. As an added precaution against tampering with the blow-back on the 250 and 350-Pound Valves, a wire seal is installed through the locking plug.

Seat tightness: It is more difficult to keep valves tight on air or gas services than it is on steam or water. The seating surfaces of these safety valves are carefully prepared by grinding to insure audible tightness at all pressures up to 80 per cent of the set pressure. Safety valves for air or gas should be set at a pressure 25 per cent higher than the normal working pressure. No leakage will be experienced with Crane Safety Valves if they are properly installed and given ordinary care.

Code requirements: These valves comply with the requirements of the A.S.M.E. Code for Unfired Pressure Vessels for pressures above 30 pounds.

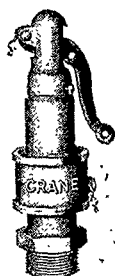
Installation: All safety valves should be installed with the stem in a vertical position. If they are installed horizontally or at an angle, the discs may not seat properly, permitting the valve to leak, and eventually cut the seating surfaces. Safety valves for air or gas should preferably be installed in an inverted position, in order to allow the moisture to collect and seal the seating surfaces.

Best results are obtained by mounting the valves directly on the apparatus to be protected.

Capacities: Capacities are furnished on application. Inquiries should advise size, catalog number, air or gas pressure, and set pressure desired.

Maintenance: It is recommended that these valves be manually operated at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the vessel or line to blow any accumulation of foreign matter clear of the seating surfaces, particularly when starting up a new installation.

Brass Safety Valves For Air and Gas



Top Outlet
With Wire Seal

No. 2550 - 250-Pound
No. 2560 - 350-Pound
No. 2570 - 600-Pound
No. 2580 - 1000-Pound
No. 2590 - 2500-Pound



Top Outlet
With Lock

No. 2552
No. 2562

*Can be set at any pressure
within the following ranges:*

250-Pound — 3 to 250 pounds
350-Pound — 251 to 350 pounds
600-Pound — 351 to 600 pounds
1000-Pound — 601 to 1000 pounds
2500-Pound — 1001 to 2500 pounds

Maximum temperature — 450° F.



Side Outlet
With Wire Seal

No. 2551 - 250-Pound
No. 2561 - 350-Pound
No. 2571 - 600-Pound
No. 2581 - 1000-Pound
No. 2591 - 2500-Pound



Side Outlet
With Lock

No. 2553
No. 2563

*When ordering,
be sure to specify
the set pressure.*

List Prices

Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
250-Pound	No. 2550 Each		13.50	13.50	14.50	17.50	20.00	25.00	35.00	50.00
	No. 2551 Each		13.75	13.75	15.00	18.25	21.00	26.50	37.00	55.00
	No. 2552 Each		14.75	14.75	16.00	19.25	22.00	27.50	38.00	55.00
	No. 2553 Each		15.00	15.00	16.50	20.00	23.00	29.00	40.00	60.00
350-Pound	No. 2560 Each			13.50	14.50	17.50	20.00	25.00	35.00	
	No. 2561 Each			13.75	15.00	18.25	21.00	26.50	37.00	
	No. 2562 Each			14.75	16.00	19.25	22.00	27.50	38.00	
	No. 2563 Each			15.00	16.50	20.00	23.00	29.00	40.00	
600-Pound	No. 2570 Each			13.50	14.50	17.50	20.00	25.00		
	No. 2571 Each			13.75	15.00	18.25	21.00	26.50		
1000-Pound	No. 2580 Each	13.50	13.50	13.50	14.50	17.50	20.00	25.00		
	No. 2581 Each	13.75	13.75	13.75	15.00	18.25	21.00	26.50		
2500-Pound	No. 2590 Each	13.50	13.50	13.50	14.50	17.50				
	No. 2591 Each	13.75	13.75	13.75	15.00	18.25				

Pressure setting: Safety valves for air and gas service always should be set 25% higher than the normal operating pressure. These valves will be set at any pressure within the ranges specified above.

Orders must state the pressure at which the valve is to be set.

Valves with lock: Prices of valves with lock include one padlock and two keys.

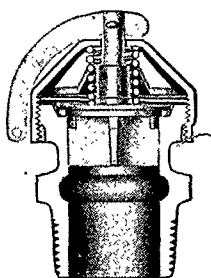
Service recommendations: These valves are recommended for receivers, tanks, pipe lines, and similar vessels, on temperatures not exceeding 450° F. For air, either top or side outlet valves are suitable, but for gases, the side outlet type generally is used, the discharge being piped away.

Noxious gases: For noxious or inflammable gases, side outlet valves having a pressure tight outlet side are recommended. These are made to order and are priced on application. Brass Relief Valves with side outlet are made regularly for such services; see pages 398 and 399.

Dimensions, in Inches

Size (Size of Inlet)		1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
250 Pound	Size of outlet, Side Outlet Valves		1/2	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
	Height to top of cap, Top or Side Outlet Valves		6	6	6 1/2	7 7/8	7 7/8	9 3/8	10 5/8	12 3/4
	Center to inlet, Side Outlet Valves		2 1/4	2 1/4	2 3/4	3 1/4	3 1/2	3 7/8	4 1/2	5
	Center to outlet, Side Outlet Valves		1 1/8	1 1/8	1 3/8	1 5/8	1 3/4	2 1/8	2 7/16	2 7/8
350 Pound	Size of outlet, Side Outlet Valves		3/4	3/4	1	1 1/2	2	2 1/2		
	Height to top of cap, Top or Side Outlet Valves			6 1/8	6 1/2	7 7/8	9 3/8	10 5/8	12 3/4	
	Center to inlet, Side Outlet Valves			2 3/8	2 3/4	3 1/4	3 3/8	4 1/2	4 3/4	
	Center to outlet, Side Outlet Valves			1 3/8	1 3/8	1 5/8	2 1/8	2 7/16	2 7/8	
600 Pound	Size of outlet, Side Outlet Valves		1/2	1	1 1/2	2	2 1/2			
	Height to top of cap, Top or Side Outlet Valves			6	7 7/8	9 3/8	10 5/8	12 3/4		
	Center to inlet, Side Outlet Valves			2 1/4	3 1/4	3 3/8	4 1/2	5		
	Center to outlet, Side Outlet Valves			1 1/8	1 5/8	2 1/8	2 7/16	2 7/8		
1000 Pound	Size of outlet, Side Outlet Valves	1/2	1/2	3/4	1	1 1/2	2	2 1/2		
	Height to top of cap, Top or Side Outlet Valves	6	6	6 1/2	7 7/8	9 3/8	10 5/8	12 3/4		
	Center to inlet, Side Outlet Valves	2 1/4	2 1/4	2 3/4	3 1/4	3 3/8	4 1/2	5		
	Center to outlet, Side Outlet Valves	1 1/8	1 1/8	1 3/8	1 5/8	2 1/8	2 7/16	2 7/8		
2500 Pound	Size of outlet, Side Outlet Valves	1/2	3/4	1	1 1/2	2				
	Height to top of cap, Top or Side Outlet Valves	6	6 1/2	7 7/8	9 3/8	10 5/8				
	Center to inlet, Side Outlet Valves	2 1/4	2 3/4	3 1/4	3 3/8	4 1/2				
	Center to outlet, Side Outlet Valves	1 1/8	1 5/8	1 3/4	2 1/8	2 3/8				

Low Pressure Brass Pop Safety Valves For Steam Heating Boilers



Cross Section
No. 2565

Set Pressure — Non-Adjustable.
These valves are regularly set at 15 pounds pressure.

List Prices and Dimensions

Size (Size of Inlet)	Inches	3/4	1	1 1/4	1 1/2	2
No. 2565, with buffed cap	Each	2.20	2.50	3.00	4.00	5.50
Overall height, open	Inches	3 3/8	3 5/8	4	4 3/8	5 1/4

Service recommendations: Crane No. 2565 Brass Pop Safety Valves are especially recommended for service on low pressure steam heating boilers. They can also be used on tanks, receivers, pipe lines, etc. where safety valves set at 15 pounds are required.

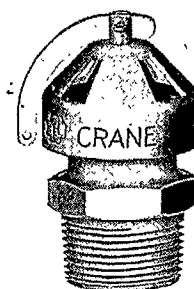
Features and construction: This valve, although relatively inexpensive, is particularly compact and sturdy. Made in all brass construction except for a steel spring, they will render excellent service if properly installed and reasonably maintained.

Maintenance: It is recommended that these valves be manually opened at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the boiler to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new boiler.

Pressure setting: These valves are non-adjustable. After they have been adjusted for pressure in the factory, the valves are permanently locked by indenting the cap into a recess in the body threads. The indentation is made with a steel stamp bearing the word "SEAL"; they cannot be taken apart or readjusted.

Crane No. 2565 Valves are set and sealed for a minimum and maximum pressure setting of 15 pounds.

Code requirements: These valves comply with the requirements of the A.S.M.E. Code for Low Pressure Heating Boilers. They bear the Code cloverleaf symbol.



No. 2565
Open Discharge

31

Low Pressure Brass Pop Safety Valves

Pressure Setting

Can be set at any specified pressure between 3 and 20 pounds.
If orders do not specify the set pressure, these valves will be set for 10 pounds.

List Prices and Dimensions

Size (Size of Inlet)	Inches	1/2	3/4
No. 1160, Rough body	Each	5.25	5.25
No. 1164, Finished and nickel-plated	Each	6.75	6.75
Height over all, No. 1160 and No. 1164	Inches	4 5/8	4 5/8

When ordering, be sure to specify the set pressure and the catalog number.



No. 1160
Rough Body

Service recommendations: These safety valves are ideal for use on jacketed kettles, cookers, and similar low pressure steam-heated apparatus, where the working pressures do not exceed 20 pounds and extremely high capacities are not required.

Features and construction: These valves are of the single disc type with a bottom guide. Made of brass, except for a steel spring and a malleable iron lifting lever, they are simple and sturdy and will render excellent service if given a little care.

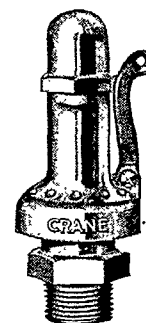
Valves arranged for an Inspector's Seal will be furnished when so ordered, at an extra charge.

Maintenance: It is recommended that these valves be manually opened at regular intervals to assure proper action. This operation should be performed

only when there is sufficient pressure available within the apparatus to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new installation.

Pressure setting: Nos. 1160 and 1164 Valves can be set for any specified pressure between 3 and 20 pounds, and orders should include the set pressure wanted.

If orders do not specify the set pressure, the valves will be regularly furnished set for 10 pounds pressure.



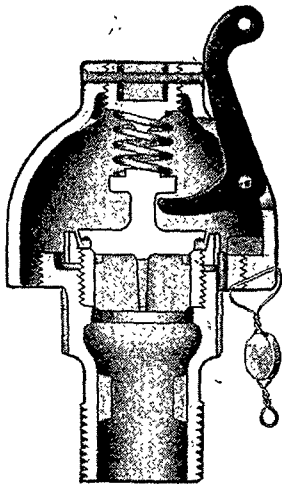
No. 1164
Finished and
Nickel-Plated

Low Pressure Iron Body Pop Safety Valves For Steam Heating Boilers

Set Pressures — Non-Adjustable

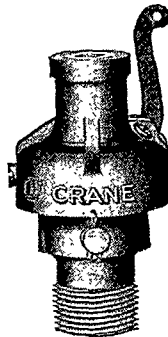
These valves are regularly set at 5, 10, or 15 pounds pressure.

On special order, they can be set at any other pressure specified, between 5 and 25 pounds, at an increased price.

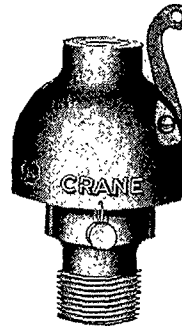


Cross Section
No. 1166

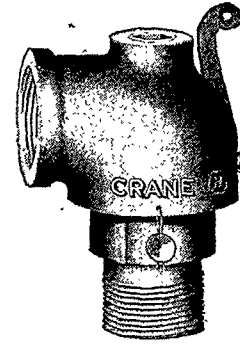
*When ordering,
be sure to specify
the set pressure
and the catalog number.*



No. 1165
Up Discharge



No. 1166
Down Discharge



No. 1168
Side Outlet

All of these valves have a black enamel finish.

List Prices and Dimensions

Size (Size of Inlet)	Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
No. 1165, Up Discharge	Each	6.00	6.75	8.25	11.25					
No. 1166, Down Discharge	Each	5.00	5.75	6.75	8.25	10.00				
No. 1168, Side Outlet	Each	5.25	6.00	7.00	8.50	11.00	19.00	25.00	45.00	65.00
Height over all, No. 1165	Inches		5 1/4	5 1/2	6 3/4	7 1/4				
Height over all, No. 1166	Inches	4 3/4	5 1/4	5 1/2	6 3/4	7 1/4				
Height over all, No. 1168	Inches	4 3/4	5 1/4	5 1/2	6 3/4	7 1/4	10 3/4	11 3/8	13 1/8	13 3/4
Center to end of inlet, No. 1168	Inches	3	3 1/4	3 3/8	3 3/4	4 1/8	6	6 7/8	7 3/4	8 1/2
Size of side outlet, No. 1168	Inches	1	1 1/4	1 1/2	1 3/4	2	2 1/2	3	3 1/2	4
Center to end of outlet, No. 1168	Inches	1 5/8	1 3/4	2	2 1/4	2 3/4	3 1/4	3 3/4	4 1/4	4 3/4

Service recommendations: These pop safety valves are particularly designed and constructed for service on low pressure steam heating boilers. They can also be used on tanks, pipe lines, receivers, etc., where safety valves are required, and where the pressure does not exceed 25 pounds.

Features of design: This line of valves is of the single disc type and has a long guide integral with the bottom of the disc to assure accurate seating. The seat ring is screwed into the body and is equipped with a blow-back regulating ring which provides a means of adjusting the amount of steam the valve will relieve.

The bodies and bases of all valves 2-inch and smaller are malleable iron and the two parts are joined in a screwed connection as shown in the above illustration of the cross sectioned No. 1166 valve. In sizes 2 1/2-inch and larger the bodies and bases are of cast iron with a flanged and bolted connection joining the two parts. Seats and discs in all of these valves are made of brass.

Pressure setting: These valves are non-adjustable. After they have been set for pressure in the factory, the adjusting screw is locked in place with a pin, and the popping pressure cannot be altered. As a further

protection against tampering by opening up the valve, a wire seal is drawn through the body and base joint.

The valves are regularly furnished for set pressures of 5, 10, or 15 pounds. When so ordered, they can be furnished set at any other specified pressure between 5 and 25 pounds, at an increased price.

Orders must specify the set pressure and the catalog number.

Code requirements: When these valves are set at pressures not exceeding 15 pounds, they comply with the requirements of the A.S.M.E. Code for Low Pressure Heating Boilers.

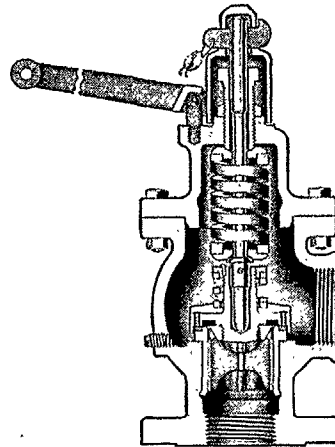
Installation: Pop safety valves should always be installed in an upright position. When side outlet valves are used in order that the discharge may be piped away, it is essential that the outlet piping be made the full size of the valve outlet tapping.

Maintenance: It is recommended that these valves be manually opened at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the boiler or pressure vessel to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new boiler.

Iron Body Pop Safety Valves For Air and Gas

Can be set at any pressure within the following range:
5 to 150 pounds air or gas.

Screwed
Side Outlet
Flanged and Screwed
Combination Inlet



Renewable
Composition Disc
High Capacity
Auxiliary Spring and Disc

Cross Section
No. 1102, Pop Safety Valve
with Side Outlet

List Prices and Dimensions

Size (Size of Inlet)	Inches	2½	3	3½	4
No. 1102 (Inlet flange F. & D.)	Each	65.00	75.00	100.00	110.00
Size of outlet	Inches	2½	3	3½	4
Center to top of cap	Inches	11	12	14	14½
Center to face of inlet	Inches	5¼	5¾	6¾	6¾
Center to end of outlet	Inches	3¾	4¼	4¾	5
Diameter of flange	Inches	7½	8¼	9	10
Thickness of flange	Inches	1	1½	1¾	1¾

Service recommendations: The Crane No. 1102 Iron Body Pop Safety Valves are especially designed for use on air and gas receivers, pipe lines, etc. where pressures do not exceed 150 pounds.

Features of design: These valves are equipped with a renewable type Crane No. 2 medium-hard composition disc which assures tight seating. A patented Crane auxiliary disc, installed directly above and acting against the main disc holder enables the valve to accommodate large capacities with a small blow-back; the main valve disc and seat is not affected by wire drawing or cutting and these parts remain tight longer. Two springs control the action of this valve — a large spring for the main valve and a smaller spring for the auxiliary valve.

When the valve is adjusted for set pressure at the factory a wire seal is installed through the stem key to prevent removal of the cap and unauthorized tampering with the adjustment.

Pressure setting: Crane Iron Body Pop Safety Valves can be set at any pressure specified between 5 and 150 pounds. The set pressure should be 25 per cent above the normal working pressure in the system.

Orders must specify the set pressure wanted.

Templates for drilling . . . page 552

Code requirements: These valves comply with the requirements of the A.S.M.E. Codes for Unfired Pressure Vessels for pressures above 30 pounds.

Capacities: Capacities are furnished on application. Inquiries should advise size, catalog number, type of service, and set pressure.

Maintenance: It is recommended that these valves be manually operated at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the receiver or pipe line to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new installation.

Flange dimensions and facing: The dimensions and drilling of the inlet flange conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Flanges have a 1/16-inch raised face finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices include facing and drilling the inlet flange to the 250-Pound American Cast Iron Flange Standard. No deduction is made when the order specifies "inlet flange faced only".

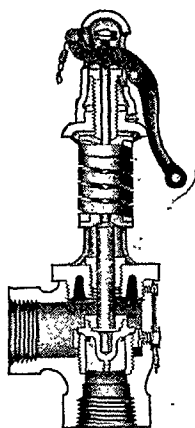
Capacities on application

Outside Spring and Yoke Cast Steel Pop Safety Valves

Capacities on application

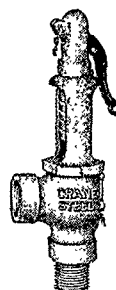
MAXIMUM SET PRESSURE
350 pounds steam, 750° F. maximum temperature

It is recommended that these valves be manually operated at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the system to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new system.

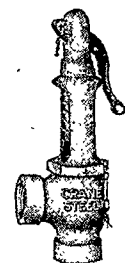


Cross Section
No. 2534

When ordering, be sure to specify the set pressure.



No. 2531
Male Inlet



No. 2534
Female Inlet

List Prices and Dimensions

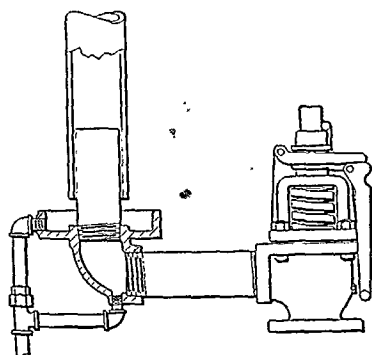
Size (Size of inlet)	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 2531	Each	42.00	45.00	50.00	58.00	69.00	85.00	107.00
No. 2534	Each	42.00	45.00	50.00	58.00	69.00	85.00	107.00
Size of outlet	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
Center to top	Inches	5 5/8	6 1/8	7	8 1/4	9 3/8	11 5/8	14 1/4
Center to end, male inlet	Inches	2 1/8	2 3/4	3 5/8	3 7/8	4 3/4	4 3/4	5 5/8
Center to end, female inlet	Inches	1 1/2	1 3/4	2 1/4	2 5/8	3	3 1/2	4 1/4
Center to end, outlet	Inches	1 1/2	1 3/4	2 1/4	2 5/8	3	3 1/2	4 1/4

Construction: This line of valves has been particularly designed to meet the need for small, high capacity pop safety valves for high pressures and high temperatures. The valves are of the single disc type and all sizes, except the 3/8-inch, have adjustable blow-back regulating rings. This provides a means for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside without interfering with the setting of the valve.

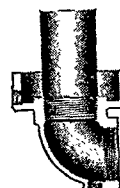
Regulating adjustments of the spring permit the set pressures to be increased or decreased by 10 per cent. Greater changes will require new springs.

Materials: These valves have Crane Cast Steel bodies and bonnets. The discs in sizes 3/8 to 1 1/4-inch inclusive and the seat bushings on all sizes are Crane 18-8 Mo Chrome-Nickel Alloy Steel; discs in sizes 1 1/2 and 2-inch are Exelloy. The springs are made of chromium-vanadium steel.

Cast Iron Drip Pan Elbows



Application of Drip Pan
Elbow to Safety Valve Piping



No. 1100

List Prices and Dimensions

Size	Inches	2	2 1/2	3	3 1/2	4	4 1/2	5
No. 1100	Each	6.00	6.75	7.50	8.50	10.00	11.75	12.50
Center to inlet end	Inches	2 1/4	2 11/16	3 1/8	3 7/16	3 3/4	4 1/16	4 7/16
Center to top of pan	Inches	4 3/4	5 1/4	5 5/8	6 3/16	6 3/4	7 1/16	7 7/16
Diameter of pan	Inches	5	7	7 1/2	8 1/2	9	10	11
Size of drain tapping	Inches	3/4	3/4	3/4	3/4	3/4	3/4	3/4

Service recommendations: These Cast Iron Drip Pan Elbows have been especially designed for use in the vent piping from the outlets of boiler safety valves to the atmosphere.

They permit the use of a slip joint in the vertical run of outlet piping, thus enabling the weight of the vertical piping to be supported independently. Unnecessary strains on the body of the valve are

avoided and possible seat distortion is eliminated.

They provide means for collecting and removing condensate and rain water from the outlet piping.

When more than one safety valve discharges into the same outlet piping, the leakage of vapor from the drip pan will indicate if any one of the valves requires attention.

The image displays five technical drawings of Crosby valves, arranged in two rows. The top row shows four valves: Style HR and Style HO (left), Industrial Service Styles HN and HS (middle), and Marine Service Styles HSA, HSAC, HNA, and HNAC (right). The bottom row shows Style JPE and Style JPC. Each drawing is a detailed cross-section or side view of the valve, showing its internal components like the spring, stem, and seat. The valves are labeled with 'CROSBY' on the body. The Industrial Service and Marine Service valves have flanged ends, while the others have different connection types.

Style HR
Style HO

Industrial Service
Styles HN, HS

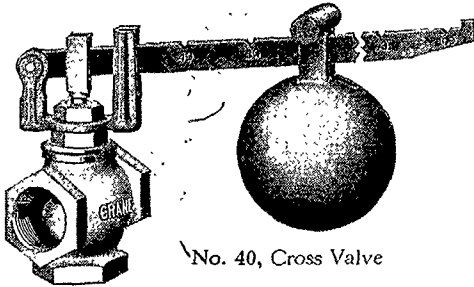
*Marine Service
Styles HSA, HSAC
Styles HNA, HNAC

Style JPE
Style JPC

Valves Recommended Maximum Temperatures				Max. Press.	Size of Inlet, in Inches											
					3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	6	
Iron Valves																
For Saturated Steam				Psi.	List of Sizes and Orifice Letters											
HR-a and HR-b				250					G	G	H	H	J	J	J	
HO-a and HO-b				250		F	G	H	H	J	K	K	L	L	L	Q
HO-bfn				250				H	H	J	K	K	L	L		
HO-be				250										N		
Steel Valves																
650° F.	750° F.	900° F.	1000° F.	Psi.	List of Sizes and Orifice Letters											
*HRC-1				350					G	G	H	H	J	J	J	
*HRD-2				450					G	G	G	H	H	J	J	
*HRD-3	*HRSA-3			500					G	G						
*HS-1	*HSA-1	HSAC-1		300		F	G	H	H	J	K	K	L	L		
				250												Q
*HS-2	*HSA-2	HSAC-2		450		F	G	H	H	J	K	K	L	L		
				400												Q
HS-3	HSA-3	HSAC-3		700		F	G									
HS-4	HSA-4	HSAC-4		900	D	E	F									
HSB-1	HSBA-1	HSBAC-1		300										N		
HSB-2	HSBA-2	HSBAC-2		450										N		
HSB-3	HSBA-3	HSBAC-3		600										N		
				600				H	J	K	L					
	*HN-2	*HNA-2	HNAC-2	450										P		
				250												Q
				900				H	J	K	L					
	*HN-3	*HNA-3	HNAC-3	800										P		
				400												Q
	HN-5	HNA-5	HNAC-5	900				G	H	J	K					
	HNA-6	HNA-6	HNAC-6	1500				F	G	H	J					
	HNA-7	HNA-7	HNAC-7	2000				F	G	H	J					
Iron and Steel Valves for Economizer Service																
Iron		Steel		Psi.	List of Sizes and Orifice Letters											
425° F.	475° F.	525° F.	750° F.						H	H	J	K	K	L		
JPE-a				300												
JPE-c				500					H	H	J	K	K	L		
		JPE-cc		800					H	H	J	K	K	L		
				1800					G	H						
			JPCE-6	1050							J					
Steel and Bronze Valves for Marine Service, for Evaporators, and for Feed Water Heaters																
Steel (650° F.)		Bronze (406° F.)		Psi.	List of Sizes and Orifice Letters											
HS-MS-1				300					H	H	J	K	K	L	L	
HS-MS-2				450					H	H	J	K	K	L	L	
		HH-MS-2		250	1 1/2" size only. (Bottom guided)											

Lever and Weight Safety Valves Brass Body

PRESSURE RANGE—
15 to 100 pounds steam



No. 40, Cross Valve

Service recommendations: These valves are suitable for ordinary low pressure relief valve service where a simple, inexpensive valve is wanted; they should not be confused with spring-loaded pop safety and relief valves. They do not have positive opening and closing points and must be set at least 20 per cent above the normal working pressure to avoid continual leakage.

Valves of this type have large blow-down of pressure, and therefore are wasteful in operation; they should never be used on compressed air or gas service.

Cross valves have two inlet openings and one outlet, and therefore can be installed either on vertical or horizontal lines. In either case, the stem must be vertical and the lever horizontal.

List Prices, Each and Dimensions, in Inches

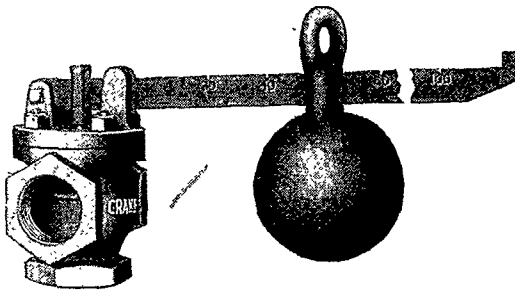
Size	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 40 Cross	With lever and weight for 41 to 100 pounds	4.40	5.00	6.50	7.80	9.40	14.30	18.00	25.00
	With lever and weight for 15 to 40 pounds	5.50	6.00	6.40	7.70	9.00	13.15	16.40	22.75
	Valve only — without lever or weight	3.25	3.70	5.00	6.00	7.00	10.15	13.15	17.75
No. 42 Angle	With lever and weight for 41 to 100 pounds		5.00	6.50	7.80	9.40	14.30	18.00	25.00
	With lever and weight for 15 to 40 pounds		6.00	6.40	7.70	9.00	13.15	16.40	22.75
	Valve only — without lever or weight		3.70	5.00	6.00	7.00	10.15	13.15	17.75
Prices of Levers and Weights are determined by deducting the price for "valve only" from the price for "valve with lever and weight".		Center to end	7/8	1	1 1/8	1 3/8	1 5/8	1 7/8	2 1/8
		Center to top	2 3/4	3 1/8	3 1/4	3 1/2	4 1/8	4 5/8	5 3/8
		Center to end of lever	7 1/2	7 1/2	10 1/2	12 1/2	16 1/4	18 1/2	17 1/2

Pressure range: These valves are regularly furnished with graduated levers for pressures from 15 to 40 pounds, or for pressures from 41 to 100 pounds. Orders must specify which pressure range is wanted.

Materials: The bodies, bonnets, discs, and stems of these valves are made of brass. Yokes and weights are made of cast iron, and levers are of steel. All iron parts are japanned maroon.

Iron Body

PRESSURE RANGE — 15 to 100 pounds steam



No. 376, Cross Valve

Service recommendations: Lever and weight safety valves are suitable for ordinary low pressure relief valve service, where protection against excessive pressures is desired, and where a simple, inexpensive valve is wanted. Unlike spring loaded pop safety and relief valves, they have low capacities, have no positive opening or closing points, and the blow-down of pressure is large.

Valves of this type should always be set at least 20 per cent above the normal working pressure in order to avoid continual leakage past the disc. They should never be used on compressed air or gas service.

These valves have two inlet openings and one outlet; they can be installed in horizontal or vertical lines, but the stem must be vertical and the lever horizontal.

List Prices, Each and Dimensions, in Inches

Size	Inches	1 1/4	1 1/2	2	2 1/2	3	4
No. 376 Cross	With lever and weight for 31 to 100 pounds	5.00	5.80	7.80	13.25	17.25	28.75
	With lever and weight for 15 to 30 pounds	4.25	5.05	6.60	10.25	13.00	23.25
	Valve only — without lever or weight	3.00	3.50	4.35	7.25	9.25	14.75
Prices of Levers and Weights are determined by deducting the price for "valve only" from the price for "valve with lever and weight".		Center to end	2	2 3/8	3 1/4	3 1/2	4
		Center to top	14 1/2	17 1/2	17	17 1/4	22 1/2
		Center to end of lever	18	22 1/4	21 1/4	27 3/4	35 1/2

Pressure range: These valves are regularly furnished with levers graduated for pressures from 15 to 30 pounds or for pressures from 31 to 100 pounds. Orders must specify which pressure range is wanted.

Materials: These valves have cast iron bodies,

brass discs and seats, steel levers, and cast iron weights. Valves in sizes 2-inch and smaller have brass screwed bonnets and brass stems. Sizes 2 1/2-inch and larger have bolted type bonnets of cast iron, and steel stems.

Brass Relief Valves

Pressure Settings — Non-Adjustable

No. 1131 Valves are regularly set for 50, 75, 100, or 125 pounds hot water pressure.

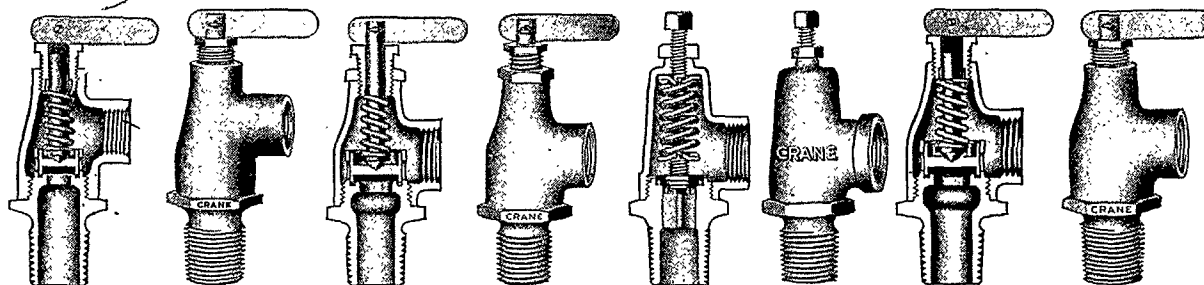
No. A 1131 Valves are regularly set for 25, 75, or 125 pounds air pressure.

No. 1133½ Valves are regularly set for 50, 75, 100, or 125 pounds cold water pressure.

Ranges of Pressure Settings — Adjustable

No. 1133 Valves are regularly set for 25, 75, or 125 pounds steam or cold water pressure.

The No. 1133 Valves are adjustable through the pressure ranges of 10 to 25 pounds, 30 to 75 pounds, and 80 to 125 pounds.



No. 1131
For Hot Water

No. A 1131
For Air

No. 1133
For Steam and Cold Water

No. 1133½
For Cold Water

When ordering, be sure to specify the set pressure and the catalog number.

List Prices and Dimensions

List Prices, Each						Dimensions, in Inches											
Size	Inches	¾	½	¾	1	Height over all, closed				Center to Inlet				Center to Outlet			
No. 1131	Each	3.50	3.50	4.25	5.00	4	4⅜	4⅝	5⅛	1¾	2⅜	2⅞	2⅞	7/8	1¼	1¼	1¼
No. A 1131	Each	3.50	3.50	4.25		4	4⅜	4⅝		1¾	2⅜	2⅞		7/8	1¼	1¼	
No. 1133	Each		3.50	4.25			3⅞	5⅛			1⅞	2¼			1	1⅜	
No. 1133½	Each	3.50	3.50	4.25		4	4⅜	4⅝		1¾	2⅜	2⅞		7/8	1¼	1¼	

Service recommendations: No. 1131 Relief Valves have been particularly designed for use on domestic hot water heaters, but will give excellent service on any hot water lines. They should not be used on steam, air, or cold water.

No. A 1131 valves are intended for use on air compressors in garages, service stations, etc., where a simple, inexpensive relief valve is wanted. They should not be used on steam or water service.

No. 1133 valves can be recommended for use on steam or cold water, when metal disc valves without lifting levers are wanted. They should not be used on air or hot water.

No. 1133½ valves have been particularly designed for use on domestic water pumping systems, and will give excellent service on cold water lines. They should not be used on hot water, steam, or air.

Features: These relief valves are made of high-grade materials throughout, are simple in design, inexpensive in first cost, and will give excellent service under all ordinary conditions. Nos. 1131, A 1131, and 1133½ valves have composition discs specially selected for the service each type is designed to be used on. Discs in these valves are cemented in the disc holders with a special cement and are not readily renewable. In case it is desired to replace the discs, disc holders complete with discs can be furnished. These valves all have lifting levers, so that the discs may be raised from the seats manually.

No. 1133 valves are made with brass discs and without lifting levers. They can be used either on steam or general cold water service. For domestic water pumping systems, the No. 1133½ valves are usually recommended.

Pressure setting: No. 1131, No. A 1131, and No. 1133½ valves are non-adjustable and when set at the factory for any of the following pressures they cannot be re-set in the field:

No. 1131 — 50, 75, 100, or 125 pounds set pressure

No. A 1131 — 25, 75, or 125 pounds set pressure

No. 1133½ — 50, 75, 100, or 125 pounds set pressure

No. 1133 valves are adjustable and although they are regularly set at the factory for any of the following pressures, they can be re-set in the field through a definite range:

No. 1133 — 25, 75, or 125 pounds set pressures.

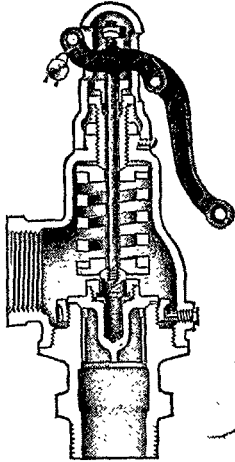
— 10 to 25 pounds, 30 to 75 pounds, and 80 to 125 pounds pressure ranges.

Orders must specify the set pressure wanted.

Capacities: Capacities are furnished on application. Inquiries should advise size, catalog number, type of service, and set pressure.

Maintenance: It is recommended that these valves be manually operated at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available to blow any accumulated foreign matter clear of the seating surfaces, particularly when starting up a new installation.

Brass Relief Valves for Water Heaters



Cross Section
No. 2606

*Can be set at any specified pressure within the following range:
5 to 250 pounds pressure. Maximum temperature 400° F.*

*When ordering, be sure to specify
the set pressure and the catalog number.*

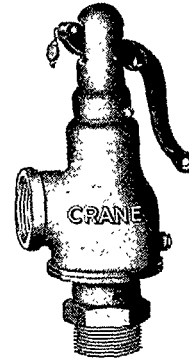
SERVICE RECOMMENDATIONS

These high grade and sturdy brass relief valves are especially recommended for use on water heaters, where valves of outstanding quality are desired.

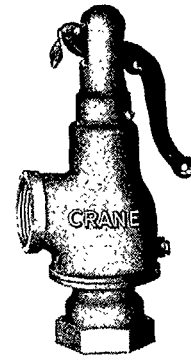
FEATURES

All valves except the $\frac{3}{8}$ -inch size have pop chambers and blow-back regulating rings, which enables them to operate with the same positive action of a pop safety valve, should steam develop in the water heater.

A stuffing box around the stem prevents leakage of hot water from the valve top.



No. 2606
Male Inlet
Side Outlet



No. 2607
Female Inlet
Side Outlet

Construction: These brass relief valves have a single disc with a bottom guide and are similar in design to the relief valves shown on pages 396 and 397, except that they have levers, caps, and wire seals. The levers, japanned maroon, are suitable for up-pull operation, or when reversed, for down-pull.

Maintenance: The stuffing box gland should be pulled up only to "finger tightness." Excessive tightness on the packing is apt to interfere with the operation of the valve.

It is recommended that these valves be manually opened at regular intervals to assure proper action. This operation should be performed only when there is sufficient pressure available within the tank to flush any accumulated scale or foreign matter clear of the seating surfaces, particularly when starting up a new heater installation.

Pressure setting: Relief valves on liquid service

List Prices and Dimensions

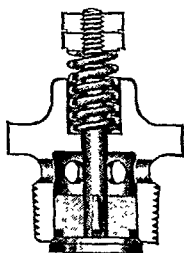
Size (Size of Inlet)	Inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 2606, Male Inlet	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
No. 2607, Female Inlet	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00
Size of outlet	Inches	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
Center to top	Inches	$3\frac{3}{4}$	$3\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{5}{8}$	$5\frac{1}{4}$	$6\frac{1}{8}$	$7\frac{3}{4}$
Center to male inlet	Inches	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$
Center to female inlet	Inches	$1\frac{7}{8}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{7}{8}$	$4\frac{3}{8}$
Center to outlet	Inches	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{5}{8}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$

should always be set 25 per cent above the normal working pressure of the system to avoid waste due to minor fluctuations of pressure.

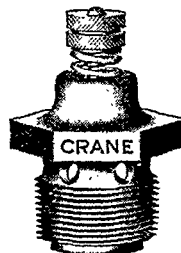
These valves can be set for any pressure within the range of 5 to 250 pounds. Orders must specify the set pressure and the catalog number.

The original setting of the valve may be readjusted for pressures 20 per cent higher or lower, but not exceeding the maximum range stated above. For greater changes in set pressures, new springs may be required, since one spring cannot cover the entire range of pressures at which the valves can be set

Brass Vacuum Relief Valves



No. 1155 V
Vacuum
Relief Valves



List Prices

Size	Inches	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	3
No. 1155 V	Each	14.00	14.00	15.00	19.00	25.00	30.00	45.00

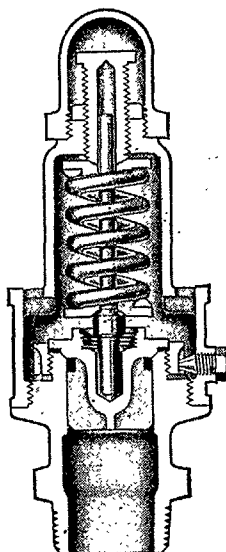
Service recommendations: These valves are designed for use as vacuum breakers on light low pressure tanks, steam jacketed kettles, and similar

apparatus, where there is a possibility of a vacuum forming which might cause injury to the apparatus because of the effect of atmospheric pressure upon it.

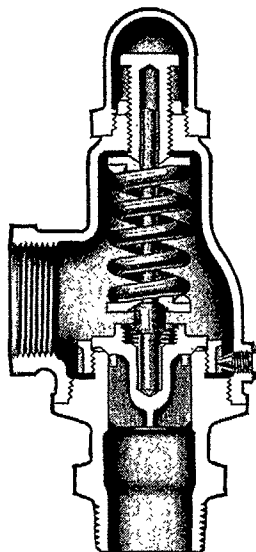
In service, the disc of the valve is normally held to its seat, both by spring tension and by the pressure in the apparatus to which the valve is attached. When the pressure in the vessel falls below atmosphere, the spring tension is overcome, and the disc is forced from its seat. Air is then admitted through the valve, thus preventing the vacuum from reaching a dangerous point.

Pressure setting: These valves are regularly furnished with springs for 10 inches of vacuum. They are set to open at 5 inches of vacuum but are adjustable for higher or lower vacuums. Valves are regularly tested for tightness at the seat with 50 pounds steam pressure.

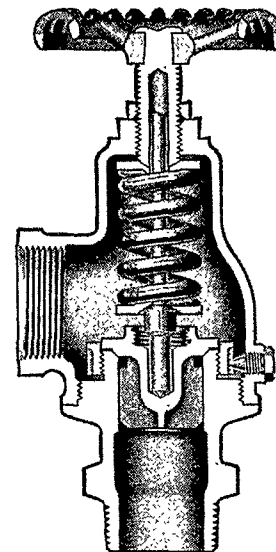
Brass Relief Valves For Steam, Water, or Oil



Cross Section
Top Outlet Valve
With Cap



Cross Section
Side Outlet Valve
With Cap



Cross Section
Side Outlet Valve
With Wheel

The above illustrations show the three basic styles of Crane Brass Relief Valves for steam, water, or oil service. For a complete range of styles, sizes, and pressures available, see the following page.

* **A complete line:** Crane Brass Relief Valves for steam, water, or oil service are made in an exceptionally broad variety of styles and sizes. Suitable for pressure settings up to 250 pounds on services at 400° F. maximum temperature and up to 300 pounds on cold services, they easily fulfill exacting requirements for many installations.

A complete listing of sizes and illustrations of all styles are shown on the following page.

Features of design: These valves are all made with high grade brass bodies, bases, and discs. The springs, spring washers, and stems are of steel with a special coating to resist corrosion. On handwheel equipped valves, the wheel is made of tough malleable iron; it is permanently and securely fastened on the brass adjusting screw.

To assure true seating of the valve, the single disc is made with a long bottom guide which operates in the finished bore of the base. The seat is integral with the base of the valve.

All of these relief valves except the $\frac{3}{8}$ -inch size are equipped with adjustable blow-back regulating rings around the seat, which provide a means of adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside of the valve without interfering with the pressure setting. A locking plug screwed into and projecting through the wall of the

body prevents the regulating ring from loosening up once it has been set for blow-down.

The regulating adjustment for the main spring permits the set pressure to be increased or decreased 10 per cent. While this feature allows the user a generous latitude in resetting the valve in the field to meet necessary pressure changes, particular consideration should be given to these limitations of readjustment, because a new spring may be required if greater changes are to be made. One spring will not cover the entire range of pressures at which a valve may be set.

All side outlet valves are made for pressure tight discharge. A stuffing box filled with asbestos packing and surrounding the main spring adjusting screw under the locknut forms an effective seal for the body.

Installation: Relief valves should always be installed with the stems in a vertical position, in order to insure proper seating of the disc. Outlet piping should be as short as possible, never smaller than the outlet of the valve, and should be so arranged as to provide proper drainage.

Capacities: Capacities of these valves will be furnished on application. Inquiries should advise full information regarding the proposed installation—kind of fluid, working pressure of system, and desired set pressure.

Brass Relief Valves For Steam, Water, or Oil

Can be set at any specified pressure within the following ranges:

$\frac{3}{8}$ to $2\frac{1}{2}$ -inch sizes — 10 to 250 pounds steam, water, or oil, 400° F., or 10 to 300 pounds water or oil, 100° F.
 $\frac{3}{4}$ and 4-inch sizes — 10 to 200 pounds steam, water, or oil, 400° F., or 10 to 250 pounds water or oil, 100° F.

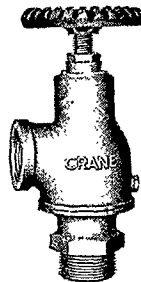
When ordering, be sure to specify the set pressure.



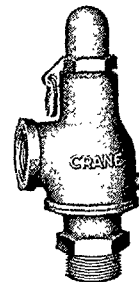
No. 2600
Male Inlet
Top Outlet
With Cap



No. 2601
Male Inlet
Side Outlet
With Cap



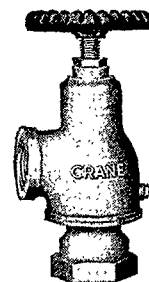
No. 2602
Male Inlet
Side Outlet
With Wheel



No. 2603
Male Inlet
Side Outlet
With Lock-up Cap



No. 2604
Female Inlet
Side Outlet
With Cap



No. 2605
Female Inlet
Side Outlet
With Wheel

List Prices

Size	Inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
No. 2600	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00			
No. 2601	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00			
No. 2602	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00			
No. 2603	Each	15.00	15.00	16.50	20.00	23.00	29.00	40.00			
No. 2604	Each	13.75	13.75	15.00	18.25	21.00	26.50	37.00	55.00	110.00	200.00
No. 2605	Each	13.50	13.50	14.50	17.50	20.00	25.00	35.00	50.00	105.00	190.00

Service recommendations: These valves are recommended for pipe lines, presses, pumps, cylinders, etc. where a blow-back or pressure drop of 10% is permissible. Relief valves are intended to relieve excessive pressures; they should not be used in an attempt to relieve shock pressures in hydraulic lines.

When a pressure drop smaller than 10% is required on steam service, pop safety valves should be used.

The side outlet valves are pressure tight on the outlet and can discharge against low head pressures.

Materials: The base, body, and disc of all of these valves are made of a high grade brass. The spring and stem are steel, the stem point being case-hardened.

Fire protection service: Relief valves used in connection with fire protection installations ordinarily must comply with various Underwriters' specifications. Before ordering valves for this service, a care-

ful study should be made of all such specifications applying to the locality in which the valves will be used, to make sure that suitable valves are secured.

Pressure setting: These valves can be set at any pressure within the ranges specified above. On steam service, relief valves should be set at least 10% higher than the normal working pressure in the system; on water or oil service, 25% higher.

Orders must specify the set pressure.

Pressure adjustment: The set pressure of these valves can be adjusted after installation to any pressure within a range of 10% above or below the original factory setting, but not exceeding the maximum pressure for which the valve is recommended.

Valves with lock: Prices of valves with lock include one padlock and two keys.

Marine service: Sizes $\frac{1}{2}$ to 2-inch are suitable for marine service.

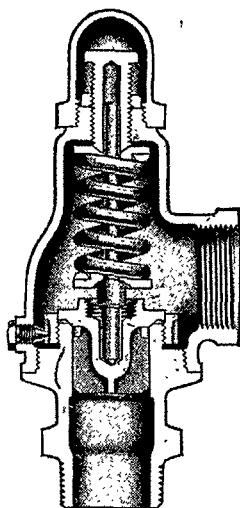
Dimensions, in Inches

Size (Size of Inlet)	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
Size of outlet, Side Outlet Valves	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	4
Over-all height	Male Inlet Valves	With Cap	$5\frac{3}{8}$	$5\frac{3}{8}$	6	$6\frac{7}{8}$	8	$9\frac{3}{4}$	$11\frac{1}{8}$	
		With Wheel	$5\frac{5}{8}$	$5\frac{5}{8}$	$6\frac{1}{8}$	$7\frac{1}{8}$	$8\frac{1}{8}$	$9\frac{1}{2}$	$11\frac{1}{4}$	
	Female Inlet Valves	With Cap	5	$5\frac{1}{8}$	$5\frac{3}{8}$	$6\frac{3}{8}$	$7\frac{3}{8}$	$9\frac{1}{4}$	11	$12\frac{1}{2}$
		With Wheel	$5\frac{1}{4}$	$5\frac{3}{8}$	$5\frac{3}{4}$	$6\frac{5}{8}$	$7\frac{3}{4}$	9	$11\frac{1}{8}$	$12\frac{1}{2}$
Center to inlet, Side Outlet Valves	With Male Inlet	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{1}{4}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$4\frac{1}{2}$		
	With Female Inlet	$1\frac{7}{8}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{7}{8}$	$4\frac{3}{8}$	$4\frac{7}{8}$	$5\frac{3}{16}$
Center to outlet, Side Outlet Valves		$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{5}{8}$	$2\frac{1}{16}$	$2\frac{7}{16}$	$2\frac{3}{4}$	3	$3\frac{1}{2}$
Diameter of wheel		$2\frac{9}{16}$	$2\frac{9}{16}$	$2\frac{9}{16}$	$3\frac{1}{16}$	$3\frac{5}{8}$	$4\frac{1}{16}$	$4\frac{3}{4}$	$4\frac{3}{4}$	6

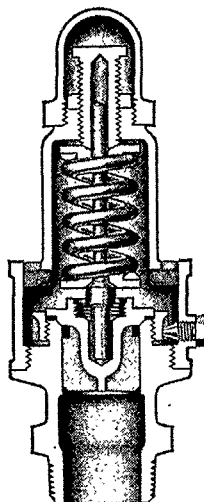
Additional description page 396

Capacities on application

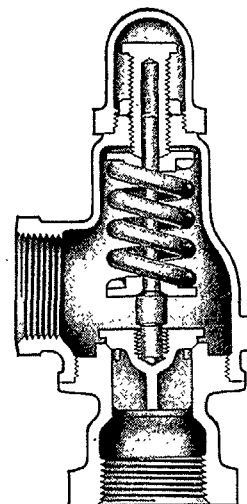
Brass Relief Valves For Air and Gas



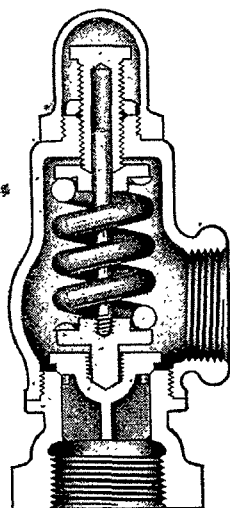
Cross Section
No. 2651



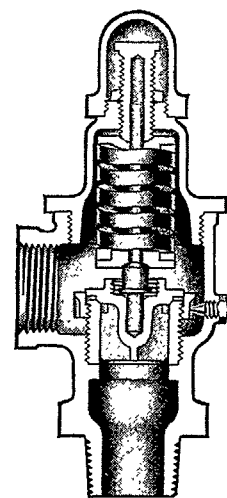
Cross Section
No. 2650



Cross Section
No. 2664



Cross Section
No. 2674
No. 2684



Cross Section
No. 2668

A complete line: Crane Brass Relief Valves for air and gas are made in a complete variety of styles, a wide range of sizes, and for an exceptional scope of pressure settings. A brief summary of this line of valves and the maximum pressures follows:

250-Pound, sizes $\frac{3}{8}$ " to 2"	500-Pound, sizes $\frac{1}{2}$ " to 2"
300-Pound, sizes $\frac{3}{8}$ " to 2"	800-Pound, sizes $\frac{3}{4}$ " to 2"

Features of design: These valves are all of the single disc type with bottom guide to assure proper seating. Except for the $\frac{3}{8}$ -inch size 250 and 300-Pound Valves and all sizes of the No. 2664, No. 2674, and No. 2684 Valves, these valves are equipped with blow-back regulating rings. In the lower pressures, these rings enable the user to adjust the blow-down when changing or regulating the set pressure.

For the higher pressures, relief valves without regulating rings are more serviceable; valves equipped with rings would have excessive capacities. The area through the seating surfaces of these high pressure valves is considerably reduced.

All side outlet valves have a pressure tight outlet. A stuffing box around the main spring adjusting screw is filled with an asbestos packing to form an effective seal for the body.

Seat tightness: It is always more difficult to keep relief valves tight on air or gas service than it is on steam, water, or oil. The seating surfaces of these valves are carefully ground to insure audible tightness at all pressures up to 80 per cent of the set pressure.

Relief valves should always be set at a pressure 25 per cent higher than the normal working pressure in the system; no leakage will be experienced with Crane Relief Valves if they are properly installed and given reasonable care.

Installation: Relief valves should always be in-

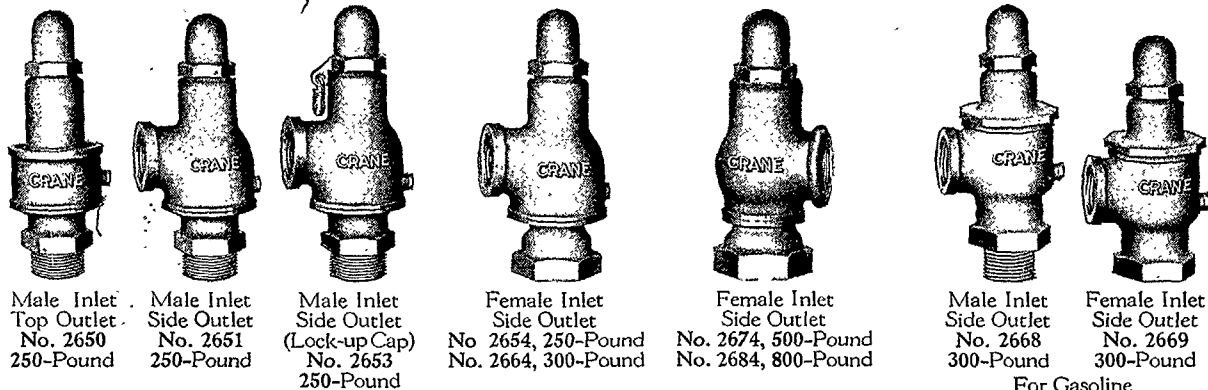
stalled with the stems in a vertical position. If they are installed horizontally or at an angle, the discs may not seat properly, resulting in a leaky valve and eventual cutting of the seating surfaces. For air and gas service, these valves should preferably be installed inverted to allow moisture to collect and seal the seating surfaces.

Special services: For service on noxious gases or inflammable liquids it is particularly desirable to use relief valves which are tight on the outlet side. Crane side outlet relief valves are especially designed for this service and should always be specified.

Brass Relief Valves For Air or Gas

Can be set at any specified pressure within the following ranges:
 250-Pound Valves — 10 to 250 pounds 500-Pound Valves — 301 to 500 pounds
 300-Pound Valves — 10 to 300 pounds 800-Pound Valves — 501 to 800 pounds
 Maximum temperature — 400° F.

When ordering, be sure to specify the set pressure.



List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
250-Pound Valves	No. 2650	Each	13.50	13.50	14.50	17.50	20.00	25.00
	No. 2651 or No. 2654	Each	13.75	13.75	15.00	18.25	21.00	26.50
	No. 2653	Each	15.00	15.00	16.50	20.00	23.00	29.00
300-Pound Valves	No. 2664, No. 2668, or No. 2669	Each	13.75	13.75	15.00	18.25	21.00	26.50
500-Pound Valves	No. 2674	Each		13.75	15.00	18.25	21.00	26.50
800-Pound Valves	No. 2684	Each			15.00	18.25	21.00	26.50

For Gasoline
or Noxious Gases

Service* recommendations: These valves are recommended for air or gas compressors, cylinders, pipe lines, etc. where a blow-back or pressure drop of 10% is permissible. When a pressure drop smaller than 10% is required, pop safety valves should be used.

The side outlet valves are pressure tight on the outlet and may discharge against low back pressures. The Nos. 2668 and 2669 Valves are especially suitable for gasoline and noxious gases; they can be dismantled without disturbing the piping connections.

Materials: The base, body, and disc of 250 and 300-Pound Valves are brass. On 500 and 800-Pound Valves, the body is brass, and the base and disc,

Crane Hard Metal. All valves have a steel spring and stem, the stem point being casehardened.

Valves with lock: Prices of valves with lock include one padlock and two keys.

Pressure setting: Relief valves used on air or gas should be set at least 25% higher than the normal working pressure in the system. Orders must specify the set pressure.

Pressure adjustment: The set pressure of these valves can be adjusted after installation to any pressure within a range of 10% above or below the original factory setting, but not exceeding the maximum pressure for which the valve is recommended.

Dimensions, in Inches

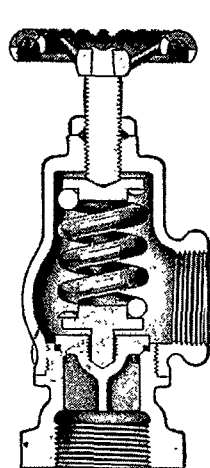
Size (Size of Inlet)	3/8	1/2	3/4	1	1 1/4	1 1/2	2
250 and 300-Pound Valves Nos. 2650, 2651, 2653, 2654, and 2664	Size of outlet	1/2	1/2	3/4	1	1 1/4	1 1/2
	Center to top	3 1/8	3 1/8	3 1/4	3 5/8	4 1/4	5 3/8
	Center to male inlet	2 1/4	2 1/4	2 3/4	3 1/4	3 3/4	4 3/8
	Center to female inlet	1 7/8	2	2 3/8	2 3/4	3 3/8	3 7/8
	Center to outlet	1 1/8	1 1/8	1 3/8	1 5/8	2 1/16	2 7/16
500 and 800-Pound Valves Nos. 2674 and 2684	Size of outlet		3/4	3/4	1	1 1/4	1 1/2
	Center to top		3 1/4	3 1/4	3 9/16	4 5/16	5 3/8
	Center to female inlet		2 1/8	2 1/8	2 1/2	2 5/16	3 1/8
	Center to outlet		1 3/8	1 3/8	1 5/8	1 3/4	2
300-Pound Valves for Gasoline or Noxious Gases Nos. 2668 and 2669	Size of outlet	1/2	1/2	3/4	1	1 1/4	1 1/2
	Center to top	3 5/16	3 5/16	3 3/8	4	4 7/8	6 1/4
	Center to male inlet	2 5/16	2 7/16	2 7/8	3 3/16	3 11/16	4
	Center to female inlet	1 11/16	1 11/16	2	2 3/16	2 5/8	2 7/8
	Center to outlet	1 1/16	1 1/16	1 5/16	1 5/8	2 1/16	2 3/8

Additional description... page 398

Capacities on application

Brass Hydraulic Relief Valves

Can be set at any specified pressure within the following ranges:



Cross Section
No. 1128



No. 1128
No. 1128½

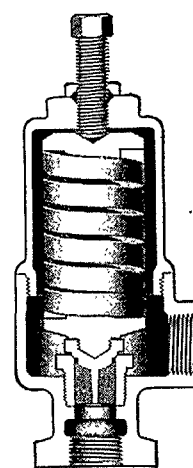
No. 1128
All sizes, 300 to 600 pounds

No. 1128½
All sizes, 300 to 800 pounds

No. 1130
½-inch valves, 800 to 8000 pounds
¾-inch valves, 800 to 6000 pounds
1-inch valves, 800 to 4500 pounds
1¼-inch valves, 800 to 4000 pounds
1½-inch valves, 800 to 2600 pounds
2-inch valves, 800 to 2600 pounds
2½-inch valves, 800 to 2600 pounds



No. 1130



Cross Section
No. 1130

Orders must specify the set pressure and the catalog number.

List Prices

Size	Inches	½	¾	1	1¼	1½	2	2½
No. 1128	Each	13.50	14.50	17.50	20.00	25.00	35.00	50.00
No. 1128½	Each		14.50	17.50	20.00	25.00	35.00	50.00
No. 1130	Each	50.00	50.00	55.00	85.00	90.00	130.00	225.00

31

Service recommendations: These valves are particularly designed to safeguard hydraulic apparatus operating at high pressures and atmospheric temperatures, such as hydraulic presses and elevators or high pressure pumping systems. They are also recommended for use on high pressure oil lines, providing the outlet drains to atmospheric pressure.

Hydraulic Relief Valves should never be used as unloading valves or in an attempt to relieve shock in hydraulic systems.

Features: This line of valves is characterized by its rugged construction, simple design, and high grade materials. Bases for the Nos. 1128 and 1128½ are cast in Crane Hard Metal, an exceptionally strong and durable copper-tin bronze. Discs in Nos. 1128 and 1128½ Valves are also made of Crane Hard Metal, while in the No. 1130 Valves, the discs are made of Alloy Steel. These latter valves have renewable screwed-in body seat rings made of Crane No. 49 Nickel Alloy. Springs are exceptionally long and made of the best quality steel.

Nos. 1128 and 1128½ Valves are provided with handwheels for easy adjustment of the set pressure, while No. 1130 Valves have a hexagon end on the adjusting screw for wrench engagement. In both types, a lock nut is provided so that the adjusting

screw may be locked at the desired set pressure.

All of these valves are pressure tight on discharge. A stuffing box around the adjusting screw, and under the lock nut, is filled with high grade packing to seal the top end of the valve.

Pressure setting: All hydraulic relief valves can be readjusted for pressures 10 per cent above or below the original set pressure, but should never be set at pressures in excess of the maximum rating for which the valve is designed. If a greater change in the set pressure is to be made, a new spring may be required, since one spring will not cover the entire range of pressures at which the valve can be set.

Relief valves should be set at least 25 per cent higher than the normal working pressure in the system in order to avoid wasting water or oil in discharges due to minor fluctuations of pressures.

The function of these valves is to safeguard the apparatus and the piping against excessive pressures, and they should not be used in an attempt to maintain pressure at a maximum point. Operating pressures maintained continuously close to the set pressure of the valve will tend to cause leakage and maintenance difficulties.

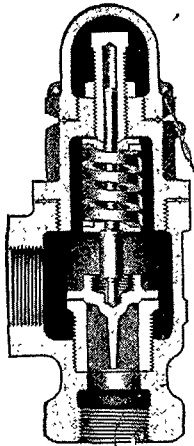
Orders for relief valves must specify the set pressure desired and the catalog number.

Dimensions, in Inches

Size	(Size of Inlet)	½	¾	1	1¼	1½	2	2½
No. 1128 No. 1128½	Size of Outlet	½	¾	1	1¼	1½	2	2½
	Center to Top	3½	3½	4¼	4½	5¼	6½	7¾
	Center to Inlet	2⅞	2⅞	2½	2½	2½	3⅞	4¾
	Center to Outlet	1⅞	1⅞	1⅞	1¾	2	2½	3
No. 1130	Size of Outlet	1	1	1	1½	1½	2	2½
	Center to Top	7¼	7¼	7¼	9½	9½	11¾	14¼
	Center to Inlet	3	3	3	3⅞	3⅞	4¾	4¾
	Center to Outlet	2½	2½	2½	3⅞	3⅞	3⅞	4¾

Capacities furnished on application

All-Iron Relief Valves



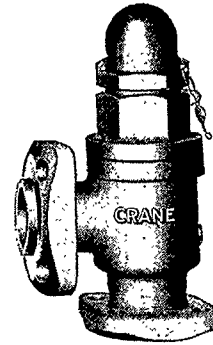
Cross Section
No. 1118

*Can be set at any specified pressure
within the following range:*
10 to 300 pounds
Maximum temperature 400° F.

*When ordering, be sure to specify
the set pressure and the catalog number.*



No. 1118
Screwed Inlet
and Outlet



No. 1118 1/2
Flanged Inlet
and Outlet

List Prices

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 1118, Screwed	Each	16.50	17.50	21.00	25.00	37.00	45.00		
No. 1118 1/2, Flanged, Faced and Drilled	Each	22.00	23.50	28.00	34.00	48.00	60.00	115.00	170.00
Extra for Companion Flanges Bolted on, per Valve		2.25	2.80	3.35	3.90	4.50	6.00	10.00	14.50

Service recommendations: These relief valves have been particularly designed for ammonia service, but may also be used wherever all-iron construction is preferred because of conditions corrosive to brass. For air or gas service, the seats should be oil sealed. Service temperatures should not exceed 400° F.

Valves in sizes 1/2 to 1 1/4-inch have a screwed bonnet; sizes 1 1/2-inch and larger have bolted bonnets. All bonnet and cap joints are sealed with a lead gasket.

Features: These valves are of sturdy construction and simple design. Bodies and bonnets are of Crane Ferrosteel; body seat rings are of steel; discs in sizes 1/2-inch to 1 1/4-inch are of cast iron, while in sizes 1 1/2-inch and larger, they are of forged steel.

The seating surfaces can be easily reground when necessary; the top of the discs are tapped with pipe threads to permit insertion of a pipe nipple for rotating the discs when regrinding.

Pressure setting: Relief valves should always be set at least 25 per cent above the normal working pressure in the system in order to prevent wastage

of fluid when minor fluctuations of pressure occur in the system. Pressure setting of these valves can be readjusted 10 per cent above or below the original set pressure, but not in excess of the maximum given above. If a greater change in the set pressure is to be made, new springs may be required, since one spring cannot cover the entire range of pressures at which the valves can be set.

Orders must always state the set pressure wanted.

Flanges: Flanged valves have ammonia tongue and groove facings. Inlet flanges are grooved and outlet flanges are tongued. 1/2-inch and 3/4-inch valves have oval flange on inlet and outlet; 1, 1 1/4, 1 1/2 and 2-inch valves have square flange on inlet and outlet; 2 1/2-inch valves have square flange on the inlet and round flange on the outlet; 3-inch valves have round flange on both inlet and outlet.

Drilling: All flanged end valves are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include drilling. No deduction is made if valves are ordered faced only.

Dimensions, in Inches

Size (Size of Inlet)	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Size of Outlet	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2
No. 1118	Center to top	3 3/8	4 1/8	5 3/8	6 7/8	6 7/8	7 1/2	
	Center to end of inlet	2 1/4	2 5/8	3 1/8	3 3/4	3 5/16	4 3/8	
	Center to end of outlet	1 3/8	1 5/8	2	2 1/2	3	3 15/16	
	Center to top	3 3/8	4 1/8	5 3/8	6 7/8	6 7/8	7 1/2	10 3/4
	Center to face of inlet	2 3/4	3	3 1/4	3 9/16	3 13/16	4 9/16	4 3/4
	Center to face of outlet	3 1/8	3 3/8	3 3/4	4	4 3/4	5 3/4	6 1/2
No. 1118 1/2	Inlet Flange	Oval flange dimensions	4	4 3/4				
		Square flange dimensions			3 9/16	3 15/16	4 11/16	5 1/16
		Round flange diameter						8 1/4
	Outlet Flange	Oval flange dimensions	4 3/4	4 3/4				
		Square flange dimensions			3 15/16	4 11/16	5 1/16	5 15/16
		Round flange diameter					8 1/4	9

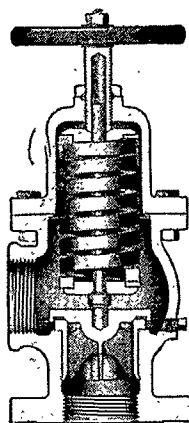
Inside Spring Iron Body Relief Valves

Can be set at any specified pressure within the following ranges:

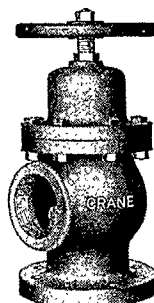
No. 1123 Valves — 10 to 300 pounds

No. 1124 Valves — 301 to 600 pounds

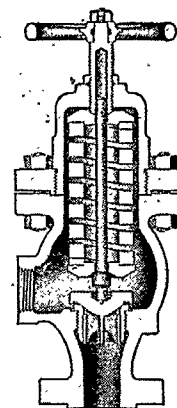
For water or oil services — maximum temperature 100° F.
Outlet pressures are not to exceed 20 pounds gauge.



Cross Section
No. 1123



No. 1123
No. 1124



Cross Section
No. 1124

When ordering, be sure to specify the set pressure.

List Prices

Size	Inches	2½	3	3½	4	5
No. 1123, Faced and Drilled	Each	42.00	50.00	68.00	75.00	120.00
No. 1124, Faced and Drilled	Each	105.00	125.00	165.00	210.00	

Service recommendations: Nos. 1123 and 1124 Relief Valves are designed for service on water or oil, where the temperature does not exceed 100° F. They are commonly used on pump discharge lines, on standpipes, pipe lines, cylinders, oil lines, etc.

These valves should not be used as unloading valves or in an attempt to relieve shock from hydraulic lines.

Outlet pressures should not exceed 20 pounds gauge.

Construction: These valves are of the inside spring, single disc type. The flanged bonnet is securely bolted to the body and makes a pressure tight joint.

A machined recess filled with packing is provided around the adjusting screw to seal this point and render the valve pressure tight on discharge.

The inlet connections on the No. 1123 Valves are suitable for a flanged or screwed joint. Outlet connections on all of these valves are screwed.

Materials: Crane Iron Body Relief Valves have iron bodies and bonnets and steel springs and stems. The seats and discs are regularly made of brass. Valves equipped with Monel seats or Monel seats

and discs can be supplied on special order, when so desired, at an advance in price.

Pressure setting: Relief valves on liquid service should be set 25 per cent above the normal working pressure of the system to insure tightness at the seat. They may be readjusted for pressures 10 per cent above or below the original set pressure, but not exceeding the maximums given above. For a greater readjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set.

Orders must specify the set pressure wanted.

Flange dimensions and facing: The dimensions and drilling of the inlet flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). They have a 1/16-inch raised face finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Drilling: List prices include facing and drilling of the inlet flanges to the 250-Pound American Cast Iron Flange Standard. No deduction is made when valves are ordered faced only.

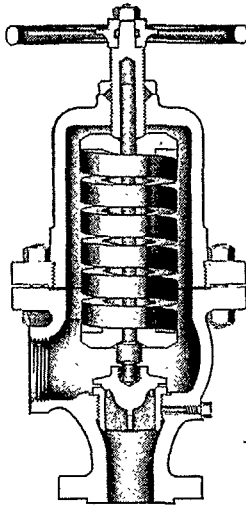
Dimensions, in Inches

Size (Size of Inlet)	No. 1123					No. 1124				
	2½	3	3½	4	5	2½	3	3½	4	5
Size of outlet	2½	3	3½	4	5	2½	3	3½	4	5
Center to top	12⅝	13⅞	14¼	14⅞	15¾	13¾	14¼	15¼	15½	
Center to face of inlet	5¼	5¾	6¼	6¾	7¾	5¼	5¾	6¼	6¾	
Center to end of outlet	3⅞	4¼	4⅞	5	6⅞	3⅞	4¼	4⅞	5	

*Capacities are
furnished on application.*

*Templates for drilling....
....page 552*

Inside Spring Alloy Cast Steel Relief Valves



Cross Section

WORKING PRESSURES

No. 1124 XR — 600 pounds
No. 1241 XR — 1200 pounds
No. 3041 XR — 3000 pounds

MAXIMUM SET PRESSURES

No. 1124 XR — 750 pounds
No. 1241 XR — 1500 pounds
No. 3041 XR — 3600 pounds

For cold water and oil; maximum temperature 100° F.

Outlet pressure not to exceed 100 pounds gauge

Pressure setting: To insure tightness at the seat, these valves should be set 20% above the normal operating pressure of the installation. They may be readjusted for pressures 10% above or below the original set pressure, but not exceeding the maximums given above. For a greater adjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set.

When ordering, be sure to specify the set pressure.

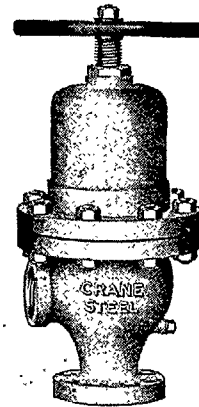
List Prices, Faced, Drilled, and Spot Faced

Size	Inches	1½	2	2½	3	3½	4	5
No. 1124 XR	Each							
No. 1241 XR	Each							
No. 3041 XR	Each							

Prices on application

Prices on application

Prices on application



No. 1124 XR
No. 1241 XR
No. 3041 XR

Servicerecommendations: Nos. 1124 XR, 1241 XR, and 3041 XR Alloy Steel Relief Valves are designed for service on water or oil where the temperature of the fluid does not exceed 100 degrees F. They are commonly used on pump discharge lines, on stand pipes, pipe lines, cylinders, hydraulic presses, oil lines, etc. They are suitable for outlet pressures up to 100 pounds gauge.

These valves should not be used as unloading valves or in an attempt to relieve shock in hydraulic lines.

Construction: These valves are of the inside spring, single disc type. They have a flanged bonnet secured to the body with through bolt-studs threaded their entire length, making a pressure tight joint. A machined recess for packing is provided around the adjusting screw. The seat bushings are renewable.

Materials: The bodies are made of Crane No. 4 Carbon-Molybdenum Steel; the bonnets, of Carbon Cast Steel; and the springs, of a high grade Open Hearth Steel. The discs are Exelloy; and the seat bushings, No. 49 Nickel Alloy.

Inlet and outlet connections: The No. 1124 XR Valves have a combination flanged and screwed inlet; Nos. 1241 XR and 3041 XR Valves have a flanged inlet. The outlets on all of these valves are screwed.

Flange dimensions: The inlet flanges conform to the American Standard for Steel Pipe Flanges and

Flanged Fittings, B16-1939. On the No. 1124 XR Valves the flange conforms to the 300-Pound Standard; on the No. 1241 XR, to the 600-Pound; and on the No. 3041 XR, to the 1500-Pound.

Drilling: The flange on these valves is furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the particular standard applying, as listed above, and spot facing. No deduction is made if valves are ordered faced only.

Flange facing: The inlet flange on the No. 1124 XR Valves is regularly furnished with an American Standard 1/16-inch raised face. On the No. 1241 XR and No. 3041 XR Valves it is furnished with an American Standard 1/4-inch male face (large male). When so ordered, the inlet flange can be furnished with ring joint, male (on the No. 1124 XR), female, tongue, groove, or other types of facings; see the Crane Discount Sheet for prices.

Finish of flange faces: The 1/16-inch raised face and the large male face on the inlet flange are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the raised or male faces when so ordered; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

Dimensions, in Inches

Size	No. 1124 XR					No. 1241 XR					No. 3041 XR				
	2½	3	3½	4	5	1½	2	2½	3	1½	2	2½	3		
Size of inlet and outlet	2½	3	3½	4	5	1½	2	2½	3	1½	2	2½	3		
Diameter of seat opening	2½	3	3½	4	5	1½	2	2½	3	1½	2	2½	3		
Center to top	13¾	14¼	15¼	15½	17	13	16	19	22	13	16½	18½	23		
Center to face of inlet*	5¼	5¾	6¾	6¾	7¾	5¼	6¼	6¾	7¾	6¼	6¼	7¾	9½		
Center to end of outlet	3¾	4¼	4¾	5	6¾	3¾	4¾	5	5¾	4¾	5	6	7		

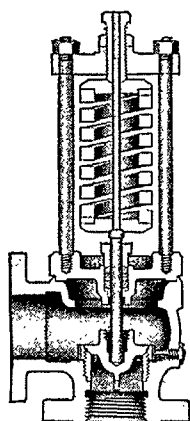
*Includes 1/16-inch raised face on No. 1124 XR and 1/4-inch male face on No. 1241 XR and No. 3041 XR.

Description of materials... pages 1 to 9

Capacities on application

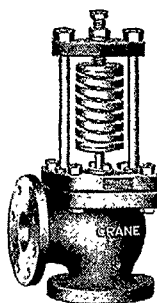
Templates for drilling... pages 553 to 555

Outside Spring Iron Body Relief Valves

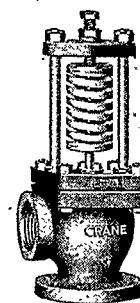


Cross Section
No. 1113
No. 1114

WORKING PRESSURES—250 pounds
MAXIMUM SET PRESSURE—300 pounds
For steam, hot water, or oil; maximum temperature 500° F.
Outlet pressures not to exceed 20 pounds gauge.



No. 1113
Flanged Inlet
Flanged Outlet



No. 1114
Flanged Inlet
Screwed Outlet

When ordering, be sure to specify the set pressure.

List Prices

Size	Inches	2	2½	3	3½	4
Nos. 1113 or 1114, Brass Seats, F. & D.	Each	63.00	84.00	100.00	136.00	155.00
Nos. 1113 or 1114, Monel Seats, F. & D.	Each	68.00	90.00	107.00	143.00	167.00

Service recommendations: Nos. 1113 and 1114 Valves are recommended for steam, hot water, or oil services at working pressures up to 250 pounds and temperatures up to 500° F. They may be set for a maximum pressure of 300 pounds and they are suitable for outlet pressures not exceeding 20 pounds gauge.

Construction: These valves are of the outside spring and yoke construction, in which the spring is not directly exposed to the temperature of the fluid within the body. They have a bolted bonnet equipped with a stuffing box, and are of the single disc type. The seat bushing is renewable. The valves are pressure tight on the outlet side and are suitable for use when discharging into a line operating under low head pressures, or for handling noxious or inflammable fluids.

In addition, these valves have pop chambers and adjustable blow-back regulating rings, which gives them an action more positive than ordinary relief valves, as well as a means of regulating the blow-down of pressure.

The inlet of these valves is regularly made with a combination flanged and screwed connection.

Seats and discs: The discs are regularly made of brass. The seat rings are either of brass or monel, but brass will always be furnished unless monel is specifically ordered. Discs made of monel can be furnished on special order, at an advance in price.

Pressure setting: To insure tight seating of relief valves, they should be set at slightly higher pressures than the normal working pressure of the installation. Relief valves for steam should be set at least 10 per cent higher and valves for water or oil, 25 per cent above the normal working pressure.

These valves may be readjusted for pressures 10 per cent above or below the original set pressure, but not exceeding the maximum given above. For a greater adjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set.

Orders must specify the set pressure wanted.

Flange dimensions and facing: The dimensions of the inlet flanges conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928). They have a 1/16-inch raised face, finished with concentric grooves, approximately 16 grooves per inch, known as a "serrated" finish.

Outlet flanges of No. 1113 Valves conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). These flanges are plain faced and have a smooth finish.

Drilling: List prices of these valves include facing and drilling to the particular standard applying, as indicated in the preceding paragraphs. No deduction is made when valves are ordered faced only.

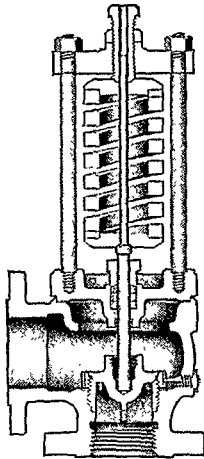
Dimensions, in Inches

Size (Size of Inlet)	2	2½	3	3½	4
Size of outlet	2½	3	3½	4	4½
Center to top	15	18½	21½	23	26
Center to face of inlet	6½	7	7½	8½	9½
Center to end of outlet	4	4½	5	5½	6
Center to face of outlet	4¾	5½	6	6½	7

Capacities
are furnished
on application

Templates for drilling....
...pages 551 and 552

Outside Spring Alloy Cast Steel Relief Valves



Cross Section
No. 1113 LX

WORKING PRESSURES

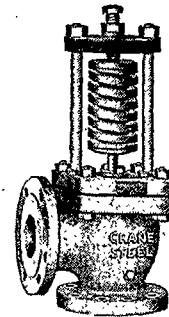
No. 1113 LX — 300 pounds
No. 1113½ LX — 600 pounds

MAXIMUM SET PRESSURES

No. 1113 LX — 360 pounds
No. 1113½ LX — 900 pounds

For steam, hot water, oil, or gas; maximum temperature 900° F.
/ Outlet pressure not to exceed 20 pounds gauge

Pressure setting: To insure tightness at the seat, these valves should be set 20 to 50 per cent above the normal operating pressure of the installation. They may be readjusted for pressures 10 per cent above or below the original set pressure, but not exceeding the maximums given above. For a greater adjustment, new springs may be required, since one spring will not cover the entire range of pressures at which these valves may be set.



No. 1113 LX
No. 1113½ LX

List Prices, Faced, Drilled, and Spot Faced

Size	Inches	1½	2	2½	3	3½	4
No. 1113 LX	Each	110.00	135.00	165.00	200.00	265.00	315.00
No. 1113½ LX	Each	125.00	150.00	182.00	220.00	290.00	345.00

When ordering, be sure to specify the set pressure.

Service recommendations: Crane No. 1113 LX and No. 1113½ LX Alloy Steel Relief Valves are recommended for high temperature service on steam, hot water, oil, and gases where the temperature does not exceed 900° F. They are suitable for outlet pressures up to 20 pounds gauge.

Construction: These valves are of the outside spring and yoke construction, in which the spring is not directly exposed to the temperature of the fluid within the body. They have a bolted bonnet equipped with a stuffing box, and are of the single disc type. The seat bushing is renewable. The valves are pressure tight on the outlet side and are suitable for use when discharging into a line operating under low head pressures, or for handling noxious or inflammable gases and fluids.

In addition, the No. 1113 LX Valves have adjustable blow-back regulating rings. This provides a means for adjusting the blow-down of pressure when changing or regulating the set pressure.

Materials: The bodies are made of Crane No. 4 Carbon-Molybdenum Steel; the bonnets, of Carbon Cast Steel; and the discs, stems, and adjusting screws, of Inconel. The seat bushings are Crane 18-8 Mo Alloy; and the springs, a high grade alloy steel. The bonnet bolt-studs are Triplex Steel.

Flange dimensions: The end flanges conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939. The inlet flange on the

No. 1113 LX Valves conforms to the 300-Pound Standard and on the No. 1113½ LX, to the 600-Pound; the outlet flanges all conform to the 150-Pound Standard.

Drilling: Flanges on these valves are furnished faced, drilled, and spot faced (F.D. & S.F.) unless otherwise ordered. List prices include drilling to the particular standard applying, as listed above, and spot facing. No deduction is made if valves are ordered faced only.

Flange facing: The flanges on the No. 1113 LX Valves and the outlet flange on the No. 1113½ LX Valve are regularly furnished with an American Standard ⅛-inch raised face. The inlet flange on the No. 1113½ LX Valve is furnished with an American Standard ¼-inch male face (large male).

When so ordered, all end flanges can be furnished with ring joint facing; and, except for 150-Pound flanges, with male, female, tongue, groove, or other facings; see the Crane Discount Sheet for prices.

Finish of flange faces: The ⅛-inch raised faces and the large male face on the end flanges are finished with concentric grooves, approximately 32 grooves per inch, known as a "serrated" finish.

A smooth finish can be furnished on the raised or male faces when so ordered; see the Crane Discount Sheet for prices. The smooth finish is recommended when a metallic gasket is used.

Dimensions, in Inches

Size (Size of inlet)		1½	2	2½	3	3½	4
Size of outlet		2	2½	3	3½	4	4½
Diameter of seat opening	No. 1113 LX	1½	2	2½	3	3½	4
	No. 1113½ LX	1¾	1½	2	2½	3	3½
Center to top	No. 1113 LX	10½	13	15½	18½	20	23
	No. 1113½ LX	12	13	16½	20½	24	27
Center to face of inlet	*No. 1113 LX	5½	6½	7	7½	8½	9½
	†No. 1113½ LX	5¾	6½	7½	7½	9	10½
*Center to face of outlet		4¾	4¾	5½	6	6½	7

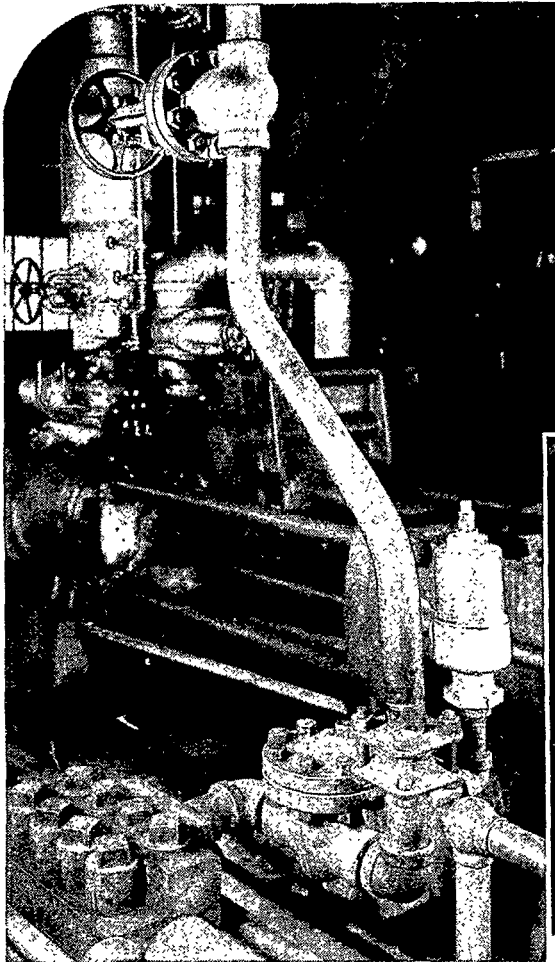
*Includes ⅛-inch raised face

†Includes ¼-inch male face.

Description of materials... pages 1 to 9

Capacities on application

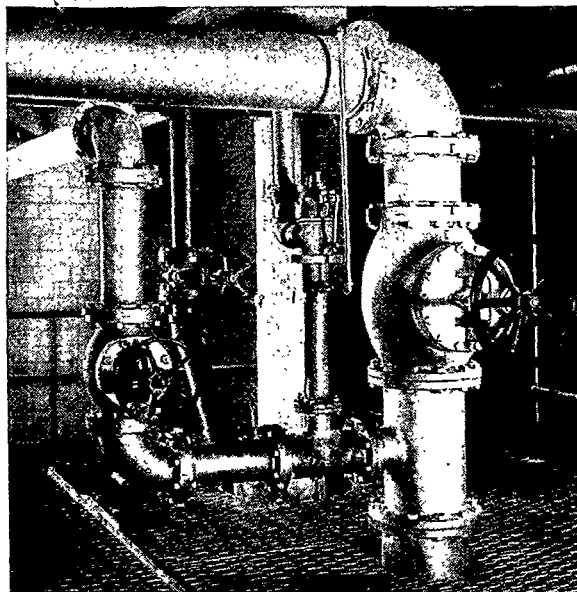
Templates for drilling... pages 553 and 554



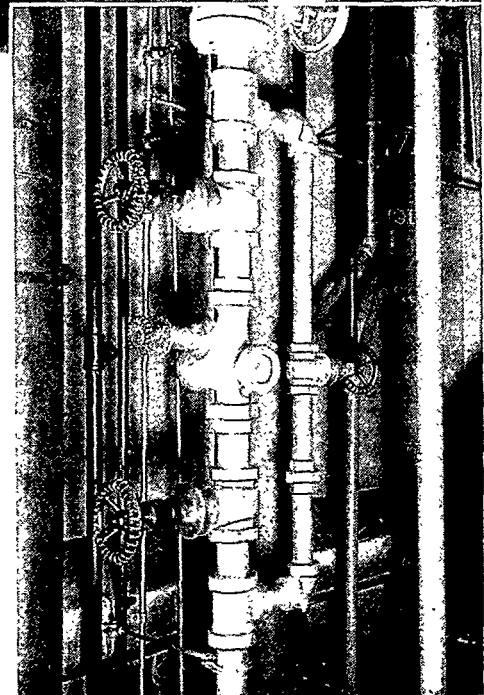
This rubber plant is Crane equipped. The hydraulic line in the foreground is fitted with a brass hydraulic relief valve and forged steel valves and fittings.



A battery of Cranetilt non-return traps, brass valves and iron fittings handling condensate in a large laundry.



A portion of the mash processing lines in a distillery; complete piping requirements were supplied by Crane.



Piping system in a manufactured gas plant, with Crane pressure regulator.

Pressure Regulators, Steam Traps, Separators, and Expansion Joints

Pressure Regulators.....	pages 410 and 411
Klipfel Pressure Reducing Valves.....	pages 412 and 413
Mueller Water Pressure Regulators.....	page 414
Klipfel Tank Thermostats.....	page 414

Steam Traps

Inverted Open Float.....	pages 415 to 417
Cranetilt Non-Return.....	page 418
Cranetilt Three-Valve Lifting.....	page 419
Automatic Air Vent Valves.....	pages 416 and 417

Steam and Oil Separators.....	pages 420 and 421
Drip Pockets.....	page 421
Sediment Separators or Strainers.....	pages 422 and 423
Swartwout Exhaust Heads.....	page 424

Expansion Joints

Copper.....	pages 424 and 425
Rubber.....	page 425
Brass.....	page 426
Iron Body.....	page 427
Adscs, Iron and Steel.....	page 428

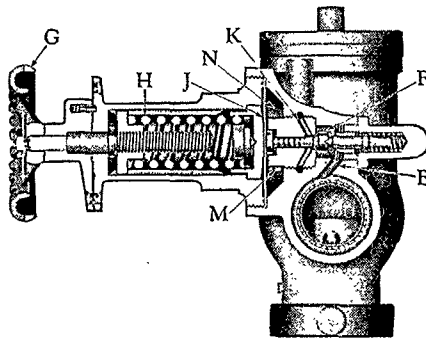
Expansion in Pipe Lines.....	page 426
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To make this catalog more convenient to use, the complete Crane line of special duty valves and of specialties has been divided into several groups. Crane special duty valves are shown on pages 369 to 407, and Crane specialties not referred to above are shown on pages 429 to 442.

Brass Pressure Regulators

Crane Pressure Regulators have two essential but separate mechanisms — the auxiliary valve assembly and the main valve assembly — which are interconnected for the transmission of pressure, but independent of each other mechanically. These two units are contained in the same body, but the regulator would function just as well if they were separated except for the necessary pipe connections. The auxiliary valve assembly includes a device for manually setting the desired service pressure, an

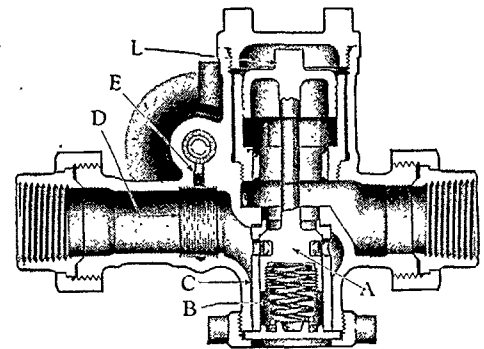
auxiliary valve to control the operation of the main valve, and a mechanism to operate the auxiliary valve itself. The main valve assembly consists of the main valve disc and seat and a piston actuated by pressure from the auxiliary valve, which controls the movement of the main valve disc. The illustrations and description below explain the operation of the Crane regulator. In the lower left hand corner of this page is shown the preferred arrangement for installing a Crane Pressure Regulator.



Crane No. 960 Pressure Regulators embody new refinements in design and construction to assure reliable and efficient operation, and long life.

At the left is a sectional view of the auxiliary valve assembly.

At the right is a sectional view of the main valve and piston assembly.



32

Operation: With the regulator properly installed in the line and ready to go into service, the successive steps which take place in its operation are as follows:

Steam (or air) from the high pressure line flows into the inlet side of the regulator as far as the main disc A, which is held lightly to its seat by the main disc spring B. This high pressure then passes into the main disc spring chamber through the ports in the liner C and acts to hold the main disc tightly to its seat. A portion of the high pressure steam (or air) in the regulator inlet passes through the screen D into the high pressure port E and fills the chamber around the auxiliary valve F, which is held lightly to its seat by the auxiliary valve spring.

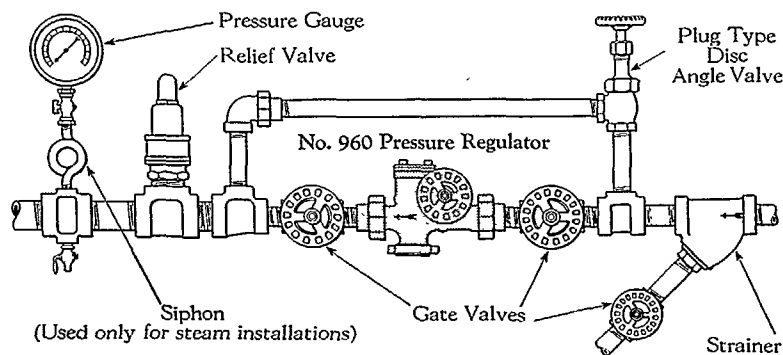
When the handwheel G is turned in a clockwise direction, the regulating spring H is compressed and deflects the diaphragm J. This deflection of the diaphragm moves the auxiliary valve F off its seat and allows pressure to flow through the intermediate pressure port K into the chamber above the piston L. The piston then moves downward, overcoming the resistance of the main disc A and forces it off its seat. Steam (or air) then flows past this disc and fills the outlet or service piping system. Pressure from the

outlet of the regulator is transmitted back through the low pressure port M to the diaphragm chamber N. As the pressure builds up in this chamber, it finally overcomes the tension on the diaphragm caused by the regulating spring, and forces the diaphragm back to its original position.

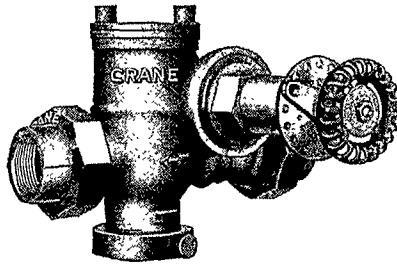
Just as soon as the diaphragm returns to its original position, the auxiliary valve closes, thus cutting off the pressure to the top of the piston L. The high pressure in the main disc spring chamber then forces the main disc back to its seat, cutting off the steam (or air) supply to the outlet side of the regulator. As the outlet or service pressure falls, the pressure in the diaphragm chamber also falls, with the result that the regulating spring tension again deflects the diaphragm and moves the auxiliary valve off its seat. The entire cycle of operations is then repeated.

It will be seen from this description of the operation of the Crane regulator, that with the handwheel set to obtain any desired service pressure, this pressure will automatically be maintained regardless of the quantity of steam (or air) being used. While each step in the automatic operation of the regulator has been described as taking place at a definite point

in the cycle, the entire cycle is performed practically instantaneously and there is no lag in any of the operations. When steam (or air) is being used in the service system, the regulator actually operates in a "floating" position, that is, both the auxiliary valve and the main disc move back and forth within the limits of their travel without coming to rest at any one position, and thus continually proportion the flow of steam (or air) to satisfy the service requirements.



Brass Pressure Regulators

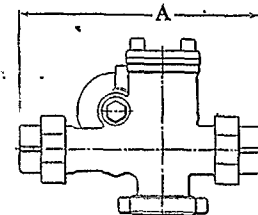
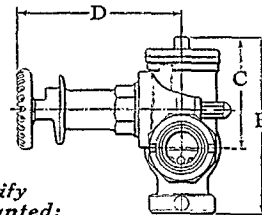


No. 960 Pressure Regulator

WORKING PRESSURES
250 pounds steam, 450° F.
250 pounds air

For description,
operation, and
recommended
installation,
see page 410.

When ordering, specify
the reduced pressure wanted;
see Service pressure ranges, below.



Service recommendations: Crane Pressure Regulators have been specifically designed to provide accurate, automatic pressure regulation on steam and air. They are particularly suitable for use in modern process work, on vulcanizers, cookers, dryers, paper machines, heating systems, air tools, air blasts, and a variety of other services. They may be used to reduce the pressure to engines and pumps if ample receiver capacity to eliminate pulsations is provided between the engine or pump and the regulator.

Fundamental characteristics: These regulators should not be confused with ordinary reducing valves. The Crane valve will reduce the initial pressure accurately and positively, will maintain the reduced pressure at the desired point, regardless of the quantity of steam or air being used, and will not allow the reduced pressure to build up to the initial pressure when no steam (or air) is being used in the service piping. Reasonable fluctuations of initial pressures do not affect the service or reduced pressures.

Features: These regulators are featured by reliability, a wide range of available reduced pressures, simplicity of operation, accessibility for inspection, and convenience in making repairs.

Union connections: All regulators are regularly furnished with malleable iron union rings and tail-pieces on inlet and outlet ends.

Location of regulating wheel: Regulators regularly have the pilot valve on the left hand side when facing the inlet. On special order, they can be furnished with the pilot valve on the right hand side.

Steam
Capacity in Pounds per Hour

Initial Pressure	Size, Inches					
	1/2	3/4	1	1 1/4	1 1/2	2
30	56	95	190	350	460	935
40	69	115	231	410	552	1165
50	78	137	272	490	645	1400
60	88	162	300	550	735	1600
70	100	180	340	625	828	1800
80	115	200	395	700	920	1985
90	125	225	435	763	1010	2195
100	134	237	475	825	1100	2400
125	159	288	570	1000	1320	2920
150	187	338	680	1160	1540	3400
175	212	388	750	1325	1770	3880
200	240	437	900	1500	2000	4360
250	280	575	1010	1800	2300	5150

List Prices and Dimensions

Size Inches	Price Each	Overall Dimensions			
		A	B	C	D
1/2	43.00	7	4 5/8	3	6
3/4	48.00	8 1/4	5 3/4	3 5/8	6 1/4
1	54.00	9	6 3/8	4	7 1/4
1 1/4	67.00	9 5/8	7	4 1/2	7 1/2
1 1/2	83.00	10 3/4	8	5	7 1/2
2	104.00	12	9 1/8	5 5/8	7 1/2

Locking: Regulators are regularly furnished with a locking device, so that the pressure setting may be protected against tampering. Locks are not furnished with regulators, except on special order, and then at an advance in price.

Service pressure ranges: Regulators are fitted with regulating springs and diaphragms to suit any one of the following ranges of service pressures:

1 to 10 pounds	20 to 100 pounds
5 to 30 pounds	90 to 200 pounds

Orders must always specify the reduced pressure wanted in order that proper springs and diaphragms may be furnished.

Valves for air service: When regulators are wanted for use on compressed air, orders must so specify.

Maximum service pressure: These regulators should not be used when the reduced pressure wanted is more than 80 per cent of the initial pressure.

High pressures: On special order, Crane Co. can furnish pressure regulators of this same design, in sizes from 1/2-inch to 2-inch, for steam pressures up to 350 pounds.

Air

Capacity in Cubic Feet of Free Air per Minute

Initial Pressure	Size, Inches					
	1/2	3/4	1	1 1/4	1 1/2	2
40	7.0	19.5	38.0	66.0	116	250
50	7.5	21.0	40.0	72.0	124	270
60	8.0	22.5	44.0	78.0	132	290
70	8.5	24.0	48.0	86.0	140	310
80	9.0	26.0	52.0	94.0	148	330
90	9.5	28.0	56.0	100	156	350
100	10.0	30.0	60.0	108	166	370
125	11.0	34.0	68.0	128	184	420
150	12.5	38.0	77.0	146	204	470
175	14.0	42.0	86.0	164	224	520
200	15.0	48.0	96.0	182	244	590
250	17.0	56.0	114	220	284	670

Klipfel Ball-Type Pressure Reducing Valves

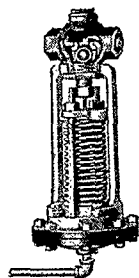
For Steam, Water, Air, or Gas

MAXIMUM INLET PRESSURES

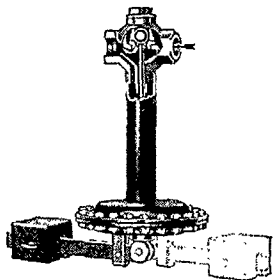
Screwed Ends — 250 pounds steam

Standard Flanged Ends — 125 pounds steam

Extra Heavy Flanged Ends — 250 pounds steam

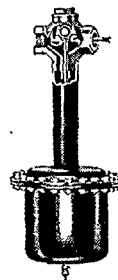


No. 400
Spring Loaded
For 10 to 50 pounds
reduced pressure

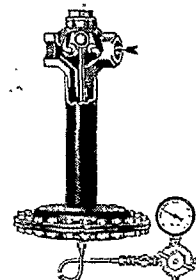


No. 410, Single Lever
For vacuum to 20 pounds
reduced pressure

No. 411, Twin Levers
For 20 to 50 pounds
reduced pressure



No. 431
Air Loaded Dome Type
For vacuum to 150 pounds
reduced pressure



No. 432
Pilot Controlled
Air Loaded
For 0 to 150 pounds
reduced pressure

List Prices

Size Inches	Type of Ends	No. 400 Spring Loaded Each	No. 410 Weight & Lever Each	No. 411 Twin Wts. & Levers Each	No. 431 Air Dome Each	No. 432 Air Pilot Each
3/8	Screwed	69.00	54.00	60.00	64.00	72.00
1/2	Screwed	69.00	54.00	60.00	64.00	72.00
3/4	Screwed	75.00	60.00	66.00	70.00	78.00
1	Screwed	81.00	66.00	72.00	76.00	84.00
1 1/4	Screwed	87.00	75.00	83.00	85.00	93.00
1 1/2	Screwed	93.00	81.00	89.00	91.00	99.00
2	Screwed	115.00	103.00	114.00	114.00	121.00
2	Standard Flanged	120.00	108.00	119.00	119.00	126.00
2	Extra Heavy Flanged	125.00	113.00	124.00	124.00	131.00

List prices are for complete valves with accessories as shown; including weights, pressure gauge, 8 feet of copper tubing, fittings, Schrader air valve, and pilot valve where such parts are required.

Ball-type reducing valves: These valves include several improvements which contribute to closer regulation of reduced pressure, greater capacity, tight closing, and durability. The ball is very hard stainless steel and is free to seat perfectly. Grinding-in is never required. The streamlined form of the opening between the ball and seat and the large body passages permit a great volume of flow. The Monel metal seat is beveled at a sharp angle to fit the ball tightly along a narrow line of contact. The guides are integral with the seat.

The internal Pitot tube control in Nos. 410, 411, 431, and 432 avoids the use of an external feeler pipe. The Pitot tube is more satisfactory for most applications.

Materials. These valves have a bronze body in sizes 1 1/2-inch and smaller; the 2-inch size has a semi-steel body. All sizes have a Monel metal seat and a stainless steel ball and stem. No. 400 has a semi-steel bracket and diaphragm chamber. The other valves have a wrought steel water leg, diaphragm chamber, and air dome.

No. 400: In this valve, seven interchangeable springs are available — each adapted to handle a limited portion of the 10 to 50-pound reduced pressure range. The spring and diaphragm assembly can be easily removed without interrupting the flow through the valve.

No. 410: This Weight and Lever Type Reducing Valve is designed for accurate regulation and large capacity. It is recommended for steam heating service, process work, and other applications where reduced pressures from 0 to 20 pounds are required. When so ordered,

the lever can be arranged for vacuum service. The reduced pressure is adjusted by changing the weights on the lever.

No. 411: This valve is the same as No. 410 except that it is equipped with two independent levers for symmetrical distribution of loading on reduced pressures from 20 to 50 pounds.

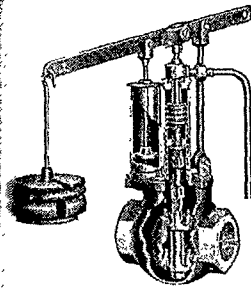
No. 431: This is a perfected design of Dome Type, Air Loaded, Reducing Valve. It can accommodate reduced pressures from vacuum to 150 pounds by merely changing the air pressure pumped into the dome to equal the desired reduced pressure. The accuracy and sensitivity of regulation is uniform over the entire range of adjustment.

No. 432: This valve is recommended for use where the reduced pressure must be changed frequently. When connected to a source of compressed air at sufficiently high pressure, the pilot valve is adjusted to maintain a loading pressure on the diaphragm equal to the desired reduced pressure. These valves are convenient for remote control.

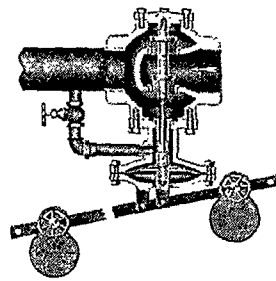
Klipfel Pressure Reducing Valves

MAXIMUM INLET PRESSURES

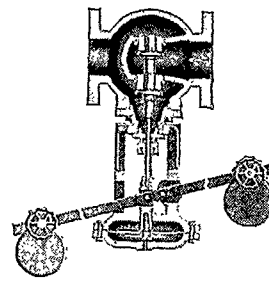
Standard — Screwed Ends — 150 pounds steam
 Standard — Flanged Ends — 125 pounds steam
 Extra Heavy — Screwed or Flanged Ends — 250 pounds steam



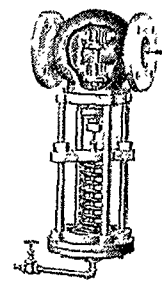
No. 1, For Steam Only
 Piston Type
 10 to 150 pounds
 reduced pressure



No. 3, For Steam,
 Water, Air, or Gas
 Vacuum and low
 reduced pressures



No. 38, For Steam,
 Water, Air, or Gas
 Vacuum to medium
 reduced pressures



No. 68, For Steam,
 Water, Air, or Gas
 10 to 75 pounds
 reduced pressure

List Prices, Each

Size Inches	No. 1			No. 3 and No. 38			No. 68		
	Screwed	Flanged F. & D.		Screwed	Flanged F. & D.		Screwed	Flanged F. & D.	
		Stand- ard	Extra Heavy		Stand- ard	Extra Heavy		Stand- ard	Extra Heavy
3/8-1/2-3/4	45.00			45.00					
1	50.00			50.00			81.00		
1 1/4	55.00			55.00			87.00		
1 1/2	60.00			60.00			93.00		
2	70.00	75.00	80.00	70.00	75.00	80.00	110.00	115.00	120.00
2 1/2	85.00	90.00	95.00	85.00	90.00	95.00	125.00	130.00	135.00
3	100.00	105.00	110.00	100.00	105.00	110.00	140.00	145.00	150.00
4	140.00	145.00	150.00	140.00	145.00	150.00	180.00	185.00	190.00
5	170.00	175.00	185.00	170.00	175.00	185.00	210.00	215.00	225.00
6	220.00	225.00	235.00	195.00	200.00	210.00	235.00	240.00	250.00

No. 1: No. 1, for steam only, has a long water sealed piston which is balanced between the reduced pressure in the valve outlet and the weighted lever. When the reduced pressure exceeds the value for which the weights are adjusted, the inner valve is pulled upward by the piston to close the valve. The oil filled dashpot insures steady operation. The desired reduced pressure should be specified so that the right piston size and correct number of weights can be furnished. The inner valve has a close sliding fit in the seats, but is not perfectly tight closing.

No. 2: This is the expanded outlet form of No. 1.

No. 3: These valves are suitable for handling any ordinary fluid which is not injurious to a rubber diaphragm. They are widely used for low pressure steam or vacuum heating. The double seated inner valve is held in the open position by the weighted lever until the reduced pressure, transmitted through the feeler pipe, is sufficient to force the diaphragm down and close the valve; it is practically tight when closed. The large area of the diaphragm and the absence of packing box friction promotes sensitive and accurate regulation regardless of changes in inlet pressure and required capacity. When used for cold fluids, these valves may be inverted.

No. 4: This is the expanded outlet form of No. 3.

No. 38: These valves are suitable for ordinary fluids not injurious to a rubber diaphragm, for reduced pressures up to 45 pounds. The diaphragm chamber is separated from the valve body for cooler operation of the diaphragm on steam lines. A feeler pipe from the reduced pressure pipe to the diaphragm chamber transmits pressure to operate the valve. These valves may be used as steam pump governors by connecting the feeler pipe from the pump discharge to the diaphragm chamber. The double seated inner valve is almost tight closing. These valves will also operate in the inverted position.

No. 39: This is the expanded outlet form of No. 38.

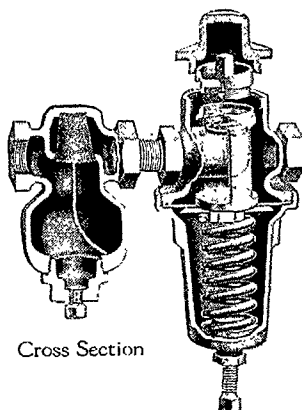
No. 68: These valves are used for handling ordinary fluids at reduced pressures up to 75 pounds. The diaphragm chamber is mounted on steel rods which makes a strong construction and provides room for a long spring of large diameter for better regulation. The reduced pressure is increased by screwing down the two spring adjusting nuts on the rods. Loading the diaphragm by means of a spring, instead of a weight and lever, permits the use of these valves for higher reduced pressures. The inner valve is double seated and practically tight closing. These valves may be used in the inverted position, and as steam pump governors.

No. 69: This is the expanded outlet form of No. 68.

Materials: These valves have bronze bodies in sizes 1 1/2" and smaller; sizes 2" and larger have semi-steel bodies. All sizes are bronze trimmed.

Expanded outlet valves: These valves are made in the following sizes: 1 x 2, 1 1/4 x 2 1/2, 1 1/2 x 3, 2 x 3, 2 x 4, 2 1/2 x 5, 3 x 5, 3 x 6, 4 x 6, 4 x 8, 5 x 8, 5 x 10, 6 x 8, 6 x 10, and 6 x 12"; prices are furnished on application.

Mueller Water Pressure Regulators

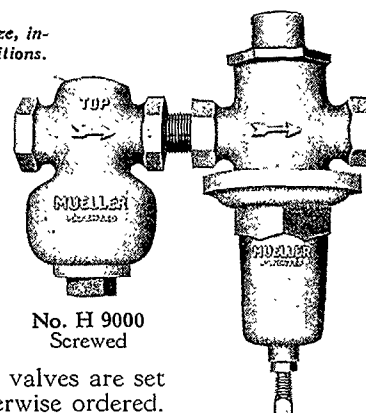


Cross Section

When ordering, specify catalog number, size, inlet and outlet pressures, and service conditions.

Service recommendations: These regulators, suitable for use on hot and cold water, air, and liquid soap lines, are particularly adapted for residence, apartment building, and industrial service.

Pressure range: Valves are regularly made for initial pressures from 40 to 250 pounds and for delivery pressures from 25 to 75 pounds. Valves can be furnished to order for any initial pressure up to 250 pounds or for delivery pressures from 5 to 125 pounds (special springs are necessary). All valves are set for 45 pounds delivery pressure unless otherwise ordered.

No. H 9000
Screwed

Construction: Regulators are furnished with strainers, completely assembled. The regulating valve, made entirely of brass and bronze (2½-inch size has an iron body), has full seat opening and can supply a full volume of water at the reduced pressure.

The special composition reinforced diaphragm will withstand a pressure of 800 pounds. The disc, also

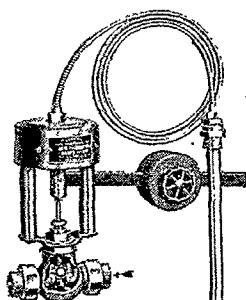
a special composition, is not affected by hot water. All parts are readily accessible. The removable seat ring, disc, and diaphragm make repair possible without removing the valve from the line.

List Prices, Each, and Dimensions, in Inches

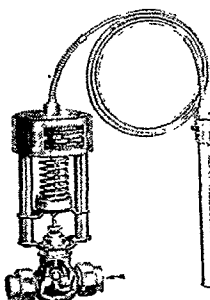
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2
No. H 9000, Screwed	17.28	18.00	18.00	19.36	31.14	54.00	72.70	105.30	136.00
End to end, assembly	5 1/16	6 3/8	7 7/16	8 15/16	9 13/16	12 11/16	14 1/2	17 3/8	20
Center to top	1 7/16	2 1/4	2 1/4	3 1/2	3 3/8	3 1/2	4	4 13/16	5 3/8
Center to bottom	4 15/16	5 1/2	7	8	8	10 1/4	10 13/16	14 3/16	16 1/4

32

Klipfel Tank Thermostats



No. 448, Lever Type



No. 449, Spring Type

Single
SeatedUnion
Ends

WORKING PRESSURES

Nos. 448 and 449	3/8 and 1/2"	125 pounds steam
	3/4"	100 pounds steam
	1"	75 pounds steam
	1 1/4"	50 pounds steam
Nos. 648 and 649	1/2 to 1 1/2"	150 pounds steam
	2 to 5"	125 pounds steam

Double
SeatedUnion
or
Flanged
Ends

Service recommendations: Nos. 448 and 449 Single Seated Thermostats prevent leakage of steam and overrun of water temperature. Nos. 648 and 649 Double Seated Thermostats are suitable for general applications.

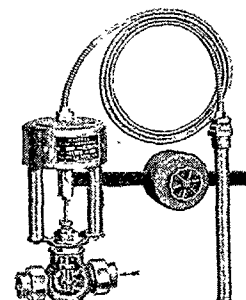
The lever type thermostat provides close regulation and quick temperature adjustment. The spring loaded type is compact and can be installed in any position; the ball-bearing spring nut is adjustable by hand.

Temperature range: These thermostats are adjustable through a 40° F. range. Any range from 50° F.—90° F. to 210° F.—250° F. can be furnished. The standard range for hot water service is 140° F. to 180° F.

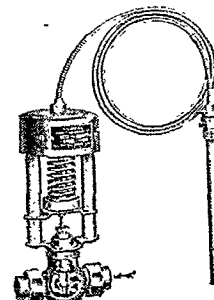
Materials: Bodies 1½-inch and smaller are bronze with union ends; larger sizes are semi-steel, flanged, with end flanges conforming to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Trimmings are Monel or stainless steel on the Nos. 448 and 449, and bronze on the Nos. 648 and 649.

Prices include bulb and 8 feet flexible armored tubing; extra tubing, 80 cents per foot.

Dimensions on request



No. 648, Lever Type



No. 649, Spring Type

List Prices, Each

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5
No. 448 or No. 449, Union Ends		120.00	120.00	125.00	137.00	150.00							
No. 648 or No. 649, Union ends			110.00	115.00	125.00	135.00	145.00						
	Flanged, F. & D.							160.00	170.00	180.00	200.00	220.00	300.00

Inverted Open Float Steam Traps

General Description

Crane Inverted Open Float Steam Traps provide a simple, efficient, and economical method for removing condensate from steam piping, separators, and all types of steam heated equipment. These traps are small, compact, and free from complex mechanisms: they have high discharging capacities

Materials and construction: The materials used in these traps have been carefully selected for strength, durability, and resistance to corrosion. The bodies and caps of 150 and 200-Pound Traps are cast iron; for 300-Pound Traps, they are of Ferrosteeel; and for 600-Pound Traps, they are of cast steel.

For the seats, discs, and hinge pins, Exelloy is used, as this chromium-iron alloy has excellent resistance to wear, erosion, and corrosion. The floats, levers, and lever supports are made from brass or copper, depending on the particular trap.

Throughout the entire design of these steam traps, simplicity is evident. They have but one moving part, the float, which actuates the disc through a simple lever. The body has an internal inlet nozzle which retains the water seal and precludes the possibility of live steam passing through the trap; the action of the float is stabilized.

In all traps, the cap joint is of the bolted type; $\frac{1}{16}$ -inch raised face for $\frac{1}{2}$ -inch traps; male and

Prices, range of sizes, pressures page 416

female in all other cast iron and ferrosteeel traps; and ring type joint in all cast steel traps. The arrangement of bolts permits assembly in only one position, at which the "Outlet" mark on the cap is immediately over that opening on the side of the trap.

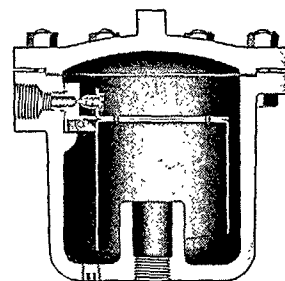
Capacity: The capacity of any trap depends upon the effective pressure and the orifice size. By effective pressure is meant the difference between the inlet pressure and that in the discharge. Outlet pressure should include the pressure due to any head of water which may be present.

The only force available to open the valve against the effective pressure in the trap is the weight of the float multiplied by the lever arm attached to the valve, and this is a fixed quantity for any one trap. As the effective pressure is increased, the orifice area must be decreased. If the area is too large, the valve will fail to function. If the area is too small, the

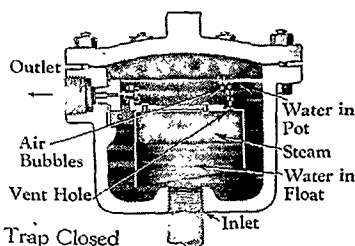
trap will function properly, but its capacity will be reduced.

Each trap is furnished with one of several sizes of seat orifices. Since both the capacity of the trap and the maximum effective pressure at which it can be used depend upon the size of the seat orifice, care should be exercised when ordering to see that both pressure and capacity are considered. Orders must specify either the size of the orifice desired or the Seat Number. See capacity table on page 417.

Capacities and Selection Table... page 417



Typical Cross Section
Inverted Float Steam Trap



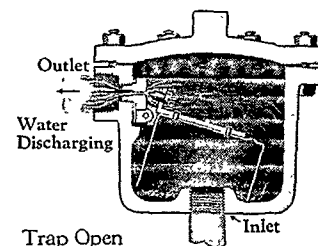
Trap Closed
Incoming steam under the float buoys it up, keeping the outlet closed.

Air or other non-condensable gas vents through a small hole in the top of the float and collects in the upper part of the trap. At each operation, this air or gas is discharged first. The entire cycle of

Operation

These traps are actuated solely by the rise and fall of the float resting on the accumulated condensate. The float is buoyant when filled with incoming steam, and the discharge valve is closed. When incoming condensate floods the float, it sinks, thereby opening the valve and permitting the condensate to be discharged by the

operation is practically instantaneous. If the condensate accumulates at a rate equal to the trap capacity, continuous discharge may occur; for these conditions a larger capacity trap is desirable.

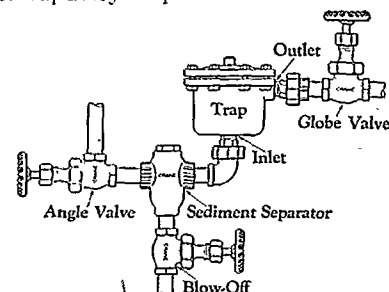


Trap Open
Incoming condensate fills the float, sinks it, and opens the outlet.

Method of Installing

The arrangement of piping and valves for a typical trap installation is shown in the accompanying illustration. A Crane Sediment Separator installed in the inlet line will prevent scale, sediment, and foreign matter from entering the trap and interfering with the proper operation. The blow-off valve permits periodic cleaning of the separator and the condensate line.

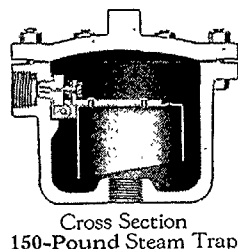
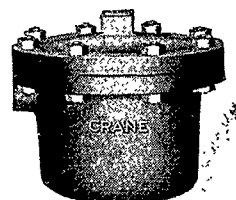
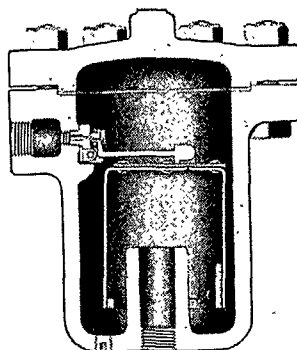
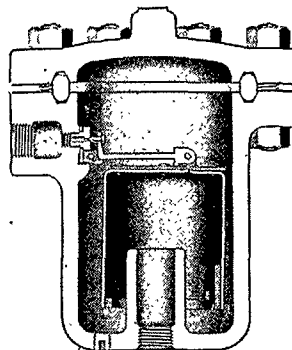
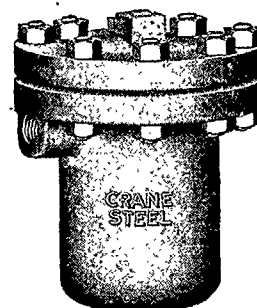
Iron Sediment Separators... pages 422 and 423
Steel Sediment Separators... page 423



Inverted Open Float Steam Traps

(Patented)

RANGE OF WORKING PRESSURES — 1 to 600 pounds saturated steam

Cross Section
150-Pound Steam TrapNo. 981, Steam Trap,
150-PoundCross Section
200 and 300-Pound
Steam TrapsCross Section
600-Pound Steam TrapNo. 983 D, Steam Trap
600-Pound***Important**

Each Trap is furnished with one of a wide variety of seat orifices. Orders must specify the orifice size or "Seat Number" to obtain the correct Trap for the desired pressure and capacity; see the Selection Table on the opposite page.

Pressures and tests: Crane Steam Traps are stamped on the cover with a maximum *Effective Pressure* to indicate the suitability of the seat orifice. Hence, a $\frac{3}{4}$ -inch No. 981 Trap with a No. 25 Seat is stamped 150.

They are all tested for seat and shell tightness, and for operation.

For general description, installation, and operation of Crane Steam Traps, see page 415. Selection Table and Capacities are given on the following page.

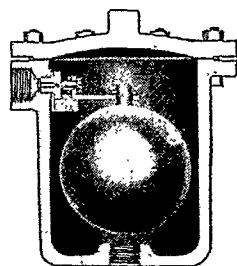
List Prices and Dimensions

Working Pressure	Size Inches	Catalog Number	List Price Each	*Seat Numbers	Height Inches	Diameter Inches
150-Pound Cast Iron	$\frac{1}{2}$	No. 981	6.50	10-11-12-13-14-15-16	4 $\frac{3}{4}$	5 $\frac{3}{8}$
	$\frac{3}{4}$	No. 981 $\frac{1}{2}$	10.00	20-21-22-23-24-25-26	7 $\frac{5}{8}$	7 $\frac{1}{2}$
200-Pound Cast Iron	$\frac{3}{4}$	No. 981	10.00	20-21-22-23-24-25-26	7 $\frac{1}{8}$	7 $\frac{1}{2}$
	$\frac{3}{4}$	No. 981 A	16.00	31-32-33-34-36-37-38	11 $\frac{1}{8}$	8 $\frac{1}{2}$
	1	No. 981	24.00	30-31-32-33-34-35-36	12 $\frac{1}{2}$	9 $\frac{7}{8}$
300-Pound Ferrosteel	$\frac{3}{4}$	No. 982	18.00	10-11-12-13	9 $\frac{3}{4}$	8 $\frac{3}{8}$
	1	No. 982	31.00	22-23-24	12 $\frac{1}{4}$	9 $\frac{7}{8}$
	1 $\frac{1}{4}$	No. 982	31.00	22-23-24	12 $\frac{1}{4}$	9 $\frac{7}{8}$
600-Pound Cast Steel	$\frac{3}{4}$	No. 983 D	37.00	10-11-12-13-14	9 $\frac{7}{8}$	8 $\frac{3}{8}$
	1	No. 983 D	60.00	22-23-24-25	12 $\frac{1}{4}$	9 $\frac{7}{8}$
	1 $\frac{1}{4}$	No. 983 D	60.00	22-23-24-25	12 $\frac{1}{4}$	9 $\frac{7}{8}$

$\frac{1}{2}$ " No. 983 D Traps can be bushed from $\frac{3}{4}$ " size on order; prices on application.

32

Cast Iron Automatic Air Vent Valves

Cross Section
No. 984

Ball Float Type

RANGE OF WORKING PRESSURES
1 to 150 pounds water

The maximum effective pressure is stamped on the cover. Vents are tested for tightness and for operation.

Exelloy Seat and Disc
Non-Corrosive Ball Float
Brass Lever and Fulcrum.

List Prices and Dimensions

Size Inches	List Price Each	Seat* Number	Height Inches	Diameter Inches
$\frac{1}{2}$	8.00	12-14	6 $\frac{1}{2}$	5 $\frac{5}{8}$
$\frac{3}{4}$	16.50	24-26	7 $\frac{5}{8}$	7 $\frac{1}{2}$

*Orders must specify a Seat Number. For capacities and orifice sizes, see the Capacity Table on opposite page.

The Crane No. 984 Air Vent Valve is a simple and economical device for removing air from water or oil piping and pressure vessels, where working pressures do not exceed 150 pounds. When installed in an inverted position, they are ideal for removing water or oil from compressed air systems. They are not suitable for use in steam services.

Air Vent Valves must be located at the highest point in the system where air will collect. The accumulation of air displaces the water in the body causing the float to drop and open the valve. As the air is discharged and the water re-enters the body, the float rises and closes the valve to prevent the escape of the water.

When inverted to drain air lines the operation is automatically reversed; they must be located at the lowest point of the system for such service.

Air capacities... page 417

Drain capacities are furnished on application.

Capacities of Inverted Open Float Steam Traps

Selection Table for Inverted Float Steam Traps

Working Pressure	Size	Trap No.	Effective Pressures, Orifice Sizes, and Seat Numbers							
1 to 150 pounds Cast Iron Trap	Range of Effective		Seat Pressures	1 - 5	5 - 15	10 - 30	25 - 50	40 - 75	60 - 125	75 - 150
	1½"	No. 981	Size of Orifice	3⁄16	5⁄32	1⁄8	3⁄32	5⁄64	1⁄16	.059
			Seat Number	10	11	12	13	14	15	16
1 to 200 pounds Cast Iron Traps	Range of Effective		Seat Pressures	1 - 5	5 - 15	10 - 30	25 - 50	40 - 100	75 - 150	125 - 200
	1½"	No. 981½	Size of Orifice	11⁄32	5⁄16	1⁄4	3⁄16	5⁄32	1⁄8	3⁄32
			Seat Number	20	21	22	23	24	25	26
	¾"	No. 981	Size of Orifice	5⁄8	1⁄2	3⁄8	5⁄16	7⁄32	3⁄16	5⁄32
			Seat Number	31	32	33	34	36	37	38
	¾"	No. 981 A	Size of Orifice	5⁄8	1⁄2	3⁄8	5⁄16	7⁄32	3⁄16	5⁄32
			Seat Number	31	32	33	34	36	37	38
1"	No. 981	Size of Orifice	11⁄16	5⁄8	1⁄2	3⁄8	5⁄16	1⁄4	7⁄32	
		Seat Number	30	31	32	33	34	35	36	
50 to 300 pounds Ferroteel Traps	Range of Effective		Seat Pressures	50 - 100	75 - 150	125 - 250	225 - 300	The "Effective Pressure" is the net difference between the inlet and the outlet pressures.		
	¾"	No. 982	Size of Orifice	3⁄16	5⁄32	1⁄8	3⁄32			
			Seat Number	10	11	12	13			
	1"	No. 982	Size of Orifice	1⁄4	3⁄16	3⁄16	5⁄32			
			Seat Number	22	23	23	24			
50 to 600 pounds Cast Steel Traps	Range of Effective		Seat Pressures	50 - 100	75 - 150	125 - 250	225 - 400	375 - 600	Each "Orifice Size" is identified by a "Seat Number" for the pressure range.	
	¾"	No. 983 D	Size of Orifice	3⁄16	5⁄32	1⁄8	3⁄32	5⁄64		
			Seat Number	10	11	12	13	14		
	1"	No. 983 D	Size of Orifice	1⁄4	3⁄16	3⁄16	5⁄32	1⁄8		
			Seat Number	22	23	23	24	25		
1½"	No. 983 D	Seat Number	22	23	23	24	25			

Capacity in Pounds of Water Per Hour Continuous Discharge

Based on Effective Pressure and Size of Orifice

Effective Pressure	Size of Orifice, Inches												
	.059	1/16	5/64	3/32	1/8	5/32	3/16	7/32	1/4	5/16	11/32	3/8	1/2
1	40	44	70	103	180	280	405	550	720	1120	1365	1620	2860
2	58	61	100	145	255	400	575	790	1040	1610	1935	2300	4100
5	93	98	158	230	410	635	915	1250	1630	2560	3050	3650	6500
10	128	140	221	318	580	880	1300	1730	2300	3500		5150	9200
15	158	165	272	391	690	1080	1600	2130	2810	4300		6360	11300
20	179	190	310	445	790	1210	1825	2400	3100	5000		7130	12500
25	193	210	335	475	845	1300	1960	2600	3350	5380		7900	13400
30	219	235	380	540	960	1480	2230	2950	3800	6100		8600	15300
40	250	265	400	610	1090	1720	2450	3380	4340	6940		9800	
50	275	295	490	680	1230	1920	2700	3750	4825	7750		10900	
60	295	310	530	725	1300	2050	2900	4040	5275	8250			
75	330	350	600	815	1470	2250	3270	4550	5975	9060			
90	360	385	650	890	1600	2450	3570	4950	6500	9800			
100	380	405	690	950	1700	2650	3750	5200	6850	10450			
125	420	450	750	1030	1850	2850	4000	5750	7370				
150	460		783	1120	2050	3120	4500	6250	8000				
175			835	1200	2140	3340	4770	6500					
200			890	1300	2280	3540	5100	7000					
225			935	1340	2360	3750	5300						
250			980	1420	2500	3940	5650						
275			1000	1470	2620	4050							
300			1060	1500	2725	4250							
325			1100	1550	2840	4320							
350			1140	1600	2930	4500							
375			1170	1650	3000	4650							
400			1200	1700	3090	4800							
450			1250		3160								
500			1300		3350								
550			1350		3450								
600			1400		3600								

Steam Traps are selected on the basis of Capacity at the Effective Pressure. The Trap chosen must satisfy the capacity demand within the pressure range of one of its recommended orifice sizes. For these ranges, see Selection Table above.

Example: At an Effective Pressure of 125 pounds (130 pounds inlet and 5 pounds outlet) a Trap is required to handle a peak load of 3500 pounds of water per hour. From this Capacity table, the nearest higher capacity at 125 pounds pressure is 4000 lbs./hr. with a 3/16-inch orifice. In the Selection Table above, this orifice size is found under 75-150 pound pressure range. To order this Trap, specify a 3/4-inch No. 981 A with No. 37 Seat.

For Effective Pressures not shown, use the next lower pressure. Always select a Trap for a higher capacity than needed.

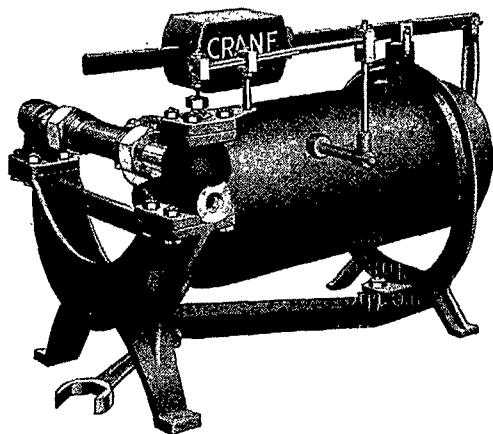
Capacities of Ball Float Air Vents

Cubic Feet of Free Air per Minute — Based on Vent Size, Orifice Size, and Effective Pressure

Size of Vent	Orifice Size	Seat Number	Maximum Effective Pressures												
			1	2	5	10	15	20	25	30	40	50	75	100	125
1/2"	1/8	12	.76	1.48	3.80	5.36	6.56	7.68	8.80	10.32					
	5/64	14	.30	.43	1.47	2.10	2.56	3.00	3.44	4.00	4.90	5.60	7.79	9.80	11.90
3/4"	5/32	24	1.20	2.40	6.05	8.48	10.40	12.10	13.90	16.40					
	3/32	26	.44	.88	2.16	3.04	3.72	4.36	5.00	5.88	7.12	8.16	11.32	14.52	17.68

Cranetilt Non-Return Steam Traps

250 pounds steam working pressure



List Prices and Dimensions

Catalog Number	List Price Each	Size of Pipe Connections		Extreme Length Inches	Extreme Width Inches	Extreme Height Inches
		Inlet Inches	Discharge Inches			
32	69.00	1	1/2	25	15	25
33	94.00	1 1/4	3/4	28	18 1/2	28
34	125.00	1 1/2	1	33 1/2	20 3/4	31
35	181.00	2	1 1/4	36	23	34

Service recommendations: Cranetilt Non-Return Traps may be used for draining condensation from all pipe lines and apparatus operating under steam pressure, such as separators, cooking kettles, stills, drip pockets, pipe coils, heating systems, etc. They cannot be used to discharge condensation and make-up water into a boiler.

Economy and efficiency: The Cranetilt Non-Return Trap is the most economical, simple, and practical device that can be used for automatically disposing of large quantities of condensation collected from steam under pressure. Its construction is strong and durable. Varying pressures have no effect upon its operation, which is always smooth and quiet. It will not air bind. In the larger sizes and for the higher effective pressures it has a large capacity, many times greater than bucket or float traps of equal pipe size. Small or large quantities of water are handled with equal efficiency.

Durability: The discharge valve is of the pilot type. Only the pilot valve is operated directly by the movement of the trap tank; the main valve is actuated, upon operation of the pilot valve, by the pressure in the tank. Consequently, the action of the main valve is very snappy both in opening and closing,

and wiredrawing is reduced to a minimum. Metals for both pilot and main valve are carefully selected for strength, hardness, and resistance to wear and to the cutting effects of steam and water.

Simplicity: Cranetilt Non-Return Traps are characterized by simplicity. Neither floats nor buckets are employed. All operating parts are on the outside where they are readily accessible for inspection, cleaning, adjustment, and repair, when necessary. The action of the trap is visible; a glance shows whether it is operating. Its operation is automatic.

Testing: Before shipment, each trap is carefully tested under actual operating conditions for tightness of valves and stuffing boxes, location of weights, and general adjustment and operation. A comprehensive instruction book, covering installation, operation, and maintenance is furnished with each trap.

Capacities

The capacity of any non-return trap depends upon the effective pressure at the trap, which is the difference between the pressures in the inlet line and in the discharge line at the trap. Pressure in the discharge line is due to back pressure in the return line into which the trap discharges and to the head of water which accumulates in the vertical discharge piping. In making allowance for such head water, figure that two feet of head is equivalent to one pound of pressure.

Cranetilt Non-Return Traps are rated on the basis of their capacity for continuous discharge to the atmosphere; they should be purchased on this basis. To determine the proper size, refer to the table

below. Find the effective pressure in the first horizontal column and follow the vertical column down to the quantity of water to be handled per hour. At the left hand end of the horizontal line corresponding to this quantity will be found the catalog number of the proper size of trap.

Crane Inverted Open Float Steam Traps, shown on pages 415 to 417, have larger capacities than the following Cranetilt Non-Return Traps:

No. 32, on effective pressures of 100 pounds or less

No. 33, on effective pressures of 30 pounds or less

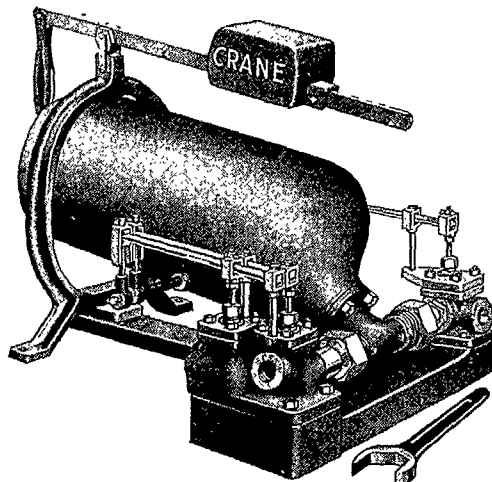
No. 34, on effective pressures of 15 pounds or less

In all other instances, the Cranetilt Traps have larger capacities than the Inverted Open Float.

Capacity in Pounds of Water per Hour

Catalog Number	Effective Pressure at Trap in Pounds per Square Inch															
	5	10	15	20	25	30	40	50	60	75	100	125	150	175	200	250
32	2050	2740	3450	3730	4200	4600	5450	6080	6450	7250	8350	9200	10000	10600	11350	12600
33	4590	6170	7750	8360	8900	10700	12250	13650	14400	16300	18700	20700	22400	23800	25400	28100
34	8200	11000	13700	14800	16850	19200	21900	24400	25800	29200	33500	37000	40000	42500	45500	50400
35	12750	17100	21450	23200	26200	29800	34000	37800	40000	45200	51900	57400	62200	66000	70700	78000

Cranetilt Three-Valve Lifting Traps



250 pounds steam working pressure

List Prices and Dimensions

Trap No.	List Price Each	Size of Pipe Connections			Overall Dimensions		
		Water Inlet and Discharge Inches	Steam Inches	Vent Inches	Length Inches	Width Inches	Height Inches
100	113.00	3/4	1/2	1/2	25 1/2	18	26
101	138.00	1	1/2	3/4	29	21 1/4	29
102	181.00	1 1/4	3/4	1	34 1/2	24 1/2	35
103	250.00	1 1/2	1	1 1/4	37 1/2	27 3/8	37
104	375.00	2	1	1 1/4	42 1/2	31 1/2	43
105	530.00	2 1/2	1 1/4	1 1/2	51	36 1/2	52

No. 104 and No. 105 Cranetilt Three-Valve Lifting Traps are equipped with dashpots to cushion the movement of the tank.

Service recommendations: Cranetilt Three-Valve Lifting Traps are designed for draining condensation from low pressure, vacuum, or varying pressure apparatus. They are particularly suited for discharging against a pressure higher than that in the inlet line to the trap. For brewing kettles, vacuum pans, evaporators, paper machines, jacketed cooking kettles, heating systems, stills, dry kilns, etc., they render excellent service.

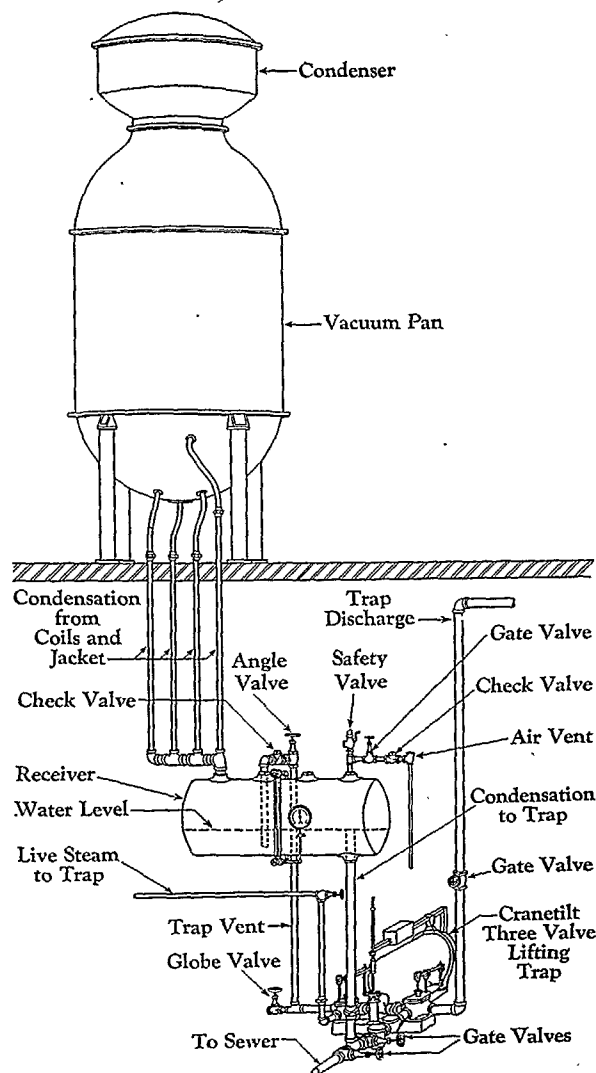
Capacities: These traps depend upon the actuating steam pressure, the back pressure against the vent discharge, and the head pressure against the trap discharge. Capacities are furnished on application when inquiries include these three factors.

Economy and efficiency: For draining low pressure apparatus into higher pressure lines, these traps function more economically than any other device. They will not steam-bind or air-bind, and they are unaffected by the pressure or temperature of incoming condensate. Heat losses are limited to only those resulting from radiation, and in properly piped systems even the operating steam is reclaimed.

Durability: The steam, vent, and discharge valves of these traps are all of the pilot operated type, in which the movement of the trap tank merely operates small pilot valves within the main valves. The main valves are actuated by pressure and consequently have a very snappy action in opening and closing. As a result, rapid wear of the seating surfaces is entirely eliminated.

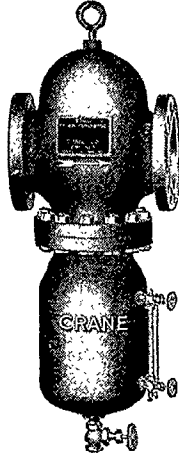
Simplicity: The Cranetilt Three-Valve Lifting Trap has no interior valves, floats, buckets, levers, or other working parts to give trouble. Its valves are all on the outside, where they are easily accessible for inspection and adjustment. The action of the trap is visible; a glance shows whether it is operating. Its operation is entirely automatic.

Testing: Each trap is carefully tested before shipment to insure that it is in perfect working order and fully up to its rated capacity. A comprehensive instruction book covering installation, operation, and maintenance is furnished with each trap.



A complete piping system for a milk evaporator illustrating the use of a Cranetilt Three-Valve Lifting Trap and a receiver to handle the condensation from the steam coils and jacket.

Steam and Oil Separators



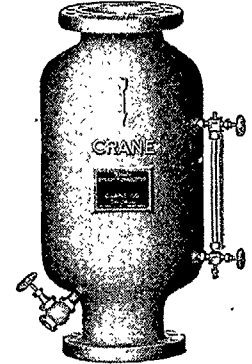
Horizontal
No. 07, Standard
No. 011, 250-Pound

WORKING PRESSURES
Standard — 125 pounds steam
250-Pound — 250 pounds steam

SERVICE RECOMMENDATIONS
Horizontal Separators are recommended for use in live steam lines to remove condensation from the steam before it is used in steam-heated apparatus, such as cooking kettles, evaporators, heating systems, etc. They can also be used as oil separators.

Vertical Separators are used to remove condensation from vertical lines with downward flow, such as steam lines to turbines, pumps, etc.

List prices of Horizontal and Vertical Separators include a drain valve with nipple and a water gauge.



Vertical
With Top Inlet
No. 09, Standard
No. 013, 250-Pound

List Prices, Each

Size	Inches	1½	2	2½	3	3½	4	5	6	8	10	12
Horizontal	No. 07, Standard	24.00	28.00	34.00	42.00	50.00	58.00	76.00	98.00	134.00	170.00	200.00
Flanged, F. & D.	No. 011, 250-Pound	26.50	31.00	37.50	46.00	55.00	64.00	84.00	108.00	147.00	187.00	220.00
Vertical	No. 09, Standard	24.00	28.00	34.00	42.00	50.00	58.00	76.00	98.00	134.00		
Flanged, F. & D.	No. 013, 250-Pound	26.50	31.00	37.50	46.00	55.00	64.00	84.00	108.00	147.00		

32

Construction and materials: These separators afford an efficient, economical means of removing free oil and condensate. Their large areas, the ample size and proper shape of their baffle surfaces, and the location of their openings, assure the highest degree of efficiency with the lowest possible pressure drop.

Standard Separators are made of cast iron. 250-Pound Separators are made of Ferrosteeel, the No. 011 having a cast iron drip pocket.

Flange dimensions: End flanges of the Standard Separators conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). End flanges of the 250-Pound Separators conform to the 250-Pound American Cast Iron Flange Standard (B16b-1928).

Drilling: All separators are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the particular standard applying, as listed above. No deduction is made for separators ordered faced only.

Importance of proper size: To secure maximum efficiency, separators should be selected on the basis of the amount of steam to be handled, not on existing

pipe sizes. Too small a separator means too high a velocity, with a resultant poor separation. To secure a proper size separator, use the following formula:

$$C = \frac{A \times B \times 2.4}{V}$$

in which C = Area of inlet in square inches

A = Pounds of steam per hour

B = Volume in cubic feet per pound of steam at given pressure

V = Velocity in feet per minute (7000 max.)

Welded Steel Steam Receiver Separators

Crane Co. can supply Steel Steam Receiver Separators of the welded type. Of high quality, and carefully and accurately fabricated, they conform to the A.S.M.E. Boiler Construction Code for Unfired Pressure Vessels.

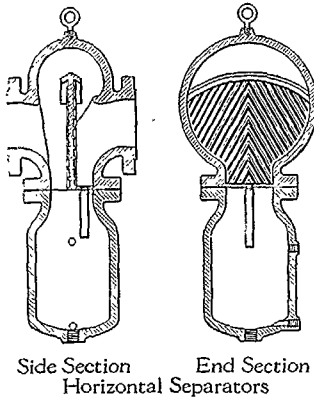
Inquiries and orders for receiver separators must be accompanied by complete specifications, including drawings showing the size and location of all openings. Prices on application.

Dimensions, in Inches

Size of Separator		1½	2	2½	3	3½	4	5	6	8	10	12
Horizontal	Face to face	10	10	11	12	14	14	16	17	20	23	26
	Center to top	4	4¾	5½	9½	11	11¼	12¾	15	18	22	26½
	Center to bottom	17	17	18½	20½	22½	23¼	26½	28¾	34½	40¾	45
	Greatest width	6⅝	7¾	8¾	9½	11⅞	12	14¼	16½	21	25	29
Vertical	Face to face	27	27	27	29	31	31	33	38	41		
	Greatest diameter	11	10¾	10⅞	12⅜	14	14	15⅞	17⅞	20		
Size of drain, Horizontal or Vertical		½	½	¾	1	1	1	1¼	1¼	1¼	1½	1½

Steam and Oil Separators

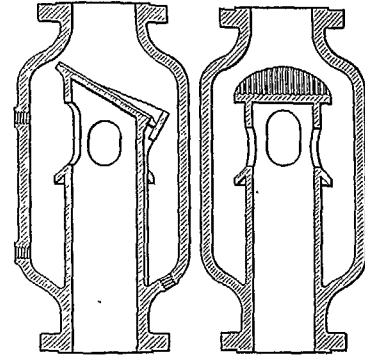
For list prices, see the preceding page.



Side Section
Horizontal Separators

PRINCIPLE OF DESIGN

The design of Crane Steam and Oil Separators is based upon a scientific principle involving the tendency of a non-elastic body to move in a straight line. Water and oil entrained in flowing steam are non-elastic; therefore, if the direction of the steam flow is abruptly changed, these fluids will tend to be precipitated out of the current. If the velocity of the flowing steam is greatly decreased at the same time, the precipitation of the fluids will be increased and there will be no tendency to pick them up again as the dry steam passes the baffle plates.



Side Section
Vertical Separators

A necessity in steam-consuming plants: In handling steam, it is essential the steam be delivered at its point of usage as moisture-free as possible.

In live steam lines, condensation is always a source of loss, whether the steam is to be used to drive an engine, turbine, or pump, or whether the steam is to be used as a heating medium.

In exhaust steam lines, oil from the engines or pumps renders the steam unfit for further use as a heating medium or for direct return to the boilers. Oil in pipes, radiators, etc., checks free radiation of heat. Oil in boilers combines with water impurities, and if present in any appreciable quantity forms a thick insulating coating over the heating surface.

Crane Steam and Oil Separators remove such condensation and oil efficiently and economically.

Horizontal separators: The bodies of horizontal separators provide a greatly enlarged cross section resulting in a lower velocity of the entering steam. Midway of this enlarged section, a corrugated baffle

plate, interposed in the flow, frees the steam of most of its entrained moisture. The steam rises over the top of the baffle, and deflected by the curved walls of the head, strikes the corrugations of the reverse side of the baffle before passing on.

The corrugations of the baffle plate run at an angle to the current of steam, affording ready drainage as well as effectively preventing the steam from picking up and carrying globules of water or oil over the top of the baffle. The normal flow of steam is away from the accumulation of condensate in the separator, which also aids in separation.

Vertical separators: Vertical separators employ the same principles of design as the horizontal type, but due to the change in form, there are certain necessary changes in structural details, which do not alter their effectiveness.

Automatic drainage: To secure maximum efficiency, all separators must be properly drained. This drainage should be automatic and only the best of steam traps should be used; see pages 415 to 419.

32

Cast Iron Drip Pockets

WORKING PRESSURES

Standard — 125 pounds steam

250-Pound — 250 pounds steam



No. 420, Standard
No. 422 E, 250-Pound

Drip Pockets are tapped for water gauges. Drip Pockets for 250 pounds steam, 500° F., are made to order of Ferrosteeel at a 25% advance in price.

Service recommendations: Drip pockets are used primarily as condensation collectors, but also aid in keeping the pipe line clean by receiving foreign matter. They should be located where condensation is most likely to collect.

Size: Full size drip pockets, corresponding to the size of the line on which they are applied, should always be used except on lines larger than 12-inch. The 12-inch size, used with a reducing fitting, is large enough for steam lines from 12 to 24-inch.

Flange dimensions: Flanges on Standard Drip Pockets conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). Flanges on 250-Pound Drip Pockets conform to the American 250-Pound Cast Iron Flange Standard (B16b-1928).

Prices include facing and drilling (F. & D.) to the Standard applying.

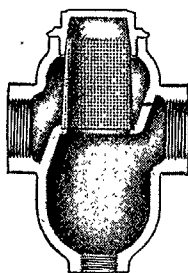
No deduction is made if drip pockets are ordered faced only.

List Prices, Each, and Dimensions, in Inches

Size	Inches	2½	3	3½	4	5	6	8	10	12
Flanged, No. 420, Standard		20.00	22.00	24.00	26.00	30.00	37.00	55.00	80.00	120.00
F. & D. No. 422 E, 250-Pound		20.00	22.00	24.00	26.00	30.00	37.00	55.00	80.00	120.00
Overall height		13	14	16	16	18	20	24¼	28	32
Size of drain		¾	1	1	1	1¼	1¼	1¼	1½	1½

Templates for drilling....pages 551 and 552

Iron Body Sediment Separators Standard

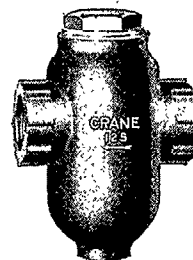


Cross Section
No. 986

125 pounds steam; 200 pounds cold water, oil, or gas working pressure

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 986, Black	Each	3.20	4.00	5.20	6.40	8.80	13.60	19.00	25.00
No. 986, Galvanized	Each	4.00	5.00	6.50	8.00	11.00	17.00	23.00	31.00
End to end	Inches	3 1/8	3 3/4	4 1/4	5	5 1/2	6 3/4	8	9 1/2
Center to top	Inches	1 3/4	2 1/4	2 7/8	3 1/4	3 3/4	5	7	8
Center to bottom	Inches	2 3/8	2 3/4	3 3/8	4	4 1/2	5 1/2	7	8 1/2
Size of drain	Inches	1/2	1/2	3/4	3/4	1	1	1 1/4	1 1/4



No. 986
Screwed

Service recommendation: Dirt and pipe scale in piping conveying steam, water, air, oil, and other fluids are serious trouble makers, frequently cutting the seats and discs of valves and interfering with the operation of automatic devices and machines. Crane Sediment Separators will effectively remove all foreign matter passing through the lines in which they are installed. They not only prevent the passage of such matter but furnish a pocket for its accumulation, from which the matter can be easily blown.

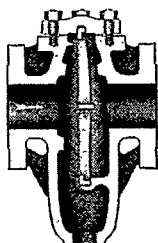
Construction: No. 986 Separators have cast iron bodies and brass screwed caps, in sizes 1 1/2-inch and smaller; 2-inch and larger have bolted iron caps. The strainer element is a brass screen rolled into the form of a frustrum of a cone, one end of which seats in the cap and the other on a machined surface in the bridge

wall of the body. The area through the screen is much greater than the area of the pipe size; the screen provides an unrestricted flow to the line fluid even when some of its holes are clogged with foreign matter.

Screens: Unless otherwise ordered, these separators are furnished with screens having perforations .057-inch in diameter (135 holes per square inch) and are then suitable for steam, water, and medium or heavy oils. For air, gas, gasoline, volatile oils, and fuel oils, screens having perforations .033-inch in diameter (331 holes per square inch) will be furnished. When finer perforations are desired, we can furnish .02-inch diameter perforated screens from stock (952 holes per square inch), although screens having any other diameter perforations also can be furnished on special order.

32

250-Pound



Cross Section
No. 989

250 pounds steam; 400 pounds cold water, oil, or gas working pressure

Features: Crane 250-Pound Sediment Separators, like the Standard, embody the four essential principles of a good separator: arrestment of foreign matter, a pocket for its accumulation, large screen area, and a vertical screen, allowing a large percentage of the heavy particles to drop naturally to the pocket. The strainer element is a flat brass screen supported between the body and cap by a malleable iron grate.

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
No. 988, Screwed	Each	4.00	5.00	6.50	8.00	11.00	17.00	21.00	28.00					
No. 989, Flanged, F. & D.	Each							33.00	43.00	65.00	80.00	125.00	165.00	230.00
End to end, screwed	Inches	3	3 1/2	3 1/2	3 3/4	4	4 1/2	5 3/8	6					
Face to face, flanged	Inches							9 1/4	10	11	12 1/4	14 3/4	17 1/4	22
Center to top	Inches	2 1/8	2 5/8	3	3 1/2	3 3/8	4 3/4	5 3/4	6 1/2	7 1/2	8 3/8	10	11 3/4	15 1/4
Center to bottom	Inches	3 1/8	4	4	4 5/8	5 1/4	6 1/2	8	9 1/4	10 1/2	11 3/4	14 1/4	17	21 7/8
Size of drain	Inches	1/2	3/4	3/4	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2

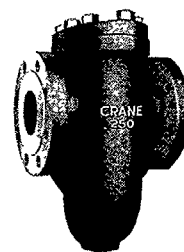
Screens: Unless otherwise ordered, these separators are furnished with screens having perforations .057-inch in diameter (135 holes per square inch) and are then suitable for steam, water, and medium or heavy oils. For air, gas, gasoline, volatile oils, and fuel oils, screens having perforations .033-inch in diameter (331 holes per square inch) will be furnished. When finer perforations are desired, we can furnish .02-inch diameter perforated screens from stock (952 holes per square inch), although screens having any other diameter perforations also can be furnished on special order.

Materials: Sizes 5-inch and larger are made of Ferrosteeel and can be used on 250 pounds super-

heated steam working pressures where the total temperature does not exceed 500° Fahrenheit. Sizes 4-inch and smaller are made of cast iron and should be used only for saturated steam service.

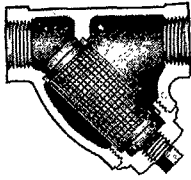
Flange dimensions: The end flange dimensions conform to the American 250-Pound Cast Iron Flange Standard, No. B16b-1928. Flanges have a 1/16-inch raised face. See page 552 for templates.

Drilling: Flanged sediment separators are furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American 250-Pound Cast Iron Flange Standard. When ordered faced only, they will be furnished at the same price as for faced and drilled.

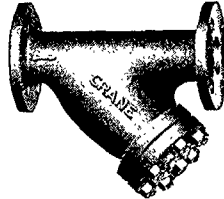


No. 988, Screwed
No. 989, Flanged

Y-Pattern Sediment Separators



Cross Section
Iron Body, Screwed
*No. 988½, Standard
*No. 990½, 250-Pound



Iron Body, Flanged
No. 989½, Standard
No. 991½, 250-Pound

WORKING PRESSURES			
Sediment Separator		Steam	Cold water, oil, or gas
Iron	Standard	125 pounds	200 pounds
Body	250-Pound	250 pounds	500 pounds
Cast Steel	Rated for 600 pounds steam, 950° F. Other ratings same as 600-Pound Screwed Gate Valves, page 301.		



600-Pound
Cast Steel
No. 994 D
Screwed

*Nos. 988½ and 990½ Sediment Separators 1½-inch and smaller have screwed caps, as illustrated; larger sizes have flanged caps.

List Prices and Dimensions

Size Inches	Iron Body and Cast Steel Screwed							Size Inches	Iron Body Flanged, F. & D.						
	List Prices Each			Dimensions in Inches					List Prices Each		Dimensions in Inches				
	Iron Body		Cast Steel No. 994 D	End to end	Center to extreme bottom		Size of blow- off		No. 989½ Stand- ard	No. 991½ 250- Pound	Face to face		Center to extreme bottom		Size of blow- off
	No. 988½ Stand- ard	No. 990½ 250- Pound			No. 988½ 990½	No. 994 D					No. 989½	No. 991½	No. 989½	No. 991½	
¼	2.35	2.60		3¼	2¼		⅜	2	16.50	19.00	10¾	11¼	8	8	1
⅜	2.35	2.60		3¼	2¼		⅜	2½	20.00	23.00	11⅞	12½	9¼	9¼	1¼
½	2.70	3.00	†	3¾	2¾		⅜	3	25.75	30.00	13¼	14	10½	10½	1¼
¾	3.15	3.50	15.50	4¼	3	4	½	3½	44.50	51.00	14¾	15½	12	12	1¼
1	3.75	4.15	20.00	5	3¾	4½	¾	4	52.00	60.00	16¼	17	13	13	1¼
1¼	4.70	5.25	26.50	6	4½	5½	¾	5	72.00	90.00	18	19	15	15½	1½
1½	6.00	6.60		7	5¼		1	6	105.00	131.00	20½	21½	16½	17	1½
2	11.50	12.50		8½	8		1	8	Prices on application	25	26	20	20½	2	
2½	14.00	15.50		10	9¼		1¼	10		31	33	24½	25	2	
3	18.50	20.50		11½	10½		1¼	12		34	36	28	28	2	

† ½-inch No. 994 D Cast Steel Separators can be made from ¾-inch size, using steel face bushings; price on application.

† 1/2-inch No. 994 D Cast Steel Separators can be made from 3/4-inch size, using steel face bushings; price on application.

Service recommendations: Crane Y-Pattern Sediment Separators are used to protect equipment against damage from dirt, grit, scale, and all foreign matter in steam, water, air, oil, and gas lines.

The No. 994 D Separators are used where severe services require the durability and strength of steel construction. They are ideal for use with the No. 983 D Cast Steel Steam Traps shown on page 416.

Features: These separators are simple in design and rugged in construction. Their large screening area makes them exceptionally efficient. Internal parts are readily accessible. The separators not only prevent passage of foreign matter, but also furnish a pocket for its accumulation, from which the matter can be easily removed through the blow-off connection. The connection is fitted with a square head plug.

Materials: The iron body separators have a screwed brass cap on sizes 1½-inch and smaller and a bolted iron cap on larger sizes.

The cast steel separators have a body and bolted cap made of Crane No. 4 Carbon-Molybdenum Alloy Cast Steel. The joint between the body and cap is of the male and female type, being equipped with a metallic gasket held in place by Triplex Steel studs.

Screens: The strainer element is a Monel metal mesh screen rolled into the shape of a cylinder. The ends are reinforced. One end fits into a recess in

the diagonal wall of the body, and the other is retained by the cap. The screen is secure; it will not loosen in service.

The mesh type of screen is furnished for greater efficiency and increased screening area. The screening area in Crane Separators is much greater than the area of the pipe (more than 500 per cent on the 20 mesh screen) assuring free fluid flow with minimum pressure loss.

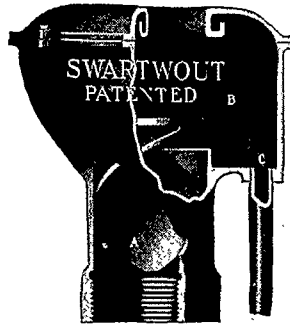
20 mesh Monel metal screens (400 holes per square inch), suitable for service on steam, water, and medium or heavy oils, are regularly furnished with the separators. When specified, 40 mesh Monel metal screens (1600 holes per square inch) can be furnished at no additional charge, for service on air, gas, gasoline and light oils.

Finer mesh screens, perforated screens, or screens made of steel or 18-8 Chrome-Nickel Alloy can be furnished when so ordered; prices on application.

Flange dimensions and drilling: Inlet and outlet flanges on the No. 989½ Sediment Separators conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939); on the No. 991½, the flanges conform to the American 250-Pound Cast Iron Flange Standard (B16b-1928).

Prices of flanged sediment separators include facing and drilling (F. & D.) to the Standard applying. No deduction is made if they are ordered faced only.

Swartwout Cast Iron Exhaust Heads



Swartwout Exhaust Head

Swartwout Exhaust Heads effectively remove water and oil from exhaust steam discharging to atmosphere. If exhausted direct from the pipe, water and oil would tend to deteriorate roofs and side walls of buildings.

These exhaust heads neither interrupt nor slow down the flow of steam; nor is there any appreciable back pressure. Oil and water are removed simultaneously and nothing but dry steam passes out into the atmosphere.

Construction: Centrifugal force, utilized in the design of the Swartwout Exhaust Head, is responsible for the removal of oil and water without any change in the direct flow of the steam.

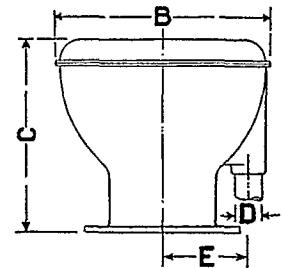
Although made of cast iron, the exhaust heads are light. They are durable, ornamental, and rustproof. Once in position, there is no further expense for replacement, except where plant expansion necessitates the use of a larger head.

Flange dimensions and drilling: End flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

List prices include facing and drilling to the aforementioned Standard. No deduction is made if Exhaust Heads are ordered faced only.

List Prices and Dimensions

Screwed						Flanged, F. & D.					
Size Inches	Price Each	Dimensions, in Inches				Size Inches	Price Each	Dimensions, in Inches			
		B	C	D	E			B	C	D	E
1	25.00	7 $\frac{3}{4}$	8 $\frac{1}{8}$	$\frac{1}{2}$	2 $\frac{7}{8}$	6	60.00	16	14 $\frac{7}{8}$	1	6 $\frac{3}{8}$
1 $\frac{1}{4}$	25.00	7 $\frac{3}{4}$	8 $\frac{1}{8}$	$\frac{1}{2}$	2 $\frac{7}{8}$	8	90.00	18 $\frac{3}{4}$	17 $\frac{7}{8}$	1 $\frac{1}{4}$	7 $\frac{1}{2}$
1 $\frac{1}{2}$	25.00	7 $\frac{3}{4}$	8 $\frac{1}{8}$	$\frac{1}{2}$	2 $\frac{7}{8}$	10	115.00	23	21 $\frac{3}{4}$	2	9 $\frac{3}{8}$
2	30.00	9	10	$\frac{3}{4}$	3 $\frac{5}{16}$	12	155.00	28 $\frac{1}{2}$	25	2 $\frac{1}{2}$	11 $\frac{3}{4}$
2 $\frac{1}{2}$	30.00	9	10	$\frac{3}{4}$	3 $\frac{5}{16}$	14	190.00	30 $\frac{1}{2}$	27	2 $\frac{1}{2}$	12 $\frac{7}{8}$
3	35.00	9 $\frac{3}{4}$	10 $\frac{3}{4}$	$\frac{3}{4}$	4 $\frac{1}{16}$	16	230.00	34 $\frac{1}{4}$	30 $\frac{1}{2}$	3	14
3 $\frac{1}{2}$	35.00	9 $\frac{3}{4}$	10 $\frac{3}{4}$	$\frac{3}{4}$	4 $\frac{1}{16}$	18	300.00	38	33 $\frac{7}{8}$	3	15 $\frac{11}{16}$
4	45.00	11 $\frac{1}{2}$	11 $\frac{11}{16}$	1	4 $\frac{15}{16}$	20	360.00	41 $\frac{1}{4}$	38 $\frac{3}{8}$	3 $\frac{1}{2}$	16 $\frac{3}{4}$
4 $\frac{1}{2}$	45.00	11 $\frac{1}{2}$	11 $\frac{11}{16}$	1	4 $\frac{15}{16}$	24	730.00	56 $\frac{1}{2}$	46	4	19 $\frac{1}{2}$
5	50.00	13 $\frac{7}{8}$	13 $\frac{1}{4}$	1	5 $\frac{1}{2}$	30	1400.00	62	57	4 $\frac{1}{2}$	24 $\frac{1}{2}$

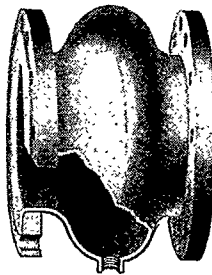


These exhaust heads are made with a screwed connection in sizes 5-inch and smaller, and with a flanged connection in larger sizes.

32

Low Pressure Copper Expansion Joints

WORKING PRESSURE—0 to 15 pounds steam, air, and gas



No. 411

Service recommendations: These low pressure expansion joints are designed for use in the exhaust steam lines from engines, turbines, pumps, etc. They should not be used when the expansion in the line is greater than $\frac{1}{4}$ inch.

The joints should be used when the pressure is above atmospheric but not exceeding 15 pounds. They should never be

used on vacuum service because of the danger of collapsing the copper shell.

Installation: These expansion joints may be used in either the horizontal or vertical position. Pipe lines containing them must be carefully anchored in order to force the joints to compensate for the expansion and contraction in the piping. Piping should be properly supported to relieve the expansion joints of the necessity of carrying any great weight.

Expansion joints of this type should be cold sprung

$\frac{1}{8}$ inch upon installation in order to relieve them of excessive strains when the line is put into service.

Flanges: End flanges are made of steel and are the swivel type. They conform to the dimensions of the 25-Pound American Tentative Cast Iron Flange Standard (B16b2-1931).

Drilling: The end flanges are always furnished faced and drilled (F. & D.). List prices include facing and drilling to the 25-Pound American Tentative Cast Iron Flange Standard.

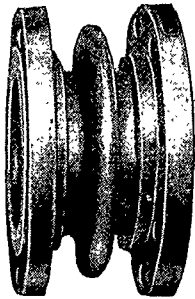
List Prices and Dimensions

Size Inches	Price F. & D. Each	Dimensions, in Inches			
		Face to Face	Diameter of Flanges and Rings	Thickness of Flanges	Size of Drain
4	110.00	8	9	$\frac{3}{4}$	$\frac{1}{2}$
5	125.00	9	10	$\frac{3}{4}$	$\frac{1}{2}$
6	140.00	9	11	$\frac{3}{4}$	$\frac{1}{2}$
8	170.00	10	13 $\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$
10	200.00	11	16	$\frac{7}{8}$	$\frac{3}{4}$
12	225.00	11	19	1	$\frac{3}{4}$

Sizes 14-inch and larger made to order; prices on request.

Badger Corrugated Type Expansion Joints

Non-Equalizing and Self-Equalizing



Non-Equalizing
Flanged or
Welding Ends

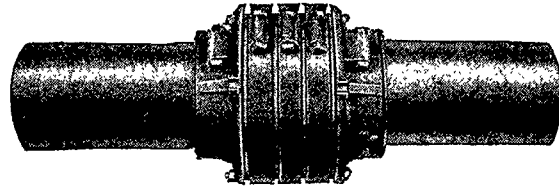
These corrugated type expansion joints are used to relieve strains, to absorb vibrations, and to compensate for change in lengths of pipe lines due to temperature fluctuations. They use no packing and, as a result, eliminate maintenance. This is an advantage particularly valuable where pipe lines are installed underground.

The expansion joints are compact. Carefully constructed, they undergo scientifically controlled heat-treatments throughout their entire fabrication. The joints can be regularly furnished made of copper or stainless steel. Special metals will be furnished to order.

Non-equalizing joints: Non-equalizing joints are limited to use on pipe lines with traverses ranging up to and including $\frac{1}{2}$ -inch, and where pressures range from high vacuum to 25 pounds. A lateral displacement up to $\frac{1}{8}$ -inch per corrugation is permissible.

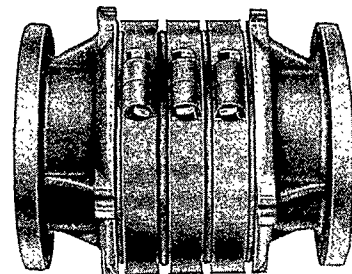
These joints can be furnished round (any diameter), oval, rectangular, or in any special shape required.

Self-equalizing joints: Self-equalizing joints feature "directed flexing". Directed flexing is the



Self-Equalizing — Welding Ends

action provided by the all-curve corrugation and the corresponding equalizing rings. This type of design distributes the flexing stresses, resulting in longer joint life.



Self-Equalizing
Flanged Ends

Self-equalizing joints are furnished in sizes up to 30-inch diameter. Single joints are available in traverses up to 6 inches; double joints, in traverses up to 12 inches.

Flexible Pipe Line Seals: Flexible Pipe Line Seals (not shown) to seal openings in walls, foundations, decks, and bulkheads can be furnished. They permit free expansion of pipe, yet prevent seepage of water.

Prices and dimensions on application

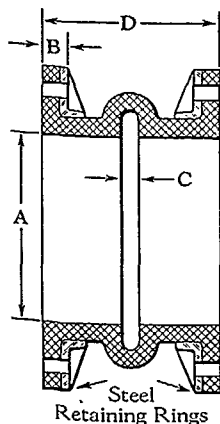
Rubber Spool-Type Expansion Joints

For Vacuum Service
Style 4039

For Pressure Service
Style 4140

Rubber Spool Type Expansion Joints find wide application in many industries. They are especially effective on piping installations for avoiding excessive stress, absorbing vibrations, and eliminating

undesirable sounds. The joints are reinforced with solid metal rings embedded in the carcass and thoroughly reinforced with heavy duck; they have full faced fabric reinforced rubber flanges.



Dimensions and Ratings

Size Inches	Dimensions, in Inches				*Ratings for Style 4140	
	A	B	C	D	Compression Inches	Working Pressure 180° F. Max.
6	6	$1\frac{5}{16}$	$\frac{1}{2}$	From 6 to 16" to suit the serv- ice.	.43	125 pounds
8	8	$1\frac{1}{4}$	$\frac{3}{4}$		.43	115 pounds
10	10	$1\frac{1}{8}$	$\frac{3}{4}$		.43	115 pounds
12	12	$1\frac{1}{8}$	$\frac{3}{4}$		.68	115 pounds
14	14	$1\frac{1}{4}$	$\frac{3}{4}$		.68	75 pounds
16	16	$1\frac{1}{4}$	$\frac{3}{4}$		.68	60 pounds
18	18	$1\frac{5}{16}$	$\frac{3}{4}$		.68	60 pounds
20	20	$1\frac{3}{8}$	$\frac{7}{8}$		.68	60 pounds
24	24	$1\frac{3}{8}$	$\frac{7}{8}$		.81	50 pounds
30	30	$1\frac{3}{8}$	1		.93	50 pounds
36	36	$1\frac{3}{8}$	1		.93	40 pounds

*Style 4039 is recommended for 30 inches of mercury.

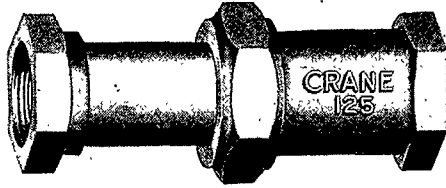
Style 4039 are recommended for 30 inches of mercury. Style 4140 are recommended for the pressures shown in the table, at 180°F. maximum temperature.

The flange diameter, bolt circle, and number and diameter of bolt holes conform to the American Cast Iron Flange Standard, Class 125 (B16a-1930); see page 551.

Smaller sizes, larger sizes, and other types of Rubber Expansion Joints can be furnished when required.

Prices on application

Standard Brass Expansion Joints



Semi-Guided
No. 404, Standard Traverse
No. 406, Special Traverse

WORKING PRESSURES

125 pounds steam
200 pounds cold water, oil, or gas

SERVICE RECOMMENDATIONS

Crane brass semi-guided expansion joints are chiefly used in interior piping work, on steam and hot water heating lines, domestic hot water lines, and for air, oil, and gas service.

List Prices and Dimensions

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 404 Standard Traverse	Price	Each	1.50	2.20	3.00	4.00	5.00	8.00	14.00	21.00
	Traverse	Inches	2	2 1/4	2 1/4	2 1/4	2 1/4	2 1/2	2 1/2	2 3/4
	End to end, open	Inches	6 3/8	7 1/4	7 3/8	7 3/8	7 5/8	8 3/8	9 1/8	10 3/8
No. 406 Special Traverse	4-inch traverse	Each	3.30	4.00	4.90	6.15	7.40	11.00	17.50	25.00
	6-inch traverse	Each		5.00	6.00	7.50	9.00	13.00	20.50	29.00
	8-inch traverse	Each		6.00	7.25	9.00	10.75	15.25	23.00	32.00
	12-inch traverse	Each		8.00	9.50	12.00	14.50	19.50	28.00	37.50

To find the over-all length of special traverse joints, take the over-all length of the standard traverse joint of the same size and add twice the difference between the special traverse and the standard traverse.

Construction: These are sturdily constructed, well-proportioned expansion joints. A large packing nut with ample space for packing is provided.

Packing: Expansion joints are regularly furnished without packing in the stuffing boxes, unless speci-

cally ordered packed, in which case an extra charge is made. Orders for packed joints must specify the kind of packing wanted, or give complete information on the fluid to be handled.

Installation: To secure the maximum efficiency from expansion joints and to assure satisfactory operation, the pipe line must be properly anchored and guided to force the joints to compensate for expansion and contraction.

32

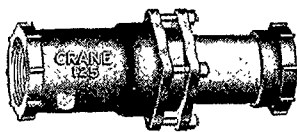
Expansion in Pipe Lines

The expansion for any length of pipe may be found by the following method: from the table below, obtain the difference in increased length at the minimum and maximum temperatures, divide the result by 100 to obtain the increase in length per foot, and multiply by the length of the line in feet.

Linear Expansion

Temp. Degrees F.	Inches per 100 Feet				Temp. Degrees F.	Inches per 100 Feet				Temp. Degrees F.	Inches per 100 Feet	
	Steel	Wrought Iron	Brass	Copper		Steel	Wrought Iron	Brass	Copper		Steel	Wrought Iron
0	0	0	0	0	340	2.76	2.87	4.30	3.95	680	5.965	6.20
20	.15	.155	.25	.25	360	2.935	3.05	4.58	4.15	700	6.17	6.42
40	.30	.31	.45	.45	380	3.11	3.235	4.85	4.40	720	6.375	6.625
60	.455	.475	.67	.65	400	3.29	3.43	5.14	4.64	740	6.58	6.835
80	.61	.63	.92	.87	420	3.465	3.62	5.45	4.89	760	6.79	7.05
100	.77	.80	1.17	1.10	440	3.65	3.805	5.73	5.15	780	6.99	7.275
120	.915	.96	1.41	1.35	460	3.835	4.00	5.95	5.37	800	7.21	7.49
140	1.075	1.13	1.69	1.57	480	4.02	4.19	6.25	5.64	820	7.415	7.73
160	1.235	1.29	1.91	1.77	500	4.21	4.39	6.55	5.88	840	7.63	7.93
180	1.40	1.46	2.15	2.00	520	4.39	4.58			860	7.84	8.145
200	1.57	1.64	2.43	2.25	540	4.59	4.78			880	8.055	8.37
220	1.73	1.81	2.71	2.52	560	4.78	4.975			900	8.28	8.60
240	1.89	1.98	2.97	2.74	580	4.975	5.175			920	8.495	8.82
260	2.065	2.16	3.22	2.95	600	5.17	5.38			940	8.72	9.05
280	2.23	2.335	3.47	3.17	620	5.365	5.58			960	8.945	9.28
300	2.41	2.52	3.76	3.42	640	5.565	5.785			980	9.17	9.52
320	2.59	2.70	4.07	3.70	660	5.765	5.99			1000	9.40	9.75

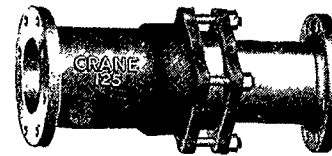
Standard Iron Body Expansion Joints



Screwed
No. 398, Standard Traverse
No. 400, Special Traverse

WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil, or gas

Flanged end joints 6-inch and smaller and all screwed end joints have brass sleeves. Flanged end joints 8-inch and larger have steel sleeves, chromium-plated; brass sleeves can be furnished when desired; prices on application.



Flanged
No. 401, Standard Traverse
No. 403, Special Traverse

List Prices and Dimensions

	Size Inches	No. 398, Standard Traverse			No. 400, Special Traverse			
		Price Each	Traverse Inches	End to End Opened Inches	4-inch Traverse Price, each	6-inch Traverse Price, each	8-inch Traverse Price, each	12-inch Traverse Price, each
Screwed	1½	6.25	2½	13¾	7.25	9.50	11.75	16.25
	2	7.00	2½	13¾	8.50	11.00	13.50	18.50
	2½	8.00	2½	14½	10.00	13.00	16.00	22.00
	3	10.00	2¾	15¼	13.50	17.50	21.50	29.50
	3½	14.00	3	17¼	20.00	25.00	30.00	40.00
	4	18.00	3¼	18½	24.00	30.00	36.00	48.00
	5	38.00	4	19¾		45.00	52.00	66.00
	6	42.50	4	21½		51.50	60.50	78.50
	8	90.00	4	22½			110.00	130.00
	Size Inches	No. 401, Standard Traverse			No. 403, Special Traverse			
		Price Each	Traverse Inches	Face to Face Opened Inches	4-inch Traverse Price, each	6-inch Traverse Price, each	8-inch Traverse Price, each	12-inch Traverse Price, each
Flanged, F.&D.	1½	13.75	2½	13¾	14.00	16.25	18.50	23.00
	2	15.00	2½	12¾	15.50	18.00	20.50	25.50
	2½	16.00	2½	12¼	17.00	20.00	23.00	29.00
	3	18.50	2¾	13	21.00	25.00	29.00	37.00
	3½	25.00	3	15	30.00	35.00	40.00	50.00
	4	30.00	3¼	15¾	34.00	40.00	46.00	58.00
	5	48.00	4	17½		55.00	62.00	76.00
	6	55.00	4	19½		63.00	71.00	87.00
	8	90.00	4	19¾			110.00	130.00
	10	135.00	4	21¾			157.00	179.00
	12	190.00	4	23¾			214.00	238.00
	14	263.00	4	24			291.00	319.00
	16	334.00	4	26½			368.00	402.00

To find the over-all length of special traverse joints take the over-all length of the standard traverse joint of the same size and add twice the difference between the special traverse and the standard traverse.

Construction: These semi-guided expansion joints are well proportioned throughout and are made of high quality materials. The stuffing boxes are of ample size; bolted packing glands insure a uniform application of pressure on the packing, and they are carefully machined to guide the sleeves.

All joints are furnished with drain bosses. They will be tapped, when so ordered, at an extra price.

When required these joints can be furnished with anchor bases which will be drilled with four bolt holes, also service outlets which will be screwed in sizes 14-inch and smaller and flanged in the 16-inch size. Prices on application.

All-Iron: All-Iron Expansion Joints will be furnished with steel sleeves, chromium-plated, unless otherwise specified. Prices on application.

Packing: Expansion Joints are regularly furnished

without packing in the stuffing boxes, unless specifically ordered packed, in which case an extra charge is made. Orders for packed joints must specify the kind of packing wanted, or give complete information on the fluid to be handled.

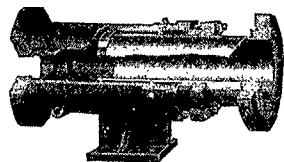
Flange dimensions: End flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939).

Drilling: Expansion Joints are regularly furnished faced and drilled (F. & D.) unless ordered faced only. List prices include facing and drilling to the American Cast Iron Flange Standard, Class 125. When ordered faced only they will be furnished at the same price as for faced and drilled.

Guided Expansion Joints: For description of Guided Expansion Joints refer to page 428.

Installation: To secure the maximum efficiency from expansion joints and to assure satisfactory operation, the pipe line must be properly anchored and guided to force the joints to compensate for expansion and contraction.

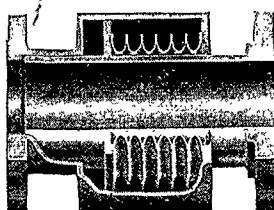
Adsko Iron and Steel Body Expansion Joints



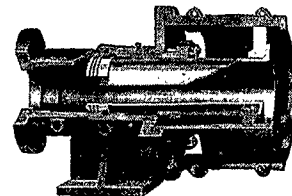
Internally Guided

125-Lb. Std. (1½ to 20")
 No. S-1-IS, Single, No Base
 No. S-2-IS, Single, With Base
 No. D-2-IS, Double, With Base
 250-Lb. Std. (1½ to 20")
 No. S-5-IS, Single, No Base
 No. S-6-IS, Single, With Base
 No. D-6-IS, Double, With Base

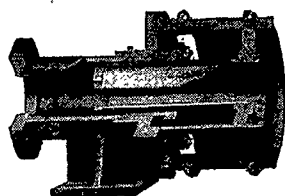
Prices and dimensions on application.



Packless U-Ring Type
 150 or 300-Lb. Stds. (3 to 12")
 Traverses 1-2-3-4", With or Without Base



Piston-Ring Type
 125-Lb. Std. (2 to 20")
 No. S-1-PG, Single, No Base
 No. S-2-PG, Single, With Base
 No. D-2-PG, Double, With Base
 250-Lb. Std. (2 to 20")
 No. S-5-PG, Single, No Base
 No. S-6-PG, Single, With Base
 No. D-6-PG, Double, With Base



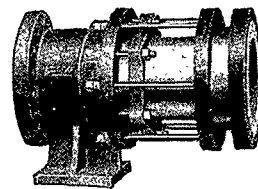
Internally-Externally Guided
 125-Lb. Std. (1½ to 20")
 No. S-1-GIS, Single, No Base
 No. S-2-GIS, Single, With Base
 No. D-2-GIS, Double, With Base
 250-Lb. Std. (1½ to 20")
 No. S-5-GIS, Single, No Base
 No. S-6-GIS, Single, With Base
 No. D-6-GIS, Double, With Base

WORKING PRESSURES

125-Lb. Semi-steel—125 pounds steam, 450° F.
 250-Lb. Semi-steel—250 pounds steam, 450° F.
 150-Lb. Steel —150 pounds steam, 750° F.
 300-Lb. Steel —300 pounds steam, 750° F.

Adsko Expansion Joints are furnished in the various styles and sizes described on this page. The joints are available with semi-steel or steel bodies depending upon the service requirements.

Internally Guided Joints: Internally Guided Joints have a guide ring on the inner end of the sleeve which moves within the machined bore of the body. The polished sleeve is not in contact with the body.



Tie-Rod Type
 125-Lb. Std. (2 to 20")
 No. S-1-T, Single, No Base
 No. S-2-T, Single, With Base
 No. D-2-T, Double, With Base
 250-Lb. Std. (2 to 20")
 No. S-5-T, Single, No Base
 No. S-6-T, Single, With Base
 No. D-6-T, Double, With Base

Internally—Externally Guided Joints: Internally—Externally Guided Joints are similar to the Internally Guided type. They feature a two-piece, removable hood, external guide, and they comply with Army and Navy specifications.

Packless U-Ring Joints: Packless Expansion Joints, U-Ring type, have an expansion element consisting of a series of corrosion-resistant steel U-Rings which are welded to a wrought steel body and to a guide on the movable sleeve. No scale or dirt can enter the element to impede operation; it is guided at three points throughout the entire traverse.

Being under compression when in operation, the element is under very little flexing strain. These joints are available with flanged or beveled ends.

Piston-Ring Joints: Piston-Ring Joints have piston rings in the internal guide. Located on the inner end of the sleeve, the rings hold the line pressure and permit unpacking and repacking of the joint without interrupting the service.

Tie-Rod Joints: Tie-Rod Joints have tie rods to prevent the sleeve from pulling out of the body. They are used where conditions do not permit the installation of a fully guided joint.

Bodies, single or double, are steel or semi-steel. They are furnished with or without base or service outlet. The bodies are tapped for drip piping when specified; lubrication fittings are included.

Sleeves are bronze with Van Stone flanges in sizes 6-inch and smaller and chromium-plated steel flanges in sizes 8-inch and larger.

Stuffing boxes, deep and properly proportioned, hold ample packing, assuring consistently tight joints with minimum repacking.

Packing is not regularly furnished with the expansion joints unless specified. When joints are ordered packed, the pressure, temperature, fluid handled, and general operating conditions should be specified.

Packing glands are accurately machined. They have a long lip to permit compression of the packing to one-half the original depth.

Glands studs and bolts are of a non-corrosive metal

to prevent freezing. The studs are firmly embedded in the body and are of sufficient size to furnish rigidity to the packing gland.

Service outlets are in the form of a service fitting in the Piston-Ring and U-Ring types. On the other styles, the outlets are integral with the body.

Bases are integral with the body. Their heavy webs withstand severe strain. They are drilled with four bolt holes.

The standard traverse of slip joint sleeves is 4 inches. Additional traverse is available in multiples of 4 inches from 4 to 12-inch. The U-Ring Joint is furnished in multiples of 1 inch to a total of 4 inches.

Drains are available. Slip joints are provided with a boss which can be tapped for drip when specified.

Lubrication fittings are available. Slip joints are tapped and plugged for the fittings which will be furnished when specified.

Flexible Joints, Gauges, Fusible Plugs, and Miscellaneous Specialties

Iron Body Swing Joints, for Gasoline service.....	page 430
Brass Swing Joints.....	page 430
Barco Flexible Ball, Swivel, and Revolving Joints.....	page 431
Chiksan Ball Bearing Swing Joints.....	page 432
Dayton Couplings.....	page 433
Brass Water Gauges.....	page 434
Gauge Glasses.....	page 435
Glass Tube Cutters.....	page 435
Extra Guards for Water Gauges.....	page 435
Water Columns, Cast Iron.....	page 436
Brass Try Cocks.....	page 435
Brass Whistles.....	page 437
Fusible Plugs.....	page 437
Crosby Gauges and Recorders.....	pages 438 and 439
Marshalltown Gauges.....	page 439
Syphon for Steam Gauges.....	page 435
Lubricators.....	page 440
Sight Feed, Snap Lever Oilers.....	page 440
Grease Cups.....	page 440
Injectors.....	page 441
Ejectors or Steam Jet Pumps.....	pages 441 and 442
Sump Pumps.....	page 442

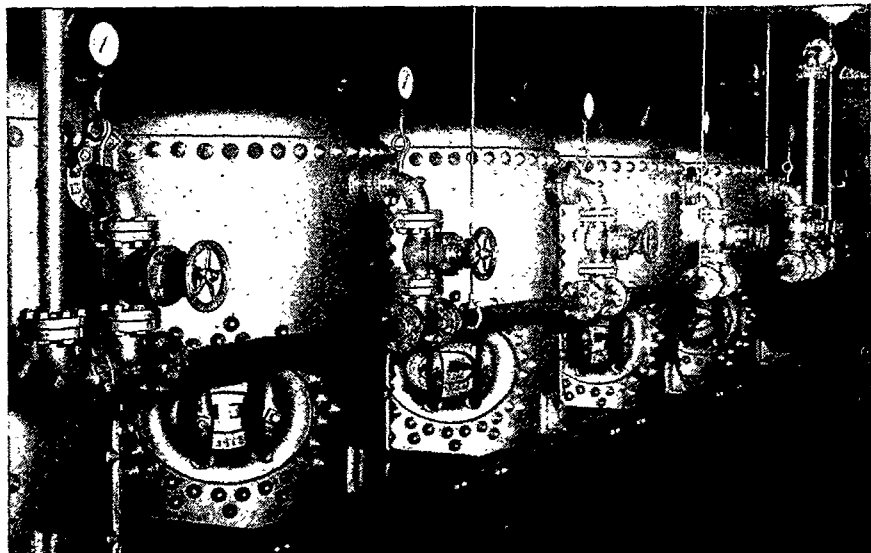
For Brass Whistle Valves, see page 67.

For Corrosion-Resistant Alloy Liquid Level Gauges, see page 450.

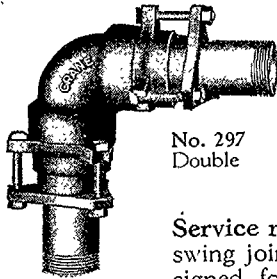
The items referred to above are only a portion of the complete Crane line of specialties and of special duty valves. For other products of this nature, see pages 369 to 428.

Piping in a manufactured gas plant, completely Crane equipped.

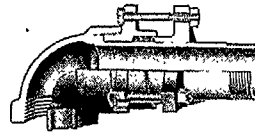
Valves, fittings, flanges, fabricated piping, specialties — all piping requirements can be had from one source when "Crane" is specified.



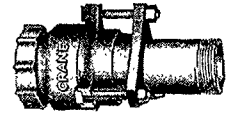
Iron Body Swing Joints For Gasoline Service



No. 297
Double



No. 295, Single



No. 299, Straight

Service recommendations: These swing joints have been primarily designed for gasoline service and are used to make adjustable connections to tanks, tank cars, barges, docks, loading and unloading racks, etc. When equipped with suitable packing they may be used for cold water, oil, or gas.

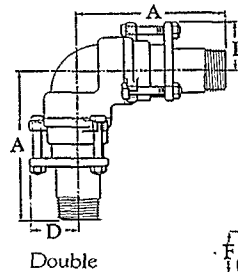
Features: The joints differ from ordinary swing joints in two important respects. First, they are made with a shoulder on the inner end of the sleeve which engages with the end piece of the body and prevents the sleeve from pulling out when in service. Second, the load on the sleeve is carried back to the body itself and does not rest on the packing. These features combined with the unusually deep stuffing box and the three-bolt gland result in leak-free service.

Materials: The bodies of these swing joints are made of cast iron, and the sleeves are made of brass tubing. Ends of the sleeves are equipped with iron pipe size male threads.

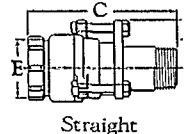
Packing: Unless otherwise ordered, the swing joints are furnished with packing suitable for gasoline service up to 100° F. When the swing joints are to be used for other liquids or for higher temperatures, they will be furnished with appropriate packing at

List Prices and Dimensions

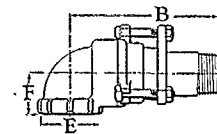
Size	Inches	2	2½	3	4
No. 295, Single	Each	13.00	17.00	24.00	40.00
No. 297, Double	Each	21.00	26.50	37.00	65.00
No. 299, Straight	Each	13.00	17.00	24.00	40.00
Dimensions, in Inches	A	8⅜	9⅞	10⅞	12⅞
	B	8½	9¾	10⅞	12½
	C	8¼	9⅝	10⅝	11½
	D	2¾	3⅛	3⅞	4⅝
	E	3⅜	3⅝	4⅝	5⅞
	F	2⅝	2⅞	3⅞	3¾



Double



Straight



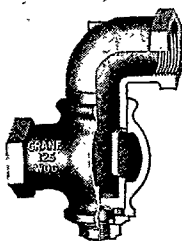
Single

an extra charge. Orders should specify the service and temperature conditions

33

Brass Swing Joints

WORKING PRESSURE
125 pounds water, oil, or gas, 200° F.



No. 300

Service recommendations: These swing joints are designed for use in making up adjustable connections in piping to tanks and other apparatus where permanently fixed connections cannot be made.

Construction: Basically, these joints consist only of a body and a hollow ell-shaped plug which is held into the body by a nut and washer. Both body and plug are tapped with iron pipe size connections. The joint operates in a manner similar to an ordinary plug cock, both body and plug being carefully ground together to insure maximum ease of operation. Ports in the plug

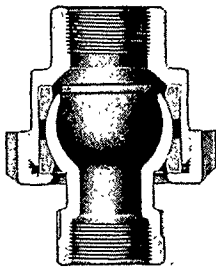
and the passageway in the body are so designed that the free flow of the fluid being handled is insured, and there is no restriction of port areas regardless of the angle at which the plug is turned. No packing is used in these joints.

Materials: All parts of these swing joints are made of brass to eliminate any possibility of having corrosion bind the plug.

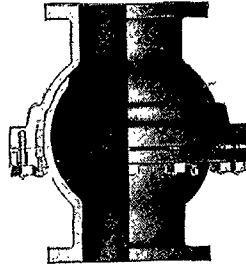
List Prices and Dimensions

Size	Inches	¼	⅜	½	¾	1
No. 300	Each	1.90	2.20	2.50	3.50	5.0
No. 300, Finished	Each	2.40	2.70	3.00	4.00	5.7
Center to end	Inches	1⅜	7/8	1⅞	1¼	1⅞
Center to center of pipe	Inches	1⅝	1⅞	1⅞	1⅞	2⅞

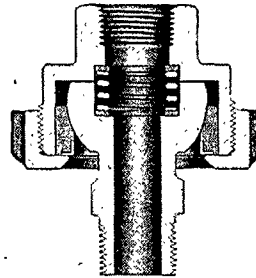
Barco Flexible Ball, Swivel, and Revolving Joints



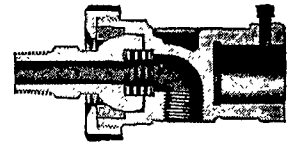
Flexible Ball Joint
Style 7-8



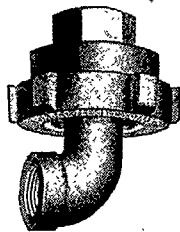
Flexible Ball Joint
Style 7-F, Flanged
125-Pound Standard



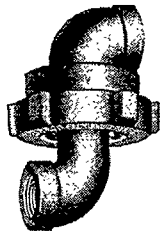
Swivel Joint
Style 7S-8CS



Swivel Joint with Socket End
For Use on Pressing Machines
Style 7KS - 8CS (Illustrated)
Style 7KS - 8BS (Not shown)
With Female 90° Angle Ball
When ordering, specify diameter
for casing socket. Shaft sizes
3/4 to 1 1/2-inch are available.



Flexible Ball Joint
Style 7-8B
Swivel Joint
Style 7S-8BS



Flexible Ball Joint
Style 7A-8B
*Style 7 A-8 C
*Male Straight Ball
*Style 7A-8
*Female Straight Ball
Swivel Joint
Style 7A-8BS
*Style 7AS-8CS
*Male Straight Ball
(*Not illustrated)

Flexible Ball Joints: Flexible Ball Joints provide for a substantial angular movement. They can be swiveled through an angle of 360°. Tight seating, they may be used on steam, water, oil, air, gasoline, tar, and similar fluids. Sizes 3-inch and smaller are recommended for 300 pounds steam and sizes 4 to 6-inch for 125 pounds steam.

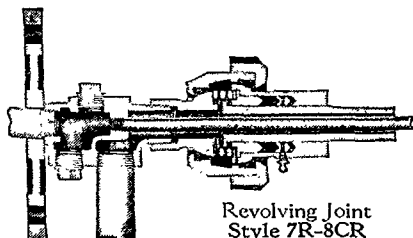
Sizes 3-inch and smaller are malleable iron; larger sizes are semi-steel. Extra heavy joints or brass joints (1/4 to 2-inch) can be furnished, at an advance in price. Information on additional styles furnished on request.

Swivel joints: Swivel Joints are spring seated, assuring tightness on both pressure and suction lines. Recommended for 300 pounds steam, the joints are ideal for use where the pressure fluctuates or where the temperature varies, as when steam and cold water are used alternately.

Swivel Joints have a malleable iron casing, a bronze ball end, a stainless steel spring, and a hard non-metallic gasket. Extra heavy joints for higher pressures or brass joints can be furnished, at an advance in price.

Revolving joints: Revolving joints are recommended for the heating or cooling of all types of rolls, drums, and dryers.

They are suitable for steam, air, gas, and hydraulic services. When so desired, the joints can be furnished with adapter 18R to hold spray or siphon pipe; orders should specify.



Revolving Joint
Style 7R-8CR
(Shown with Adapter 18R)

List Prices, Each Revolving Joints		
Size	Style 7R-8CR	
Inches	Without Adapter	With Adapter
1/2	19.75	
3/4	24.00	27.40
1	30.00	33.80
1 1/4	37.00	41.20
1 1/2	44.90	49.60
2	61.00	67.00

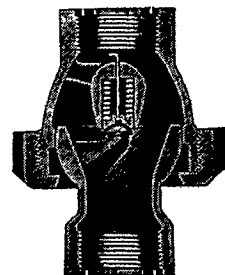
List Prices, Each, Flexible Ball Joints						
Size Inches	Style 7-8	Style 7-F Flanged F. & D.	Styles 7-8B or 7A-8	Style 7A-8B	Style 7A-8C	Total Safe Angular Movement
1/4	4.00	Sizes larger than 12-inch can be made to order; prices on request	4.30	4.60	4.30	37 1/2°
3/8	4.00		4.30	4.60	4.30	37 1/2°
1/2	4.00		4.30	4.60	4.30	37 1/2°
3/4	4.90		5.20	5.60	5.20	34°
1	5.50		5.80	6.30	5.80	35 1/2°
1 1/4	6.80		7.10	7.60	7.10	28 1/2°
1 1/2	7.80		8.10	8.60	8.10	30°
2	9.70		10.80	11.20	10.80	28 1/2°
2 1/2	17.00		18.60	19.40	18.60	27 1/2°
3	30.70		35.70	40.70	35.70	33°
4	37.30	53.50	43.50	49.60		28 1/2°
5	55.40	62.20	59.20			30°
6	63.40	71.10	68.30	81.60		31°
8		146.50				60°
10		197.00				40°
12		260.60				40°

List Prices, Each, Swivel Joints						
Size Inches	Style 7S-8BS	Style 7S-8CS	Style 7AS-8BS	Style 7AS-8CS	Style 7KS-8BS	Style 7KS-8CS
1/4	4.30		4.60		4.80	
3/8	4.30	4.00	4.60	4.30	4.80	4.60
1/2	4.30	4.00	4.60	4.30	4.80	4.60
3/4	5.20	4.90	5.60	5.20		
1	5.80	5.50	6.30	5.80		
1 1/4	7.10	6.80	7.60	7.10		

X Type Flexible Ball Joints

New design features of center spring streamlined X Type Flexible Ball Joints (see insert) assure no fluid or gas leakage.

Providing 360° swivel movement plus 40° total angular movement, they are suitable for steam pressures up to 300 pounds. Prices and data on request.



Chiksan Ball Bearing Swing Joints

High Pressure
and Low Pressure



Style No. 20
1-Way Swivel



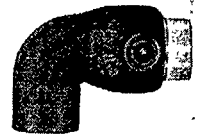
Style No. 30
1-Way Swivel

WORKING PRESSURES
Low Pressure (Malleable Iron or Steel)
300 pounds cold water, oil, or gas
High Pressure (Steel)
3000 pounds cold water, oil, or gas
High Temperature (Steel)
500 pounds steam, 700° F., max.

High Temperature



Style No. 20
1-Way Swivel



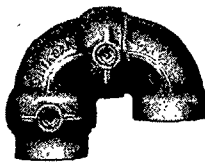
Style No. 30
1-Way Swivel

List Prices, Each, Screwed

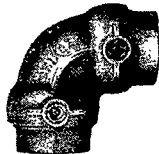
Class and Material	Size Inches	1-Way			2-Way		3-Way
		Style No. 20	Style No. 30	Style No. 40	Style No. 50	Style No. 60	Style No. 10
Low Pressure Malleable Iron Swing Joints	3/8	3.25	3.80	4.50	7.00	6.00	9.25
	1/2	3.25	3.80	4.50	7.00	6.00	9.25
	3/4	6.00	6.75	7.50	11.25	10.50	15.25
	1	6.00	6.75	7.50	11.25	10.50	15.25
	1 1/4	7.25	8.00	8.75	12.25	11.25	18.25
	1 1/2	7.25	8.00	8.75	12.25	11.25	18.25
	2	10.50	11.75	13.00	21.00	19.50	28.50
	2 1/2	16.50	18.50	21.50	32.00	28.50	41.25
	3	16.50	18.50	21.50	32.00	28.50	41.25
	4	22.75	24.75	29.00	44.25	40.00	61.50
Low Pressure Steel Swing Joints	6	63.00	70.00	78.50	125.00	120.00	179.00
	3/8	9.50	11.50	13.75	18.50	15.00	25.00
	1	9.50	11.50	13.75	18.50	15.00	25.00
	1 1/4	10.00	12.00	14.75	19.50	17.00	28.00
	1 1/2	10.00	12.00	14.75	19.50	17.00	28.00
	2	14.50	17.25	21.00	31.25	25.50	42.00
	2 1/2	24.50	29.00	33.00	49.50	45.00	65.25
	3	24.50	29.00	33.00	49.50	45.00	65.25
	4	35.25	38.50	42.00	66.75	62.00	97.75
	6	82.50	97.50	113.00	165.50	149.00	228.00
High Pressure Steel Swing Joints	8	140.00	156.50	175.00	259.50	233.50	349.00
	3/8	6.00	6.30	6.60	9.60	9.25	
	1/2	6.00	6.30	6.60	9.60	9.25	
	3/4	9.50	11.50	13.75	18.50	15.00	25.00
	1	9.50	11.50	13.75	18.50	15.00	25.00
	1 1/4	11.00	12.00	16.00	22.50	19.00	30.00
	1 1/2	11.00	12.00	16.00	22.50	19.00	30.00
	2	21.50	24.00	27.50	40.50	37.00	55.50
	2 1/2	27.00	32.00	38.00	60.00	52.50	77.50
	3	47.00	54.00	62.00	84.50	70.00	115.00
High Temperature Steel Swing Joints	4	75.00	83.00	91.50	127.00	118.00	175.00
	1/2	7.25	8.75	10.75	16.00	13.50	21.00
	1	11.00	13.50	18.00	24.75	20.00	32.00
	2	21.00	25.00	30.00	45.00	39.25	64.00
	3	36.75	41.75	48.00	69.00	60.00	94.50
	4	51.00	55.00	63.00	94.00	85.75	128.00



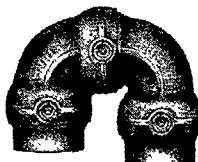
Style No. 40
1-Way Swivel



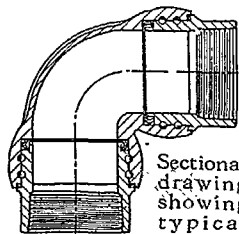
Style No. 50
2-Way Swivel



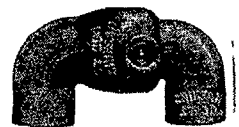
Style No. 60
2-Way Swivel



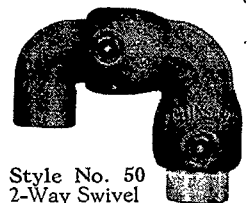
Style No. 10
3-Way Swivel



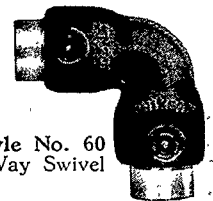
Sectional drawing showing typical construction of swing joints for low and high pressures.



Style No. 40
1-Way Swivel



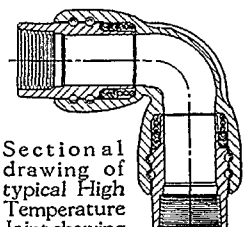
Style No. 50
2-Way Swivel



Style No. 60
2-Way Swivel



Style No. 10
3-Way Swivel



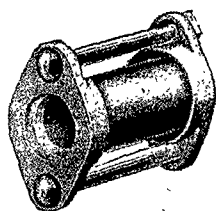
Sectional drawing of typical High Temperature Joint showing chevron-type asbestos packing with special heat-treated spring backing.

These swing joints have rotating members locked together by double rows of ball bearings. This construction performs two important functions — first, it maintains a preregulated load upon the packing element, assuring a pressure-tight joint; second, it carries all radial loads, holding the joint in perfect alignment under all conditions. The packing unit also is designed for simplicity and safety. There is nothing to adjust — nothing to tighten.

The swing joints are made in three basic types — Low Pressure, High Pressure, and High Temperature. Each type is available in a variety of styles to provide the required turning movements for different applications. Low Pressure Swing Joints, in addition to the materials specified on this page, can be made of bronze or aluminum. All swing joints are available with flanged ends. Prices for styles not listed, and dimensions and information on any style will be furnished on application.

Dayton Couplings

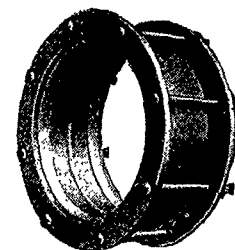
Malleable Iron and Steel



No. 1
Sizes 1/2 to 2-inch

For connecting plain end pipe on gas, water, air, or oil lines.

A simple and sturdy coupling which provides a tight joint and at the same time affords flexibility to take care of vibration, expansion, and contraction. These couplings are regularly furnished plain, not coated, or can be painted or completely plated. Rubber gaskets furnished regularly are suitable for water, air, or natural gas service.



No. 1
Sizes 2 to 24-inch

Special gaskets, with lead or duck tips and asbestos for service on condensates or oils, are available. Couplings other than those shown above include cast iron pipe sizes, special fittings, and extra long sleeves to provide or allow for unusual expansion.

Prices on application

Number of Bolts, Dimensions in Inches and Weight in Pounds

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2	2 1/2	2 3/4	3	3
O.D. of pipe	Inches	.840	1.050	1.315	1.660	1.900	2.375	2.375	2.875	3.000	3.500	3.500
Thickness and length of centers	Inches	.134x5	.125x5	.148x5	.156x5	.168x5	.180x5	.180x5	.232x5	.232x5	.230x5	.230x7
Number of bolts		2	2	2	2	2	2	3	3	3	4	4
Size of bolts	Inches	3/8x6 1/2	1/2x6 3/4	1/2x6 3/4	1/2x6 3/4	1/2x6 3/4	5/8x7	5/8x7	5/8x7	5/8x7	5/8x7	5/8x9
Weight in pounds		2	2 3/4	3 1/4	3 3/4	4 1/4	6 3/4	8 1/2	10	10	13	15
Size	Inches	3 1/2	4	4	4 1/2	4 1/2	4 3/4	4 3/4	5	5	5 5/8	5 5/8
O.D. of pipe	Inches	4.000	4.500	4.500	5.000	5.000	5.250	5.250	5.500	5.500	6.000	6.000
Thickness and length of centers	Inches	.230x5	1/4x5	.237x7	1/4x5	5/16x7	1/4x5	5/16x7	1/4x5	5/16x7	1/4x5	1/4x7
Number of bolts		4	4	4	4	4	4	4	4	4	4	4
Size of bolts	Inches	5/8x7	5/8x7	5/8x9	5/8x7 1/2	5/8x10	5/8x7 1/2	5/8x10	5/8x7 1/2	5/8x10	5/8x8	5/8x10
Weight in pounds		13 1/2	19	20	15	23	18	24	20	25	22	25
Size	Inches	5 5/8	6	6	6	6 5/8	6 5/8	6 5/8	7 5/8	7 5/8	7 5/8	8
O.D. of pipe	Inches	6.000	6.625	6.625	6.625	7.000	7.000	7.000	8.000	8.000	8.000	8.625
Thickness and length of centers	Inches	5/16x7	1/4x5	1/4x7	5/16x7	1/4x5	1/4x7	5/16x7	1/4x5	1/4x7	5/16x7	1/4x5
Number of bolts		4	6	6	6	6	6	6	6	6	6	6
Size of bolts	Inches	5/8x10	5/8x8	5/8x10	5/8x10	5/8x8	5/8x10	5/8x10	5/8x8	5/8x10	5/8x10	5/8x8
Weight in pounds		27	25	29	31 1/2	26	31	33	28 1/2	34	37	30 1/2
Size	Inches	8	8	8	9 5/8	9 5/8	9 5/8	10	10	10	10	11 5/8
O.D. of pipe	Inches	8.625	8.625	8.625	10.000	10.000	10.000	10.750	10.750	10.750	10.750	12.000
Thickness and length of centers	Inches	5/16x5	1/4x7	5/16x7	1/4x5	1/4x7	5/16x7	1/4x5	5/16x7	1/4x7	5/16x7	1/4x5
Number of bolts		6	6	6	8	8	8	8	8	8	8	8
Size of bolts	Inches	5/8x8	5/8x10	5/8x10	5/8x8 1/2	5/8x10 1/2	5/8x10 1/2	5/8x8 1/2	5/8x8 1/2	5/8x10 1/2	5/8x10 1/2	5/8x8 1/2
Weight in pounds		33	35	37	43	47 1/2	52 1/2	45 1/2	48 3/4	52	56 1/2	50
Size	Inches	11 5/8	11 5/8	12	12	12	12	12 1/2	14 O.D.	14 O.D.	14 O.D.	16 O.D.
O.D. of pipe	Inches	12.000	12.000	12.750	12.750	12.750	12.750	13.000	14.000	14.000	14.000	16.000
Thickness and length of centers	Inches	1/4x7	5/16x7	1/4x5	5/16x5	1/4x7	5/16x7	1/4x5	1/4x5	1/4x7	5/16x7	1/4x7
Number of bolts		8	8	8	8	8	8	8	10	10	10	10
Size of bolts	Inches	5/8x10 1/2	5/8x10 1/2	5/8x8 1/2	5/8x8 1/2	5/8x10 1/2	5/8x10 1/2	5/8x8 1/2	5/8x8 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2
Weight in pounds		56	61	52 1/2	56	60 1/2	64 1/2	52 1/2	58	66	72	70
Size	Inches	16 O.D.	16 O.D.	18 O.D.	18 O.D.	20 O.D.	20 O.D.	22 O.D.	24 O.D.			
O.D. of Pipe	Inches	16.000	16.000	18.000	18.000	20.000	20.000	22.000	24.000			
Thickness and length of centers	Inches	5/16x7	3/8x7	5/16x7	3/8x7	5/16x7	3/8x7	3/8x7	3/8x7			
Number of bolts		10	10	10	10	12	12	14	14			
Size of bolts	Inches	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2	5/8x10 1/2			
Weight in pounds		79	85 1/2	97 1/2	105 1/2	110	117	142	152			

Dayton No. 1 Couplings: Couplings 4 inches and larger are furnished with pipe stops rolled in centers, which can be removed at small additional cost.

Specifications: All couplings are furnished with steel centers. Sizes 1/2 to 5-inch have malleable iron flanges; sizes 5 5/8 to 24-inch have steel flanges.

Dayton Light Type Couplings: A limited number

of sizes are available with shorter centers and of lighter construction for use on low pressure, thin walled pipe.

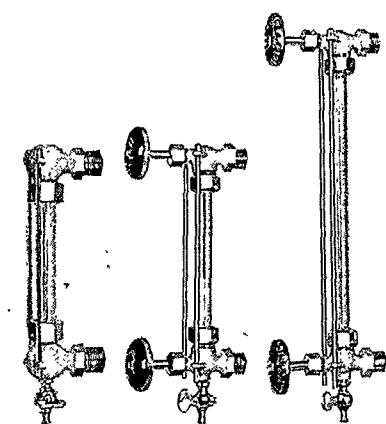
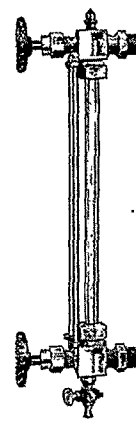
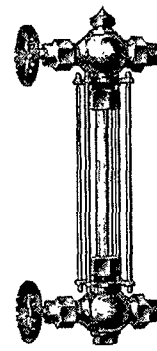
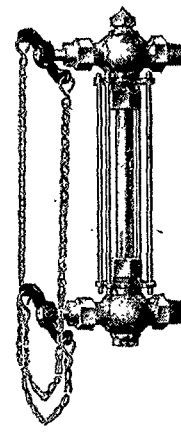
Dayton Boltless Couplings: Dayton Boltless Couplings are constructed entirely of malleable iron in sizes 3/4 to 2-inch, with 3 and 5-inch centers, using regular types of gaskets.

Brass Water Gauges

Low Pressure

175-Pound

250-Pound

No. 623
RoughNo. 625
RoughNo. 624
RoughExpansion
Tank
Water
GaugeNo. 610
PolishedFor 175 pounds
working
pressureNo. 616
PolishedNo. 613
PolishedNo. 615
Polished

For 250 pounds working pressure

Center to Center of Valves

Unless otherwise ordered, the No. 610, No. 613, No. 615, No. 616, No. 624, and No. 625 Gauges are furnished with the centers shown below:

- 1/2-inch No. 610... with 14-inch centers
- 3/4-inch No. 610... with 18-inch centers
- 3/4-inch No. 613... with 18-inch centers
- 3/4-inch No. 615... with 18-inch centers
- 1/2-inch No. 616... with 14-inch centers
- 1/2-inch No. 624... with 14-inch centers
- 1/2-inch No. 625... with 8-inch centers

When other centers are required, orders must so specify.

The No. 623 Gauge regularly is furnished with 13 3/4-inch centers, as listed in the table at the right. Any other center is considered special; prices on application.

Centers over 36 inches: When Water Gauges with centers greater than 36 inches are required, two Gauges of shorter lengths, staggered on the boiler, are recommended.

No. 613 Gauge: The lower valve of the No. 613 Water Gauge is drilled and tapped for a 3/8-inch drain.

By closing both valves and removing the cap at the top of the upper valve, the glass in this Gauge can be renewed while the boiler is under pressure.

No. 615 Gauge: The No. 615 Gauge is especially suited for service on boilers having the Water Gauge above the reach of the operator. It is chain operated and regularly is furnished with chains that drop 12 1/2 feet below the lower valve.

When the valves are open, the levers stand in a horizontal position. When the valves are closed, the

List Prices and Dimensions

1/2-inch No. 610	Price, with 14" or shorter centers	Each	5.50
	Extra for each inch over 14", up to 36"		.03
	Size of glass for 14" centers	Inches	5/8 x 12 3/4
3/4-inch No. 610	Length of guard rod for 14" centers	Inches	14
	Price, with 18" or shorter centers	Each	8.00
	Extra for each inch over 18", up to 36"		.03
3/4-inch No. 613	Size of glass for 18" centers	Inches	3/4 x 16
	Length of guard rods for 18" centers	Inches	17
	Price, with 18" or shorter centers	Each	15.00
3/4-inch No. 615	Extra for each inch over 18", up to 36"		.06
	Size of glass for 18" centers	Inches	5/8 x 16
	Length of guard rods for 18" centers	Inches	17
1/2-inch No. 616	Price, with 14" or shorter centers	Each	7.00
	Extra for each inch over 14", up to 36"		.03
	Size of glass for 14" centers	Inches	1/2 x 12 1/2
1/2-inch No. 623	Length of guard rods for 14" centers	Inches	14
	Price, with 13 3/4" centers	Each	1.90
	Size of glass	Inches	5/8 x 12
1/2-inch No. 624	Price, with 14" or shorter centers	Each	3.00
	Extra for each inch over 14", up to 36"		.03
	Size of glass for 14" centers	Inches	5/8 x 12 3/4
1/2-inch No. 625	Length of guard rods for 14" centers	Inches	15
	Price, with 8" or shorter centers	Each	3.00
	Extra for each inch over 8", up to 36"		.03
	Size of glass	Inches	5/8 x 6 3/4
	Length of guard rods	Inches	9

levers stand at an angle of 45 degrees, with the right hand side down.

The lower valve of the No. 615 Water Gauge is drilled and tapped for a 3/8-inch drain.

By closing both valves and removing the cap at the top of the upper valve, the glass in this Gauge can be renewed while the boiler is under pressure.

Water Gauge Accessories

"PYREX" High Pressure Gauge Glasses

List Prices and Dimensions

Length Inches		External Diameter			
		1/2"	5/8"	3/4"	7/8"
6 3/4	Per doz.		4.00		
8	Per doz.	4.00	4.00	5.60	6.20
9	Per doz.	4.50	4.50	6.30	7.10
10	Per doz.	5.00	5.00	7.00	8.00
11	Per doz.	5.40	5.40	7.40	8.60
12	Per doz.	6.00	6.00	8.40	10.00
12 1/2	Per doz.	6.40			
12 3/4	Per doz.		6.40		
13	Per doz.	6.40	6.40	9.00	10.60
14	Per doz.	6.60	6.60	9.60	11.00
15	Per doz.	7.00	7.00	10.00	11.80
16	Per doz.	7.80	7.80	11.40	12.60
17	Per doz.	8.00	8.00	11.80	13.40
18	Per doz.	8.60	8.60	12.20	14.20
19	Per doz.	9.00	9.00	13.00	15.00
20	Per doz.	10.00	10.00	14.00	16.40
21	Per doz.	10.50	10.50	14.40	16.80
22	Per doz.	11.00	11.00	14.80	17.20
23	Per doz.	11.50	11.50	15.80	18.60
24	Per doz.	12.00	12.00	16.80	20.00
30	Per doz.	14.00	14.00	20.00	23.40
36	Per doz.	17.20	17.20	24.40	28.40

Siphon for Steam Gauges

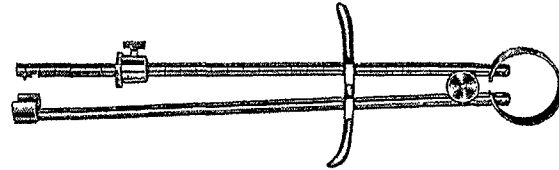


List Prices, Each

Size Inches	8-inch Length Iron	Brass
1/4	.50	1.00

Glass Tube Cutters

For Cutting Gauge Glasses to Length



List Prices

Tube Cutter Complete	Each	2.00
Extra Cutter Wheels	Each	.30

One arm has a scale in inches and fractions of an inch, a

slide stop with set screw, and a rotary cutter at the end. This arm is inserted in the end of the glass tube to the required distance, against the slide stop or gauge, the outside of the glass tube resting in the circled end of the other arm. With a slight pressure of thumb and finger on the lever, and a rotation of the glass with the other hand, the rotary cutter makes an even cut around the inside of the tube and a very little pressure breaks it off.

Extra Brass Guards for Water Gauges

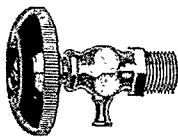
List Prices

Length Inches	Price	Length Inches	Price
9	Each .13	23	Each .23
11	Each .13	25	Each .25
13	Each .13	27	Each .28
14	Each .14	29	Each .31
15	Each .15	31	Each .34
17	Each .17	33	Each .37
19	Each .19	35	Each .40
21	Each .21		

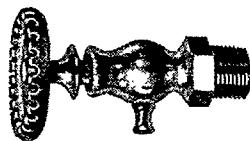


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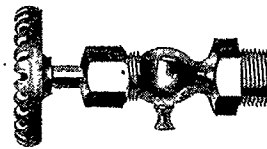
Brass Try Cocks



Low Pressure
No. 731, with Moulded
Composition Wheel
15 pounds steam
working pressure

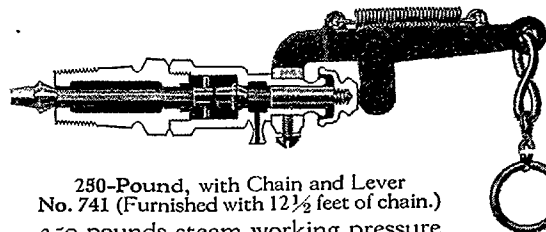


Standard
No. 730
(Short Pattern)
125 pounds steam
working pressure



250-Pound
No. 734
With Stuffing Box
250 pounds steam
working pressure

The No. 741 Chain and Lever Try Cock shown below is designed for boilers having the try cock above the reach of the operator. It can be tried from the floor, and for that purpose, it is equipped with 12 1/2 feet of brass chain.



250-Pound, with Chain and Lever
No. 741 (Furnished with 12 1/2 feet of chain.)
250 pounds steam working pressure

The cock is fitted with double valves. The outer or primary valve can be removed and re-ground while the boiler is under pressure.

List Prices, Each

Size Inches	3/8	1/2	3/4
No. 730	.95	1.00	
No. 731	.80		
No. 734	1.20	1.30	1.45
No. 741, with Chain			8.50

For Brass Cylinder Cocks, Gauge Cocks, and Pet Cocks, see page 90.

Cast Iron Water Columns



No. 640
Water Column

WORKING PRESSURES

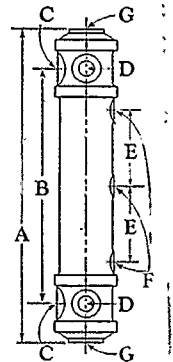
For code installations — 100 pounds steam
For non-code installations — 125 pounds steam

The No. 2, No. 3, and No. 4 sizes comply with the A.S.M.E. Boiler Construction Code (Power Boiler Section), as approved by the Council of the American Society of Mechanical Engineers, August 2, 1934, for pressures up to 100 pounds.

When used on non-code installations, all sizes are recommended for 125 pounds steam working pressure.

These Water Columns can be used either on the right hand or the left hand side of the boiler.

Water Columns are furnished without trimmings unless otherwise ordered.



List Prices and Dimensions

Size Number		1	2	3	4	
No. 640, Tapped and Painted (Without Trimmings)		Each	2.75	4.00	6.00	8.0
Dimensions in Inches	A — Length over all		13 $\frac{3}{8}$	16 $\frac{3}{4}$	18 $\frac{7}{8}$	23 $\frac{5}{8}$
	B — Center to center of boiler and water gauge connections		10	12 $\frac{1}{2}$	14	18
	C — Size of boiler connections		$\frac{1}{2}$	1	1	1 $\frac{1}{4}$
	D — Size of water gauge connections		$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
	E — Center to center of try cock connections		3 $\frac{3}{8}$	3 $\frac{3}{4}$	4 $\frac{1}{2}$	4
	Number of try cock connections		2	3	3	3
	F — Size of try cock connections		$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$
	G — Size of steam gauge and drain valve connections		$\frac{1}{2}$	* $\frac{3}{4}$	1	1 $\frac{1}{4}$

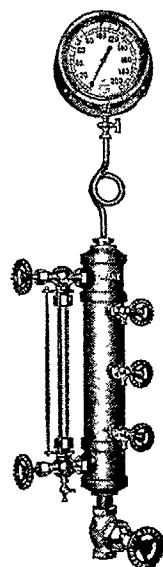
*No. 2 size can be tapped with 1-inch steam gauge and drain valve connections when so ordered, at a special price.

33

Trimmings for Water Columns

When trimmings are required for Water Columns, those shown in the following table are recommended. Prices of Water Columns complete with Trimmings are furnished on application. Orders and inquiries

must specify the pressure classification, whether for code or non-code installation, and whether the Column is to be installed on the right hand or left hand side of the boiler.



No. 640
Water Column
Complete
With Trimmings

Size Number of Water Column		†1	2	3	4
Basic Trimmings All pressures Code or Non-Code	Iron Case Steam Gauge, Bourdon Spring	†5" dia.	5" dia.	6" dia.	6" dia.
	Brass Gauge Cock, No. 712	†1 ¹ / ₄ "	1 ¹ / ₄ "	1 ¹ / ₄ "	1 ¹ / ₄ "
	Syphon for Steam Gauge	†1 ¹ / ₄ "	1 ¹ / ₄ "	1 ¹ / ₄ "	1 ¹ / ₄ "
	Bushing for Syphon	†1 ¹ / ₂ x 1 ¹ / ₄ "	3 ⁴ / ₈ x 1 ¹ / ₄ "	1 x 1 ¹ / ₄ "	1 ¹ / ₄ x 1 ¹ / ₄ "
	Bushing for Drain Valve	None required	1 x 3 ⁴ / ₈ "	1 ¹ / ₄ x 3 ⁴ / ₈ "	1 ¹ / ₄ x 3 ⁴ / ₈ "
Additional Trimmings For pressures up to 100 pounds Code or Non-Code	Nipple for Drain Valve	†1 ¹ / ₂ x 1 ¹ / ₂ "	3 ⁴ / ₈ x 2"	3 ⁴ / ₈ x 2"	3 ⁴ / ₈ x 2"
	Try Cocks, Code or Non-code	†2 - 3 ⁸ / ₈ " No. 730	3 - 1 ¹ / ₂ " No. 730	3 - 1 ¹ / ₂ " No. 730	3 - 3 ⁴ / ₈ " No. 734
	Water Gauge	Code	1 ¹ / ₂ " No. 610 12 ¹ / ₂ " centers	3 ⁴ / ₈ " No. 610 14" centers	3 ⁴ / ₈ " No. 610 18" centers
			1 ¹ / ₂ " No. 624 10" centers	1 ¹ / ₂ " No. 624 12 ¹ / ₂ " centers	
	Globe Valve for Drain	†1 ¹ / ₂ " No. 14 ¹ / ₂ P	3 ⁴ / ₈ " No. 14 ¹ / ₂ P		
Additional Trimmings For pressures from 101 to 125 pounds Non-Code Only	Try Cocks	2 - 3 ⁸ / ₈ " No. 730	3 - 1 ¹ / ₂ " No. 730	3 - 1 ¹ / ₂ " No. 730	3 - 3 ⁴ / ₈ " No. 734
	Water Gauge	1 ¹ / ₂ " No. 610 10" centers	1 ¹ / ₂ " No. 610 12 ¹ / ₂ " centers	3 ⁴ / ₈ " No. 610 14" centers	3 ⁴ / ₈ " No. 610 18" centers
	Globe Valve for Drain	1 ¹ / ₂ " No. 14 ¹ / ₂ P	3 ⁴ / ₈ " No. 14 ¹ / ₂ P		

†The No. 1 size Water Column does not comply with the A.S.M.E. Code.

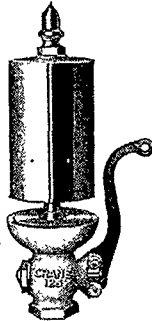
Brass Whistles

Plain

For steam up to 125 pounds
No. 602 also recommended
for air from 25 to 125 pounds.



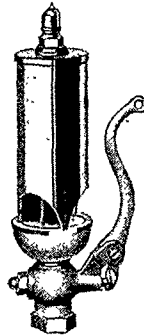
No. 602
Without Valve



No. 600
With Valve



No. 112-B
Without Valve



No. 110-B
With Valve

Chime Single Bell

For steam or air
up to 200 pounds.

These whistles are accurately designed and constructed to produce a clear, even tone with a minimum amount of steam or air.

Special whistles and valves: Whistles with a greater bell, or whistles for higher or lower steam or air pressures can be made to order; prices on application.

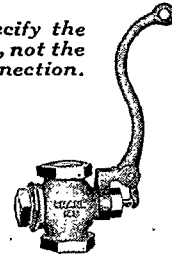
Wheel operated and special power valves can be furnished when necessary; recommendations on application.

Operating large whistle valves: To facilitate operating the larger whistle valves, the pull must be at right angles to the centerline of the whistle.

When ordering, specify the diameter of the bell, not the size of the pipe connection.

List Prices, Each, and Dimensions, in Inches

Diameter of bell		Inches	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8
Plain Whistles	No. 600, with valve		3.10	3.75	4.00	5.50	6.50	8.50	11.50	15.00	22.50	33.00	95.00
	No. 602, without valve		2.20	2.75	3.00	4.35	5.25	7.25	9.50	12.00	19.00	24.00	70.00
	Size of pipe connection		1/4	1/4	3/8	1/2	3/4	3/4	1	1 1/4	1 1/2	2	2 1/2
Chime Whistles	No. 110-B, with valve				5.00	7.00	9.00	11.00	14.00	18.00	28.00	38.00	
	No. 112-B, without valve				3.50	5.00	6.50	8.00	11.00	14.00	22.00	30.00	70.00
	Size of pipe connection				3/8	1/2	3/4	3/4	1	1 1/4	1 1/2	1 1/2	2

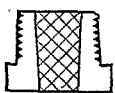


Whistle Valves,
page 67.

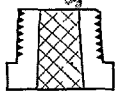
33

Fusible Plugs

Short Pattern



Fire Side Plug
Outside Type
No. 750

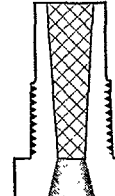


Water Side Plug
Inside Type
No. 751

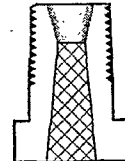
List Prices, Each, and Dimensions, in Inches

Size		Inches	3/8	1/2	3/4	1
Short Pattern	No. 750 or 751		.75	.90	1.10	1.50
	Min. dia. of core		1/4	1/2	1/2	1/2
Long Pattern	No. 4752 or 4752 L			2.40	3.00	4.00
	No. 4753 or 4753 L		2.00	2.40	3.00	4.00
Min. dia. of core			3/8	1/2	1/2	1/2

Long Pattern



Fire Side Plug
Outside Type
No. 4752
No. 4752 L
with
Oversize Thread



Water Side Plug
Inside Type
No. 4753
No. 4753 L
with
Oversize Thread

Service recommendations: Short Pattern Plugs can be used where there is no law requiring Long Pattern Plugs. They are not covered by any code and are recommended for use on heating boilers only.

Long Pattern Plugs are recommended for marine service and for service where A.S.M.E. Code applies. They conform to the specifications of the following:

A.S.M.E. Boiler Code, 1937 Edition. (This code does not advise the use of fusible plugs for working pressures in excess of 250 pounds.)

General Rules and Regulations of the U.S. Department of Commerce, Bureau of Marine Inspection and Navigation. (Under these rules and regulations, fusible plugs are not required and will not be permitted where the maximum temperature to which they are exposed exceeds 425° Fahrenheit.)

American Bureau of Shipping
Lloyds Register of Shipping

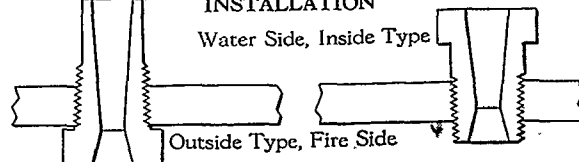
Oversize thread: The No. 4752 L and No. 4753 L Plugs have an oversize thread, and are used where the continual renewal of plugs has worn the plug

tapping too large for the standard size thread. They are stamped with the letter "L".

Massachusetts Standard: Fusible plugs for use in installations subject to the Rules of the Board of Boiler Rules of the Department of Public Safety of the Commonwealth of Massachusetts are made to order only; prices on application.

Materials: Short Pattern are brass; Long Pattern are Crane Hard Metal. Both have pure Banca Tin core.

INSTALLATION



Crosby Gauges and Recorders

Pressure, Vacuum, Compound, or Altitude

*For ratings and miscellaneous data, see the next page.
Prices and additional information furnished on application.*

Crosby Gauges and Recorders are high quality instruments designed for accuracy and durability. Illustrations on this page show, in part, the extent of the Crosby line. The table on the opposite page lists the various products available, working pressures, materials, etc.

Movements on Crosby Gauges and Recorders are mounted on a socket extension and are entirely independent of the case. Bronze movements have a hard cast bronze sector and pinion with milled teeth and lapped bushings. Steel movements have a forged steel sector and pinion with milled teeth and with stainless steel bushings, line reamed and lapped.

All tubes are heat treated. Drawn bronze tubes have soldered connections (sizes 6 to 12-inch of Style AR have threaded tubes). Drawn alloy steel tubes have threaded connections for graduations of 100 pounds or more, and silver soldered connections for graduations below 100 pounds. Bored steel tubes, bored and turned from forged alloy steel billets, have threaded connections.

Test gauges are made in a variety of sizes and pressure classes for use in various services. Style ACV, for testing gasoline and related fluids by the Reid Vapor Test Method, conforms to A.S.T.M. Specifications.

Liquid level gauges have a diaphragm bell and are used to measure the height of liquids in tanks or reservoirs.

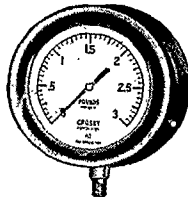
Protectors and diaphragms are available for gauges used in corrosive services. A special cleanout-type protector can be furnished where viscous matter such as paper pulp or soap accumulates and must be removed.

Illuminated dials can be furnished on any single tube gauge in sizes 10 and 12-inch. The dial is illuminated without shadows or glare by a circular neon-type tube attached to a reflector ring.

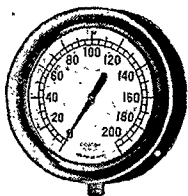
Pressure recorders with one, two, three, or four pens are offered in pressure graduations ranging to 10,000 pounds. The recorders feature interchangeable tubes, micrometer adjustments, one-piece stainless steel pens, push-pull chart hubs, and universal wall or flush mounted cases.

Dead weight testers are simply constructed, easily operated instruments for calibrating gauges used on pressures up to 2000 pounds.

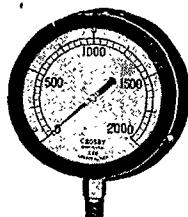
Fluid pressure scales are used to measure pressures up to 25,000 pounds. The weight of the fluid pressure (in one-pound increments) is indicated and directly read from the balanced scale beam. This type of tester is recommended for high pressures where the use of a dead weight tester might prove awkward.



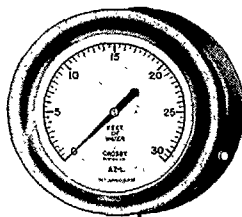
Bellows Gauge
Style AZ



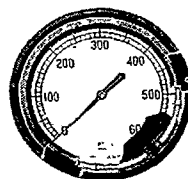
Standard Gauge
Styles AA, AAF, AAS



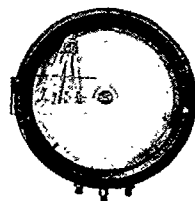
Heavy Duty Gauge
Style AIH



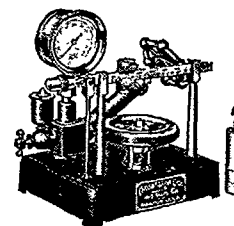
Liquid Level Gauge
Styles AZL, AAL



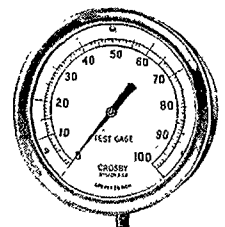
Illuminated Dial
Style A-E



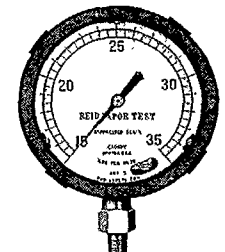
Recorders, Styles
AKA, AKIO, AKIH



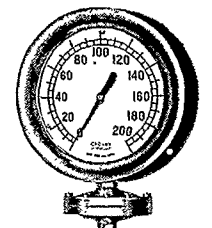
Fluid
Pressure Scale



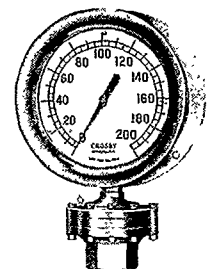
Standard Test Gauge
Style AC



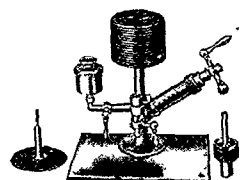
Reid Test Gauge
Style ACV



Protected Gauge
Chemical Type
Style A-P



Protected Gauge
Cleanout Type
Style A-C



Dead Weight Tester

Crosby Gauges and Recorders (Cont.)

Pressure, Vacuum, Compound, or Altitude

For general description, see the preceding page.

Styles, Sizes, Ratings, Services, and Materials

Type of Gauge and Recorders	Style No. and Description	Range of Sizes	Max. Graduation (Psi.)	Services	Materials			
					Case	Tube	Move-ment	Socket
Gauges	BelloWS	AZ — Low Pressure	4½ — 12"	15	Same as AA	...	Brass	Brass
		AW — Utility	3½ — 5"	500	Cast Iron	Brass	Brass	Brass
	Single Tube	AA — Standard	2½ — 16"	600	Cast Iron, Brass, Nickel-Plated, or Phenol	Brass	Brass	Brass
		AAF — Standard	2½ — 16"	600		Brass	Brass	Steel
		AAS — Standard	2½ — 16"	600		Brass	Steel	Brass
		AAG — Duplex	3½ — 8½"	600		Brass	Brass	Brass
		AAO — Heavy Duty	4½ — 12"	1000		Brass	Steel	Steel
		AIO — Heavy Duty	4½ — 12"	1000		Steel	Steel	Steel
		AIH — Heavy Duty	4½ — 12"	10000		Steel	Steel	Steel
		AIA — Ammonia	4½ — 12"	1000		Steel	Brass	Steel
		AH — Hydrostatic	4½ — 12"	10000		Steel	Brass	Brass
	Double Tube	AR — Self-Draining	4½ — 12"	1500	Pressure	Brass	Brass	Brass
	Test	ACV — Reid Vapor	4½"	100	Pressure	Brass or Nickel-Plated	Brass	Brass
		ACU — Underwriters'	3, 3½"	400	Pressure		Brass	Brass
		ACI — Inspectors	3"	1000	Pressure, Vacuum, or Compound		Brass	Brass
		AC — Standard	3 — 12"	1000	Pressure	Cast Iron, Brass, or Nickel-Plated	Steel	Brass
		ACH — Hydrostatic	6 — 12"	10000	Pressure or Vacuum		Steel	Steel
		ACIO — Drawn Tube	6 — 12"	1000	Pressure		Steel	Steel
	Liquid Level	AZI — With Bell	4½ — 12"	15	Pressure or Altitude	Brass	Brass	Brass
		AAL — With Bell	4½ — 12"	600	Pressure or Altitude	Brass	Brass	Brass
	Illuminated	A-E — Aluminum Case	10, 12"	...	Available on Crosby Single Tube Gauges.			
	Protector	A-P — Chemical Type	All	500	Available on all types of Crosby Gauges.			
		A-C — Cleanout Type	All	500				
Recorders		AKA — 1 to 4 Pens	10, 12"	600	Pressure, Vacuum, Compound, or Altitude	Aluminum	Brass	Brass
		AKIO — 1 to 4 Pens	10, 12"	1000		Steel	Steel	Steel
		AKIH — 1 to 4 Pens	10, 12"	10000		Steel	Steel	Steel

¹Cast iron cases are not furnished on sizes smaller than 3½-inch; Phenol cases are furnished only on 4½, 6, and 8½-inch sizes.

²Style ACV is also available with a Phenol case.

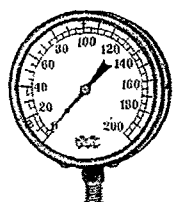
³Forged steel

⁴Drawn steel

⁵Bored steel

Marshalltown Gauges

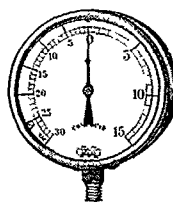
(Pressed Steel Case)



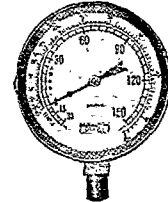
Pressure Gauge
Standard dial. Readings to 15, 30, 60, 100, 150, 200, 250, 300, and 500 lbs.



Vacuum Gauge
Standard dial, 0-30" of mercury.



Compound Gauge
Standard dial, 0-30". Vacuum and pressure readings to 15, 30, 60, 100, 150, and 300 lbs.



Ammonia Gauge
Standard dial, 0-30". Readings to 150 and to 300 lbs.

The pressure, vacuum, and compound gauges shown above are available in sizes 2, 2½, 3, 3½, 4½, and 5-inch. They are suitable for air, oil, gas, water, etc. When installed on steam lines, a siphon should be used. These gauges have a pressed steel case finished in black enamel, a seamless brass Bourdon tube, brass movements, and a brass ring. Nickel or chrome-plated rings can be furnished when specified.

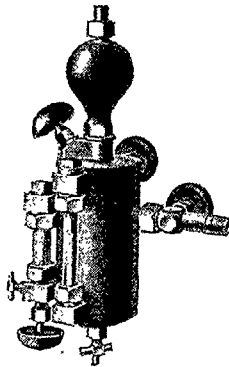
Prices and additional information on application.

Ammonia gauges, made in sizes 2½ and 3½-inch, have a stainless steel case and ring, a chrome-molybdenum steel Bourdon tube, and Monel metal movements.

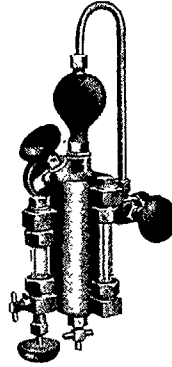
All gauges have independent mounting. They are furnished with a ¼-inch male bottom connection, unless otherwise specified. Dials should be graduated to approximately double the operating pressure.

Siphons for steam gauges...page 435

Lubricators, Oilers, and Grease Cups



Double Connection



Single Connection

"Genuine Detroit" Improved Standard Lubricators

Detroit Lubricators are made in a variety of styles and kinds to properly lubricate the valves and cylinders of all types of steam engines, steam pumps, gas engines, air compressors, and similar operating units. Improved Standard Lubricators are not to be used for pressure in excess of 150 pounds. The support arm is threaded for $\frac{1}{2}$ -inch pipe on lubricators of $\frac{1}{3}$ pint to 1 quart capacity; the $\frac{1}{2}$ gallon size has a support arm threaded for $\frac{3}{4}$ -inch pipe.

Double connection: The double connection lubricator is installed with both connections between the boiler and the throttle.

Single connection: The single connection lubricator is used where conditions do not permit the installation of a double connection lubricator. It can be connected either above or below the throttle or into the steam chest direct.

List Prices, Each

Capacity	Double Connection		Single Connection	
	Polished Brass	Nickel Plated	Polished Brass	Nickel Plated
$\frac{1}{3}$ pint	22.50	25.50	23.50	26.00
$\frac{1}{2}$ pint	23.50	27.00	25.00	27.00
1 pint	27.00	32.00	28.50	31.50
1 quart	34.50	37.50	37.00	39.00
$\frac{1}{2}$ gallon	51.50	55.00		

33

Sight Feed, Snap Lever Oiler

This Sight Feed, Snap Lever Oiler with a hinged oil hole cover is for use with engines, machinery, dynamo bearings, shafting, etc. When once adjusted for proper feed, it re-

quires no further attention. No amount of jar or motion will affect the working mechanism. When the lever is up, the cup is feeding; when down, the feed is shut off.



List Prices and Dimensions

Size Number		00	0	1	1½	2	3	4	5	6
List Price	Brass finish	Each	2.85	3.00	3.25	3.50	3.75	4.25	5.25	9.25
	Nickel plated	Each	3.25	3.50	3.75	4.00	4.25	4.75	5.75	10.25
Outside diameter of glass		Inches	1⅛	1¼	1½	1¾	2	2¼	2½	3½
Height of glass		Inches	1	1⅛	1¾	1⅝	1⅞	2⅞	3	4
Capacity		Ounces	½	⅝	1	1½	2½	4	5	18
Pipe thread of shank		Inches	⅛	⅛	¼	¼	⅜	⅜	⅜	½

Plain Compression Grease Cup

List Prices and Dimensions



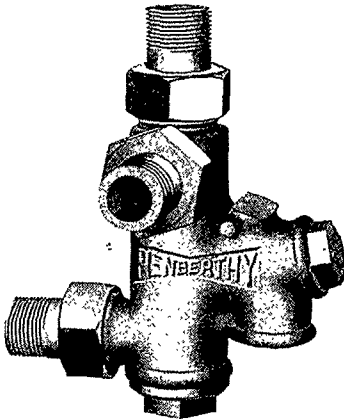
Size Number		00	0	1	2	3	4
List Price	Not polished	Each	.55	.75	.95	1.25	2.30
	Brass finish	Each	.70	.90	1.15	1.50	2.90
	Nickel plated	Each	.80	1.05	1.35	1.80	3.40
Outside diameter		Inches	1⅛	1⅞	1⅝	2⅞	3⅞
Pipe thread		Inches	⅛	¼	¼	⅜	½
Capacity		Ounces	½	⅔	1	2	5

In many places, particularly for rough work, a plain brass grease cup is a very satisfactory lubricating

device. These strong, durable grease cups are made from brass castings — not spun brass.

For oilers and grease cups of other types and sizes . . . prices on application.

Penberthy Automatic Injector



Stock Model Injector

Size	Price Each	Horse Power		Pipe Con- nection Inches	Capacity per Hour 1 to 3 feet lift, 60 to 110 pounds steam pressure	
		Based on Ordinary Tubular Boiler	Based on 30 lbs. Water per H.P. per Hour		Maximum Gallons	Minimum Gallons
O-22	15.00	3 to 6	4 to 8	1/4	60	35
OO-21	16.00	4 to 8	6 to 12	3/8	80	45
A-22	18.00	8 to 16	10 to 20	1/2	135	70
AA-21	20.00	12 to 22	15 to 30	1/2	180	100
B-22	25.00	17 to 32	22 to 45	3/4	260	140
BB-21	30.00	20 to 45	25 to 60	3/4	360	180
C-22	40.00	40 to 65	45 to 80	1	475	250
CC-21	45.00	45 to 80	50 to 100	1	600	325
D-22	55.00	50 to 100	60 to 135	1 1/4	800	425
DD-21	60.00	75 to 135	85 to 165	1 1/4	1000	525
E-24	75.00	100 to 180	125 to 235	1 1/2	1400	740
EE-23	90.00	115 to 255	150 to 320	1 1/2	1900	850
F-24	110.00	160 to 320	200 to 400	2	2400	1275
FF-23	125.00	200 to 400	250 to 500	2	3000	1600
GG-21	200.00	375 to 600	400 to 750	2 1/2	4200	2150

These injectors are designed for suction lift, but they will work fairly well with water under pressure. Better service, however, will be had at the lower steam pressures if a special steam jet is substituted when connecting directly to a city pressure line.

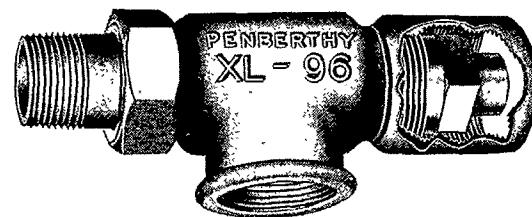
Stock Model Injectors are of the "Suction Left Over-flow Front, Delivery Back" design and are for steam from 25 to 160 pounds. Injectors with special connections or those for higher or lower pressures can be furnished when so ordered.

33

Penberthy "XL-96" Ejector

Series 1, Stock Model, Siphon or Steam Jet Pump

A forcing Ejector of sufficient power to elevate 1 foot per each 1 1/4 to 1 3/4 pounds of steam. This Ejector has both lifting and elevating power, but on deep suction lifts with slight elevation, the water can be delivered cooler with the Penberthy Series 20 or 40 Ejectors.



List Prices

Size No.	All Brass Each	Iron Body, Brass Jets Each	Pipe Con- nection, Steam	Pipe Con- nection, Suction and Delivery	Capacity, Gallons per Hour				Vertical Lift	
					40 to 65 pounds Steam, 3 Feet Lift	20 to 40 pounds or 65 to 100 pounds	40 to 65 pounds 50 Feet Elevation	40 to 65 pounds 25 Feet Elevation	40 to 75 pounds Steam Feet	25 to 40 or 75 to 100 pounds Feet
1	8.00	(Sizes 1 to 4 made in Brass only)	3/8	1/2	240	235	120	180	23	20
2	10.00		1/2	3/4	500	450	250	375	25	22
3	15.00		3/4	1	840	700	420	625	25	22
4	20.00		1	1 1/4	1,350	1,300	650	950	25	22
5	25.00	20.00	1	1 1/2	1,950	1,850	975	1,450	25	22
6	35.00	27.50	1 1/4	2	3,500	3,000	1,750	2,600	25	22
7	50.00	40.00	1 1/2	2 1/2	5,700	4,350	2,500	3,750	25	22
8	70.00	50.00	2	3	9,500	8,160	4,750	7,200	25	22
9	105.00	70.00	2	3 1/2	13,600	12,400	6,800	10,200	25	22
10	145.00	95.00	2 1/2	4	18,400	17,100	9,200	13,800	25	22

When Ejector is lifting 10 feet or over, the suction pipe should be one size larger than the suction connection of Ejector, enlarging close to Ejector. A foot valve should also be used on deep lifts.

When Ejector is elevating more than 20 feet, the discharge pipe should be one size larger than coupling on Ejector, enlarging close to Ejector.

Automatic Electric Sump Pumps

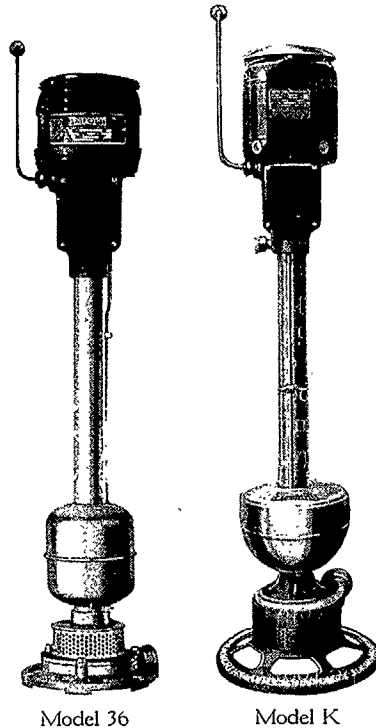
List Prices, Capacities, Dimensions, Etc.

Model No.	List Price	Pipe Conn.	Sump Depth	Height of Pump	Approximate Capacity in Gallons per Hour Against Total Discharge Head of				Size of Motor
					5 Ft.	10 Ft.	15 Ft.	20 Ft.	
36	39.50	1	2	3 4 1/2	1500	1500	1250	750	1/4
1 K	65.00	1 1/4	2	3 7 1/4	3200	2600	1900	1000	1/4
2 K	85.00	1 1/4	3	4 7 1/4	3200	2600	1900	1000	1/4
3 K	100.00	1 1/4	4	5 6	3200	2600	1900	1000	1/4
4 K	125.00	1 1/4	6 1/2	7 11	3200	2600	1900	1000	1/4
5 K	150.00	1 1/4	8 1/2	9 10	3200	2600	1900	1000	1/4

Note: Total discharge head equals the vertical distance from water level in sump to point of discharge plus all head lost by pipe friction.

Model 36: This pump is powered by a 1/4 H.P. induction motor, 1725 R.P.M., for 110 volt, 60 cycle current; motors for 220 volt, 60 cycle current can be furnished when so ordered. These pumps are of copper and bronze construction. They have a double shroud impeller, mercury switch control, and the motor is protected against improper voltage, overloading, etc.

Model K: These pumps are made in five sizes and are powered by Repulsion and Induction type motor, 1750 R.P.M., for 110 volt 60 cycle current. Motors for 110 volt, 25 or 50 cycle; 220 volt, 25, 50 or 60 cycle; or 100 volt direct current can be furnished at no additional charge. An extra charge of \$5.00 is made for motors using 110 or 220 volt, 30 cycle current; 250 volt, 50 or 60 cycle current; or 32, 220, or 250 volt direct current. These pumps are designed for a maximum head of 22 feet. They are of copper and bronze construction have a mercury type switch, and the motor is protected against overloading, improper voltages, etc. All bearings that require lubrication are provided with oil or grease cups.



Model 36

Model K

33

Steam Jet Pumps or Ejectors

List Prices, Capacities, Dimensions, Etc.

Size of Pump	List Price	Capacity	Suction Pipe	Discharge Pipe	Steam Pipe	Steam Opening	H.P. Required to operate
Inches	Each	Gallons per Minute	Inches	Inches	Inches	Inches	
3/4	8.00	8	3/4	1/2	3/8	3/16	2
1	10.00	15	1	3/4	1/2	1/4	3
1 1/4	12.00	20	1 1/4	1	1/2	5/16	4
1 1/2	14.00	30	1 1/2	1 1/4	3/4	3/8	6
2	16.00	40	2	1 1/2	3/4	7/16	8
2 1/2	20.00	50	2 1/2	2	1	1/2	10
3	24.00	60	3	2 1/2	1	9/16	15
4	70.00	250	4	3	2		

Note: The above capacities are based on 50-pound steam pressures.

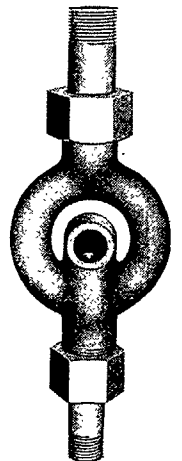
These Jet Pumps or Ejectors are used for filling tanks, transferring liquids from one part of a building to another, substituting for water tank on railroads, and unwatering shallow mines, pits, cellars, coffer-dams, quarries, wells, etc.

The limit of perpendicular suction is 14 feet and will require a steam pressure of at least 25 pounds;

special pumps are furnished for higher suction power.

Liquids may be forced to an elevation equal to about one foot to each pound of steam pressure; however, we recommend that two pumps be used, one placed above the other, for elevations above 50 feet.

These pumps will work in any position.



Corrosion-Resistant Alloy Valves and Fittings

Service recommendations	pages 443 to 445
Globe and Angle Valves	pages 446 and 447
Gate Valves	page 448
Check Valves	page 449
Relief Valves and Liquid Level Gauges	page 450
Miscellaneous Special Valves	page 451
Screwed Fittings and Unions	page 452
Flanged Fittings and Flanges	page 453
Sanitary Valves and Fittings	pages 454 and 455
Alloy Cast Iron Wedge Gate Valves	page 456
Chlorine Valves	page 457
Fabricated Alloy Piping	page 457
All-Iron Valves	page 458

Metals and Materials . . . pages 1 to 9

Service Recommendations

Crane Corrosion-Resistant Alloy Valves and Fittings are regularly made of 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze. No one of these metals is resistant to all of the corrosive fluids used in the chemical process industries; but, with a few exceptions, one or more of these metals will be found suitable for service in the presence of corrosive solutions.

All castings made of corrosion-resistant metals and alloys are produced in Crane foundries under the constant supervision of expert metallurgists. Bar stock used in valves and fittings is purchased under rigid specifications which insure the use of material adequate in both physical and chemical properties.

This page and the two following pages are devoted to service recommendations for 18-8 Mo, Monel metal, Nickel, and Silicon Bronze. It should be remembered that service recommendations are tentative in nature, and obscure factors often greatly alter circumstances and thus alter recommendations. These recommendations can be followed in most instances, however, and Crane engineers are always available to make specific recommendations based on a detailed study of the individual corrosion problem. **Marking:** Crane 18-8 Mo Valves and Fittings can be identified by the marking "18-8 M"; Monel metal, by the marking "NICU"; Nickel, by the marking "NI"; and Silicon Bronze, by the marking "CUSI."

* * * * *

18-8 Mo Alloy Steel

Crane 18-8 Mo Alloy Steel (18-8 chromium-nickel molybdenum steel) is an exceptionally high grade stainless steel that is highly resistant to many forms of corrosive action. Crane 18-8 Mo Alloy Valves and Fittings have a wide range of application in the food, pulp, paper, textile, dye, chemical, and related industries.

Crane 18-8 Mo alloy steel valves and fittings are recommended for service in handling acetic acid, nitric acid, alum solutions, alkalies (such as caustic soda, soda ash, etc.), limes, bleaching solutions, corrosive mine waters, fatty acid, food products, fruit juices, sulfite liquors and vapors in paper mills, sulfurous acid, tanning liquors, and a large number of other industrial chemicals.

Steels of the chromium-nickel type appear to be satisfactorily resistant to all the fatty acids, both pure and in the presence of the customary organic impurities; but they may not be completely resistant. The processing of the higher boiling point acids, particularly oleic and stearic, involves temperatures around 500° F. and introduces problems which are not encountered in handling the other members of this group at lower temperatures. In this service 18-8 Mo is used to a considerable extent. 18-8 Mo is used in service with carbonated beverages if sulfurous or some organic acid is present. For services with chromic acid, this alloy is often recommended when contamination with iron must be avoided, also in many services with nitric acid it is recommended, although there are some cases where it gives inferior corrosion resistance to that of the

straight chromium alloy steels. It is apparently satisfactory for handling pure phosphoric up to 85 per cent acid at ordinary temperatures, but should not be offered for use with crude acid under any circumstances. Again it shows excellent resistance to hot 98 per cent sulfuric acid and to dilute solutions (less than 10%) at ordinary temperatures. When used with cold full strength acid and with the intermediate concentrations, the results are not so good.

In the handling of calcium and magnesium hydroxides, when absolute freedom from contamination is a requisite, the use of valves, pipe, and fittings made entirely of 18-8 Mo is indicated. This alloy is sufficiently resistant to warrant its use in handling solutions in the manufacture of and involving the use of, chemically pure grades of sodium, potassium, and barium hydroxide. However, when impurities are present, the resistance may not be so good. It is more apt to be required for potassium hydroxides, while regular materials are used with sodium hydroxide where corrosion is not objectionable.

18-8 Mo is practically immune to corrosion by many food products and should be acceptable, although not necessarily required, in most all cases. It resists well all organic acids in the concentrations which are apt to be present; is not attacked by carbonic and sulfurous acid under similar circumstances; and in addition, is capable of resisting corrosion by the small amounts of phosphoric acid which are occasionally encountered. It is also resistant to alkaline cleaning solutions and to some of the chemical sterilizers.

Crane Co. is licensed under Patent No. 1,587,614 to manufacture valves and fittings made from 18-8 chromium-nickel alloy with 2 to 4% molybdenum.

34

Thread lubricants: 18-8 Mo Alloy has such excellent resistance to corrosion that it will be used in contact with a wider variety of fluids than are the more common piping materials. Some of these fluids either dissolve or react chemically with the lubricating and sealing compounds that are normally used in making up screwed joints. It is essential, therefore, that suitably compounded thread lubricants be used when assembling 18-8 Mo Alloy screwed pipe, valves, and fittings. There are several lubricants available, depending on the fluid to be handled and on the operating conditions. Specific recommendations will be furnished upon request.

Monel Metal

Monel metal is a nickel-copper alloy containing approximately two-thirds nickel and one-third copper. It has high tensile strength, ductility, and offers excellent resistance to corrosion. This alloy finds many applications in the bottling, brewing, canning, ceramic, chemical, dyestuffs, food, paint, refining, rubber, soap, sugar, tanning, textile, and their related industries.

Monel metal shows good corrosion resistance in handling hydrochloric acid, phosphoric acid, sulfuric acid, acetic acid, formic acid, butyric acid, potassium hydroxide, sodium hydroxide, vegetable oils, and food products.

In the handling of the mineral acids, the resistance

of Monel metal is fairly good in the lower concentrations. In most cases, the resistance of Monel metal is as good as that of nickel and due to its lower initial cost would make it seem the preferred material. Monel metal may be used in handling hydrochloric acid in concentrations up to about 20 per cent hydrochloric acid; higher concentrations are strongly corrosive. Caution should be exercised in using it in contact with hot or highly aerated solutions of this acid of greater than 2 per cent concentration and at temperatures above 120° F. Monel metal resists phosphoric acid over a wide range of concentrations; however, it is corroded appreciably by oxidizing impurities present in the crude acid when made by the treatment of phosphate rock with sulfuric acid. Its resistance to this crude concentrated acid is probably not quite so good as that of the copper-base alloys. Sulfuric acid solutions in concentrations up to 80 per cent sulfuric acid may not corrode this alloy to a great extent; however, the limiting concentration with which this material should be used is in the neighborhood of 50 per cent sulfuric acid. Although it is attacked very rapidly by oxidizing acids such as nitric and nitrous and is not recommended for use with sulfurous acid, it is found to have good corrosion resistance to organic acids such as acetic, formic, and butyric, and is apparently less affected by the presence of oxidizing agents than the copper-base alloys.

Monel metal has been found to show good corrosion resistance in handling of alkalies. In the handling of caustic alkalies, such as sodium and potassium hydroxides, Nickel and Monel metal are given preference for valve trim; however, if the equipment be made entirely from one material, nickel is often given the preference in some cases because of its freedom from copper, and with the cost and availability being the determining factor in other cases. Monel metal is widely used in handling salt solutions. In handling alkaline salts, there are many special cases where it may be necessary to make the entire installation of Monel metal. Where neutral salts must be handled without contamination, Monel metal is used, and in such cases where iron valves are used, they are Monel metal trimmed.

In the processing and handling of vegetable oils, it has been used to some extent to prevent contamination with copper. This alloy is very useful in the handling of food products due to the fact that it shows good resistance to the acids, cleaning solutions, organic acid salt mixtures, and brines encountered in the food industry. However, before any material is specified in the handling of food products, the stage of the process at which the equipment is to be used should be known.

Nickel

Crane Cast Nickel (commercially pure) contains a minimum of 97% nickel, the remainder consisting of silicon, carbon, manganese, and iron. It is highly resistant to corrosion and finds many applications in the food, textile, glue, paint, sugar, bottling, canning, tanning, and related industries.

Pure nickel valves and fittings are recommended for service in handling chloroacetic acid, calcium hydrox-

Corrosion-Resistant Alloy Valves and Fittings

ide, fruit juices, gallic acid, hydrochloric acid, magnesium chloride, sodium chloride, sodium hydroxide, food products, and a large number of other industrial chemicals.

One of the most useful properties of nickel is its practically complete resistance to corrosion by solutions of the alkalis. Due to this characteristic, extensive use is made of nickel in the manufacture of "fixed alkalis" and "alkaline salts". In handling solutions of calcium, magnesium, sodium, potassium, and barium hydroxides, which are known as the fixed alkalis, where absolute freedom from contamination is necessary, nickel valves, pipe, and fittings are used. It is found in the handling of alkaline salts that the carbonates, phosphates, and silicates aid in the formation of protective coatings, which after a small amount of initial corrosion usually prevent any further attack. In such cases, alkaline salt solutions are less apt to require such high-grade materials as the fixed alkalis; however, nickel is often used for valve trim, with the choice depending upon the severity of the service conditions and the type of valves required. Alkaline salts of the oxidizing variety, such as hypochlorite solutions, are generally very corrosive toward nickel. Only dilute solutions can be handled by nickel, provided the time of contact is of short duration. However, nickel is not affected by alkaline solutions containing hydrogen peroxide, such as are used for textile bleaching.

Nickel is not widely used in the handling of mineral acids but does find some application in the handling of other fluids in which these acids are present as incidental impurities. In particular, it is often the preferred material for handling food products at stages where hydrochloric acid is unavoidably present. Nickel possesses useful resistance to fatty acids such as stearic, oleic. The particular application in this case seems to be in the handling of food and other products containing these acids in combination with substances which corrode aluminum and the chromium-nickel alloys.

Nickel is used, to some extent, in the handling of oils and fats where contamination with copper is objectionable. It is also extensively used for food-processing and food-handling equipment, since its corrosion resistance is high and the nickel salts absorbed by the food stuffs are physiologically harmless.

Silicon Bronze

Silicon bronze is a high copper bronze alloy, having approximately 4% silicon as its most distinguishing element. Silicon bronze, in addition to its strength and excellent physical properties, offers good resistance to many corroding agents. This alloy has many uses in the ceramic, cleaning, dyestuff, leather, paint, refrigeration, textile, tanning, and related industries.

Silicon bronze is recommended for use in handling sulfuric acid, alum solution, calcium chloride, chloroacetic acid, carbon tetrachloride, hydrofluoric acid, hydrobromic acid, hydrochloric acid, and oxalic acid, phosphoric acid, and zinc sulfate.

Silicon bronze shows fairly good corrosion resistance

to dilute solutions of the halogen acids (hydrobromic, hydrochloric, hydrofluoric, and hydriodic), and can often be used, particularly for parts of equipment where corrosion can be offset by the use of extra heavy wall thickness. It is recommended for use with cold hydrofluoric acid of strengths up to 18 per cent acid, with cold hydrobromic and cold hydrochloric acids of all strengths, and with hot hydrochloric acid at temperature up to about 150° F. in concentrations up to 20 per cent hydrochloric acid. It must be remembered that these recommendations are based on contact with acids in the absence of air. In the presence of air the resistance is not nearly so good; and if the aeration is excessive, the resistance may not be at all satisfactory. It cannot be emphasized too strongly that the halogen acids are extremely difficult to handle in metallic equipment. Thus in selecting equipment for the handling of halogen acids careful study must be made as to its exact application. Since a certain amount of corrosion will be expected in any case, it is recommended that all valve parts be made with as heavy a wall thickness as is feasible.

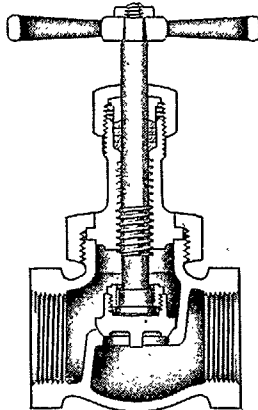
Copper and the high copper alloys are not outstanding in their resistance to either pure or crude phosphoric acid of most strengths; but, in the absence of anything better at a comparable price, they are frequently used in the handling of pure dilute acid and concentrated acids at temperatures below the boiling point. All of the copper-base alloys are actively corroded by the dilute crude acid. However, silicon bronze is recommended for use with phosphoric acid of strength up to 60 per cent acid in unaerated solutions. There are many cases in the handling of sulfuric acid which do not permit the use of lead, and for such cases there are available a number of nonferrous alloys, such as silicon bronze, which have quite satisfactory corrosion resistance to some concentrations of the acid. The limiting concentration with which silicon bronze should be used is in the neighborhood of 50 per cent acid. The amount of corrosion in this service depends largely upon the amounts of dissolved air in the acid. In the presence of a large amount of dissolved air or other oxidizing agents, the corrosion may be, and often is, considerable.

Silicon bronze and other copper base alloys have quite good corrosion resistance to boric acid, but cannot always be employed in handling pure acid because of the fact that many of the purposes for which the acid is used are such as to make contamination with copper rather undesirable. In handling of chloroacetic acid, silicon bronze is used occasionally and should give reasonable resistance in the absence of aeration. Copper and copper-base alloys show quite good corrosion resistance against oxalic acid, but as a rule are not offered for service where discoloration or contamination with copper salts is objectionable. Silicon bronze, however, is recommended for use with all concentrations up to the boiling point.

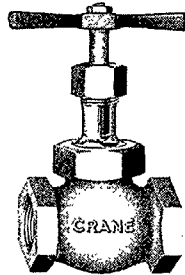
Silicon bronze is occasionally used with chlorinated solvents in recovery systems employing steam distillation, and in other situations where water may be present.

Corrosion-Resistant Globe and Angle Valves Union Bonnet

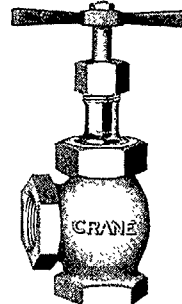
For service recommendations, see pages 443 to 445:



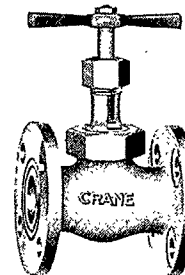
Cross Section
Globe, Screwed
18-8 Mo Alloy Steel
Monel Metal
Nickel
Silicon Bronze



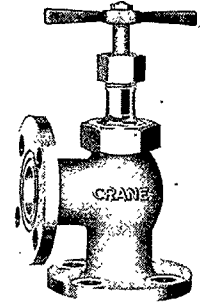
*Globe, Screwed
1/4 to 2-inch
No. 18801
18-8 Mo Alloy Steel
No. 17701
Monel Metal
No. 16601
Nickel
No. 15501
Silicon Bronze



*Angle, Screwed
1/4 to 2-inch
No. 18802
18-8 Mo Alloy Steel
No. 17702
Monel Metal
No. 16602
Nickel
No. 15502
Silicon Bronze



Globe, Flanged
1 to 2-inch
No. 18803
18-8 Mo Alloy Steel
No. 17703
Monel Metal
No. 16603
Nickel
No. 15503
Silicon Bronze



Angle, Flanged
1 to 2-inch
No. 18805
18-8 Mo Alloy Steel
No. 17705
Monel Metal
No. 16605
Nickel
No. 15505
Silicon Bronze

*1/4 and 3/8-inch valves have a screwed bonnet (not illustrated).

Prices on application

Materials: With the exception of the malleable iron handle and brass handle nut, all parts of sizes 1/2-inch and larger are cast entirely from 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze.

In the 1/4 and 3/8-inch sizes, these parts are made from bar stock of the same metals.

For service recommendations and marking identifications, see pages 443 to 445.

Disc connection: The disc in sizes 1/4 to 1/2-inch is integral with the stem. In larger sizes, the disc swivels on the stem as illustrated in the cross-section.

Bonnet construction: Valves 1/2-inch and larger have a union bonnet; smaller sizes have a screwed bonnet.

The union bonnet type construction utilizes a union ring which reinforces the bonnet joint and facilitates dismantling and reassembling without danger of injuring the valve.

Handles: The valves are furnished with a tee handle on the 1/4 and 3/8-inch sizes and a cross handle on sizes 1/2 to 2-inch.

Stuffing box: The stuffing box is equipped with a gland and is unusually deep. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and bolt holes.

Prices of flanged valves include drilling to the MSS 150-Pound SP Bronze Standard, and spot facing; no deduction will be made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

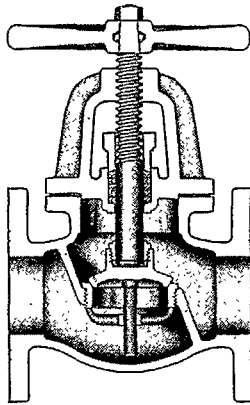
Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
End to end, Globe, Screwed	1 7/8	2 7/16	2 1/4	2 3/4	3 5/16	3 7/8	4 1/2	5 1/4
Center to end, Angle, Screwed	1 15/16	1 17/32	1 3/16	1 3/8	1 11/16	1 15/16	2 1/4	2 5/8
Face to face, Globe, Flanged					4 3/16	4 9/16	5 5/16	6
Center to face, Angle, Flanged					2 5/8	2 7/8	3 3/16	3 3/4
Center to top of stem, open, Globe or Angle	3 1/8	3 5/8	4 3/8	5 3/8	6	6 7/8	7 7/8	8 5/8
Distance across handle	2 9/16	2 9/16	3 3/4	3 3/4	4 3/4	4 3/4	6	7
Diameter of flange					4 1/4	4 5/8	5	6
Thickness of flange					3/8	13/32	7/16	1/2

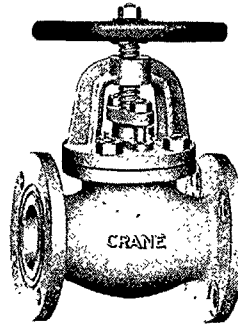
†These are for center to side opening only; center to bottom opening is 9/16" and 1 1/16", respectively.

Corrosion-Resistant Globe and Angle Valves Bolted Bonnet

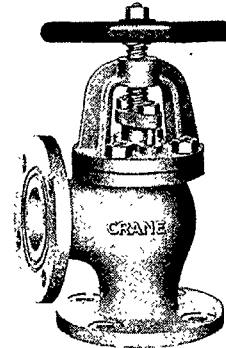
For service recommendations, see pages 443 to 445.



Cross Section
Globe, Flanged
18-8 Mo Alloy Steel
Monel Metal
Nickel
Silicon Bronze



Globe, Flanged
2½ to 6-inch
No. 18803
18-8 Mo Alloy Steel
No. 17703
Monel Metal
No. 16603
Nickel
No. 15503
Silicon Bronze



Angle, Flanged
2½ to 6-inch
No. 18805
18-8 Mo Alloy Steel
No. 17705
Monel Metal
No. 16605
Nickel
No. 15505
Silicon Bronze

Prices on application

Construction and materials: These flanged end Globe and Angle Valves are of the outside screw and yoke type, with a bolted bonnet and a renewable seat.

All parts which come in contact with the fluid in the line, including the body, bonnet, stem, disc, disc stem ring, body seat ring, and gland are made entirely of 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze.

For service recommendations and marking identifications, see pages 443 to 445.

Disc connection: The disc swivels on the stem; it is closely guided throughout its travel by a guide stem operating in the bridge cast integral with the body seat ring.

Bolted bonnet: The yoke type bolted bonnet brings the stem threads on the outside where they are not affected by the fluid in the line and where

they can be easily lubricated when necessary.

This bonnet construction provides a strong, tight joint which can be easily dismantled and reassembled without danger of injury to the valve.

Stuffing box: The stuffing box is equipped with a bolted gland and is unusually deep. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and bolt holes. Prices of flanged valves include drilling to the MSS 150-Pound Standard, and spot facing; no deduction will be made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

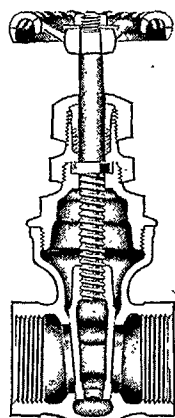
Dimensions, in Inches

Size	2½	3	4	5	6
Face to face, Globe	8	9⅞	11	12¼	14
Center to face, Angle	4¼	4⅝	5½	6¼	7
Center to top of stem, open, Globe	10¾	11⅞	13⅞	16½	18¼
Center to top of stem, open, Angle	9¾	10⅞	12¾	15⅞	16¾
Diameter of wheel	8	9	10	10	12
Diameter of flange	7	7½	9	10	11
Thickness of flange	9/16	5/8	11/16	¾	13/16

Corrosion-Resistant Gate Valves

Wedge Disc—Non-Rising Stem

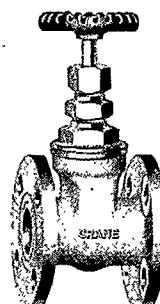
For service recommendations, see pages 443 to 445.



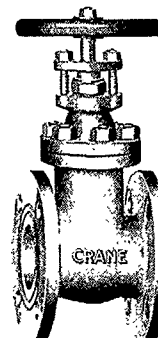
Cross Section
Screwed Bonnet
18-8 Mo Alloy Steel
Monel Metal
Nickel
Silicon Bronze



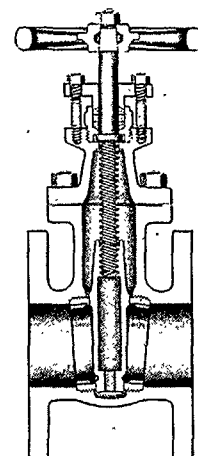
Screwed Bonnet
1/4 to 2-inch
No. 18840, Screwed
18-8 Mo Alloy Steel
No. 17740, Screwed
Monel Metal
No. 16640, Screwed
Nickel
No. 15540, Screwed
Silicon Bronze



Screwed Bonnet
1 to 2-inch
No. 18841, Flanged
18-8 Mo Alloy Steel
No. 17741, Flanged
Monel Metal
No. 16641, Flanged
Nickel
No. 15541, Flanged
Silicon Bronze



Bolted Bonnet
2 1/2 to 6-inch
No. 18841, Flanged
18-8 Mo Alloy Steel
No. 17741, Flanged
Monel Metal
No. 16641, Flanged
Nickel
No. 15541, Flanged
Silicon Bronze



Cross Section
Bolted Bonnet
No. 18841
18-8 Mo Alloy Steel
No. 17741
Monel Metal
No. 16641
Nickel
No. 15541
Silicon Bronze

Prices on application

34

Construction: These valves are the non-rising stem, wedge disc type, and are carefully designed and assembled to assure efficient operation and long life. Metal sections are more than ample.

Flanged end valves in sizes 2 1/2-inch and larger have a bolted bonnet and renewable seats. Sizes 1 to 2-inch have a screwed bonnet, and the seats are cast integral with the body.

Screwed end valves also have a screwed bonnet and seats cast integral with the body.

Materials: All materials which come in contact with the fluid in the line are cast entirely from 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze. These parts include the body, bonnet, stem, disc, body seat rings, stuffing box, packing nut, and gland.

For service recommendations and marking identifications, see pages 443 to 445.

Stuffing box: The stuffing box is deep and is equipped with a gland. It is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and bolt holes. Prices of flanged valves include drilling to the MSS 150-Pound Standard, and spot facing; no deduction will be made if valves are ordered faced only.

Full faced gaskets should be used; see page 567.

Dimensions, in Inches

Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
End to end	1 15/16	1 15/16	2 1/8	2 3/8	2 13/16	3 3/16	3 7/16	3 7/8					
Face to face					3 3/8	3 7/8	4 3/8	5 1/2	5	5 1/2	6 1/2	7	7 1/2
Center to top	3 3/4	3 3/4	4 1/16	4 3/4	5 5/8	6 7/16	7 1/4	8 5/8	10 1/4	12 1/8	14 3/8	16 1/2	18 1/8
Diameter of wheel	1 3/4	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	6	7	8	9	9
Diameter of flange					4 1/4	4 5/8	5	6	7	7 1/2	9	10	11
Thickness of flange					3/8	13/32	7/16	1/2	9/16	5/8	11/16	3/4	13/16

Quick Opening and Outside Screw and Yoke Gate Valves... page 451

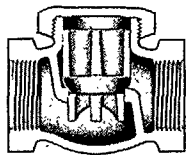
Crane materials... pages 1 to 9

Templates for drilling... page 550

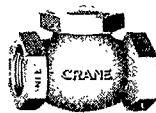
Corrosion-Resistant Check Valves

Union and Bolted Cap

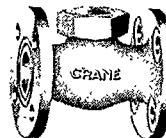
For service recommendations, see pages 443 to 445.



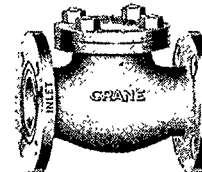
Cross
Section
Horizontal
Screwed
18-8 Mo Alloy Steel
Monel Metal
Nickel
Silicon Bronze



*Screwed
With Union Type Cap
 $\frac{1}{4}$ to 2-inch
No. 18820
18-8 Mo Alloy Steel
No. 17720
Monel Metal
No. 16620
Nickel
No. 15520
Silicon Bronze



Flanged
With Union Type Cap
1 to 2-inch
No. 18821
18-8 Mo Alloy Steel
No. 17721
Monel Metal
No. 16621
Nickel
No. 15521
Silicon Bronze



Flanged
With Bolted Cap
 $2\frac{1}{2}$ to 6-inch
No. 18821
18-8 Mo Alloy Steel
No. 17721
Monel Metal
No. 16621
Nickel
No. 15521
Silicon Bronze

$\frac{1}{4}$ and $\frac{3}{8}$ -inch valves have a screwed cap (not illustrated).

Prices on application

Construction: These are well-proportioned, dependable, horizontal check valves. Screwed valves are made in sizes $\frac{1}{4}$ to 2-inch; and flanged valves, in sizes 1 to 6-inch.

Sizes $\frac{1}{4}$ and $\frac{3}{8}$ -inch have a screwed cap.

Sizes $\frac{1}{2}$ to 1 $\frac{1}{2}$ -inch have a union type one-piece cap; the 2-inch size has a two-piece cap, equipped with a union ring.

Sizes 2 $\frac{1}{2}$ -inch and larger have a bolted cap and a renewable seat. The disc is both top and bottom guided, the bottom guide consisting of a guide stem operating in a bridge cast integral with the body seat ring.

Both the union type cap and the bolted type cap construction provide a very strong, tight joint, yet they can be easily dismantled for cleaning and repairing.

Materials: These union and bolted cap check valves are available in 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon bronze. All valves $\frac{1}{2}$ -inch and larger are cast. $\frac{1}{4}$ and $\frac{1}{8}$ -inch sizes are made from bar stock of the same metals.

Studs and stud nuts used on bolted cap check valves are made of steel.

For service recommendations and marking identifications, see pages 443 to 445.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and bolt holes. Prices of flanged valves include drilling to the MSS 150-Pound Standard, and spot facing; no deduction will be made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Dimensions, in Inches

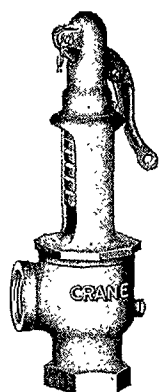
Size	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$	3	4	5	6
End to end	1 $\frac{7}{8}$	2 $\frac{7}{16}$	2 $\frac{7}{32}$	2 $\frac{3}{4}$	3 $\frac{5}{16}$	3 $\frac{7}{8}$	4 $\frac{1}{2}$	5 $\frac{1}{4}$					
Face to face					4 $\frac{3}{16}$	4 $\frac{9}{16}$	5 $\frac{5}{16}$	6	8	9 $\frac{1}{8}$	11	12 $\frac{1}{4}$	14
Center to top of valve	1	1 $\frac{1}{8}$	1 $\frac{3}{16}$	1 $\frac{7}{16}$	1 $\frac{3}{4}$	2 $\frac{1}{8}$	2 $\frac{1}{4}$	3 $\frac{3}{8}$	4 $\frac{1}{2}$	5	5 $\frac{3}{4}$	6 $\frac{3}{4}$	7 $\frac{3}{4}$
Diameter of flange					4 $\frac{1}{4}$	4 $\frac{5}{8}$	5	6	7	7 $\frac{1}{2}$	9	10	11
Thickness of flange					$\frac{3}{8}$	1 $\frac{3}{32}$	7 $\frac{1}{16}$	$\frac{1}{2}$	9 $\frac{1}{16}$	5 $\frac{1}{8}$	1 $\frac{1}{16}$	3 $\frac{1}{4}$	1 $\frac{3}{16}$

Swing Check Valves . . . page 451

Crane materials . . . pages 1 to 9

Templates for drilling . . . page 550

Corrosion-Resistant Relief Valves



No. 18859
Relief Valve
18-8 Mo Alloy Steel
Female Inlet, Side Outlet

Prices on application

Maximum Set Pressure
250 pounds
Maximum Temperature
600° F.

When ordering, be sure
to specify set pressure.

Materials: All parts of these relief valves coming in contact with the fluid in the line, including the body, bonnet, stem, disc, disc nut, regulating ring, gland, bonnet bushing, bushing, and locking plug are made of Crane 18-8 Mo Steel, an alloy having a minimum chromium content of 18%, a minimum nickel content of 8%, and from 2 to 4% molybdenum.

The 3/8-inch size valves do not have a regulating ring and locking plug.

Gas service: When specifically ordered for manufactured gases, valve seats are ground special.

Construction: The valves are ruggedly constructed. They are the outside spring type and have a screwed bonnet and a lifting lever. A stuffing box around the stem prevents the escape of the fluid while the valve is discharging.

A blow-back regulating ring is provided for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside, without interfering with the setting of the valve.

Marking: Crane 18-8 Mo Alloy Steel Valves can be identified by the marking "18-8M" on the valve body.

Dimensions, in Inches

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Size of inlet	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Size of outlet	1/2	1/2	3/4	1	1 1/4	1 1/2	2
Center to top of cap	5 5/8	5 5/8	5 7/8	7	8 1/4	9 1/4	11 1/2
Center to end of female inlet	11 1/16	11 1/16	2	2 3/16	2 5/8	2 7/8	3 7/16
Center to end of side outlet	1 1/16	1 1/16	1 5/16	1 5/8	2 1/16	2 3/8	2 3/4

Relief Valves of other corrosion-resistant alloys can be furnished when ordered.

34

Corrosion-Resistant Liquid Level Gauges

Materials: These are sturdy, well-constructed Liquid Level Gauges. All parts which come in contact with the fluid in the line including the bodies, bonnets, stems, packing nuts, glands, glass retainers, and drain plugs are made of Crane 18-8 Mo Steel, an alloy having a minimum chromium content of 18%, a minimum nickel content of 8%, and from 2 to 4% molybdenum.

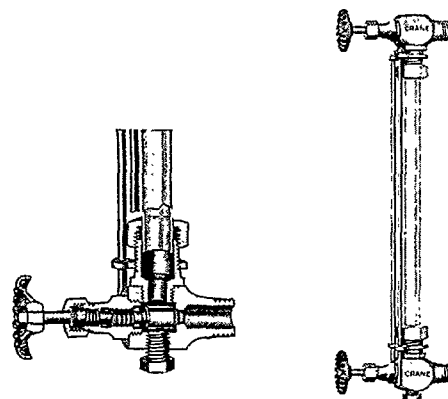
Construction: Crane No. 18898 Gauges are regularly made in the 1/2-inch size and with 14-inch centers. Gauges with other centers can be furnished when ordered.

The valve bodies are square type and have an integral seat. The disc and stem also are integral. The Gauges have 5/8-inch O.D. glass and are equipped with two guard rods.

Special Gauges: When ordered with a drain, the bottom valve will be fitted with a 1/4-inch short nipple and a 1/4-inch No. 18840 (see p. 448) Gate Valve. An extra charge is made for the drain.

Gauges with an automatic check can be furnished when ordered, at a special price. The bottom valve is made with a special adapter, a special stem, and a 5/16-inch diameter ball.

Prices on application

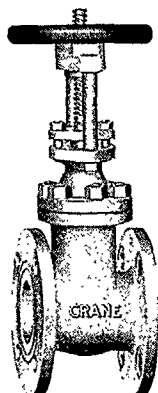


No. 18898
Liquid Level Gauge
18-8 Mo Alloy Steel
(With Guard and Glass Tube)

Liquid Level Gauges of other corrosion-resistant alloys can be furnished when ordered.

Other Corrosion-Resistant Products

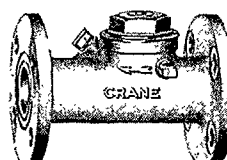
Prices and dimensions
on application



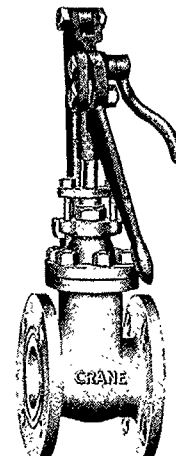
Outside Screw & Yoke Gate Valve



Swing Check Valve
Screwed



Swing Check Valve
Flanged



Quick Opening Gate Valve

Outside Screw and Yoke Gate Valves are available in a wide range of sizes, with either screwed or flanged ends. Small sizes are available in clamp or screwed bonnet type; larger sizes have a bolted bonnet. These valves are made of 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze. They are also made in the Non-Rising Stem type, as illustrated on page 448.

Regrinding Swing Check Valves, sizes $\frac{1}{4}$ to 3-inch screwed and sizes $\frac{3}{4}$ to 3-inch flanged, can be furnished when ordered.

These are made of 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze. For Horizontal Check Valves (lift type), see page 449.

Quick Opening Sliding Stem Gate Valves are made in a wide range of sizes, with either screwed or flanged ends. Small sizes are available in clamp type or with a screwed bonnet; larger sizes have a bolted bonnet. A cushioning device should be used with quick opening valves to prevent shock in liquid lines. These valves are cast from 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon Bronze.

This page shows a few special types of valves which are available for corrosive services. Most regular Crane designs can be made from commercially available corrosion-resistant metals and alloys, or combinations of these, to suit almost any corrosive conditions existing in the chemical process and food industries.

No attempt has been made to list all of the very special materials available for unusual services. 18-8 Mo Alloy Steel, Monel metal, Nickel, or Silicon-Bronze, however, will be found suitable for most installations. Crane corrosion-resistant products can also be made from Ni-Resist, all-iron, and iron construction with alloy trim on request.

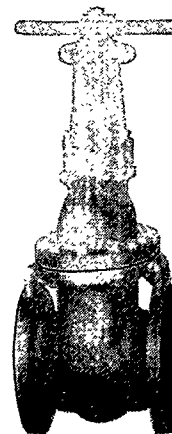
Information on materials and designs to meet such special requirements will gladly be furnished on receipt of inquiries accompanied by full details of the conditions. Crane engineers, backed by the facilities of Crane research, are always available upon request to study corrosion control problems and to make specific recommendations on suitable materials and designs for all purposes.

The behavior of metals and alloys in contact with corrosive fluids is often affected by factors which are not always obvious. For this reason it is desirable to have complete information on the service requirements of the installation. It is also advantageous

to know something about the installation itself. This is particularly true where there is a background of previous experience and when a rough sketch of the layout of tank, piping, etc. can be accompanied by notations indicating the locations at which corrosion has been most severe. An opportunity to examine corroded pipe, valves, and fittings will often aid materially in the making of recommendations.

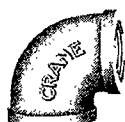
Rubber Lined Valves and Fittings

In addition to the regular line of corrosion-resistant alloy gate valves and fittings, hard rubber lined flanged gate valves and flanged fittings are available in a wide range of sizes. Every part of the valve or fitting that comes in contact with the corrosive fluid in the line is covered with a coating of hard rubber to prevent corrosive chemical action on the metallic parts. In certain installations, hard rubber has been found to be more suitable than a metallic material for handling corrosive fluids.



Rubber Lined
O. S. & Y. Gate Valve

Corrosion-Resistant Screwed Fittings and Unions



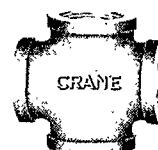
90° Elbow
No. 18860
18-8 Mo Alloy
No. 17760
Monel
No. 16660
Nickel
No. 15560
Silicon Bronze



45° Elbow
No. 18862
18-8 Mo Alloy
No. 17762
Monel
No. 16662
Nickel
No. 15562
Silicon Bronze



Tee
No. 18868
18-8 Mo Alloy
No. 17768
Monel
No. 16668
Nickel
No. 15568
Silicon Bronze



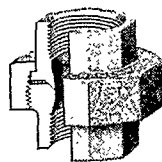
Cross
No. 18872
18-8 Mo Alloy
No. 17772
Monel
No. 16672
Nickel
No. 15572
Silicon Bronze



Cap
No. 18878
18-8 Mo Alloy
No. 17778
Monel
No. 16678
Nickel
No. 15578
Silicon Bronze



Coupling
No. 18882
18-8 Mo Alloy
No. 17782
Monel
No. 16682
Nickel
No. 15582
Silicon Bronze



Union
No. 18890
18-8 Mo Alloy
No. 17790
Monel
No. 16690
Nickel
No. 15590
Silicon Bronze

The Screwed Fittings and Unions shown on this page are made in sizes 1/4 to 2-inch inclusive.



Plug
No. 18884
18-8 Mo Alloy
No. 17784
Monel
No. 16684
Nickel
No. 15584
Silicon Bronze



Bushing
No. 18886
18-8 Mo Alloy
No. 17786
Monel
No. 16686
Nickel
No. 15586
Silicon Bronze

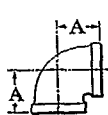
34

Prices on application

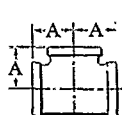
Materials: Except for the plugs, bushings, and 1/4 and 3/8-inch caps and couplings, which are made of bar stock, the screwed fittings and unions shown on this page are cast in four high grade corrosion-resistant metals — Crane 18-8 Mo Alloy Steel, Monel metal, Nickel, and Silicon Bronze.

Unions: 18-8 Mo Alloy Steel Unions are regularly furnished with a galvanized malleable iron union ring unless specifically ordered with 18-8 Mo ring. Union rings on Monel metal, Nickel, and Silicon Bronze Unions are regularly made of the same material as the thread-piece and the tail-piece.

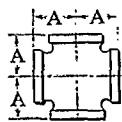
For service recommendations and marking identification, see pages 443 to 445.



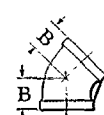
90° Elbow



Tee



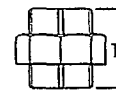
Cross



45° Elbow



Coupling



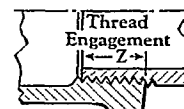
Union



Cap

Dimensions, in Inches

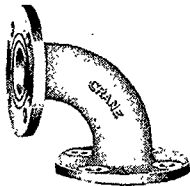
Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	13/16	15/16	1 1/8	1 5/16	1 1/2	1 3/4	1 15/16	2 1/4
B	3/4	13/16	7/8	1	1 1/8	1 5/16	1 7/16	1 11/16
C	1	1 1/8	1 5/16	1 1/2	1 11/16	1 15/16	2 1/8	2 1/2
D	1 5/8	1 13/16	1 15/16	2 1/4	2 7/16	2 13/16	3	3 3/8
E	1 1/16	3/4	7/8	1 1/16	1 3/16	1 1/4	1 5/16	1 7/16
Z	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4



For explanation, see page 591.

Corrosion-Resistant Flanged Fittings and Flanges

For service recommendations, see pages 443 to 445.



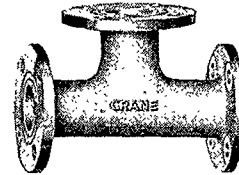
90° Flanged Elbow

No. 18861
18-8 Mo Alloy
No. 17761
Monel
No. 16661
Nickel
No. 15561
Silicon Bronze



45° Flanged Elbow

No. 18863
18-8 Mo Alloy
No. 17763
Monel
No. 16663
Nickel
No. 15563
Silicon Bronze



Flanged Tee

No. 18869
18-8 Mo Alloy
No. 17769
Monel
No. 16669
Nickel
No. 15569
Silicon Bronze



Screwed Companion Flange

No. 18889
18-8 Mo Alloy
No. 17789
Monel
No. 16689
Nickel
No. 15589
Silicon Bronze

The Flanged Fittings and Flanges shown on this page are made in sizes 1 to 6-inch inclusive.

Prices on application



Blind Flange

No. 18891
18-8 Mo Alloy
No. 17791
Monel
No. 16691
Nickel
No. 15591
Silicon Bronze

Materials: The flanged fittings and flanges shown on this page are cast in four different high grade corrosion-resistant metals — Crane 18-8 Mo Alloy Steel, Monel metal, Nickel, and Silicon Bronze.

For service recommendations and marking identifications, see pages 443 to 445.

Additional sizes and types: Other sizes and types of corrosion-resistant alloy flanged fittings and flanges are made to order; prices on application.

Flanges: Flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced with two V-shaped concentric grooves between the port and bolt holes.

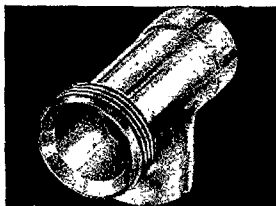
Prices of these corrosion-resistant flanged fittings and flanges will include drilling to the MSS 150-Pound Bronze Flange Standard, and spot facing; no deduction will be made if flanges are ordered faced only.

Full face gaskets should be used; see page 567.

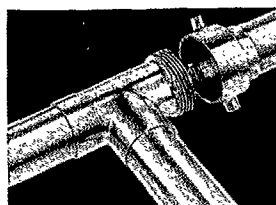
Dimensions, in Inches

Size	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6
Center to face									
90° Elbows and Tees	3 1/2	3 3/4	4	4 1/2	5	5 1/2	6 1/2	7 1/2	8
45° Elbows	1 3/4	2	2 1/4	2 1/2	3	3	4	4 1/2	5
Diameter of flange	4 1/4	4 5/8	5	6	7	7 1/2	9	10	11
Thickness of flange	3/8	13/32	7/16	1/2	9/16	5/8	11/16	3/4	13/16

Stainless Steel Sanitary Valves and Fittings



No Food Pockets



Quickly Demountable

Crane Co. manufactures a complete line of Stainless Steel Sanitary Valves and Fittings for use with 1 and 1½-inch O.D. 18 gauge tubing, and with 2, 2½, and 3-inch O.D. 16 gauge tubing.

These valves and fittings are designed for handling food products and beverages; they offer excellent resistance to chemical action and discoloration by milk, milk products, lactic and butyric acids, fruit and vegetable juices, vinegar, and practically all cooked or prepared food products.

Crane Sanitary Valves and Fittings are completely machined on the inside to eliminate all pockets where food might lodge and decay. Exterior surfaces are polished or furnished with a fine sand blast finish. The threaded ends of these valves and fittings comply with the Standards of the International Association of Milk Dealers (I.A.M.D.).

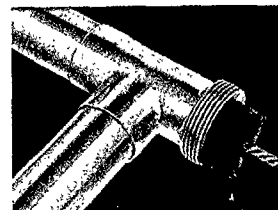
Fittings are made of 18-8 Mo Alloy, a chromium-nickel alloy containing from 2 to 4% molybdenum. They can be furnished in many combinations of

threaded and recessed ends as shown on the following page; valves are furnished with threaded ends only.

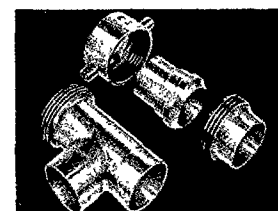
Recessed ends: Joints between fittings and tubing are made by inserting the tubing into the recessed end of the fitting and soldering or brazing it into place; the body of the fitting has the same bore as the inside diameter of the tubing.

Ground joints: Threaded end valves and fittings are regularly furnished with 45° ground metal joints unless gasket type joints are ordered. Ground joint valves and fittings use the regular catalog numbers shown below and on the following page.

Gasket type joints: Stainless Steel Valves and Fittings with flat gasket type joints are designated by adding the suffix "G" to the regular catalog number. For example: No. 4, No. 7, No. 26 A, etc., must be ordered as No. 4-G, No. 7-G, No. 26 A-G, etc., when gasket type ends are wanted. If this suffix "G" is not used when ordering, valves and fittings with ground joint ends will be furnished.



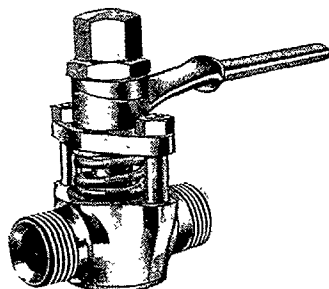
Easily Cleaned



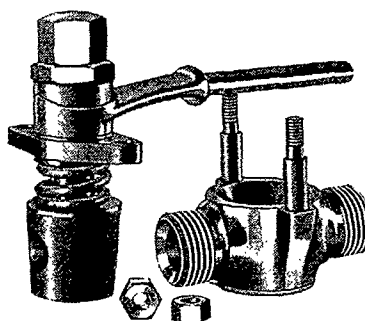
Interchangeable Parts

34

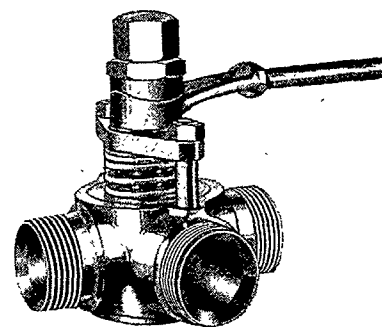
Stainless Steel Sanitary Plug Valves



No. 10 C, Straightway Valve



Straightway Valve (Dismantled)



No. 11 C, Three-Way Valve

These Stainless Steel Sanitary Plug Valves are a new, improved type having many advantages not found in ordinary plug valves. The top and bottom of the plug are open and do not have plates or covers which might trap food particles and cause contamination. The upper trim is exposed for cleaning and inspection; and, when necessary, the plug and trim can be removed and cleaned as a single unit.

In opening the valve, the first part of the handle travel puts a cam in action, causing a minute lift of the plug, to minimize friction and prevent galling while the plug is being turned. It is unnecessary to

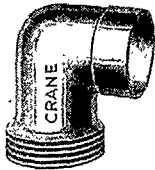
loosen the nuts or tap the bottom of the plug to remove the wedging or sticking action that often occurs in conventional type plug valves.

The body and plug are cast from Crane 18-8 Mo Alloy, the nuts and spring are chrome plated, and all other parts are made of stainless steel.

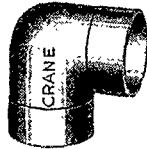
These valves are furnished with threaded ends for 45° ground joints, but gasket type joints can be furnished when so ordered. The valves are recommended for pressures up to 20 pounds. Prices, dimensions, and additional data will be furnished on request.

Stainless Steel Sanitary Fittings

With Recessed Ends, Ground Joints, or Gasket Type Joints



No. 26B, 90° Elbow
One end recessed,
other end union
ring thread.



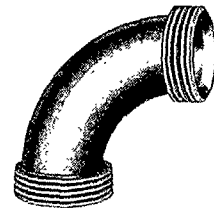
No. 26A, 90° Elbow
Both ends recessed.



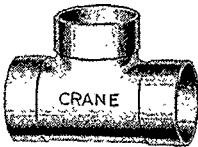
No. 26C, 45° Elbow
One end recessed,
other end union
ring thread.



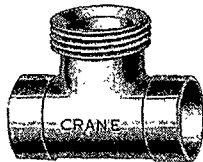
No. 26, 45° Elbow
Both ends recessed.



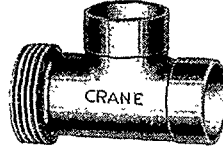
No. 2C
90° Long Radius Elbow
Both ends with union
ring threads.



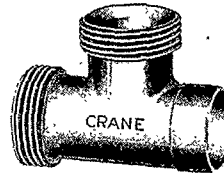
No. 3, Tee
All ends recessed.



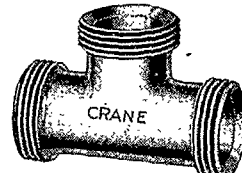
No. 4, Tee
Both ends of run re-
cessed, outlet union
ring thread.



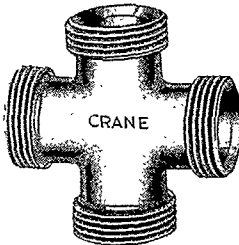
No. 5, Tee
One end of run union
ring thread, other ends
recessed.



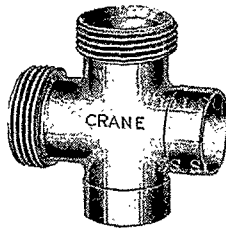
No. 6, Tee
One end of run recessed,
other ends union ring
threads.



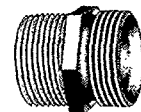
No. 7, Tee
All ends with union
ring threads.



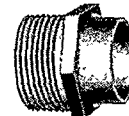
No. 9, Cross
All ends with union
ring threads.



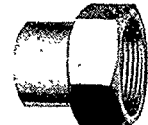
No. 8, Cross
Two adjacent ends re-
cessed, other ends union
ring threads.



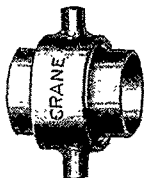
No. 21, Nipple



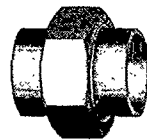
No. 19A, Adapter
One end recessed,
other end male pipe
thread.



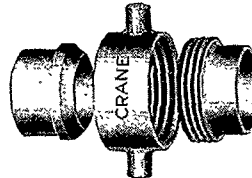
No. 18, Adapter
One end recessed,
other end female
pipe thread.



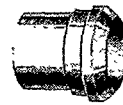
No. 12, Union
With Prong Type Ring
Consisting of
No. 14 Tail-piece
No. 13 Union Ring
No. 15 Thread-piece



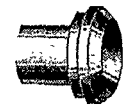
No. 12H, Union
With Hexagon Ring
Consisting of
No. 14 Tail-piece
No. 13H Union Ring
No. 15 Thread-piece



No. 14
Tail-piece
No. 15
Thread-piece
Shown with No. 13 Union Ring.
No. 13 Union Ring, No. 13H
Union Ring, and No. 14 Tail-
piece may be used with any
union end valve or fitting.



No. 14A, Tail-piece
Made with plain
or male shank.



No. 31, Tail-piece
Reducing one or
more sizes.



No. 16A
Flat Plug
These two fittings can be used with
No. 13 or No. 13H Union Ring. No.
16A is used to blank off any union
end fitting; No. 23A is used to allow
for the insertion of a thermometer.

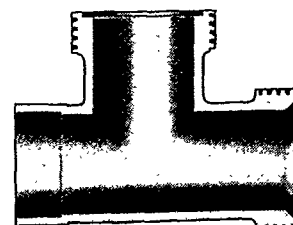


No. 23A
Thermometer Cap



No. 17
Coupling
Both ends
recessed.

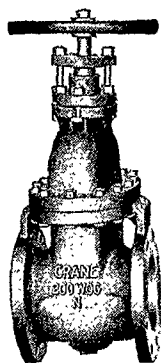
Recessed
End for
Tubing



Threaded
End for
Ground
Joint
Union

Fittings with Gasket Type Joints have the suffix "G" added to the regular catalog number; see page 454. Prices and dimensions on application.

Alloy Cast Iron Wedge Gate Valves For Process Industries



Non-Rising Stem
Flanged

No. 14471

Exelloy Trimmed

No. 14475

18-8 Mo Alloy Steel
Trimmed

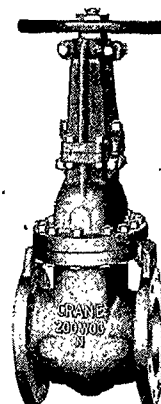
WORKING PRESSURE
200 pounds cold water, oil, gasoline, or gas, non-shock

HYDROSTATIC TEST PRESSURES
350 pounds shell 225 pounds seat

Air Tested

EXELLOY TRIMMED	18-8 MO ALLOY TRIMMED
Exelloy Body Seat Rings	18-8 Mo Body Seat Rings
Exelloy Faced Alloy Cast Iron Disc	18-8 Mo Faced Alloy Cast Iron Disc
Exelloy Stem	18-8 Mo Stem
Alloy Cast Iron Body	Alloy Cast Iron Body
Nickel-Plated Steel Gland	Nickel-Plated Steel Gland
Ferrosteel Yoke Sleeve in O.S. & Y.	Ferrosteel Yoke Sleeve in O.S. & Y.

These valves are similar in design to the Crane Standard Iron Body Wedge Gate Valves shown on pages 101 to 103. They are made of corrosion-resistant metals and alloys for use in the process industries, and are available with flanged ends only.



Outside Screw
and Yoke
Flanged

No. 14473

Exelloy Trimmed

No. 14477

18-8 Mo Alloy Steel
Trimmed

List Prices, Flanged, F.&D.

Size Inches	Exelloy Trimmed		18-8 Mo Alloy Steel Trimmed	
	No. 14471	No. 14473	No. 14475	No. 14477
	Non-Rising Stem Each	O.S. & Y. Each	Non-Rising Stem Each	O.S. & Y. Each
2	26.50	33.25	28.00	34.75
2½	30.00	36.75	31.50	38.25
3	36.50	43.25	38.50	45.25
4	49.50	59.00	52.00	61.50
6	75.00	89.00	80.00	94.00
8	113.00	136.00	122.00	145.00

For dimensions, see Standard Iron Body Wedge Gate Valves, page 106.

Service recommendations: These valves are offered for use in services where the conventional "all-iron" and "brass trimmed" valves fail because of corrosion of seating surfaces.

Typical applications of the Exelloy trimmed valves are found in the petroleum industry handling oils containing sulfur compounds that corrode iron and brass, but which do not contain mineral acids and other compounds corrosive to Exelloy.

The valves trimmed with 18-8 Mo Alloy Steel are being used in the same industry handling oils which do contain traces of mineral acids. They are also used in the wood treating industry handling creosote vapors and oils, and in the pulp and paper industry handling alkaline liquors of various kinds.

Alloy cast iron: The valve body and disc are made of a nickel low alloy cast iron, developed to meet the need for an iron having better physical properties and resistance to corrosion when subjected to services where ordinary gray iron is not adequate.

Body and bonnet: The body and bonnet are made with liberal metal sections to assure maximum strength. Tie ribs between the bonnet flange and

the end flanges provide exceptional resistance to line strains. The body has straight through ports to minimize turbulence and thereby obtain a more uniform flow through the valve.

Disc: Outside Screw and Yoke Valves have a solid web disc. All valves have extra long disc guides to minimize drag on the seating surfaces.

Stem: Stem threads have long engagement in the disc or yoke sleeve. Outside Screw and Yoke Valves have tee-head disc-stem connection.

Gland and stuffing box: These valves have a two-piece ball-type gland which maintains an even load on the packing and prevents binding on the stem even when the gland bolts are not pulled up evenly.

Non-Rising Stem Valves have through bolts holding the stuffing box to the bonnet. Outside Screw and Yoke Valves have swinging gland eye bolts which move out of the way when the stuffing box is being repacked, but which do not become detached or lost.

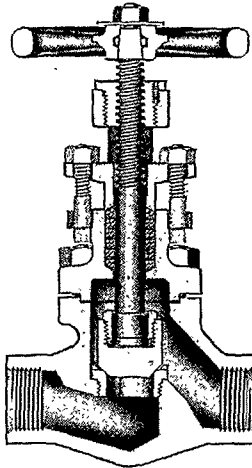
Standards: These valves conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Gate Valves. The valves also conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939), for 125-Pound Cast Iron Wedge Gate Valves.

Flange dimensions and facing: The dimensions and drilling of end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced with smooth finish.

Drilling: Flanges are furnished faced and drilled unless ordered faced only. No deduction is made when valves are ordered faced only.

Forged Steel Globe and Angle Valves For Chlorine Service

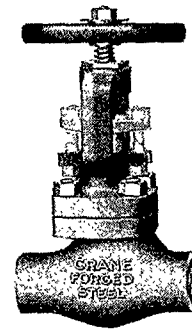
Tested 300 pounds air under water



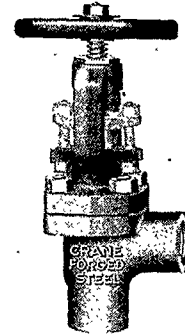
Cross Section
No. 1644, Globe

SERVICE RECOMMENDATIONS

These valves are recommended for chlorine gas and liquid service, free from water, at temperatures not to exceed 300° F. They are strong, durable, compact valves — suitable for severe service conditions.



No. 1644, Globe
Screwed



No. 1645, Angle
Screwed

List Prices and Dimensions

Size	Inches	1/2	3/4	1	1 1/4	1 1/2	2
No. 1644 or No. 1645	Each	27.25	30.75	35.00	47.50	61.50	79.00
End to end, Globe	Inches	3 5/8	4 3/8	5 1/8	6 1/4	7	8 3/8
Center to end, Angle	Inches	1 13/16	2 3/16	2 9/16	3 1/8	3 1/2	4 3/16
Center to top, open	Globe Inches	7 5/16	8 7/8	9 7/16	11 1/16	12	14 1/8
Angle	Inches	6 3/4	8	8 5/16	9 5/8	10 3/16	12 1/16
Diameter of wheel	Inches	3 1/2	4	5	6	7	9

Materials and construction: These valves for chlorine service are Bolted Bonnet O. S. & Y. Globe and Angle Valves. The body and one-piece bonnet and yoke are forged carbon steel. The disc, disc stem ring, and body seat ring are made of Hastelloy "C" to resist the corrosive action of chlorine. The valves have a 45° narrow bearing seat. The gland is forged

steel, zinc plated, and the bonnet bolt studs are Triplex steel. The stem is made of Monel metal and is fitted with a malleable iron handwheel.

The bonnet joint is fitted with a corrugated soft Monel metal gasket. These valves, when wide open, can be repacked while under pressure.

Crane Fabricating Service

Users of alloy material will find many advantages in procuring fabricated piping from the same source as the valves, fittings, and other requirements. Pre-fabrication assures ultimate accuracy and also saves the erecting force from the responsibility of designing, fabricating, and finishing piping in the field under less favorable conditions than those found in a modern, well-equipped shop devoted to the pre-fabrication of piping.

Crane shop facilities embrace the full range of fabrication in brass, aluminum, nickel, 18-8 Mo Alloy Steel, silicon bronze, and other alloys in the sizes, thicknesses, and ranges commercially available. There are facilities for pipe bending, welding, flanging, swedging and forming, heat treating, normalizing, quenching, pickling, polishing, and finishing. Special finishes or polishing operations can be applied after fabrication.

Crane fabricating shops are located in Chicago, Bridgeport, Birmingham, and on the Pacific Coast.

Fabricated piping . . . pages 597 to 619

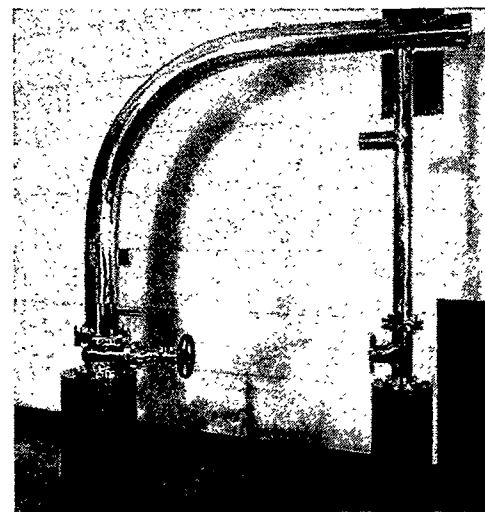
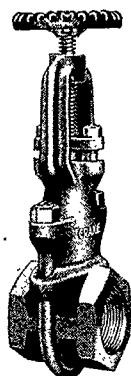


Exhibit of 18-8 Mo Alloy Materials

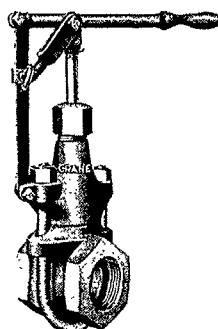
All-Iron Valves



Inside Screw Valve

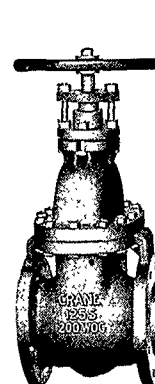


O.S. & Y. Valve

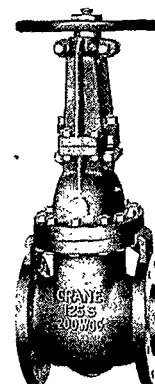


Quick Opening Valve

For All-Iron Clamp Gate Valves, see pages 98 and 99.

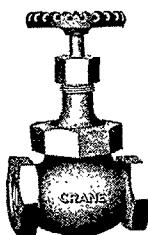


Non-Rising Stem Valve



O.S. & Y. Valve

For All-Iron Wedge Gate Valves and All-Iron Double Disc Gate Valves, see pages 97 to 141.

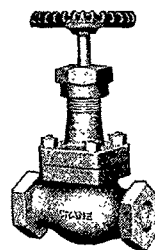


Union Bonnet, Globe



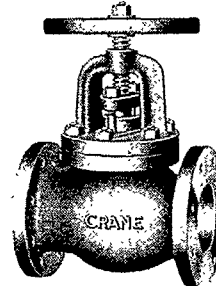
Union Bonnet, Angle

For All-Iron Union Bonnet Globe and Angle Valves, see pages 144 and 145.

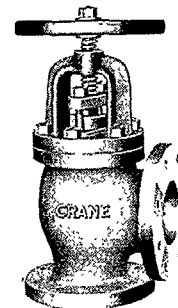


Ferrosteel Bolted Bonnet Globe Valve With Lead-Faced or Steel Disc

For Ferrosteel Globe and Angle Valves, see page 481.

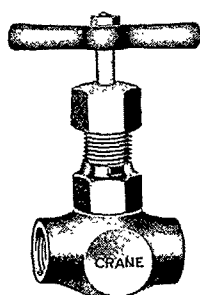


Bolted Bonnet, Globe

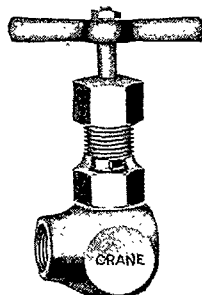


Bolted Bonnet, Angle

For All-Iron Bolted Bonnet Globe and Angle Valves, see page 150.



Bar Stock Globe Valve

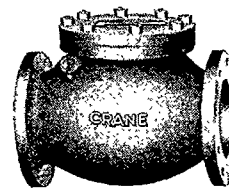


Bar Stock Angle Valve

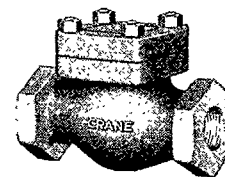
Made of Steel, Exelloy, or 18-8 Mo Alloy
For Bar Stock Valves, see page 310.



Malleable Iron Swing Check Valve



All-Iron Swing Check Valve



Ferrosteel Lift Check Valve

Malleable Iron Swing Check Valves... page 156; All-Iron Swing Check Valves... pages 160 and 161; Lift Check Valves... page 482.

Crane Co. manufactures an unusually complete assortment of All-Iron Gate, Globe, Angle, and Check Valves, including a wide variety of types and a full range of sizes.

Although cast iron cannot be listed specifically as one of the corrosion resisting metals, all-iron valves find wide application in many services where brass or brass trimmed valves are not entirely suited. Without good inherent resistance to corrosion, cast

iron frequently depends for its general serviceability upon the fact that, in many situations, the initial corrosion is followed by the formation of protective coatings which slow up the rate of corrosion or entirely prevent it.

For greater convenience, All-Iron Valves are listed with related products in other sections of this catalog. A few of the common types are illustrated above, together with page references.

Valves and Fittings For Marine Service

Specifications and General Requirements pages 460 and 461

Brass Valves and Fittings

Globe, Angle, and Cross Valves pages 462 and 463
Check Valves pages 464 and 465
Gate Valves page 466
Hose Valves page 467
Radiator Valves page 467

Fittings, Screwed and Flanged page 461
Chronometer Valves page 476
Pop Safety and Relief Valves pages 477 and 478

Iron Valves and Fittings

Gate Valves page 468
Globe and Angle Valves page 469
Check Valves page 469
Fittings, Cast and Malleable Iron page 461
Relief Valves page 478

Steel Valves and Fittings

Adjusted Marine Pressure Ratings page 470
Gate Valves pages 471 to 475
Globe and Angle Valves pages 471 to 474
Check Valves pages 471 to 475
Flanged Fittings pages 471 to 473
Flanges pages 470 to 473
Pop Safety Valves page 477

Fusible Plugs page 478
Main Injection Valves page 476
Overboard Discharge Valves page 476
Manifold Valves page 476

Pages 460 to 478 show the Crane Valves and Fittings commonly used for marine service. In most cases, these are regular Crane products which also are popular for commercial purposes and which are for that reason listed elsewhere in the book with related items. These pages, therefore, briefly describe the product, specify the particular marine service for which it is suitable, and refer to other pages for prices, dimensions, and additional data. In other cases, where the product is used only in marine piping, complete information is given in this section.

The extra quality built into Crane Valves and Fittings makes them accepted everywhere. It is this quality that has long maintained for Crane its enviable position for meeting marine requirements — safety, ruggedness, and durability. Then too, the completeness of the Crane line is important. Whether it be the smallest tug or the largest passenger liner — a vessel for river, lake, or ocean service — a wide selection of Crane products is available.

Valves and Fittings for Marine Service

The valves and fittings illustrated and described on pages 462 to 478 are designed and manufactured in strict accordance with the rules and regulations of the following:

Bureau of Marine Inspection and Navigation
(U. S. Department of Commerce)

American Bureau of Shipping

Lloyds' Register of Shipping
(Ships built in U. S. A.)

There are numerous requirements and limitations governing marine service which make the use of ordinary commercial material inadvisable. The most important of these are given on this and the opposite page for convenient reference.

According to the Rules of the Bureau of Marine

Inspection and Navigation, piping on board ship is divided into two general classes:

Class I Piping:

Power Piping, for pressures over 100 pounds regardless of temperature; for temperature over 500° F. regardless of pressure.

Hot Water Piping, for pressures over 100 pounds regardless of temperature; for temperatures over 200° F. regardless of pressure.

Oil Piping, for pressures over 100 pounds regardless of temperature; for temperatures over 150° F. regardless of pressure.

Class II Piping

For all miscellaneous piping at lower pressures and temperatures than Class I.

General Requirements

Metals: Regular Crane metals comply with the requirements for service as outlined herein:

Grade A Bronze for pressure-containing parts subjected to maximum working pressures of 150 pounds, or maximum temperatures of 366° F. (Crane Steam Brass).

Grade B Bronze for pressure-containing parts subjected to maximum steam working pressures of 300-pounds, or maximum temperatures of 450° F., or for hydraulic or compressed air pressures up to 1200-pounds, and temperatures not over 150° F. (Crane Special Brass or Crane Hard Metal).

Crane Malleable Iron, for maximum of 125 pounds working pressure, 450° F. temperature; 4-inch maximum size.

Crane Cast Iron, for maximum of 125 pounds working pressure, 450° F. temperature.

All metals regularly used in Crane Cast and Forged Steel Valves, Fittings, and Flanges are acceptable.

Working pressures: Valves and fittings are not allowed for water working pressure higher than the recommended steam working pressure.

For boiler feed or blow-off service, valves and fittings may only be used for pressures up to $83\frac{1}{3}\%$ of the recommended steam working pressure.

The American Standard pressure ratings for Steel Valves, Fittings, and Flanges are reduced by the Marine Rules. See page 470.

Tests: Tests regularly made on Crane Valves and Fittings comply with the requirements for Class II Piping.

For Class I Piping, valves and fittings must be subjected to a hydrostatic shell test equal to three times

the working pressure, until the test pressure reaches 1000 pounds. Thereafter the ratio of test pressure to working pressure shall be proportionately reduced until the test pressure does not exceed 1500 pounds at 600 pounds working pressure; 2000 pounds at 900 pounds working pressure; and 3500 pounds at 1500 pounds working pressure. The Crane products recommended for Class I Piping on the following pages are regularly subjected to such a test.

Tests regularly made on Crane Steel Valves and Flanged Fittings comply with the requirements for Class I Piping.

Pipe connections: For Class I Piping, valves and fittings $2\frac{1}{2}$ -inch and larger must be flanged end. Screwed companion flanges are allowed only on sizes $2\frac{1}{2}$ -inch and smaller. Welding Neck Flanges can be used on sizes $2\frac{1}{2}$ -inch and larger; Slip-On Welding Flanges can be used on sizes 2-inch and smaller. Cast Iron Flanges are not allowed for Class I Piping.

Valves, fittings, and flanges having socket-welding ends may be used for sizes 2-inch and smaller.

Bronze valves, fittings, or flanges of the solder-joint type may be used where the pressure does not exceed 100 pounds, and the temperature does not exceed 240° F.

For Class II Piping, there is no limitation on the use of screwed joints.

For boiler mountings, valves and fittings $1\frac{1}{2}$ -inch and larger must be flanged end.

Regular Cranelap Joints conform to all requirements when used for the pressure ranges allowed.

Except for Screwed, Welding Neck, Slip-On Welding, and Cranelap Flanges as outlined above, all other types of flanges are entirely special.

(Continued on the next page)

Valves and Fittings for Marine Service

General Requirements (Cont.)

Markings: Regular Crane markings comply with the marine requirements; no additional marking is required.

Design: For Class I Piping, all valves 2½-inch and larger must have a bolted bonnet; all sizes of cast iron valves must have a bolted bonnet. Screwed bonnet globe, angle, or gate valves, where permitted, must be of the union bonnet construction. Non-rising stem valves must be provided with an approved indicator.

For Class II Piping, either screwed bonnets or union bonnets are permitted except that all cast iron valves must have bolted bonnets. Non-rising stem valves must be provided with an approved indicator except for cargo oil piping where valves without indicator may be used.

Boiler mountings: All valves and fittings must be cast or forged steel, except that Crane Special Brass or Crane Hard Metal may be used when the temperature does not exceed 450° F. Sizes 1½-inch and larger must be flanged end.

Cast iron and malleable iron are not allowed for boiler mountings.

Fuel oil service piping: Valves and fittings for

fuel oil service piping (that is, pressure piping from pumps to burners) must conform to the requirements for Class I and, in addition, must be designed for at least 250 pounds steam working pressure.

Iron valves and fittings are not allowed.

Bushings and street elbows are not permitted.

Blow-off valves: Blow-off valves must be Y-pattern or angle type, or straight-way pattern (not globe). Check valves in blow-off lines must be swing type.

See paragraphs on "working pressure", page 460.

Cocks: For Class I, cocks must be designed so that the cap holds the plug in place; the conventional type with nut holding the plug is not allowed. For Class II, there are no restrictions.

By-pass: Although the specifications require by-passes on all globe, angle, and gate valves larger than 4-inch, Crane Co. will not furnish a by-pass unless specifically ordered, because it is permissible to place the by-pass entirely around the valve, from pipe to pipe, and this is done frequently.

Specialties: Relief valves, safety valves, expansion joints, etc., must be of approved design.

* * * * *

Numerous Crane Valves and Fittings as regularly manufactured conform to the requirements for marine service. These fill the need for a large majority of Class I and Class II piping; they are described and illustrated on the pages which follow. In addition, the following Crane Fittings are acceptable, within the limitations mentioned.

Brass screwed fittings: Standard Brass Screwed Fittings in sizes 3-inch and smaller, shown on pages 256 to 258, are suitable for Class II Piping. When specially tested, sizes 2-inch and smaller are suitable for Class I Piping. This also applies to the No. 521½ Union shown on page 262.

250-Pound Brass Screwed Fittings in sizes 3-inch and smaller, shown on page 260, are suitable for Class II Piping. When made special of special metal and specially tested, sizes 2-inch and smaller are suitable for Class I Piping. The No. 96 E Union, shown on page 263, is suitable for Class II; and sizes 2-inch and smaller when specially tested, for Class I.

Brass flanged fittings and flanges: The Brass

Flanged Fittings and Flanges shown on page 264 are well suited for marine service. The flanged fittings can be used for Class II Piping, and when specially tested, for Class I Piping. The flanges in sizes 2½-inch and smaller only can be used for both Class I and II Piping.

Cast and malleable iron screwed fittings: Standard Cast Iron Screwed Fittings (pages 197 to 202) and Standard Malleable Iron Screwed Fittings (pages 180 to 186) in sizes 3-inch and smaller are suitable for Class II Piping. This also applies to the No. 519 Malleable Iron Unions shown on page 240. When specially tested, all of these in sizes 2-inch and smaller are suitable for Class I Piping.

Cast iron flanged fittings: The 125-Pound Cast Iron Flanged Fittings, shown on pages 274 to 280, in sizes 16-inch and smaller are suitable for Class II Piping, and when specially tested, for Class I.

Steel flanged fittings and flanges: Pages 470 to 473 refer to the Cast Steel Flanged Fittings and Forged Steel Flanges which are used in marine piping.

Crane Co. is exceptionally well equipped to supply valves and fittings for all marine piping requirements. Special or modified valves and fittings can be made when so ordered.

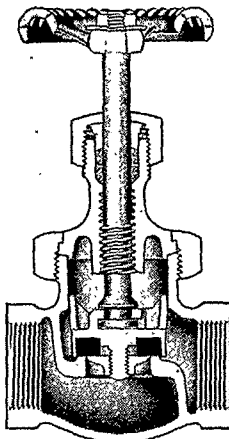
More complete information on Crane Marine Valves and Fittings will be furnished on request.

Brass Globe, Angle, and Cross Valves For Marine Service

150-Pound Composition Disc

WORKING PRESSURE

150 pounds saturated steam, water, or oil



Cross Section
No. 7, Globe

No. 7, Globe or Angle
Screwed, $\frac{1}{8}$ to 3-inch
No. 9, Globe or Angle
Flanged, $\frac{3}{4}$ to 3-inch

When ordering specify whether globe or angle valves are wanted.

When equipped with the proper composition disc, the No. 7 and No. 9 Valves are suitable for steam, water, oil, and other fluids. Sizes 2-inch and smaller have a union bonnet; larger sizes have a bolted bonnet. List prices, dimensions, and description, see page 30.

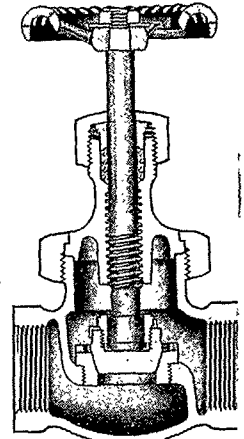
All sizes are suitable for Class II Piping.

2" and smaller, when specially tested, are suitable for Class I Piping; prices on application.

150-Pound Plug Type Disc

WORKING PRESSURE

150 pounds saturated steam, water, or oil



Cross Section
No. 14 1/2 P, Globe

No. 14 1/2 P, Globe
Screwed
 $\frac{1}{8}$ to 3-inch
No. 16 1/2 P, Angle
Screwed
 $\frac{1}{8}$ to 3-inch

The No. 14 1/2 P and No. 16 1/2 P Valves have a plug type disc, making them suitable for unusually severe services. Sizes 2-inch and smaller have a union bonnet; larger sizes have a bolted bonnet. For list prices, dimensions, and description, see page 31.

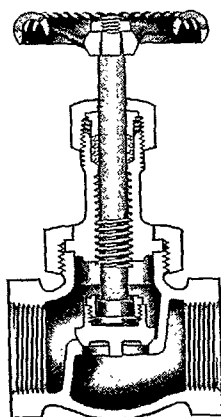
All sizes are suitable for Class II Piping.

2" and smaller, when specially tested, are suitable for Class I Piping; prices on application.

150 and 200-Pound Regrinding

WORKING PRESSURES

Screwed, 200 pounds steam, water, or oil, 450° F.
Flanged, 150 pounds steam, water, or oil, 450° F.



Cross Section
No. 70, Globe

No. 70, Globe
Screwed
 $\frac{1}{8}$ to 3-inch
No. 70, Angle
Screwed
 $\frac{1}{8}$ to 3-inch
No. 71, Globe
Flanged
 $\frac{3}{4}$ to 3-inch
No. 71, Angle
Flanged
 $\frac{3}{4}$ to 3-inch

No. 74, Cross
Screwed
 $\frac{1}{2}$ to 2-inch

When ordering No. 70 or No. 71, specify whether globe or angle valves are wanted.

These valves are regrinding type with integral seat. All sizes have a union bonnet. For prices, dimensions, and description, see page 34.

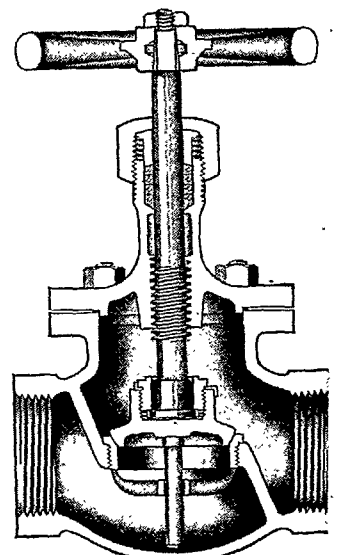
Screw-Down Check Valves can be made to order; in addition, this design can be made special with a needle point stem and a retewable body seat ring. Prices on application.

*All sizes are suitable for Class II Piping.
Sizes 2" and smaller are suitable for Class I Piping.*

150 and 200-Pound Bolted Bonnet

WORKING PRESSURES

Screwed, 200 pounds steam, water, or oil, 450° F.
Flanged, 150 pounds steam, water, or oil, 450° F.



Cross Section, No. 4196, Globe

No. 4196, Globe
Screwed
1 1/2 to 4-inch
No. 4198, Angle
Screwed
1 1/2 to 4-inch
No. 4197, Globe
Flanged, 1 1/2 to 6-inch
No. 4199, Angle
Flanged, 1 1/2 to 6-inch

These valves have a bolted bonnet. Sizes 3-inch and smaller have inside stem threads; larger sizes have outside threads with crosshead yoke and bolted gland. See page 35. Cross Valves and Screw-Down Check Valves are made to order; prices on application.

*All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.*

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Brass Globe and Angle Valves For Marine Service

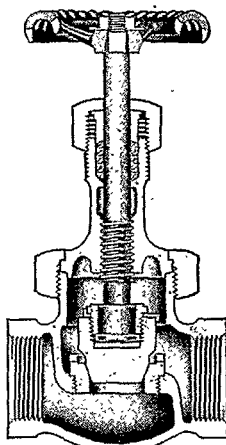
250-Pound Plug Type Disc

WORKING PRESSURE

250 pounds steam, water, or oil, 450° F.

No. 212 P, Globe
Screwed, ¼ to 3-inch

No. 214 P, Angle
Screwed, ¼ to 3-inch



Cross Section
No. 212 P, Globe

These are plug type disc valves, suitable for throttling on steam, water, and oil lines. Sizes 2-inch and smaller have a union bonnet; larger sizes have a bolted bonnet. For prices, dimensions, and description, see page 36.

The valves can be made to order with a ball to flat seat; prices on application.

All sizes are suitable for Class II Piping.

Sizes 2" and smaller are suitable for Class I Piping.

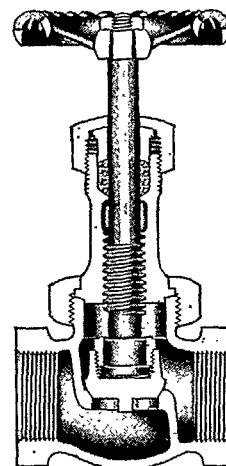
300-Pound Regrinding

WORKING PRESSURE

300 pounds steam, water, or oil, 450° F.

No. 362 E, Globe
Screwed, ¼ to 3-inch

No. 364 E, Angle
Screwed, ¼ to 3-inch



Cross Section
No. 362 E, Globe

No. 362E and No. 364E are regrinding type valves. They are recommended for severe services. All sizes have an integral seat and a union bonnet. For prices, dimensions, and description, see page 38.

Cross Valves and Screw-Down Check Valves can be made to order; prices on application.

All sizes are suitable for Class II Piping.

Sizes 2" and smaller are suitable for Class I Piping.

300-Pound Plug Type Disc

WORKING PRESSURE

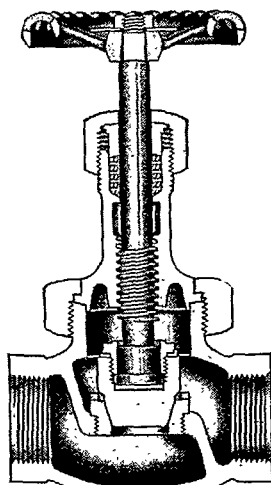
300 pounds steam, water, or oil, 450° F.

No. 382 P, Globe
Screwed, ¼ to 3-inch

No. 384 P, Angle
Screwed, ¼ to 3-inch

No. 383 P, Globe
Flanged, ¾ to 3-inch

No. 385 P, Angle
Flanged, ¾ to 3-inch



Cross Section
No. 382 P, Globe

These valves are recommended for unusually severe services. Their plug type disc and seat offer excellent resistance to foreign matter and to wire drawing.

The disc taper assists in maintaining tightness and permits easy flow regulation when throttling. Sizes 2-inch and smaller have the union bonnet construction; larger sizes have the

bolted bonnet construction.

For prices, dimensions, and description, see page 40.

All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

300-Pound Bolted Bonnet

WORKING PRESSURE

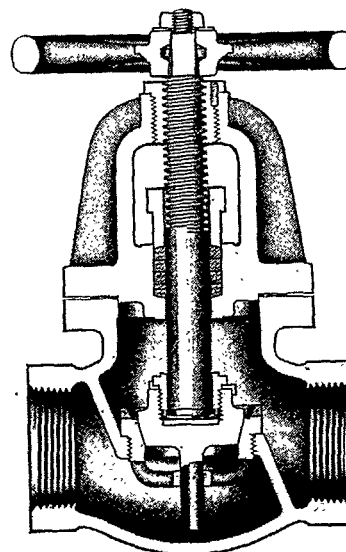
300 pounds steam, water, or oil, 450° F.

No. 85 P, Globe
Screwed, 1½ to 3-inch

No. 85½ P, Angle
Screwed, 1½ to 3-inch

No. 87 P, Globe
Flanged, 1½ to 3-inch

No. 87½ P, Angle
Flanged, 1½ to 3-inch



Cross Section, No. 85 P, Globe

These outside screw and yoke bolted bonnet valves with plug type disc are ideal for extremely severe services. Sizes 2½ and 3-inch have the disc guided through a bridge cast integral with the seat, as illustrated; smaller sizes do not have the guide. For prices, dimensions, and description, see page 47.

Screw-Down Check Valves and valves with a ball to flat seat can be made to order; prices on request.

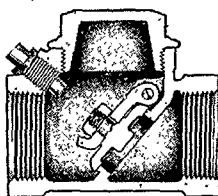
All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.

Brass Check Valves For Marine Service

150 and 200-Pound Swing Check Regrinding

WORKING PRESSURES

Screwed: 200 pounds steam, water, or oil, 450° F.
Flanged: 150 pounds steam, water, or oil, 450° F.



Cross Section
No. 35, Swing

No. 35, Swing
Screwed
 $\frac{1}{4}$ to 3-inch

No. 35½, Swing
Flanged
 $\frac{3}{4}$ to 3-inch

No. 37, Swing
Angle, Screwed
 $\frac{1}{2}$ to 2-inch

*No. 35 and No. 35½ Swing
Check Valves may also be
used in a vertical posi-
tion for upward flow.*

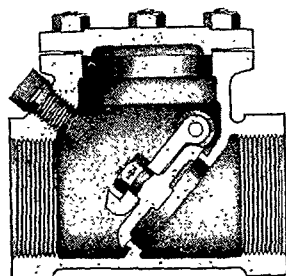
These swing check valves are suited for use on steam, water, oil, and other fluids. They may be reground without removing the bodies from the line. By removing the stop plug, a screw driver can be engaged with the slot in the disc spud, making it easy to rotate the disc when regrinding. For prices, dimensions, and description, see page 57.

*All sizes are suitable for Class II Piping.
Sizes 2" and smaller are suitable for Class I Piping.*

150 and 200-Pound Swing Check Bolted Cap

WORKING PRESSURES

Screwed: 200 pounds steam, water, or oil, 450° F.
Flanged: 150 pounds steam, water, or oil, 450° F.



Cross Section, No. 4032, Swing

No. 4032, Swing
Screwed
2 to 3-inch

No. 4033, Swing
Flanged
2 to 6-inch

*Swing Check Valves
may also be used in
a vertical position
for upward flow.*

These are high quality swing check valves suitable for severe service on steam, water, and oil lines. Their bolted cap construction makes an exceptionally tight, strong, and serviceable joint.

Sizes 4-inch and smaller may be reground without removing the body from the line; they have a separate disc and hinge, as illustrated. Sizes larger than 4-inch have a one-piece disc and hinge. For prices, dimensions, and description, see page 58.

*All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged
valves all sizes are suitable for Class I Piping.*

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

150 and 200-Pound Lift Check Regrinding

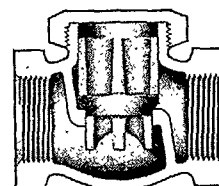
WORKING PRESSURES

Screwed: 200 pounds steam, water, or oil, 450° F.
Flanged: 150 pounds steam, water, or oil, 450° F.

No. 72, Horizontal
Screwed
 $\frac{1}{4}$ to 3-inch

No. 72, Angle
Screwed
 $\frac{1}{4}$ to 3-inch

*When ordering
specify whether
horizontal or angle
valves are wanted.*



Cross Section
No. 72, Horizontal

The No. 72 line of Check Valves includes horizontal and angle screw valves in the sizes listed above. Durable and well-constructed, these valves may be reground without removing the bodies from the line. They will give excellent results on severe services. For prices, dimensions, and description, see page 57.

*All sizes are suitable for Class II Piping.
Sizes 2" and smaller are suitable for Class I Piping.*

150 and 200-Pound Lift Check Bolted Cap

WORKING PRESSURES

Screwed: 200 pounds steam, water, or oil, 450° F.
Flanged: 150 pounds steam, water, or oil, 450° F.

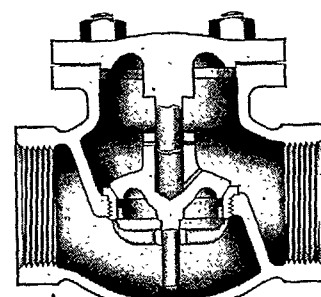
No. 4062, Horizontal
Screwed
 $1\frac{1}{2}$ to 3-inch

No. 4062, Angle
Screwed
 $1\frac{1}{2}$ to 3-inch

No. 4063, Horizontal
Flanged
 $1\frac{1}{2}$ to 6-inch

No. 4063, Angle
Flanged
 $1\frac{1}{2}$ to 6-inch

*Specify whether
horizontal or angle
valves are wanted.*



Cross Section
No. 4062, Horizontal

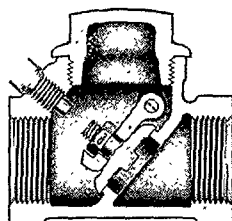
These bolted cap check valves are recommended for hard service. They are liberally proportioned to withstand severe operating strains.

The bolted cap construction assures long, trouble-free operation. The joint is unusually tight and strong, providing maximum utility. For prices, dimensions, and description, see page 58.

*All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged
valves all sizes are suitable for Class I Piping.*

Brass Check Valves For Marine Service

300-Pound Swing Check Regrinding



Cross Section
No. 74 E, Swing

WORKING PRESSURE
300 pounds steam, water,
or oil, 450° F.

No. 74 E, Swing
Screwed, ¼ to 3-inch

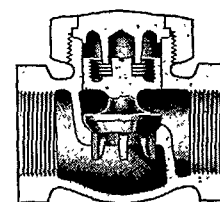
No. 75 E, Swing
Flanged, ¼ to 3-inch

*Swing Check Valves may
also be used in a vertical
position for upward flow.*

Ruggedly constructed, these swing check valves are suitable for use on steam, water, oil, and other fluids. They may be reground without removing the bodies from the line. By removing the stop plug, a screwdriver can be engaged with the disc-spud slot, making it easy to rotate the disc when regrounding. For prices, dimensions, and description, see page 60.

*All sizes are suitable for Class II Piping.
Sizes 2" and smaller are suitable for Class I Piping.*

300-Pound Lift Check Regrinding



Cross Section
No. 366 E, Horizontal

WORKING PRESSURE
300 pounds steam, water,
or oil, 450° F.

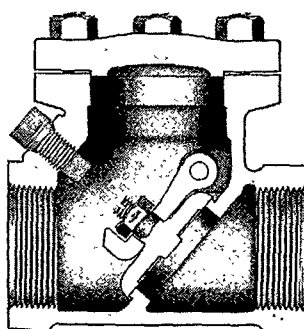
No. 366 E, Horizontal
Screwed
¼ to 3-inch

No. 369 E, Horizontal
Flanged
¾ to 3-inch

These are high-grade horizontal check valves. They can be reground without removing the bodies from the line. The valves are particularly suitable for service where pulsations in the line are apt to cause an ordinary check valve to hammer. The dashpot formed above the piston type disc effectively cushions the disc. For prices, dimensions, and description, see page 60.

*All sizes are suitable for Class II Piping.
Sizes 2" and smaller are suitable for Class I Piping.*

300-Pound Swing Check Bolted Cap



Cross Section, No. 4234 E, Swing

WORKING PRESSURE
300 pounds steam,
water, or oil,
450° F.

No. 4234 E, Swing
Screwed, 2 to 3-inch

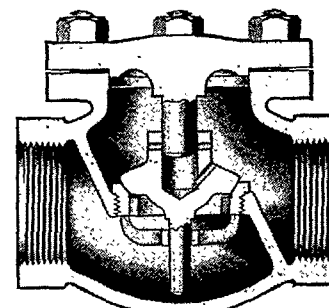
No. 4235 E, Swing
Flanged, 2 to 3-inch

*Swing Check Valves
may also be used in
a vertical position
for upward flow.*

The No. 4234 E and No. 4235 E are heavy swing check valves of the bolted cap pattern. They are suitable for hard use in steam, water, and oil lines. The bolted cap construction provides an unusually strong, tight joint, assuring long trouble-free service. These valves may be reground without removing the body from the line. For prices, dimensions, and description, see page 61.

*All sizes are suitable for Class II Piping.
Screwed valves in the 2" size and flanged
valves all sizes are suitable for Class I Piping.*

300-Pound Lift Check Bolted Cap



Cross Section
No. 4064 E, Horizontal

WORKING PRESSURE
300 pounds steam,
water, or oil,
450° F.

No. 4064 E
Horizontal
Screwed
1½ to 3-inch

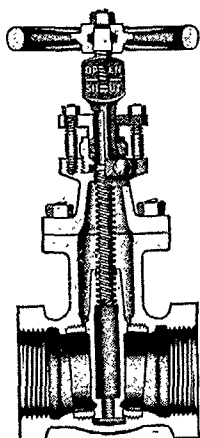
No. 4065 E
Horizontal
Flanged
1½ to 3-inch

The exceptional ruggedness and the heavy metal sections of these horizontal check valves make them suitable for use wherever operating conditions are unusually severe. The valves have a renewable seat and a bolted cap, the latter providing a strong, secure joint. The valves can be reground without removing the bodies from the line. For prices, dimensions, and description, see page 61.

*All sizes are suitable for Class II Piping.
Screwed valves 2" and smaller and flanged
valves all sizes are suitable for Class I Piping.*

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Brass Gate Valves For Marine Service



No. 4436, Screwed, With Indicator, 2 to 4-inch
No. 4437, Flanged, With Indicator, 2 to 10-inch

The No. 4436 and No. 4437 are liberally proportioned, well-constructed low pressure brass gate valves. They will give good results where working conditions are not too severe and are particularly suitable for general shut-off valve service on low pressure steam and water lines.

Cross Section
No. 4436 with Indicator
All sizes have a bolted bonnet, non-rising stem, wedge disc, and renewable body seat rings.

Low Pressure Bolted Bonnet

WORKING PRESSURE

100 pounds saturated steam, water, or oil

The stuffing box is exceptionally deep and has a bolted gland on sizes 2½ to 10-inch; the 2-inch size has a screwed type stuffing box and gland.

These valves are regularly furnished with an approved type indicator to show whether the valve is open or closed.

For prices, dimensions, and complete description, see page 15.

All sizes are suitable for Class II Piping.

150 and 200-Pound Rising Stem

WORKING PRESSURES

Screwed Valves
200 pounds steam, water, or oil, 450° F.

Flanged Valves
150 pounds steam, water, or oil, 450° F.

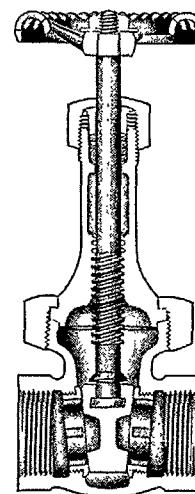
These are high quality brass gate valves of the inside screw, rising stem type. Sturdy and dependable, they are suitable for use on steam, water, and oil lines. The No. 423, having renewable seats, is recommended for use where conditions are unusually severe.

With the exception of the Crane Nickel Alloy renewable seats on the No. 423 and

the integral seats on the No. 422 and No. 422½, the valves are similar. They have a solid wedge disc made of Crane Nickel Alloy. Sizes 1-inch and smaller have a union bonnet; larger sizes have a bolted bonnet. Both types provide a strong, tight joint.

For prices, dimensions, and description, see page 20.

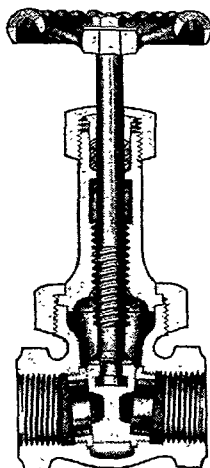
Integral Seats
No. 422, Screwed, ¼ to 3-inch
No. 422½, Flanged, ¼ to 3-inch
Renewable Seats
No. 423, Screwed, ¼ to 3-inch



Cross Section
No. 423

All sizes are suitable for Class II Piping.

Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.



Cross Section
No. 623 E

300-Pound Rising Stem

Integral Seats
No. 622 E, Screwed, ¼ to 3-inch

Renewable Seats
No. 623 E, Screwed, ¼ to 3-inch
No. 623½ E, Flanged, ¼ to 3-inch

These 300-Pound, inside screw, rising stem valves are exceptionally sturdy and rugged. They are recommended for high-pressure services. The No. 623 E and No. 623½ E, having renewable seats, are particularly suited for use where operating conditions are extremely severe.

Except for the integral seats on the No. 622 E and the renewable seats on the No. 623 E and

WORKING PRESSURE

300 pounds steam, water, or oil, 450° F.

No. 623½ E, the valves are similar in design and construction. They have a solid wedge disc made of Crane Nickel Alloy. Sizes 1-inch and smaller have a union bonnet; larger sizes have a compact, inside screw bolted bonnet equipped with steel studs, brass nuts, and a Crane gasket. Both types provide a strong, tight joint. For prices, dimensions, and description, see page 23.

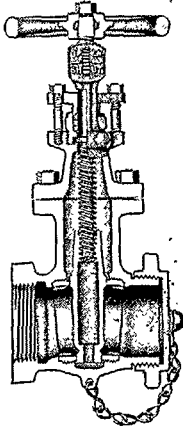
All sizes are suitable for Class II Piping.

Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Low Pressure Brass Hose Gate Valves

For Marine Service — Non-Rising Stem Type with Indicator



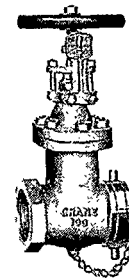
Cross Section
No. 4448

WORKING PRESSURE
100 pounds cold water

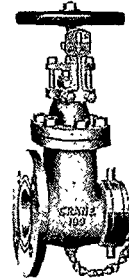
List Prices, Each, and Dimensions

Size	Inches	1½	2	2½
With brass cap, and chain, and indicator.	No. 4448, Screwed	30.00	45.00	60.00
	No. 4449, Flanged, F.D. & S.F.	35.00	55.00	75.00
Dimen- sions, in Inches	Center to female end, Screwed	15⁄8	17⁄8	23⁄4
	Center to face, Flanged	23⁄16	23⁄4	21⁄2
	Center to hose end	21⁄16	25⁄16	25⁄8
	Center to top	85⁄8	93⁄4	111⁄2
	Diameter of wheel	35⁄8	41⁄16	6
	Diameter of flanges	5	6	7
	Thickness of flanges	7⁄16	1⁄2	9⁄16

Templates for drilling . . . page 550



No. 4448
Screwed



No. 4449
Flanged

All sizes are suitable
for Class II piping.

These are strong, durable valves of the non-rising stem type. The body, bonnet, stem, body seat rings, and solid wedge disc are brass.

Sizes 1½ and 2-inch have a screwed bonnet and integral seats; their hexagonal packing nut and gland are brass. The 2½-inch size has a bolted bonnet, renewable seats, and a brass bolted gland. All valves are equipped with an approved type of indicator to show whether the valve is open or closed.

Stuffing box; repacking: The stuffing box is deep, and is filled with high grade packing. The valves, when wide open, can be repacked while under pressure.

Flanged valves: End flanges conform to the MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). They are plain faced, with two V-shaped concentric grooves between the port and the bolt

holes. Prices include drilling to the MSS 150-Pound Standard, and spot facing; no deduction is made if valves are ordered faced only. Full face gaskets should be used; see page 567.

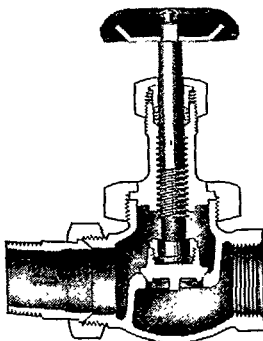
Hose Thread: These valves will be regularly furnished with any recognized standard hose thread used in Marine work, such as "National Standard Hose Thread", "Iron Pipe Hose Thread", and "New York Corporation Hose Thread". Orders must specify the type of hose thread desired. When hose threads other than these are required, it will be necessary to send detailed information or a sample, preferably the male end of a hose coupling.

Globe and angle hose valves: Brass globe and angle hose valves made from the patterns of the No. 7 and No. 9 Valves shown on page 30 can be made to order; prices on application.

35

Brass Radiator Globe and Angle Valves

For Marine Service — Union Bonnet Type with Brass Disc



Cross Section
No. 4270, Globe
3⁄8 to 1¼-inch

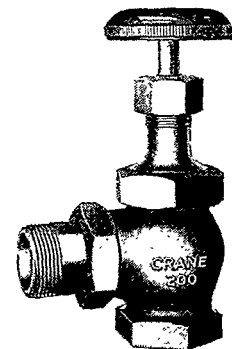
WORKING PRESSURE — 200 pounds steam, 450° F.

No. 4270 Brass Radiator Globe and Angle Valves are heavy and are ruggedly constructed. Their body and disc are made of Crane Special Brass. The valves have a union bonnet and can be reground without removing the body from the line. Sizes 1½-inch and smaller have a one-piece disc and stem.

The stuffing box is equipped with a gland. The valves when wide open can be repacked while under pressure.

For prices and dimensions, see page 81. These valves can be furnished to order in ¼, 1½, and 2-inch sizes; prices on application.

All sizes are suitable for Class I and Class II piping.



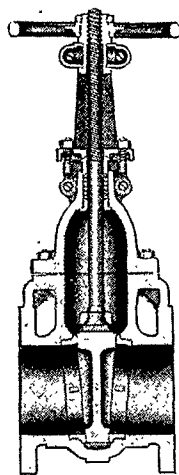
No. 4270, Angle
3⁄8 to 1¼-inch

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

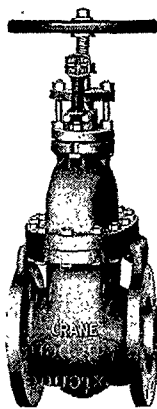
Standard Iron Body Wedge Gate Valves For Marine Service

WORKING PRESSURE

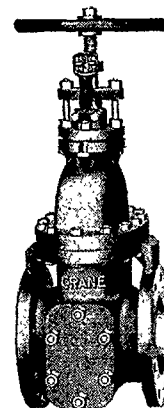
125 pounds saturated steam, water, or oil



Cross Section
No. 4465, Flanged
Outside Screw and Yoke



No. 4461, Flanged
Non-Rising Stem
With Indicator



No. 4467, Flanged
Non-Rising Stem
With Cleanout
and Indicator

These valves are similar in design to the regular Crane Standard Iron Body Wedge Gate Valves shown on pages 101 to 103, but are specially fitted for Marine Service.

The Nos. 4461 and 4465 Valves are regularly made in sizes 2 to 12-inch, inclusive, flanged end only. The No. 4467 Valve, recommended for Marine Cargo Oil Systems, is regularly made in sizes 3, 4, 6, 8, 10, and 12-inch, flanged end only.

Other sizes, screwed end valves, and other modifications of these valves can be furnished on special order.

Prices on application

For Cargo Oil Systems

Body and bonnet: The valves have an oval-shaped cast iron body and bonnet; liberal metal sections combined with proper metal distribution assure maximum strength. Straight through ports with tie ribs between the bonnet flange and the end flanges provide additional resistance to line strains.

No. 4467 Valve bodies have a single side cleanout. Bottom cleanouts can be furnished when ordered. They have two tapped and plugged bosses, one on the side opposite the cleanout and one on the bottom, suitable for $\frac{3}{4}$ -inch steaming out connections.

The bonnet bolts and nuts are zinc plated.

Disc and seats: The body seat rings are brass and are screwed into the body. No. 4467 Valves in sizes 10 and 12-inch have pressed-in body seat rings.

The No. 4461 and No. 4465 Valves have a solid brass disc. The No. 4467 Valves are regularly furnished with a cast iron disc having brass seating faces; it is brass-bushed where it engages the stem threads. A solid brass disc can be furnished when so ordered.

Stem: The brass stem is of liberal diameter and amply strong. Stem threads have long engagement in the disc or yoke sleeve. Outside screw and yoke valves have a tee-head disc-stem connection.

Gland and stuffing box: These valves have a two-piece ball-type gland, consisting of a gland and a gland flange. This construction maintains an even load on the packing and prevents binding on the stem even when the gland bolt nuts are not pulled up evenly.

Non-rising stem valves have through bronze bolts holding the stuffing box to the bonnet; the stem collar recess is brass-bushed, top and bottom, to minimize friction and to prevent corrosion. Outside screw and yoke valves have swinging gland eye bolts made of bronze, which move out of the way

when the stuffing box is being repacked but which will not become detached and lost.

The stuffing box is exceptionally deep and is filled with high grade packing.

Repacking: These valves, when wide open, can be repacked while under pressure. Outside screw and yoke valves have a brass stem hole bushing, offering a better back seat for the stem and making this point non-corrosive.

Indicator on Non-Rising Stem Valves: No. 4461 Valves are regularly furnished with an approved type indicator to show whether the valve is open or closed. No. 4467 Valves, not regularly furnished with an indicator, will be so equipped when specified on orders.

Flange dimensions and facing: The dimensions and drilling of the end flanges conform to the American Cast Iron Flange Standard, Class 125 (B16a-1939). The flanges are plain faced, with a smooth finish.

Drilling: Prices include facing and drilling to the American Cast Iron Flange Standard, Class 125. No deduction is made when valves are ordered faced only.

Standards: Flanged valves conform to the American Standard for Face to Face Dimensions of Ferrous Flanged Valves (B16.10-1939) for 125-Pound Cast Iron Wedge Gate Valves.

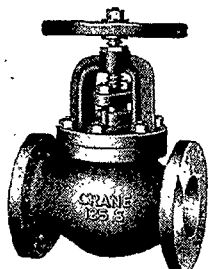
Flanged valves also conform to the American Petroleum Institute (A.P.I.) Standard No. 5-G-1, Second Edition, September, 1938, for 175-Pound Iron Pipe Line Gate Valves.

Dimensions: Dimensions of these valves are the same as given for the regular line of Crane Standard Iron Body Wedge Gate Valves; see page 106. "Center to top" dimension for valves with indicator will be furnished on application.

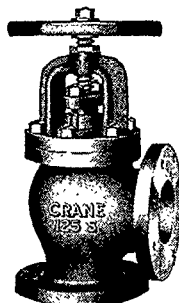
For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Standard Iron Body Globe and Angle Valves For Marine Service

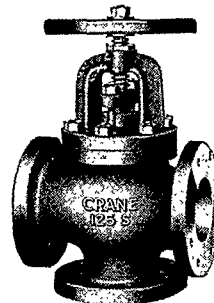
WORKING PRESSURE
125 pounds saturated steam, water, or oil



No. 351
Globe, Flanged
Brass Trimmed
2 to 16-inch



No. 353
Angle, Flanged
Brass Trimmed
2 to 16-inch



No. 363
Cross, Flanged
Brass Trimmed
2 to 12-inch

All sizes are suitable for Class II Piping.

Crane Standard Iron Body Globe, Angle, and Cross Valves are admirably suited for Marine service.

Made with cast iron yoke-type bolted bonnet and cast iron body, the valves are brass fitted throughout. They have a screwed-in brass body seat ring, a solid brass disc, a Cast Manganese Bronze stem and yoke bushing, a brass stem hole bushing and gland, and silicon bronze gland bolt nuts.

The disc is accurately guided throughout its travel by a guide stem operating in the bridge cast integral with the body seat ring. The gland is of the two-piece ball-type construction, consisting of a gland and a gland flange.

For prices, dimensions, and complete description, see pages 149 and 150. Screw-Down Check Valves can be made to order; prices on application.

35

Standard Iron Body Swing Check Valves For Marine Service

WORKING PRESSURE
125 pounds saturated steam, water, or oil



No. 373
Swing, Flanged
Brass Trimmed
2 to 24-inch

These valves are sturdily constructed and well proportioned. The body is oval or globular in shape, providing an ample flow area around the disc when the valve is wide open.

The body and cap are cast iron. The body seat ring is brass, screwed into the body. The disc is solid brass on sizes 3-inch and

smaller, and cast iron with a brass seating face on larger sizes.

For prices, dimensions, and complete description, see pages 160 and 161.

Valves with solid brass disc in sizes larger than 3-inch can be made to order; prices will be furnished on application.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Adjusted Marine Pressure Ratings For Steel Valves, Fittings, and Flanges

	American Standard (A.S.A.) Pressure Class (All pressures are in pounds per square inch)						
	150 Pound	300 Pound	400 Pound	600 Pound	900 Pound	1500 Pound	2500 Pound
*A.S.A. ratings at 750° F.	100 lbs.	300 lbs.	400 lbs.	600 lbs.	900 lbs.	1500 lbs.	2500 lbs.
Marine steam ratings at 750° F.	80 lbs.	250 lbs.	350 lbs.	525 lbs.	800 lbs.	1350 lbs.	2250 lbs.
Service Temperature	Adjusted Marine Steam Service Pressure						
450° F.	130	325	455	680	1040	1755	2925
500° F.	125	310	435	655	1000	1685	2815
550° F.	115	300	420	630	960	1620	2700
600° F.	105	285	400	600	920	1550	2590
650° F.	100	275	385	575	880	1485	2475
700° F.	90	260	365	550	840	1415	2365
750° F.	80	250	350	525	800	1350	2250
800° F.	70	205	280	435	665	1125	1875
850° F.	55	165	235	350	530	900	1500
Saturated Steam Temperature	Marine Pressures for External Feed Water and Blow-Off Piping†						
450° F.		270	380	565	865	1460	2435
500° F.				545	835	1405	2345
550° F.					800	1350	2250
600° F.						1290	2160
650° F.							2060

*Carbon steel with Standard facings other than ring joint.

†In no case shall it be permissible to use valves, fittings, or flanges for feed and blow-off service which have a lower pressure rating than that required for steam service at 750° F.

35

Revision per Table P-7-A, Supplement II, General Rules and Regulations, Bur.
Marine Inspec. & Navigation, U. S. Dept. of Commerce. Dated May 5, 1939.

* * * * *

Crane Co. manufactures an exceptionally complete assortment of Steel (Cast or Forged) Valves, Fittings, and Flanges, in a wide range of sizes and for all pressure and temperature service. With few exceptions, all of these products as regularly supplied are eminently suited for Marine service when used at the prescribed Marine pressure ratings shown above.

Pages 471 to 475 illustrate only a few of the regular Crane Steel Valves, Fittings, and Flanges that are popular for marine piping. Crane Co.



Forged Steel
Socket-Welding Flange
Made in 150, 300, 400, and 600-
Pound pressure classes. Prices
and dimensions on request.

supplies a large number of special steel products for this service, including Screw-Down Check Valve Manifold Valves, Main Injection Valves, special flanges like the one illustrated at the left, etc.

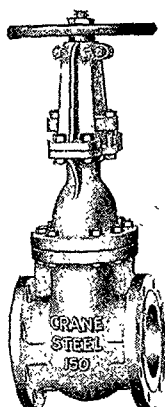
Complete information and detailed recommendations for proposed construction will be furnished on request.

Steel Welding Fittings (Butt or Socket-Welding) are listed and described on pages 351 to 359. Forged Steel Screwed Fittings are listed at described on pages 337 to 342.

150-Pound Steel Valves, Fittings, and Flanges For Marine Service

Cast Steel Wedge Gate Valves

Outside Screw and Yoke
For Steam or Water



No. 47 XR
Flanged

No. 47 XR Flanged 2 to 24-inch
No. 47½ XR Butt-Welding 2 to 24-inch

These Gate Valves have a carbon steel body and bonnet, an Exelloy stem, a solid Exelloy or Exelloy faced disc, and No. 49 Nickel Alloy body seat rings.

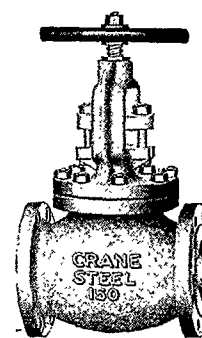
The body has straight-through ports. The disc guides are long and close fitting; a tee-head disc-stem connection is used. The bonnet joint is plain faced, has a Cranite gasket, and is fitted with Triplex Steel bolt-studs. For

prices, dimensions, and complete description, see pages 301 to 307.

Valves with brass trimmings can be furnished when so ordered; prices on application.

Cast Steel Globe and Angle Valves

Plug Type—Bolted Bonnet
For Steam or Water



No. 143 XR, Globe
Flanged

No. 143 XR, Globe
No. 145 XR, Angle
Flanged, 2 to 8-inch
No. 143½ XR, Globe
No. 145½ XR, Angle
Butt-Welding, 2 to 8-inch

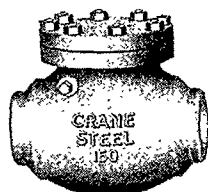
Crane 150-Pound Cast Steel Globe and Angle Valves have a carbon steel body and bonnet, an Exelloy stem and body seat ring, and a No. 49 Nickel Alloy disc. Sizes 6-inch and

smaller have a plug type disc and seat; the 8-inch size has a flat seat and disc. The bonnet joint is the male and female type with Cranite gasket; it is fitted with Triplex Steel studs.

For prices, dimensions, and complete description, see pages 321 to 326. Screw-Down Check Valves can be made to order; prices on application.

Cast Steel Swing Check Valves

For Steam or Water



No. 147½ X
Butt-Welding

No. 147 X Flanged 2 to 12-inch
No. 147½ X Butt-Welding 2 to 12-inch

These Cast Steel Swing Check Valves have a carbon steel body and cap, an Exelloy or Exelloy faced disc, and an Exelloy body seat ring. The

cap joint is the male and female type, with a corrugated soft iron gasket and Triplex Steel cap studs.

For prices, dimensions, and complete description, see pages 332 to 336. Brass trimmed Swing Check Valves are made to order; prices on application.

Cast Steel Flanged Fittings

Crane 150-Pound Cast Steel Flanged Fittings are made of carbon steel.

They are available in a complete assortment of types and in a wide range of both straight and reducing sizes.

For prices, dimensions, and complete description, see pages 343 to 349.

Special angle elbows, base tees, tees with anchorage base, and other unusual fittings can be furnished to order; prices on request. Inquiries should be accompanied by drawings.



No. 525 D
90° Elbow

Forged Steel Flanges



No. 556, Screwed Flange



No. 572, Cranelap Flange

Crane Forged Steel Flanges are made from high grade carbon steel billets. They are available in sizes ½ to 24-inch inclusive and in a wide assortment of types. See pages 361 to 367.

For marine service, screwed flanges are not regularly used in sizes larger than 2½-inch. Cranelap, Slip-On Welding, and Welding Neck Flanges are suitable for the service in all sizes.



No. 554, Slip-On Welding Flange

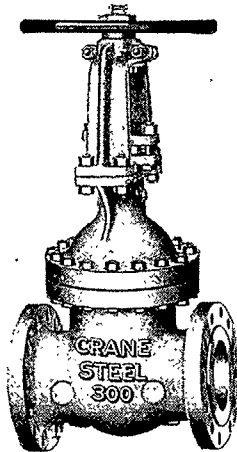


No. 568, Welding Neck Flange

For adjusted Marine pressure ratings, see page 470.
For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

300-Pound Steel Valves, Fittings, and Flanges For Marine Service

Cast Steel Wedge Gate Valves



No. 33 XR, Flanged

Outside Screw and Yoke
For Steam or Water

No. 33 XR or U, Flanged
No. 33½ XR or U, Butt-Welding
1¼ to 24-inch

Gate Valves have a Crane No. 4 Carbon-Molybdenum Steel body and bonnet, an Exelloy stem, and either Exelloy to No. 49 Nickel Alloy or Stellite-faced seating surfaces.

The valves have straight-through ports, long, close-fitting disc guides, and a tee-head disc-stem connection. The male and female bonnet joint has a Cranite

or corrugated soft iron gasket; it is fitted with Triplex or Templex Steel bolt-studs. Valves 14-inch and larger can be made with a ball-bearing yoke.

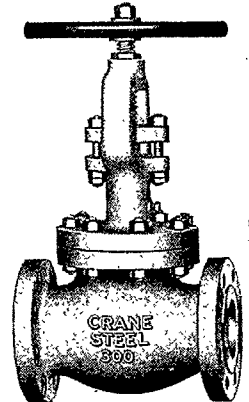
For prices, dimensions, and complete description, see pages 301 to 307. Brass trimmed valves are made to order; prices on application.

Cast Steel Globe and Angle Valves

Plug Type
Bolted Bonnet
For Steam or Water

No. 151 XR or U, Globe
No. 153 XR or U, Angle
Flanged, 2 to 8-inch

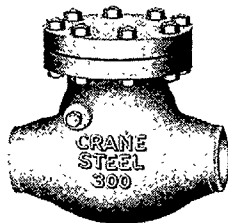
No. 151½ XR or U, Globe
No. 153½ XR or U, Angle
Butt-Welding, 2 to 8-inch

No. 151 XR, Globe
Flanged

Globe and Angle Valves have a Crane No. 4 Carbon-Molybdenum Steel body and bonnet, an Exelloy stem, and either No. 49 Nickel Alloy to Exelloy or Stellite-faced seating surfaces. Sizes 6-inch and smaller have a plug type disc and seat; the 8-inch size has a flat seat and disc, and ball-bearing yoke and gearing. The male and female bonnet joint has a Cranite or corrugated soft iron gasket and Triplex or Templex Steel bolt-studs.

For prices, dimensions, and complete description, see pages 321 to 326. Screw-Down Check Valves can be made to order; prices on application.

Cast Steel Swing Check Valves

No. 159½ XR
Butt-Welding

For Steam or Water

No. 159 X, Flanged
No. 159½ X, Butt-Welding
1¼ to 12-inch

Swing Check Valves have a Crane No. 4 Carbon-Molybdenum Steel body and cap, an Exelloy or Exelloy faced disc, and an Exelloy body seat ring. The male and female cap joint has a cor-

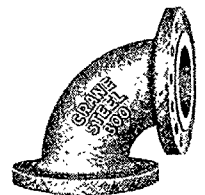
rugated soft iron gasket and Triplex Steel bolt-studs. For prices, dimensions, and complete description, see pages 332 to 336. Brass trimmed valves are made to order; prices on application.

Cast Steel Flanged Fittings

Crane 300-Pound Cast Steel Flanged Fittings are made of Crane No. 4 Carbon-Molybdenum Steel in a complete assortment of types and in a wide range of both straight and reducing sizes.

For prices, dimensions, and complete description, see pages 343 to 349.

Special angle elbows, base tees, tees with anchorage base, and other unusual fittings can be furnished to order; prices on request. Inquiries should be accompanied by drawings.

No. 401 D
90° Elbow

Forged Steel Flanges



No. 291 E, Screwed Flange

Crane 300-Pound Forged Steel Flanges are made from high grade carbon steel billets. They are available in sizes ½ to 24-inch, inclusive, and in a wide assortment of types. See pages 361 to 367.

For marine service, screwed flanges are not regularly used in sizes larger than 2½-inch. Cranelap, Slip-On Welding, and Welding Neck Flanges are suitable for the service in all sizes.



No. 496 E, Cranelap Flange



No. 294 E, Slip-On Welding Flange



No. 296 E, Welding Neck Flange

For adjusted Marine pressure ratings, see page 470.
For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

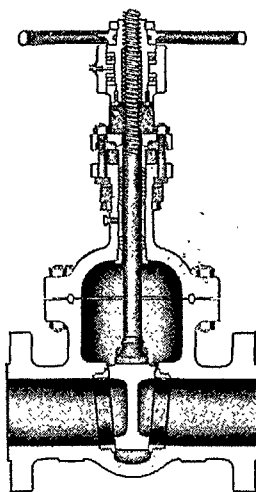
600-Pound Steel Valves, Fittings, and Flanges For Marine Service

Cast Steel Wedge Gate Valves

Outside Screw and Yoke

For Steam or Water

No. 76 XR or U, Flanged
No. 76½ XR or U, Butt-Weld
1 to 24-inch



Cross Section
No. 76 XR, Flanged

Gate Valves have a Crane No. 4 Carbon-Molybdenum Steel body and bonnet, an Exelloy stem, and either Exelloy to No. 49 Nickel Alloy or Stellite-faced seating surfaces.

The valves have straight-through ports, long, close fitting disc guides, and a tee-head disc-stem connection. The ring-type bonnet joint has a soft steel gasket and Triplex or Templex Steel bolt-studs. Sizes 6" and larger have a ball-bearing yoke. For prices

and dimensions, see pages 301 to 307. Brass trimmed valves made to order; prices on request.

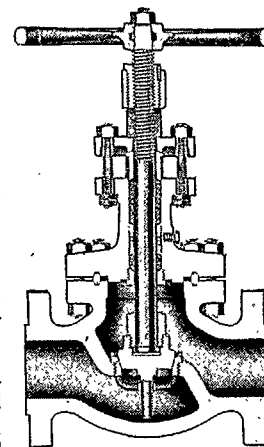
Cast Steel Globe and Angle Valves

Plug Type — Bolted Bonnet

For Steam or Water

No. 171 XR or U, Globe
No. 173 XR or U, Angle
Flanged, 1½ to 6-inch

No. 171½ XR or U, Globe
No. 173½ XR or U, Angle
Butt-Welding, 1½ to 6-inch



Cross Section, Globe
No. 171 XR, Flanged

Globe and Angle Valves have a Crane No. 4 Carbon-Molybdenum Steel body and bonnet, Exelloy stem, and either No. 49 Nickel Alloy to Exelloy or Stellite-faced seating surfaces.

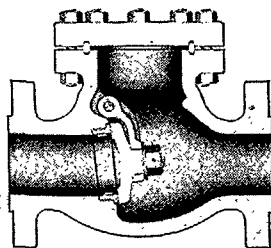
The ring-type bonnet joint has a soft steel gasket and Triplex or Templex Steel bolt-studs. Sizes 5-inch and larger have a ball-bearing yoke and gearing.

For prices, dimensions, and complete description, see pages 321 to 326. Screw-Down Check Valves can be made to order; prices on application.

Cast Steel Swing Check Valves

For Steam or Water

No. 175 X, Flanged
No. 175½ X, Butt-Welding
1¼ to 12-inch



Cross Section
No. 175 X, Flanged

Swing Check Valves have an alloy cast steel body and cap, an Exelloy or Exelloy faced disc, and Exelloy body seat ring.

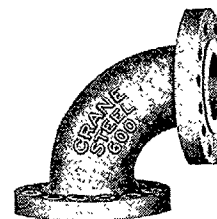
The ring-type cap joint has a soft steel gasket

and Triplex Steel bolt-studs. For prices and dimensions, see pages 332 to 336. Brass trimmed valves made to order; prices on request.

Cast Steel Flanged Fittings

Crane 600-Pound Cast Steel Flanged Fittings are made of Crane No. 4 Carbon-Molybdenum Steel. They are available in a complete assortment of types and in a wide range of both straight and reducing sizes. For prices, dimensions, and complete description, see pages 343 to 349.

Special angle elbows, base tees, tees with anchorage base, and other unusual fittings can be furnished to order; prices on request. Inquiries should be accompanied by drawings.



No. 845 D
90° Elbow

Forged Steel Flanges

No. 856 E
Screwed
Flange



These flanges are made from high grade carbon steel billets. They are available in sizes ½ to 24-inch, inclusive, and in a wide assortment of types. See pages 361 to 367.

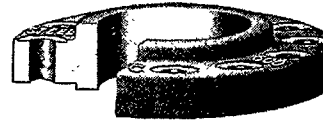
For marine service, screwed flanges larger than 2½" are not regularly used; Cranelap, Slip-On Welding, and

No. 862 E
Cranelap
Flange

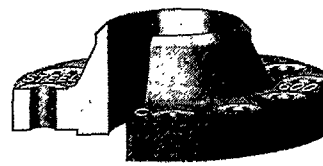


Welding Neck Flanges are used in all sizes.

No. 854 E
Slip-On
Welding
Flange



No. 855 E
Welding
Neck
Flange



For adjusted Marine pressure ratings, see page 470.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

600-Pound Forged Steel Globe and Angle Valves For Marine Service — Outside Screw and Yoke

Carbon Steel Valves — Union Bonnet

For Steam or Water

No. 3640 XR, Globe
No. 3641 XR, Angle
Screwed, $\frac{1}{4}$ to $\frac{3}{4}$ -inch

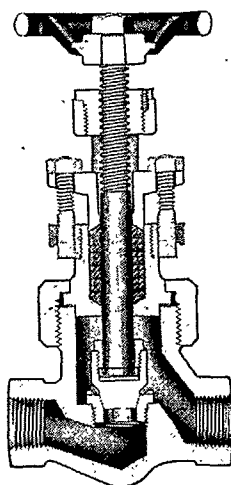
No. 3648 XR, Globe
No. 3649 XR, Angle
Socket-Welding, $\frac{1}{4}$ and $\frac{3}{8}$ -inch

These are union bonnet, outside screw and yoke valves with plug type seat and disc. The bonnet and yoke are joined by long, fine threads to give the rigidity of one-piece construction.

The body, bonnet, and yoke are forged carbon steel: the latter is equipped with a Cast Manganese Bronze yoke bushing. The disc is Crane No. 49 Nickel Alloy. The body seat ring and stem are Exelloy. Cadmium plated steel tee-head

bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place. The bonnet joint is fitted with a corrugated soft iron gasket.

For prices, dimensions and complete description, see pages 314 and 315.



Cross Section
No. 3640 XR, Globe
Union Bonnet
Screwed

Carbon Steel Valves — Bolted Bonnet

For Steam or Water

No. 3644 XR, Globe
No. 3645 XR, Angle
Screwed, $\frac{1}{2}$ to 2-inch

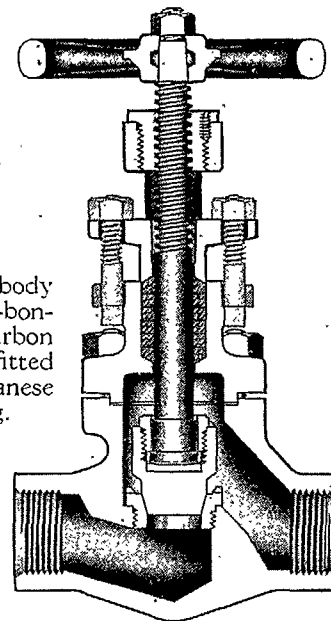
No. 3652 XR, Globe
No. 3653 XR, Angle
Socket-Welding
 $\frac{1}{2}$ to 2-inch

No. 3656 XR, Globe
No. 3657 XR, Angle
Flanged, $\frac{1}{2}$ to 2-inch

These valves have a body and one-piece yoke-bonnet made of forged carbon steel; the yoke is fitted with a Cast Manganese Bronze yoke bushing.

The plug type disc and seat, especially suitable for throttling, consists of a Crane No. 49 Nickel Alloy disc and an Exelloy body seat ring. The stem is also Exelloy.

The male and female bonnet joint is equipped with a corrugated soft iron gasket and Triplex Steel studs. Cadmium plated steel tee-head bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place. For prices, dimensions, and complete description, see pages 314 and 315.



Cross Section
No. 3644 XR, Globe
Bolted Bonnet, Screwed

Alloy Steel Valves — Bolted Bonnet

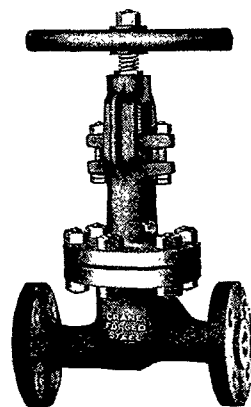
For Steam or Water

No. 196 XR or U, Globe
No. 197 XR or U, Angle
Flanged, $\frac{1}{2}$ to 2-inch

These bolted bonnet, outside screw and yoke valves with plug type seat and disc have a body and bonnet of forged No. 4 Carbon-Molybdenum Steel; the joint is the male and female type. Their stem is Exelloy. The gland, made of cast manganese bronze, is the two-piece ball-type.

"XR" trimmed valves have a Crane No. 49 Nickel Alloy disc and an Exelloy body

seat ring. In "U" trimmed valves, these parts are Stellite-faced alloy steel. Triplex or Templex Steel bolt-studs are used. For prices, dimensions, and complete description, see pages 316 and 317.



No. 196 XR, Globe
Bolted Bonnet
Flanged

For adjusted Marine pressure ratings, see page 470.

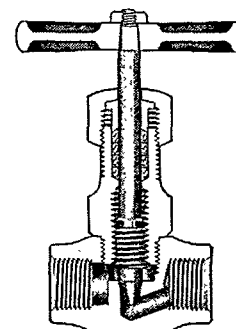
For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

High Pressure Bar Stock Valves

Furnished with either female or male and female ends, these small, rugged Bar Stock Globe and Angle Valves are made of steel, Exelloy, or 18-8 Mo Alloy. They have a screwed bonnet and inside stem threads, and are suitable for a wide variety of service on lines not subjected to high temperature.

Steel Valves have a steel body, bonnet, packing nut, and gland, and an Exelloy stem.

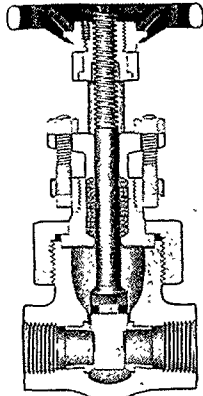
In Exelloy Valves, these parts are made of Exelloy; and in 18-8 Mo Alloy Steel Valves, of Crane 18-8 Mo Chrome-Nickel-Molybdenum Alloy Steel. Full details on page 310.



Cross Section
Globe, Female
Steel, Exelloy,
or 18-8 Mo

600-Pound Cast Steel Wedge Gate Valves For Marine Service — Small Sizes

Union Bonnet Valves



Cross Section
No. 3606 W, Screwed
Union Bonnet

Outside Screw and Yoke For Steam or Water

No. 3606 W, Screwed
 $\frac{1}{4}$ to $\frac{3}{4}$ -inch

These 600-Pound Cast Steel Wedge Gate Valves, small, compact, and strong, are the outside screw and yoke type with union bonnet. They have a tee-head disc-stem connection. The valves have a body, bonnet, and yoke cast from high quality carbon steel. The disc and seat are hardened stainless steel. The stem is Exelloy. Cadmium plated steel tee-head bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place. Bonnet joints are fitted with a soft iron gasket.

Sizes $\frac{1}{2}$ and $\frac{3}{4}$ -inch have a male and female type joint; smaller sizes have an integral bonnet ring.

For prices, dimensions, and complete description, see pages 298 and 299.

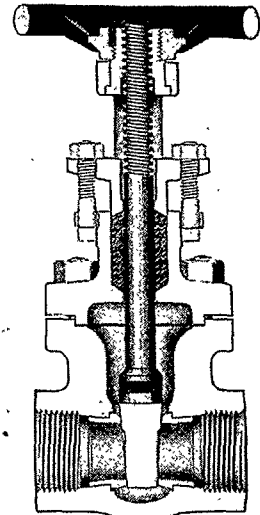
Bolted Bonnet Valves

Outside Screw and Yoke For Steam or Water

No. 3607 W, Screwed
No. 3611 W, Flanged
No. 3615 W, Socket-Welding
 $\frac{1}{2}$ to 2-inch

These sturdy bolted bonnet gate valves have a one-piece bonnet and yoke and a tee-head disc-stem connection. The body, bonnet, and yoke are cast from high quality carbon steel. The stem is Exelloy. Cadmium plated steel tee-head bolts hold the forged steel electrogalvanized one-piece gland and gland flange rigidly in place.

The bonnet joint is the male and female type and is fitted with a soft iron gasket. The valves have Triplex Steel studs. For prices, dimensions, and complete description, see pages 298 and 299.

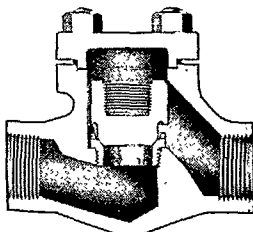


Cross Section
No. 3607 W, Screwed
Bolted Bonnet

600-Pound Steel Check Valves

For Marine Service — Small Sizes

Forged Steel Lift Check Valves



Cross Section
No. 3674 X, Screwed
Bolted Cap

For Steam or Water

Union Cap
No. 3670 X, Screwed
 $\frac{1}{4}$ to $\frac{3}{4}$ -inch
No. 3678 X, Socket-Welding
 $\frac{1}{4}$ and $\frac{3}{8}$ -inch

Bolted Cap
No. 3674 X, Screwed
No. 3682 X, Socket-Welding
No. 3686 X, Flanged
 $\frac{1}{2}$ to 2-inch

These are high quality, exceptionally sturdy horizontal check valves. Their body and cap are made of forged carbon steel. The disc and seat are made of Exelloy.

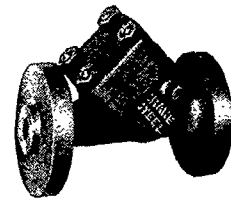
Union cap valves are made in sizes $\frac{1}{4}$ to $\frac{3}{4}$ -inch. Bolted cap valves, made in sizes $\frac{1}{2}$ to 2-inch, secure maximum compactness through the use of Triplex Steel studs; the joint is the male and female type. Both joints are strong and tight yet easily dismantled or reassembled. They are equipped with a corrugated soft iron gasket.

For prices, dimensions, and complete description, see pages 328 and 329.

Cast Steel Swing Check Valves

For Steam or Water

These small size, 600-Pound Cast Steel Swing Check Valves have a 45° bolted cap. The body and cap are cast carbon steel. The disc and screwed-in body seat ring are Exelloy. The cap joint is the male and female type, fitted with a corrugated soft iron gasket and Triplex Steel cap-studs. End flanges conform to the 600-Pound American Standard. Prices on application.



Swing Check Valve
With 45° Bolted Cap
Flanged, $\frac{1}{2}$ to 2-inch

Dimensions, in Inches, Swing Check Valves

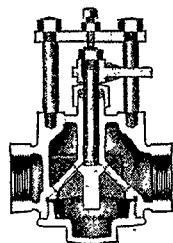
Size	$\frac{1}{2}$	$\frac{3}{4}$	1	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2
*Face to face	6 $\frac{1}{2}$	7 $\frac{1}{2}$	8 $\frac{1}{2}$	10 $\frac{1}{4}$	11 $\frac{1}{4}$	12 $\frac{1}{2}$
Center to top	3 $\frac{3}{8}$	4	4 $\frac{1}{2}$	5	5 $\frac{1}{2}$	6 $\frac{3}{4}$
Diameter of flange	3 $\frac{3}{4}$	4 $\frac{5}{8}$	4 $\frac{7}{8}$	5 $\frac{1}{4}$	6 $\frac{1}{8}$	6 $\frac{1}{2}$
*Thickness of flange	$\frac{9}{16}$	$\frac{5}{8}$	1 $\frac{1}{16}$	1 $\frac{3}{16}$	$\frac{7}{8}$	1
Diameter of male face	1 $\frac{3}{8}$	1 $\frac{11}{16}$	2	2 $\frac{1}{2}$	2 $\frac{7}{8}$	3 $\frac{5}{8}$
Diameter of bolt circle	2 $\frac{5}{8}$	3 $\frac{1}{4}$	3 $\frac{1}{2}$	3 $\frac{7}{8}$	4 $\frac{1}{2}$	5
No. and dia. of bolts	4- $\frac{1}{2}$	4- $\frac{5}{8}$	4- $\frac{5}{8}$	4- $\frac{5}{8}$	4- $\frac{3}{4}$	8- $\frac{5}{8}$

*The face to face dimensions include the $\frac{1}{4}$ -inch male faces; the thickness of flange dimensions do not.

For adjusted Marine pressure ratings, see page 470.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Brass Chronometer Valves for Marine Service



Cross Section
No. 4382
Screwed

Service recommendations: Crane Brass Chronometer Valves are designed for regulating and governing purposes and should not be used as stop valves. They open or close completely in one-eighth turn of the lever. The adjusting screw at the stem end is used to vary the pressure of the disc against the seat bearing, so that easy operation can be obtained when desired. With proper adjustment, the valves can be operated by a float.

Materials and construction: The valves have a body, cap, disc, stem, gland, and packing nut made of brass. The lever is made of malleable iron.

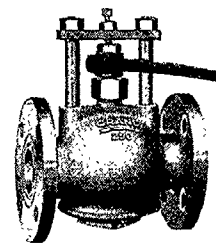
Sizes 1½-inch and smaller have a screwed cap; larger sizes have a bolted cap.

Flanged valves: End flanges conform to the

WORKING PRESSURE
250 pounds saturated steam

All sizes are suitable for Class II Piping.

Screwed valves 2" and smaller and flanged valves all sizes are suitable for Class I Piping.



No. 4383
Flanged

MSS 250-Pound SP Bronze Flange Standard, No. SP-2-1937. They are plain faced, with two V-shaped concentric grooves between the port and the bolt holes. Prices include drilling to the MSS 250-Pound Standard, and spot facing. No deduction is made if valves are ordered faced only.

Full face gaskets should be used; see page 567.

Larger sizes: Valves 3-inch and larger can be furnished to order; prices on application.

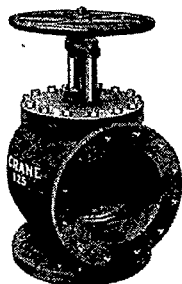
List Prices, Each, and Dimensions, in Inches

Size	Inches	½	¾	1	1¼	1½	2	2½
No. 4382, Screwed		51.00	51.00	51.00	75.00	75.00	150.00	225.00
No. 4383, Flanged, F.D. & S.F.			68.00	68.00	100.00	100.00	195.00	290.00
End to end, Screwed		5¼	5¼	5¼	6½	6½	8¾	10¾
Face to face, Flanged					7	7	9¾	11¾
Center of valve to top		5¾	5¾	5¾	7	7	8½	9¾
Center of stem to end of handle		4¾	4¾	4¾	6¼	6¼	7½	8¾
Diameter of flange					5¼	6⅞	6½	7½
Thickness of flange					17/32	9/16	5/8	11/16

Templates for drilling . . . page 550

35

Main Injection Valves

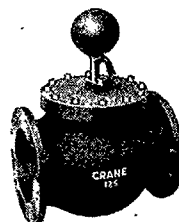


No. 4347
Iron Body Main Injection Valve
Brass Trimmed — Class II

Crane Main Injection Valves are made in a wide range of sizes, in both angle and cross patterns.

The valves are regularly furnished with brass trimming. They can be supplied with either iron or cast steel body and bonnet.

Overboard Discharge Valves

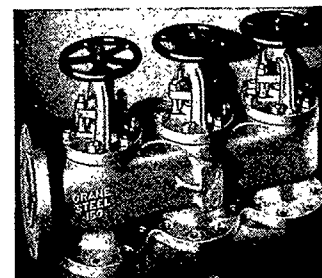


No. 4377
Iron Body Overboard Discharge Valve
Brass Trimmed — Class II

Crane Overboard Discharge Valves are available in a complete range of sizes, in either globe pattern (No. 4377) or angle pattern (No. 4379), as ordered.

The valves have a cast iron body and cap, and a bronze disc, seat ring, and stem. The latch is malleable iron, and the ball is cast iron. Cast Steel Valves also can be furnished when ordered.

Manifold Valves



Manifold Valves
Cast Steel

Crane Manifold Valves, made of brass, Ferrosteeel, or cast steel, are ideal for the transfer of cargo oil, bilge water, or salt water from one point to another.

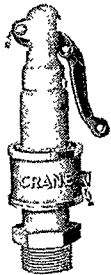
Full details on types and sizes will be furnished on request.

Prices and dimensions of Main Injection, Overboard Discharge, and Manifold Valves furnished on application.

Marine Brass and Steel Pop Safety Valves

Brass—With Inside Spring
For Steam or Air

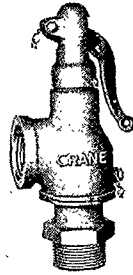
Steel—With Outside Spring
For Steam



Top Outlet
with
Wire Seal

No. 2500
For Steam

No. 2550
For Air



Side Outlet
with
Wire Seal

No. 2501
For Steam

No. 2551
For Air



Top Outlet
with
Lock

No. 2502
For Steam

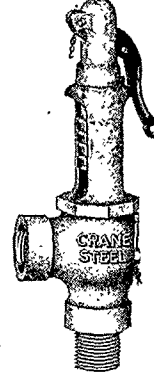
No. 2552
For Air



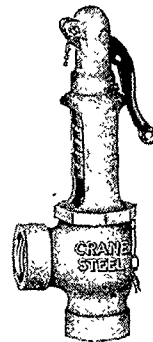
Side Outlet
with
Lock

No. 2503
For Steam

No. 2553
For Air



No. 2531
Side Outlet
Male Inlet



No. 2534
Side Outlet
Female Inlet

Brass valves for steam: The Nos. 2500, 2501, 2502, and 2503 Brass Pop Safety Valves in sizes 2-inch and smaller only are suitable for Marine service (not boilers) on steam up to 150 pounds at 366° F. For prices and dimensions, see page 385. These valves can be made special, when so ordered, for steam up to 250 pounds at 406° F.; prices will be furnished on application.

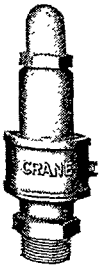
Brass valves for air: The Nos. 2550, 2551, 2552, and 2553 Brass Pop Safety Valves in sizes 2-inch and

smaller only are suitable for Marine service on air up to 150 pounds at 366° F. For prices and dimensions, see page 387. These valves can be made special, when so ordered, for air up to 250 pounds at 400° F.; prices will be furnished on application.

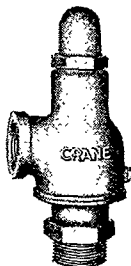
Steel valves: The No. 2531 and No. 2534 Cast Steel Pop Safety Valves shown on page 391 are well suited for Marine service. They have an outside spring, making them suitable for high temperature steam. The valves are made in sizes $\frac{3}{8}$ to 2-inch.

Marine Brass Relief Valves

With Inside Spring



No. 2600
Male Inlet
Top Outlet
With Cap.



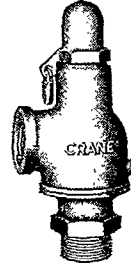
No. 2601
Male Inlet
Side Outlet
With Cap



No. 2602
Male Inlet
Side Outlet
With Wheel

For Steam,
Water, or Oil

These valves, sizes 2-inch and smaller only, are suitable for Marine service; for prices and dimensions, see page 397.



No. 2603
Male Inlet
Side Outlet
With Lock-up Cap



No. 2604
Female Inlet
Side Outlet
With Cap



No. 2605
Female Inlet
Side Outlet
With Wheel

Steam: For steam, the Nos. 2600, 2601, 2603, and 2604 Valves can be used, on pressures up to 150 pounds at 366° F.

These valves can be made special, when so ordered, for steam up to 250 pounds at 406° F.; prices are furnished on application.

Oil or water: For oil or water, the Nos. 2601, 2602, 2603, 2604, and 2605 Valves can be used, on pressures up to 150 pounds at 366° F.

They can be made special, when so ordered, for oil or water up to 250 pounds at 406° F., or up to 300 pounds at 200° F.; prices on application.

For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Marine Brass Relief Valves

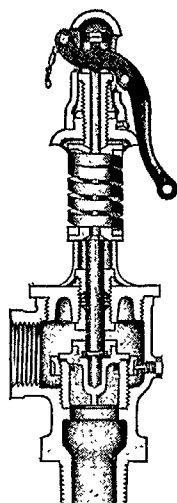
Outside Spring Type

SET PRESSURE RANGE
10 to 250 pounds steam, 450° F.
10 to 300 pounds water or oil, 200° F.

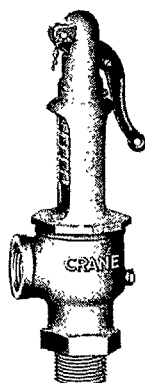
When ordering, be sure to specify the set pressure.

Relief valves on steam service should always be set 10 per cent above the normal working pressure; and on liquid service, 25 per cent above the working pressure.

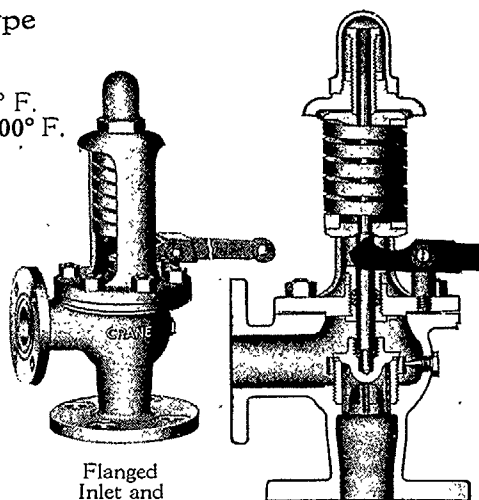
Prices of flanged valves include facing and drilling to the MSS Standard, and spot facing. No deduction is made when valves are ordered faced only.



Cross Section
No. 2621



Male Inlet
No. 2621
Female Inlet
No. 2624



Flanged
Inlet and
Outlet
No. 2628

Cross Section, No. 2628

Features of design:
These valves have been particularly designed for marine service.

Their exposed springs make them suitable for high temperature service.

An adjustable blow-back regulating ring is provided for adjusting the blow-down of pressure when changing or regulating the set pressure. The adjustment of this ring may be made from the outside, without interfering with the setting of the valve. A huddling or pop chamber is formed under the extended lip of disc, insuring a snappy action.

All valves have renewable seats. Valves for steam service have steel stems and no stuffing boxes.

List Prices and Dimensions, in Inches

Size (Size of Inlet)	Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
No. 2621	Each	13.75	15.00	18.25	21.00	26.50	37.00		
No. 2624	Each	13.75	15.00	18.25	21.00	26.50	37.00		
No. 2628, F.D. & S.F.	Each					100.00	125.00	160.00	200.00
Size of Outlet		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Center to end	Female inlet	1 11/16	2	2 3/16	2 5/8	2 7/8	3 7/16		
	Male inlet	2 7/16	2 7/8	3 3/16	3 11/16	4	4 11/16		
	Screw outlet	1 1/16	1 5/16	1 5/8	2 1/16	2 3/8	2 3/4		
Center to face, flanged valves						4	4 3/4	5 1/2	6
Center to top	Screw valves	5 5/8	5 7/8	7	8 1/4	9 1/4	11 1/2		
	Flanged valves					10 5/8	13 1/8	16 1/8	20

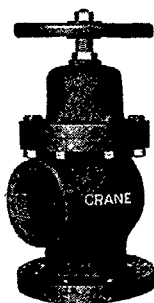
Valves for oil or water have rolled naval brass stems, and stuffing boxes around the stems. Lifting levers permit manual operation of the valves.

Flanged valves: The inlet flange conforms to the MSS 300-Pound SP Bronze Flange Standard, No. SP-2-1937. The outlet flange conforms to the MSS 150-Pound SP Bronze Flange Standard No. SP-2-1937.

Templates for drilling . . . page 550

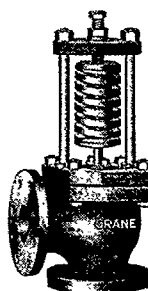
Iron Body Relief Valves

Inside Spring



Special Iron Body Relief Valves of the inside spring type (see illustration at the left) can be supplied for Marine service. They are made in sizes 2 1/2 to 5-inch with flanged inlet and either screwed or flanged outlet.

Outside Spring

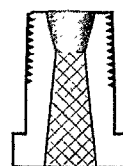


Outside Spring Relief Valves No. 1113 (shown at the right) and No. 1114 are suitable for steam, water, or oil. They are described in detail on page 404. For Marine service, Outside Spring Relief Valves can be set at a maximum of 250 pounds at 406° F. or at a maximum of 300 pounds at 200° F.

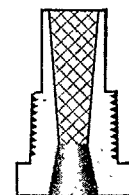
For Marine specifications, boiler feed service, general requirements, etc., see pages 460 and 461.

Fusible Plugs

Long Pattern



Water Side Plug
Inside Type



Fire Side Plug
Outside Type

These plugs are regularly suited for Marine service. The complete line (see page 437) includes Fire Side Plugs, No. 4752 and No. 4752 L with oversize thread, and Water Side Plugs, No. 4753 and No. 4753 L with oversize thread.

Valves and Fittings for Ammonia

Description.....	page 480
Globe and Angle Valves.....	pages 480 and 481
Expansion Valves.....	page 482
Check Valves.....	page 482
Liquid Gauges.....	page 483
Flanged Fittings.....	page 483
Boyle Flange Unions.....	page 484
Flanges.....	page 484
Return Bends.....	page 483
Atmospheric Condensers.....	page 485
Double Pipe Condensers and Brine Coolers.....	page 486
Double Pipe Water Coolers.....	page 486
Double Pipe Fittings.....	pages 486 and 487
Gaskets.....	page 485
Dimensions.....	page 488

For greater convenience, the following valves and fittings, suitable for ammonia, are shown in other sections of this catalog because of their adaptability to general piping service:

Screwed Fittings.....	pages 190 and 191
Bushings.....	pages 226 and 227
Plugs.....	page 228
Wrought Couplings.....	page 229
Wrought Steel Nipples.....	page 230
Screwed Unions.....	pages 246 and 247
Flange Unions.....	page 252
Combination Elbows.....	page 252
Welding Fittings.....	pages 351 to 360
Relief Valves.....	page 401
Pressure Gauges.....	pages 438 and 439

Fabricated Double Pipe Heat Exchangers.....page 619

Valves and Fittings For Ammonia

Pages 481 to 488 illustrate Crane piping equipment for ammonia refrigeration. This line includes valves; flanged or screwed fittings; flanges and unions; return bends and other fittings for coils and condensers; and return bends and fittings for double pipe condensers, brine coolers, and heat exchangers.

Service recommendations: This line is especially recommended for high pressure ammonia refrigeration service.

However, it is also admirably suited for use on air, gas, oil, or chemicals, or in special process work where heavy, all-iron construction is desired.

Construction: Every detail of design, construction, and workmanship is directed toward producing piping materials that are uniquely adapted to conveying deadly or hazardous gases.

All valves and fittings are unusually massive and rugged, to provide a high margin of safety against accidents.

Flanged valves and fittings have tongue and groove

faces, to assure tightness at the joints and as an added precaution against blowing out gaskets.

Screwed valves and fittings have long threads, and are recessed to enable soldering the joints.

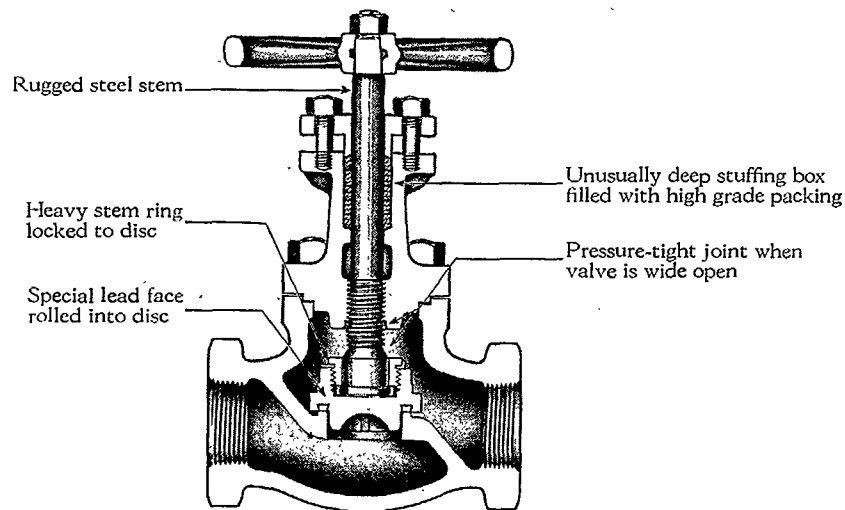
All valves and fittings recommended for ammonia (except flanges) are tested to 300 pounds air under water.

Metals: Ammonia valves and fittings are made of Crane Ferrosteeel, screwed fittings of malleable iron, and flanges of forged steel or malleable iron, depending on the size and style.

Valves are all-iron, with steel stems, and have special lead disc faces or steel discs. No copper or brass is used in their construction, being unsuitable for use on ammonia.

Interchangeability: Flanged valves have the same center to face and face to face dimensions as flanged fittings. For example, a flanged globe valve can be substituted for a flanged tee; a flanged angle valve, for a flanged elbow.

This is an important feature when quick changes are necessary.



36

The construction of Crane Ammonia Globe and Angle Valves, illustrated above, is especially suited to conveying noxious gases.

Disc and seat: The disc has a Special Lead face, securely rolled into a machined dovetail in the disc. The face seats upon a crowned face in the body, assuring tightness in service.

Where high temperature or corrosive action prevent the use of lead, the valves can be furnished with a case-hardened steel disc and a steel seat ring, illustrated on the opposite page.

The disc is held to the stem by a threaded stem ring; the stem ring is locked to the disc, preventing the disc from becoming detached in service.

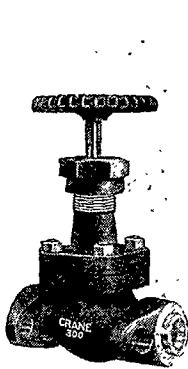
Stuffing box: The stuffing box is unusually deep, and is filled with high grade packing.

The stem is provided with a tapered, machined shoulder, which seats against a machined chamfer in the bonnet when the valve is wide open. This removes pressure from the packing, assures tightness at the stuffing box, and enables repacking the valve when wide open and under pressure.

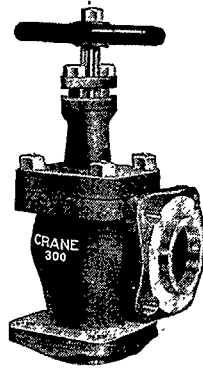
Ferrosteel Globe and Angle Valves for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test

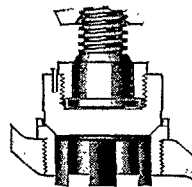
Bolted Bonnet Valves with Special Lead Disc



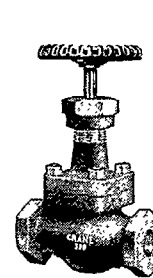
No. 1501, Globe
Flanged
Tongue and Groove



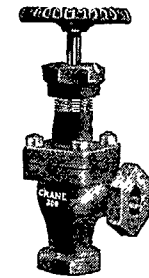
No. 1503, Angle
Flanged
Tongue and Groove



Steel Disc and Seat



No. 1504, Globe
Screwed



No. 1505, Angle
Screwed

List Prices

Size	Inches														1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Flanged Valves	Style of flanges		Oval						Square						Round											
	*No. 1501 or No. 1503	Each	6.00	6.50	7.00	8.00	9.00	15.00	16.00	19.00	28.50	43.20	55.80	72.00												
Screwed Valves	No. 1504 or No. 1505	Each	3.50	4.50	5.00	5.50	6.00	7.50	9.00	12.00	16.00	21.00														
Extra for Steel Disc and Seat Ring		Per Valve	3.30	3.55	3.85	4.30	4.85	6.40	6.80	8.00	12.00	18.25	23.50	30.50												

*List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

The valves listed above can be furnished with a case-hardened steel disc and a steel seat ring, as illustrated; extra list prices are shown in the table.

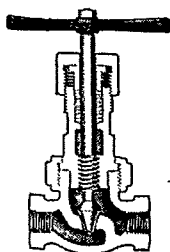
When so equipped, and when a suitable stuffing box packing is used, the valves are recommended for air or gas working pressures up to 250 pounds at 500° F.

Description page 480

Dimensions page 488

Companion Flanges page 484

Union Bonnet Valves with Plug Type Disc



No. 1504 1/2, Globe
Screwed

List Prices		Size	Inches	1/4	3/8	1/2	3/4	1
		No. 1504 1/2 or No. 1505 1/2	Each	3.00	3.60	4.00	4.40	5.00
Dimensions	End to end, Globe	Inches	3	3 1/4	3 1/2	4	4 1/2	
	Center to end, Angle	Inches	1 1/2	1 5/8	1 3/4	2	2 1/4	
	Center to top, Open	Inches	6 1/2	6 1/2	6 3/4	8 1/4	8 1/2	
	Length of T-Handle	Inches	4 1/2	4 1/2	4 1/2	6	6	

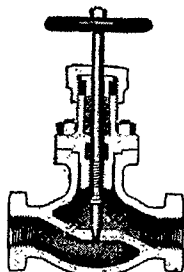
These valves have a plug type disc, integral with the steel stem. They may be reground without removing them from the line.



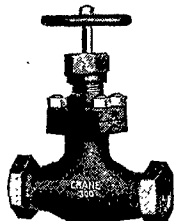
No. 1505 1/2, Angle
Screwed

Ferrosteel Expansion Valves for Ammonia

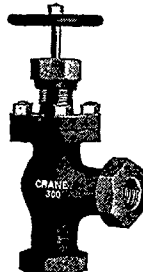
300 pounds ammonia working pressure
300-pound air-under-water test



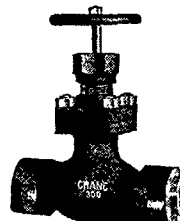
Cross Section
Rising Stem



Globe, Screwed
No. 1519½
Rising Stem
No. 1519
Non-Rising Stem



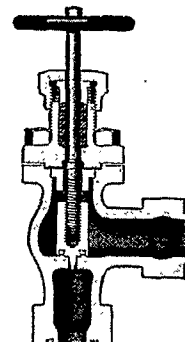
Angle, Screwed
No. 1519¾
Rising Stem
No. 1519¼
Non-Rising Stem



Globe, Flanged
Tongue and Groove
No. 1513
Rising Stem
No. 1511
Non-Rising Stem



Angle, Flanged
Tongue and Groove
No. 1517
Rising Stem
No. 1515
Non-Rising Stem



Cross Section
Non-Rising Stem

List Prices

Size	Inches						
	1/4	3/8	1/2	3/4	1		
Flanged Valves	Style of flanges						
	Oval					Square	
	*No. 1511, No. 1513, No. 1515, or No. 1517	Each	6.00	6.50	7.00	8.00	9.00
Screwed Valves	No. 1519, No. 1519 ¹ / ₄ , No. 1519 ¹ / ₂ , or No. 1519 ³ / ₄	Each	4.75	5.50	6.00	6.80	7.50

*List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

Rising Stem Valves have a needle-point stem. The stem has fine, close fitting threads, permitting very accurate adjustment. These valves are particularly recommended for short lines.

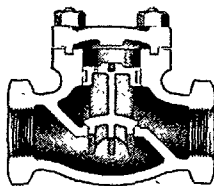
Non-Rising Stem Expansion Valves have a combina-

tion special lead and needle-point disc. Fine stem threads permit a close adjustment. However, the disc is not integral with the stem; therefore, these valves are recommended for long lines where minute adjustment is unnecessary.

36

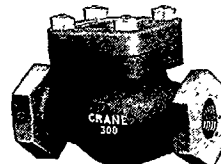
Ferrosteel Check Valves for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test

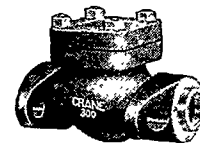


Cross Section
No. 1507½, Horizontal
Screwed

Crane Ammonia Check Valves are constructed with a dash pot that effectively cushions the disc in service, thereby materially increasing the life of the valve. Sizes 1½-inch and larger have a piston ring; smaller sizes have a grooved piston without ring.



No. 1507½, Horizontal
Screwed



No. 1507, Horizontal
Flanged
Tongue and Groove

List Prices, Each

Size		Inches	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Flanged Valves	Style of flanges		Oval			Square					Round	
	*No. 1507		8.70	10.00	11.20	18.50	19.80	23.50	34.70	53.50	68.40	89.00
Screwed Valves	No. 1507 1/2		6.80	7.25	8.00	10.75	12.40	15.40				

*List prices of Flanged Valves include facing and drilling but not companion flanges, bolts, or gaskets.

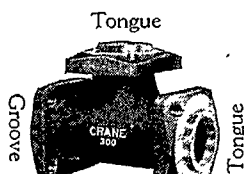
Ferrosteel Flanged Fittings for Ammonia

300 pounds ammonia working pressure
300-pound air-under-water test



No. 1521
90° Elbow
Tongue and Groove

List prices include
facing and drilling
but not
companion flanges,
bolts or gaskets.



No. 1523
Tee
Tongue and Groove

Description . . . page 480
Dimensions . . . page 488

Companion flanges . . . page 484
Screwed Fittings . . . pages 190 and 191

List Prices

Style of Flanges	Size Inches	No. 1521 90° Elbows Each	No. 1523 Tees Each
Oval	1/4	1.00	1.50
	3/8	1.25	1.75
	1/2	1.40	1.95
	3/4	1.75	2.20
Square	1	2.00	2.50
	1 1/4	2.25	3.70
	1 1/2	2.50	3.75
	2	3.00	4.00
	2 1/2	5.50	8.00
Round	3	10.00	17.00
	3 1/2	13.50	21.00
	4	15.00	23.50

Return Bends

For Atmospheric Ammonia Condensers or Pipe Coils

300 pounds ammonia working pressure
300-pound air-under-water test

List Prices

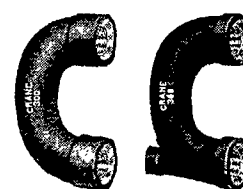
Size Inches	Center to center Inches	No. 1559 Flanged Each	No. 1570 Divided Each
1 1/4	4	1.90	2.50
1 1/4	6	2.40	2.70
2	3 1/2	....	4.40
2	4	....	4.75
2	4 5/8	2.60	5.00
2	6	2.85	6.00
2	8	3.40	....



No. 1559
Flanged
Tongue and Groove
Ferrosteel



No. 1570
Divided
Screwed Ends
Malleable Iron



No. 272 E
Screwed
No. 1564
Screwed

Malleable Iron
See page 190

Prices of Flanged Return Bends include facing and drilling but not companion flanges, bolts, or gaskets.

*Flanges: Because of short center-to-center dimension, the 2 x 4 5/8-inch Flanged Return Bends require No. 1582 1/2 and No. 1583 1/2 Flanges; see page 484. All other sizes require the regular No. 1547 and No. 1545 Flanges.

Dimensions . . . page 488

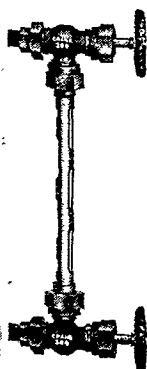
Combination elbows: No. 1570 Bends can be divided, and used as combination screwed and flanged elbows; one return bend and one No. 1589 Union (page 252) enable making two complete combination elbows with flange, bolts, and gasket.

Companion flanges . . . page 484

All-Iron Liquid Gauges for Ammonia

With Special Lead Seat

300 pounds ammonia working pressure — 300-pound air-under-water test



No. 1586 1/2
Liquid Gauge

List Prices

Size		Inches	1/2	3/4
No. 1586 1/2	Liquid Gauge, with 15" centers, complete	Each	25.50	25.50
	Extra for each inch over 15", up to 24"		.37	.37
Parts for No. 1586 1/2	Valves, only	Each	11.65	11.65
	Glasses, only (5/8" outside diameter), for 15" centers	Each	.35	.35
	Guards, only, for 15" centers	Each	1.65	1.65
	Rubber Gauge Glass Gaskets, only	Each	.05	.05
	Flat Steel Gauge Glass Washers, only	Each	.05	.05
	Steel Stuffing Box Washers, only	Each	.25	.25

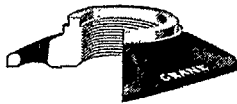
The Gauge Valves have a ball check valve in their inlet end. Should a glass tube be broken, the check valves close instantly and automatically, preventing the escape of ammonia.

Ammonia Pressure Gauges . . . page 438

Ammonia Relief Valves . . . page 401

Flanges for Ammonia

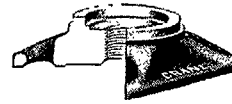
300 pounds ammonia working pressure



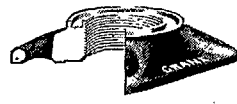
No. 1547
Screwed Flange
Tongue



No. 1555
Blind Flange
Tongue



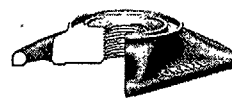
No. 1549
Reducing Screwed Flange
Tongue



No. 1545
Screwed Flange
Groove



No. 1557
Blind Flange
Groove



No. 1551
Reducing Screwed Flange
Groove

Unless otherwise ordered, flanges are furnished without bolts or gaskets.

$\frac{1}{4}$ to 3-inch are forged steel; $3\frac{1}{2}$ and 4-inch are malleable iron.

List Prices Screwed and Blind Flanges

Style of Flange	Size Inches	No. 1545, No. 1547, No. 1555, or No. 1557	
		With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	$\frac{1}{4}$	.50	.40
	$\frac{3}{8}$	.55	.45
	$\frac{1}{2}$	.70	.50
	$\frac{3}{4}$	.90	.65
Square	1	1.20	.95
	$1\frac{1}{4}$	1.25	1.00
	$1\frac{1}{2}$	1.50	1.20
	2	1.70	1.40
	$2\frac{1}{2}$	3.00	2.50
Round	3	3.75	3.00
	$3\frac{1}{2}$	4.25	3.50
	4	5.00	4.25

List Prices Reducing Screwed Flanges

Style of Flange	Size Inches	No. 1549 or No. 1551	
		With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	$\frac{3}{8} \times \frac{1}{4}$	.55	.45
	$\frac{1}{2} \times \frac{3}{8}$	.70	.50
	$\frac{1}{2} \times \frac{1}{4}$		
	$\frac{3}{4} \times \frac{1}{2}$	.90	.65
	$\frac{3}{4} \times \frac{3}{8}$		
	$\frac{3}{4} \times \frac{1}{4}$		
	1 x $\frac{3}{4}$	1.20	.95
	1 x $\frac{1}{2}$		
	1 x $\frac{3}{8}$		
Square	1 x $\frac{1}{4}$	1.25	1.00
	$1\frac{1}{4} \times 1$		
	$1\frac{1}{4} \times \frac{3}{4}$		
	$1\frac{1}{4} \times \frac{1}{2}$		
	$1\frac{1}{4} \times \frac{3}{8}$		
	$1\frac{1}{4} \times \frac{1}{4}$	1.50	1.20
	$1\frac{1}{2} \times 1\frac{1}{4}$		
	$1\frac{1}{2} \times 1$		
	$1\frac{1}{2} \times \frac{3}{4}$	1.70	1.40
	2 x $1\frac{1}{2}$		
	2 x $1\frac{1}{4}$		
	2 x 1		
	2 x $\frac{3}{4}$		
	2 x $\frac{1}{2}$	3.00	2.50
	2 x $\frac{3}{8}$		
	2 x $\frac{1}{4}$		
Round	$2\frac{1}{2} \times 2$	3.75	3.00
	$2\frac{1}{2} \times 1\frac{1}{2}$		
	$2\frac{1}{2} \times 1\frac{1}{4}$		
	3 x $2\frac{1}{2}$	4.25	3.50
	3 x 2		
	3 x $1\frac{1}{2}$		
	$3\frac{1}{2} \times 3$	5.00	4.25
	$3\frac{1}{2} \times 2\frac{1}{2}$		
	$3\frac{1}{2} \times 2$		
	4 x $3\frac{1}{2}$		
	4 x 3		
	4 x $2\frac{1}{2}$		
	4 x 2		

Special Forged Steel Screwed Flanges



No. 1582 $\frac{1}{2}$
Tongue



No. 1583 $\frac{1}{2}$
Groove

List Prices

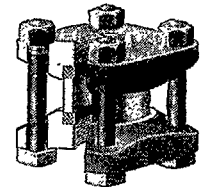
Style of Flange	Size Inches	With Bolts and Gasket Each	Without Bolts or Gasket Each
Oval	1	.65	.50
	$1\frac{1}{4}$	.75	.60
Square	2	1.00	.85

The No. 1582 $\frac{1}{2}$ and No. 1583 $\frac{1}{2}$ Special Screwed Flanges have smaller overall dimensions than regular flanges, and are used on the following:

2 x $4\frac{5}{8}$ " No. 1559 Return Bends (p. 483).
No. 1591 $\frac{1}{2}$ Flange Unions (p. 252).
No. 1529 Combination Elbows (p. 252).

Boyle Flange Unions

300 pounds ammonia working pressure

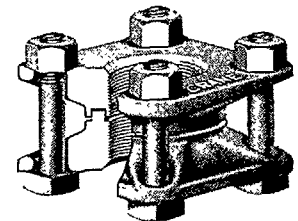


No. 1585
Cast Iron Boyle Flange Union

List Prices

Style of Flange	Size Inches	No. 1585 Each
Oval	$\frac{1}{4}$	1.05
	$\frac{3}{8}$	1.15
	$\frac{1}{2}$	1.35
	$\frac{3}{4}$	1.60
Square	1	1.95
	$1\frac{1}{4}$	2.65
	$1\frac{1}{2}$	3.10
	2	3.70
	$2\frac{1}{2}$	6.25
Round	3	9.50

Tongue and Groove Flange Unions



No. 1589

The No. 1589 Unions are equipped with a Granite gasket and are recommended for 300 pounds ammonia working pressure; see page 252. An unusually compact union for pipe coil work, the No. 1591 $\frac{1}{2}$, and a Combination Elbow, the No. 1529; also are shown on page 252.

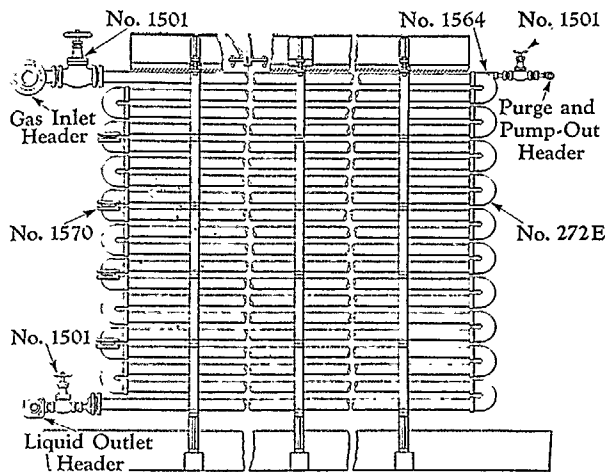
For dimensions of regular screwed, blind, and reducing screwed flanges, see page 488.

For extra charge for bolting on companion flanges, see the Crane Discount Sheet.

Atmospheric Ammonia Condensers

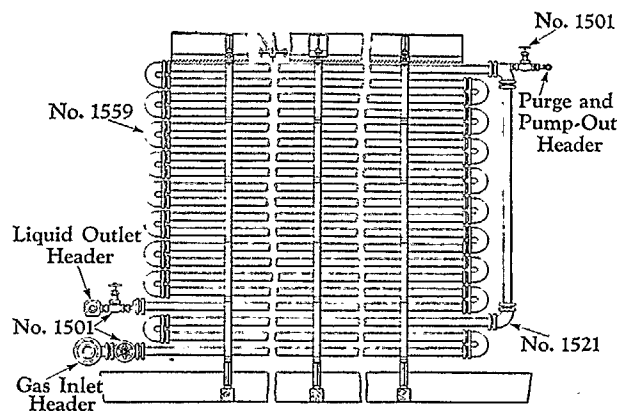
The illustrations below show two common types of atmospheric condensers, and indicate the application of the return bends and fittings shown on page 483. Either type, or any other type, can be made with

flanged, screwed, or divided return bends, or combinations of all three; if welded joints are preferred, welding fittings (see pages 351 to 359) and flanges (see pages 361 to 367) can be used.



Atmospheric Condensers
With Three Preliminary Pipes

The ammonia condenser shown on the right is of the atmospheric type with a three-pipe preliminary cooler at the lower part of the coil. The hot gas enters at the bottom, where it is partly cooled by the water which has already passed over the main condenser. The partially cooled gas then passes to the top of the coil and meets the coldest condensing surface where the actual process of condensation begins.



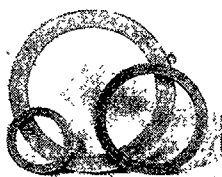
Atmospheric Condensers

The atmospheric condenser shown on the left is the simplest type of ammonia condenser, the hot gas from the compressor entering at the top and the condensed liquid ammonia leaving at the bottom.

These condensers are usually made of 2-inch Standard weight pipe, 20 feet long, and 18 or 20 pipes high. However, they can be built of any weight or length of pipe, and any number of pipes high.

Each stand of condensers should have a galvanized water trough made in two sections, with adjustable trough supports for leveling.

Gaskets for Ammonia



Granite Gaskets
for Tongue and Groove Joints

The tongue and groove dimensions of all flanged ammonia valves, fittings, and flanges are the same for each corresponding pipe sizes. Gaskets, therefore, are interchangeable; both the Cranite and lead are $\frac{1}{16}$ -inch thick.

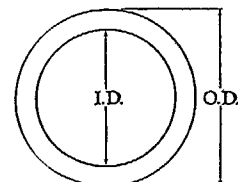
Gaskets for Boyle joints are made of rubber, canvas wrapped; they are used in Boyle Unions and in certain double pipe return bends and tees.



Rubber Gaskets
for Boyle Joints

List Prices and Dimensions

Size	Inches	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Tongue and Groove Gaskets	Cranite Per Dozen	.25	.30	.30	.40	.40	.50	.50	.55	.60	.70	.85	1.00
	Lead Per Dozen	.45	.50	.50	.70	.90	1.25	1.25	1.50	1.70	1.85	2.15	2.40
	I.D. Inches	$\frac{19}{32}$	$\frac{23}{32}$	$\frac{7}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$	$1\frac{11}{16}$	$1\frac{5}{8}$	$1\frac{27}{16}$	$2\frac{15}{16}$	$3\frac{9}{16}$	$4\frac{1}{16}$	$4\frac{9}{16}$
	O.D. Inches	$\frac{31}{32}$	$\frac{13}{32}$	$\frac{17}{32}$	$\frac{115}{32}$	$\frac{125}{32}$	$\frac{27}{32}$	$\frac{215}{32}$	$\frac{33}{32}$	$\frac{21}{32}$	$\frac{49}{32}$	$\frac{427}{32}$	$\frac{515}{32}$
Canvas Wrapped Boyle Gaskets	Rubber Per Dozen	1.40	1.60	1.85	2.10	2.60	5.00	5.30	8.10	13.20	16.80	21.00	26.00
	I.D. Inches	$\frac{9}{16}$	$1\frac{1}{16}$	$1\frac{3}{16}$	$1\frac{1}{2}$	$1\frac{11}{16}$	$1\frac{11}{16}$	$1\frac{15}{16}$	$2\frac{7}{16}$	$2\frac{29}{32}$	$3\frac{9}{16}$	$4\frac{1}{16}$	$4\frac{9}{16}$
	O.D. Inches	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{13}{16}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{8}$	$3\frac{11}{16}$	$4\frac{5}{16}$	$4\frac{7}{8}$	$5\frac{1}{2}$
	Thickness Inches	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$



Ferrosteel Double Pipe Fittings

Crane Double Pipe Fittings, shown on the opposite page, are designed especially for use in heat exchangers, ammonia condensers, brine coolers, water coolers, and similar coils formed of two sets of pipes, one placed inside of the other.

With Crane fittings, the inside and outside pipes are entirely independent of each other, and are free to expand or contract independently without danger of straining the joints. The fittings can be de-mounted easily and quickly for cleaning or repairs.

Service recommendations: No. 1565 Double Pipe Return Bends, No. 1571 Double Pipe Tees, and No. 1569 Return Bends are recommended for heat exchangers. They are equipped with special groove flanges and Crane gaskets, and the stuffing boxes are packed with special asbestos rings.

No. 1565 and No. 1571 are recommended for the following working pressures:

- 300 pounds ammonia
- 300 pounds water, gas, or air, 300° F.
- 250 pounds oil or steam, 500° F.

No. 1569 Return Bends are recommended for:

- 175 pounds water, oil, or gas, 100° F.
- 125 pounds saturated steam
- 25 pounds oil, 500° F.

No. 1575 Double Pipe Return Bends, No. 1581 Double Pipe Tees, and No. 1574 Return Bends are recommended for ammonia condensers and brine

coolers. All joints are Boyle rubber with the exception of the outlet of the No. 1581 Tee, which has a regular groove for tongue and groove joint. The No. 1574½ Union Return Bend can be used instead of the No. 1574 Boyle Return Bend.

No. 1575 and No. 1581 are recommended for the following working pressures:

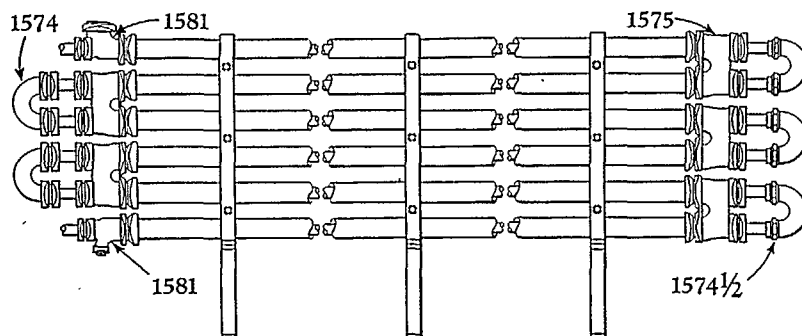
- 300 pounds ammonia
- 300 pounds water, air, or gas, 300° F.

No. 1574 Boyle Return Bends are recommended for 175 pounds cold water, while No. 1574½ Union Return Bends are recommended for 175 pounds cold water or 125 pounds saturated steam working pressures.

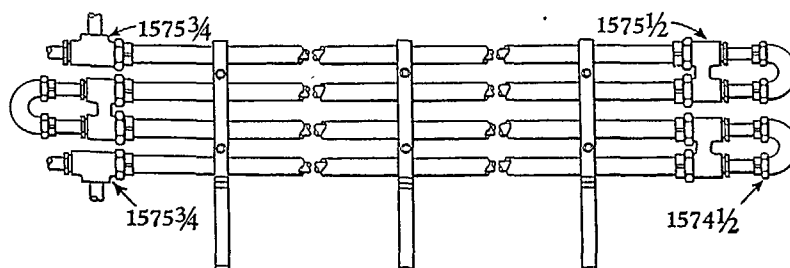
No. 1575½ Double Pipe Return Bends and No. 1575¾ Double Pipe Tees are recommended for water coolers. They are equipped with rubber gaskets. They are recommended for 125 pounds saturated steam or 175 pounds cold water working pressures.

Test pressures: No. 1565, No. 1571, No. 1575, and No. 1581 are tested to 300 pounds air under water. The other fittings shown on the opposite page are given a 250-pound hydrostatic test.

Application: The illustrations below show the application of double pipe fittings for ammonia condensers, brine coolers, and water coolers. The application of fittings for heat exchangers is shown in the section of this catalog devoted to Fabricated Piping; see page 619.



Fittings for Double Pipe Ammonia Condensers and Brine Coolers



Fittings for Double Pipe Water Coolers

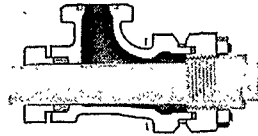
Ferrosteel Double Pipe Fittings

For Ammonia Condensers,
Brine Coolers, and Heat Exchangers

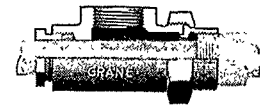
For Water Coolers



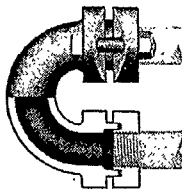
Cross Sections
Showing Boyle Joints



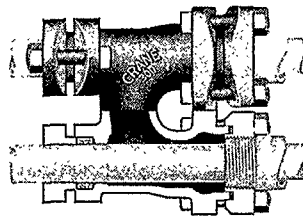
Double Pipe Tee
No. 1571, Tongue & Groove Joint
No. 1581, Boyle Joint



No. 1575 3/4
Double Pipe Tee



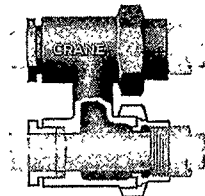
Return Bend
No. 1569, Tongue & Groove Joints
No. 1574, Boyle Joints



Double Pipe Return Bend
No. 1565, Tongue & Groove Joints
No. 1575, Boyle Joints



No. 1574 1/2
Cast Iron
Return Bend
With
Union Ends



No. 1575 1/2
Double Pipe Return Bend

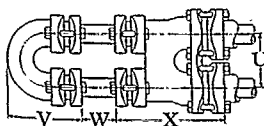
List Prices

Return Bends				Double Pipe Return Bends						Double Pipe Tees			
Size Inches	Center to Center Inches	No. 1569 or No. 1574 Each	No. 1574 1/2 Black Each	Size Inches	Center to Center Inches	No. 1565 or No. 1575 Each	No. 1575 1/2 Black Galv. Each Each			Size Inches	No. 1571 or No. 1581 Each	No. 1575 3/4 Black Galv. Each Each	
1 1/4	4 5/8	3.25	1.60	2 x 1 1/4	4 5/8	8.00	4.75	6.50		2 x 1 1/4 x 2	6.70	4.50	6.25
2	6	4.45	3.00	2 1/2 x 1 1/4	4 5/8	10.35				2 x 1 1/4 x 1 1/2	6.70		
3	8		*	3 x 2	6	14.00				2 x 1 1/4 x 1 1/4	6.70		
*Price on application				4 x 3	8	*				2 x 1 1/4 x 1	6.70		
				*Price on application						2 x 1 1/4 x 3/4	6.45		
										2 x 1 1/4 x 1/2	6.45		
										2 1/2 x 1 1/4 x 2	8.30		
										3 x 2 x 2	14.00		
										3 x 2 x 1 1/2	14.00		
										3 x 2 x 1 1/4	14.00		
										3 x 2 x 3/4	13.50		
										3 x 2 x 1/2	13.50		
										4 x 3 x 3	*		
										*Price on application			

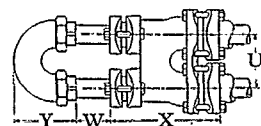
List prices of Return Bends, Double Pipe Return Bends, and Double Pipe Tees include fittings complete with flanges, bolts, gaskets, unions, glands, and stuffing box packing as shown in the illustrations, *with the following exception:*

Exception: List prices of No. 1571 and No. 1581 Tees do not include the flange, bolts, and gasket for the outlet opening.

Dimensions, in Inches

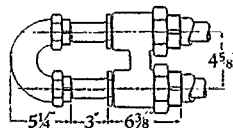


Double Pipe Return Bends
No. 1565 or No. 1575
With No. 1569 or No. 1574



Double Pipe Return Bends
No. 1565 or No. 1575
With No. 1574 1/2

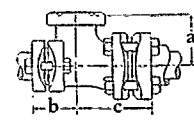
Double Pipe Return Bends						
Size	U	V	W	X	Y	
2 x 1 1/4	4 5/8	6	3	9 3/8	15 1/4	
2 1/2 x 1 1/4	4 5/8	6	3	9 5/8	15 1/4	
3 x 2	6	7 1/2	3	10 1/2	16 3/4	
4 x 3	8		3	13 1/4	9	



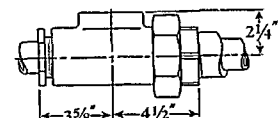
Double Pipe Return Bends
No. 1575 1/2
with No. 1574 1/2

Double Pipe Tees

Size	a	b	c
2 x 1 1/4 x 2	3 11/16	3 5/8	5 3/4
2 x 1 1/4 x 1 1/2	3 13/16	3 1/4	5 3/4
2 x 1 1/4 x 1 1/4	3 11/16	3 5/8	5 3/4
2 x 1 1/4 x 1	3 7/8	3 5/8	5 3/4
2 x 1 1/4 x 3/4	3 7/16	3 5/8	5 3/4
2 x 1 1/4 x 1/2	3 7/16	3 5/8	5 3/4
2 1/2 x 1 1/4 x 2	3 13/16	3 1/4	6 3/8
3 x 2 x 2	4 3/8	3 7/8	6 3/4
3 x 2 x 1 1/2	4 1/2	3 7/8	6 3/4
3 x 2 x 1 1/4	4 1/2	3 7/8	6 3/4
3 x 2 x 3/4	4 3/8	4 1/2	6 3/8
3 x 2 x 1/2	4 7/8	3 7/8	6 3/4
4 x 3 x 3	On request		



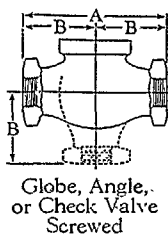
Double Pipe Tee
No. 1571 or No. 1581



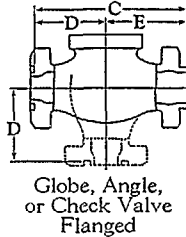
Double Pipe Tee
No. 1575 3/4

Valves and Fittings for Ammonia

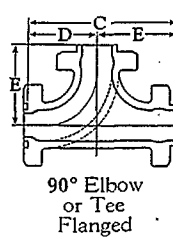
Dimensions, in Inches



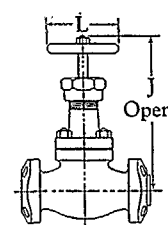
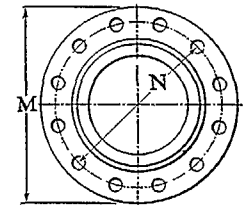
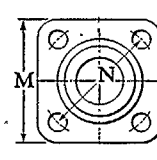
Globe, Angle,
or Check Valve
Screwed



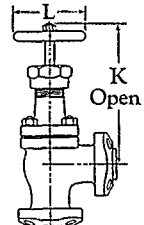
Globe, Angle,
or Check Valve
Flanged



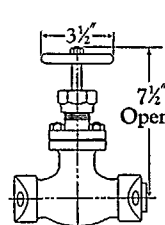
90° Elbow
or Tee
Flanged



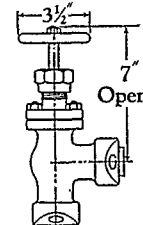
Globe Valve
No. 1501, Flanged
No. 1504, Screwed



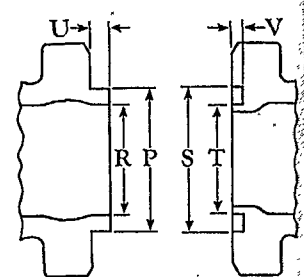
Angle Valve
No. 1503, Flanged
No. 1505, Screwed



Expansion Valve
Globe

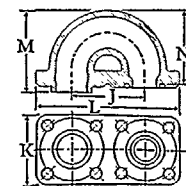


Expansion Valve
Angle



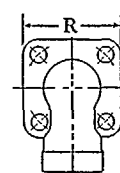
Style of Flanges	Size	A	B	C	D	E	J	K	L	M	N	P	R	S	T	U	V	Bolts No. Dia.
Oval	1/4	4 1/2	2 1/4	5 5/16	2 7/16	2 7/8	7 1/4	6 3/4	3 5/8	3 5/8	2 3/8	3 1/32	1 9/32	1	9/16	3/16	1/8	2 1/2
	3/8	4 3/4	2 3/8	5 9/16	2 9/16	3	7 1/4	6 3/4	3 5/8	3 13/16	2 9/16	1 3/32	2 3/32	1 1/8	1 1/16	3/16	1/8	2 1/2
	1/2	5	2 1/2	5 13/16	2 11/16	3 1/8	7 1/4	6 3/4	3 5/8	4	2 3/4	1 7/32	7/8	1 1/4	2 7/32	3/16	1/8	2 1/2
	3/4	5 1/2	2 3/4	6 5/16	2 15/16	3 3/8	9 1/4	8 1/2	4 1/16	4 3/4	3 1/4	1 15/32	1 1/8	1 1/2	1 3/32	3/16	1/8	2 5/8
Square	1	6 1/4	3 1/8	6 11/16	3 1/8	3 9/16	9 1/4	8 1/2	4 1/16	3 9/16	3 1/4	1 25/32	1 3/8	1 13/16	1 11/32	3/16	1/8	4 1/2
	1 1/4	6 3/4	3 3/8	7 3/8	3 3/8	4	11 1/4	10 1/4	4 3/4	3 15/16	3 3/4	2 7/32	1 11/16	2 1/4	1 21/32	1/4	3/16	4 1/2
	1 1/2	7 1/2	3 3/4	8 1/8	3 3/4	4 3/8	11 1/2	10 1/4	6	4 1/16	4 1/2	2 15/32	1 15/16	2 1/2	1 29/32	1/4	3/16	4 5/8
	2	8 1/2	4 1/4	9 1/8	4 1/4	4 7/8	12 1/4	11	8	5 1/16	5	3 3/32	2 7/16	3 1/8	2 13/32	1/4	3/16	4 5/8
Round	2 1/2	9 1/2	4 3/4	10 5/16	4 3/4	5 9/16	12 3/4	11 1/4	8	5 15/16	5 7/8	3 21/32	2 15/16	3 11/16	2 29/32	5/16	1/4	4 3/4
	3	12	6	12 13/16	6	6 13/16	14 1/4	12 3/4	9	8 1/4	6 5/8	4 9/32	3 9/16	4 5/16	3 17/32	5/16	1/4	8 3/4
	3 1/2			13 13/16	6 1/2	7 5/16	15	13 1/2	10	9	7 1/4	4 27/32	4 1/16	4 7/8	4 1/32	7/16	1/4	8 3/4
	4			14 9/16	6 7/8	7 11/16	16 1/4	14 1/2	10	10	7 7/8	5 15/32	4 9/16	5 1/2	4 17/32	7/16	1/4	8 3/4

On flanged valves, the tongue is on the end next to the upper side of the disc.



Flanged Return Bend
No. 1559

Return Bends								
Size	J	K	L	M	N	R	S	
1 1/4	4	3 15/16	7 15/16	4 5/8	4 1/8	3 15/16	5 3/8	
	6	3 15/16	9 15/16	5 5/8	5 1/8	3 15/16	5 3/8	
2	3 1/2					5 1/16	7 1/16	
	4					5 1/16	7 1/16	
	*4 5/8	4 1/2	9 1/8	6 1/2	6	5 1/16	7 1/16	
	6	5 1/16	11 1/16	6 5/16	5 13/16	5 1/16	7 1/16	
	8	5 1/16	13 1/16	7 5/16	6 13/16			



Divided Return Bend
No. 1570

*The 2 x 4 5/8-inch No. 1559 Return Bends require All other sizes require the regular No. 1545 Groove and No. 1583 1/2 Groove and No. 1582 1/2 Tongue Flanges. and No. 1547 Tongue Flanges.

For dimensions of Double Pipe Return Bends and Tees, see page 487.

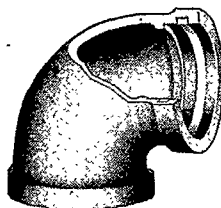
Crane-Seal Brass Valves and Fittings For Making Silbraz Joints

General Description of the Crane-Seal Silbraz Joint.....	page 490
Instructions for Making a Crane-Seal Silbraz Joint.....	page 491
Gate Valves.....	page 492
Globe and Angle Valves.....	page 493
Check Valves.....	page 492
150-Pound Fittings.....	pages 494 and 495
300-Pound Fittings.....	page 496
300-Pound Unions and Union Fittings.....	page 497
Copper Tubing and Brass and Copper Pipe.....	page 498

The name "Crane-Seal*", when used in connection with a Crane Brass Valve, Fitting, Union, Fitting, and Flange, indicates that that product is especially prepared for Oxy-Acetylene brazing. The recessed openings are bored within close tolerances to maintain predetermined clearances when used with Iron Pipe Size Outside Diameter standard weight, extra heavy weight, and Type B (thin wall) brass or copper pipe or tubing.

Further indicated by the name "Crane-Seal", is that each product so identified is equipped with Sil-Fos brazing alloy ring inserts. The Sil-Fos brazing alloy, made by Handy & Harmon Co., has

better resistance to corrosion than copper or brass pipe; it has rendered excellent service throughout wide usage in non-ferrous piping installations.



The recessed opening in a Crane-Seal Valve or Fitting, the preinserted Sil-Fos, and the procedure for making up on non-ferrous pipe produce a "Silbraz* Joint". Because of these three features in combination, it is comparatively easy to obtain uniformly strong and tight piping connections where vibration, temperature changes, pressure, and corrosion are factors. A Crane-Seal Silbraz installation is a close approach to a one-piece pipe line.

*Reg. U.S. Pat. Off.

Manufacture of these products is licensed under U.S. Pat. No. 2,050,728

General Applications

The following paragraphs outline some representative applications for Crane-Seal Silbraz Brass Valves and Fittings. Within the scope of each of these uses may be encountered a wide variety of service conditions. Reference, therefore, is made in a general sense rather than specifically.

Buildings — Hot and cold water lines.

— Steam heating and return lines.

Crane-Seal 150-Pound Brass Valves, Fittings, and Flanges.

Boiler plants — Water treatment lines.

Crane-Seal 150-Pound Brass Valves, Fittings, and Flanges.

— Boiler feed lines.

Crane-Seal 150 or 300-Pound Brass Valves, Fittings, and Flanges to meet the requirements of Codes covering these lines.

Process piping — Water, steam, and air lines, or chemical piping where brass or copper is suitable.

Crane-Seal 150 or 300-Pound Brass Valves, Fittings, and Flanges.

Marine piping — For Class II piping as given in Rules and Regulations of the Bureau of Marine Inspection and Navigation.

Crane-Seal 150-Pound Brass Valves, Fittings, and Flanges.

Refrigeration and Air Conditioning —

— For refrigerating fluid lines.

Crane-Seal 150-Pound Brass Fittings and Flanges.

— For water, steam, and vacuum lines.

Crane-Seal 150-Pound Brass Valves, Fittings, and Flanges.

— For water and refrigerant coils.

Crane-Seal headers made special to order.

— For water, steam, and refrigerant coils.

Crane-Seal Brass Return Bends.

Railroads; Diesel Locomotives; and Cars —

— Fuel oil, lubricating oil, and oil control lines.

— Circulating water and steam heating lines.

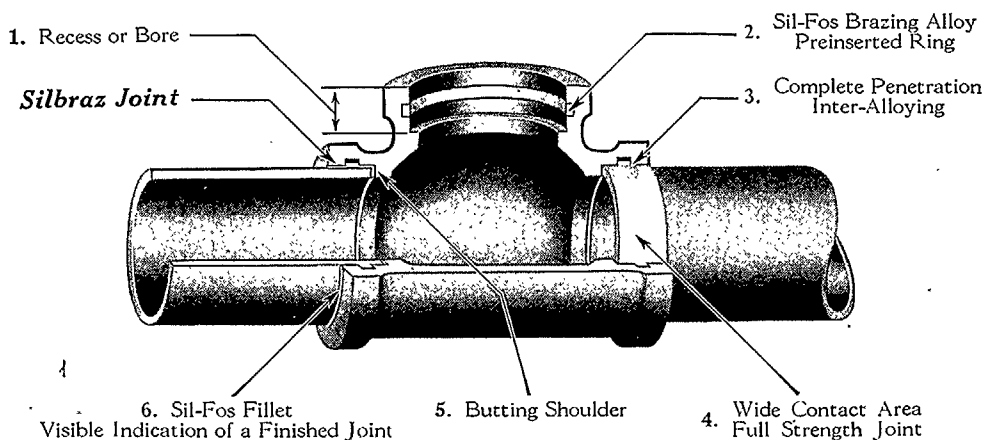
— Air, water, and steam lines.

Crane-Seal Brass Valves, Fittings, Unions, Union Fittings, and Flanges; 150 or 300-Pound, depending upon operating pressure requirements.

— Refrigerant lines.

Crane-Seal 150-Pound Brass Fittings and Flanges.

General Description Crane-Seal Silbraz Joints



The above illustration of a Crane-Seal Silbraz assembly, partially sectioned, indicates the following important features.

1. The recess or bore is amply deep; it is accurately machined to maintain a close predetermined clearance area over the pipe.
2. The Sil-Fos brazing alloy ring insert, installed at the factory, assures the user that the correct type and quantity of brazing metal is employed. Application is controlled and waste of expensive materials is eliminated. There is an ample quantity of alloy in the insert to remake the joint, if necessary.
3. While at a fusing temperature and under pressure due to the unstretching of the fitting band, the Sil-Fos actually penetrates into and inter-alloys with the surfaces of the pipe and fitting. The bond thus formed is stronger than the parts joined.
4. The Sil-Fos flows over the pipe through the entire clearance area and depth of the recess uniformly, to make a wide and unbroken contact. Full strength is assured. Under actual tests of vibration, tension, and pressure the Crane-Seal Silbraz joints remained tight.
5. A square shoulder at the bottom of the bore limits the distance that the pipe can be inserted and provides a dam for the brazing alloy.
6. In the final stage of flow, the molten Sil-Fos forms a fillet at the end of the fitting adjoining the pipe. This continuous fillet of Sil-Fos appearing around the pipe is visible proof that the Crane-Seal Silbraz joint is completed.

Crane-Seal Silbraz Brass Valves, Fittings, Flanges, Unions, and Union Fittings are regularly made with ends bored for Standard Iron Pipe Size Outside Diameter brass pipe or copper tubing. These pipe sizes of brass or copper pipe may be standard weight, extra heavy weight, or Type B (Thin Wall).

Crane-Seal products for pipe or tubing of other diameters are considered special and will be made to order only.

Special valves, fittings, and flanges can be made to order. When special products are desired, requests for prices should include complete data on quantities, detail dimensions, and service conditions.

Working Data
Crane-Seal Brass Fittings on I.P.S. Brass or Copper Pipe

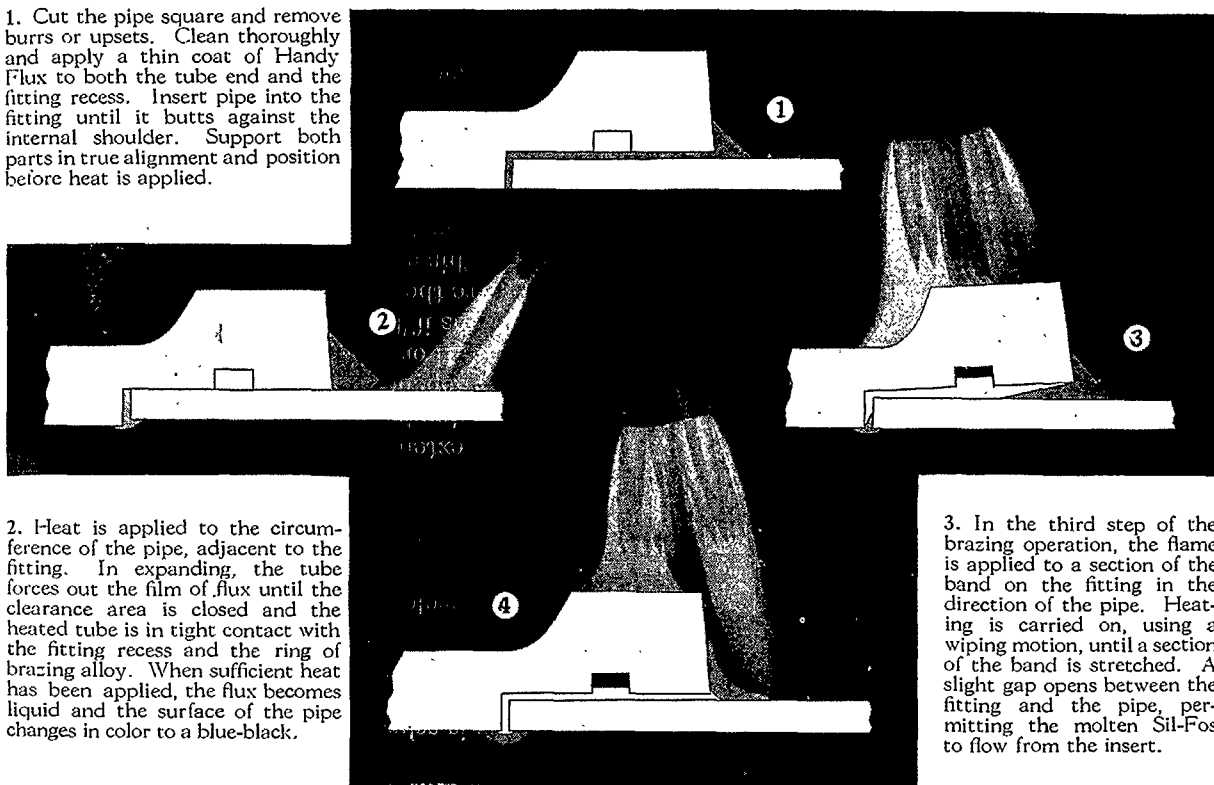
Pipe Size Inches	*Tip Size Number	Heating Time Minutes	Oxygen Cubic Feet	Acetylene Cubic Feet	Observed Joints Per Hour	†Point of Application of heat	Depth of Bore Inches
1/8	4	1/3	1/10	1/10	.....	1/2	13/64
1/4	4	1/2	1/8	1/8	.....	3/4	17/64
3/8	4	1/2	1/8	1/8	.....	3/4	5/16
1/2	5	2/3	1/4	1/4	40-50	3/4	3/8
3/4	6	3/4	3/8	3/8	35-45	3/4	13/32
1	6	1	1/2	1/2	30-42	1	7/16
1 1/4	7	1 1/4	3/4	3/4	24-34	1	1/2
1 1/2	7	1 1/2	1	1	22-28	1 1/2	5/8
2	8	2 1/4	1 1/3	1 1/3	15-20	1 1/2	21/32
2 1/2	8	2 1/2	1 3/3	1 3/3	12-15	1 1/2	25/32
3	9	3 1/2	3 1/2	3 1/2	9-14	1 1/2	53/64
3 1/2	9	4	4 1/2	4 1/2	8-12	1 1/2	7/8
4	10	5	6	6	7-12	2	29/32
5	10	6	7	7	5-10	2	1
6	11	7 1/2	10	10	6-8	2	1 1/4
8	12	9	12	12	.....	2	1 5/16

*Size of tip, based on Airco D-B torch, Styles 9800 and 9900. For ideal conditions the gas pressure on the regulators is the same as the tip number. If running a line of 3/4-inch pipe branching into 1/2-inch pipe, it is not necessary to change from a No. 6 tip to a No. 5 tip at each branch.

†The values shown in this column are inches; they represent the approximate distance from the fitting end to the point of application of heat to the pipe.

Instructions for Making Silbraz Joints with Crane-Seal Valves and Fittings

1. Cut the pipe square and remove burrs or upsets. Clean thoroughly and apply a thin coat of Handy Flux to both the tube end and the fitting recess. Insert pipe into the fitting until it butts against the internal shoulder. Support both parts in true alignment and position before heat is applied.



2. Heat is applied to the circumference of the pipe, adjacent to the fitting. In expanding, the tube forces out the film of flux until the clearance area is closed and the heated tube is in tight contact with the fitting recess and the ring of brazing alloy. When sufficient heat has been applied, the flux becomes liquid and the surface of the pipe changes in color to a blue-black.

3. In the third step of the brazing operation, the flame is applied to a section of the band on the fitting in the direction of the pipe. Heating is carried on, using a wiping motion, until a section of the band is stretched. A slight gap opens between the fitting and the pipe, permitting the molten Sil-Fos to flow from the insert.

4. Both the pipe and the fitting are heated, applying the flame in a wiping motion, to a uniform brazing temperature throughout this section of the joint.

The flame is then withdrawn, and the fitting band, unstretching as it cools, exerts a pressure on the molten Sil-Fos to effect its complete penetration into the surfaces of both the pipe and the fitting. Under pressure, the Sil-Fos also flows throughout the clearance area in both directions until a fillet appears at the edge of the fitting. This operation assures a complete bonding and fusing of the brazing alloy with the pipe and fitting. If the fillet does not appear immediately, steps 3 and 4 are repeated to pump more Sil-Fos from the insert. Joints must not be strained while cooling.

These illustrations and explanatory notes demonstrate the correct procedure for making a Crane-Seal Silbraz Joint. Note particularly, that the preinserted Sil-Fos brazing alloy is within the joint, ready for the brazing operation.

Care in making the joint and observance of the following precautionary measures, will result in strong and tight joints.

Preparation of the joint is comparatively simple and easy. The pipe must be cut square, free from burrs or upsets, and it must not be deformed or made undersize. In cleaning the pipe, use emery cloth and brighten up a length greater than the depth of the fitting recess.

An OXY-ACETYLENE flame is required for this joint. The size of the tip and the point of application of the heat to the pipe should conform to the table of Working Data, shown on the preceding page.

The "Four Steps" indicated in the above illustrations show the procedure to be followed for each quarter-section of the joint. When the fillet is clearly visible, the next adjacent quarter-section is similarly treated until, through repeated operations, the entire circumference is covered. When the Sil-Fos appears as a continuous fillet all around the pipe, the joint is finished.

A joint is not completed in its entire circumference at one time, except on pipe sizes $\frac{1}{2}$ -inch and smaller

where the alloy will flow out over the full circumference. This is due to the small size, and best results are here obtained by making the joint quickly and with a minimum amount of heat.

Excess heat enlarges the clearance and retards, rather than hastens, the flow of the alloy. If in a section being heated, the fitting or pipe becomes bright in color, heat should be withdrawn.

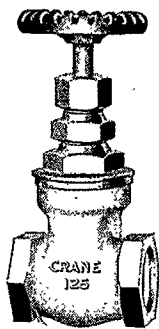
Valve joints are made by the same process. The valves must be open while the joints are being made. While heat does not usually discolor a valve bonnet, yet to be positively assured, it should be wrapped in a wet swab.

Unions should be assembled tightly by hand while making the joints, to avoid seat distortion.

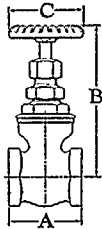
Discoloration may be removed from valves, fittings, and pipe by brushing. The original color can often be restored also, by washing the joints with water, while warm.

Crane-Seal Brass Gate and Check Valves

For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe



No. 438 CS
Wedge Disc Gate Valve
Non-Rising Stem
WORKING PRESSURES
125 pounds steam
200 pounds cold water, oil,
or gas, non-shock



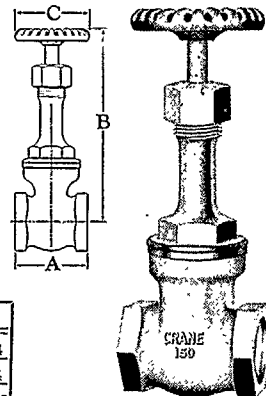
No. 438 CS, Non-Rising Stem Gate Valves are suitable for steam, water, oil, or gas service.

Size	A	B	C
1/4	1 3/4	3 3/4	1 3/4
3/8	1 13/16	3 3/4	1 3/4
1/2	2	4 1/16	2 1/16
3/4	2 1/4	4 3/4	2 9/16
1	2 11/16	5 5/8	2 3/4
1 1/4	3	6 1/2	3 1/16
1 1/2	3 1/4	7 1/4	3 5/8
2	3 11/16	8 5/8	4 1/16
2 1/2	4 1/4	10	4 3/4
3	4 11/16	11 1/8	5 3/8

Gate Valves

These valves, when wide open, can be repacked while under pressure.

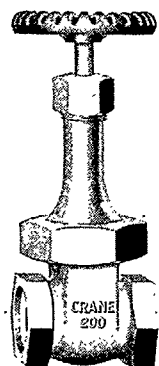
No. 431 CS, Rising Stem Gate Valves have a solid brass wedge disc which slips onto the stem. These valves are recommended for steam, water, oil, or gas.



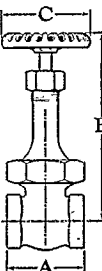
No. 431 CS
Wedge Disc Gate Valve
Rising Stem

WORKING PRESSURES
150 pounds steam
300 pounds cold water, oil,
or gas, non-shock

Size	A	B—open	C
1/4	1 7/8	5 1/8	1 3/4
3/8	1 15/16	5 1/8	1 3/4
1/2	2 1/8	5 1/2	2 1/16
3/4	2 5/8	6 5/8	2 9/16
1	2 7/8	7 7/8	2 3/4
1 1/4	3 3/16	9 1/2	3 1/16
1 1/2	3 7/16	10 7/8	3 5/8
2	3 7/8	13 1/8	4 1/16
2 1/2	4 1/2	15 5/8	4 3/4
3	4 15/16	17 7/8	5 3/8



No. 422 CS
Wedge Disc Gate Valve
Rising Stem
WORKING PRESSURES
200 pounds steam, 500° F.
400 pounds cold water, oil,
or gas, non-shock



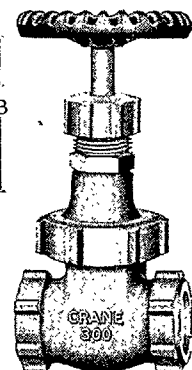
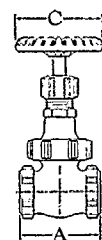
No. 422 CS, Rising Stem Gate Valves have a solid Crane Nickel Alloy Disc. The 2 1/2 and 3-inch sizes have bolted bonnets; smaller sizes have a union bonnet.

These valves are recommended for severe services in steam, water, oil, or gas lines.

Size	A	B—open	C
1/4	1 3/4	3 7/8	1 3/4
3/8	2	4 1/4	2 1/16
1/2	2 1/4	5 5/8	2 9/16
3/4	2 9/16	6 7/8	2 3/4
1	2 7/8	8	3 1/16
1 1/4	3 3/16	9 3/8	3 5/8
1 1/2	3 1/2	10 5/8	4 1/16
2	4	12 7/8	4 3/4
2 1/2	4 11/16	15 1/2	5 3/8
3	5 1/4	17 7/8	6

No. 624 E-CS, Non-Rising Stem Gate Valves have a Crane Nickel Alloy Disc. Sizes 1 1/4-inch and larger have a bolted bonnet; smaller sizes have a union bonnet.

These valves are ideal for the more severe services.

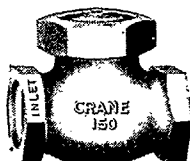


No. 624 E-CS
Wedge Disc Gate Valve
Non-Rising Stem

WORKING PRESSURES
300 pounds steam, 550° F.
600 pounds cold water, oil,
or gas, non-shock

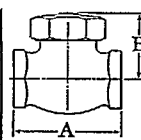
Size	A	B	C
1/4	1 15/16	3 5/8	2 1/16
3/8	2 1/16	4 3/8	2 9/16
1/2	2 3/8	4 13/16	2 3/4
3/4	2 3/4	5 3/8	3 1/16
1	3 1/4	6 3/8	3 5/8
1 1/4	3 1/2	7 3/16	4 1/16
1 1/2	3 3/4	8	4 3/4
2	4 5/16	9 5/16	5 3/8
2 1/2	5 3/16	10 3/8	5 5/8
3	5 5/8	11 7/8	6

Check Valves

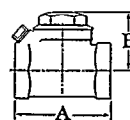


No. 27 CS, Horizontal Lift Check Valve Composition Disc. 2-inch and smaller have union cap; 2 1/2 and 3-inch have bolted cap.
WORKING PRESSURES — 150 pounds steam
300 pounds cold water, oil, or gas, non-shock

Size	A	B	Size	A	B
1/4	2	1 5/8	1 1/4	4 1/4	2 5/8
3/8	2 5/16	1 1/2	1 1/2	4 3/4	3
1/2	2 11/16	1 3/4	2	5 3/4	3 1/2
3/4	3 3/16	2	2 1/2	6 3/4	3 3/2
1	3 3/4	2 1/4	3	8	3 7/8



No. 27 CS

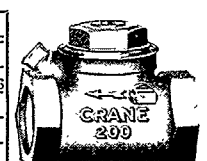


No. 35 CS

No. 35 CS, Swing Check Valve Regrinding Type Brass Disc

WORKING PRESSURES
200 pounds steam, 500° F.
400 pounds cold water, oil, or gas, non-shock

Size	A	B	Size	A	B
1/4	2	1 5/16	1 1/4	3 13/16	2 3/8
3/8	2 3/16	1 5/16	1 1/2	4 1/4	2 11/16
1/2	2 1/2	1 7/16	2	5 5/16	3 3/16
3/4	2 3/4	1 11/16	2 1/2	6	3 3/4
1	3 1/4	2	3	7	4 5/16



Prices on application

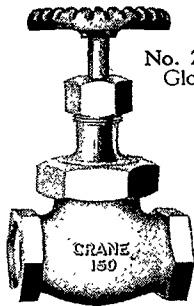
Sizes and dimensions are in inches.

Description of joint.....pages 489 to 491

Crane-Seal Brass Globe and Angle Valves

For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe

These valves, when wide open, can be repacked while under pressure.



No. 7 CS
Globe

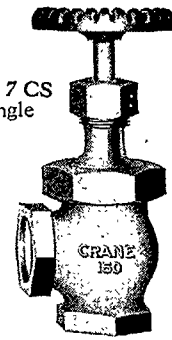
150-Pound Renewable Composition Disc

WORKING PRESSURES — 150 pounds steam
— 300 pounds cold water, oil, or gas, non-shock

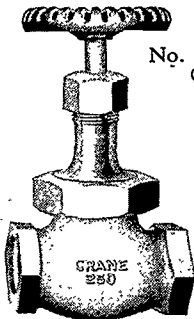
Discs: Unless otherwise ordered, No. 4 Cranite Discs for high pressure steam are furnished. For hot water, gas, oil, or gasoline, use No. 2 Discs. For cold water or air, use No. 3 Discs.

Bonnet design: Valves 2-inch and smaller have union bonnets, as illustrated; 2½ and 3-inch sizes have bolted bonnets.

Specify whether globe or angle valves are wanted.



No. 7 CS
Angle



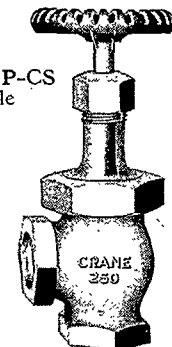
No. 212 P-CS
Globe

250-Pound Plug Type Disc

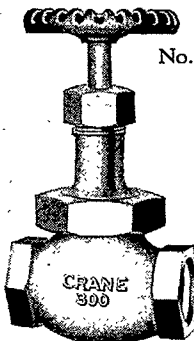
WORKING PRESSURES — 250 pounds steam, 500° F.
— 500 pounds cold water, oil, or gas, non-shock

Disc and seat: The plug type disc and seat, made of Crane Nickel Alloy and Exelloy, respectively, have a wide and tapered seating surface. Throttling and severe wire-drawing conditions are easily served and long wear is assured.

Bonnet design: Valves 2-inch and smaller have union bonnets, as illustrated; 2½ and 3-inch sizes have bolted bonnets.



No. 214 P-CS
Angle



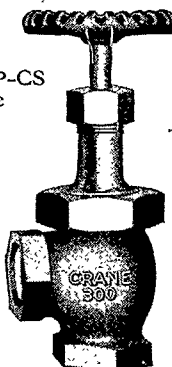
No. 382 P-CS
Globe

300-Pound Plug Type Disc

WORKING PRESSURES — 300 pounds steam, 550° F.
— 600 pounds cold water, oil, or gas, non-shock

Disc and seat: These valves have a plug type disc and seat; the disc is Crane Nickel Alloy and the seat is Exelloy. The combination of these metals with a wide and tapered seating surface offers unusual resistance to wire-drawing, galling, and wear. Throttling is easily obtained.

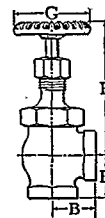
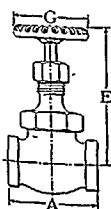
Bonnet design: Valves 2-inch and smaller have union bonnets, as illustrated; 2½ and 3-inch sizes have bolted bonnets.



No. 384 P-CS
Angle

Dimensions, in Inches

Catalog Number	Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
150-Pound No. 7 CS, Globe No. 7 CS, Angle	A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	6 3/4	8
	B	1 5/16	1 11/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 1/4	3 3/16
	E—Open	4	4 1/2	5	5 5/8	6 3/8	7 1/8	7 7/8	9 1/8	11	12 1/4
	F—Open	3 7/8	4 3/8	4 7/8	5 1/2	6 1/4	7	7 5/8	8 7/8	10 7/8	12
	G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	7	8
250-Pound No. 212 P-CS, Globe No. 214 P-CS, Angle	A	2	2 5/16	2 11/16	3 3/16	3 3/4	4 1/4	4 3/4	5 3/4	7 1/4	8 1/4
	B	1 5/16	1 11/16	1 1/4	1 7/16	1 11/16	2	2 3/16	2 11/16	3 5/8	4 1/8
	E—Open	4 1/8	4 3/4	5 3/8	6	6 3/4	7 5/8	8 5/8	10	11 1/4	12 3/4
	F—Open	4 1/8	4 5/8	5 1/4	5 7/8	6 5/8	7 1/2	8 1/2	9 3/4	10 1/4	11 3/4
	G	1 3/4	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	5 3/8	7	8
300-Pound No. 382 P-CS, Globe No. 384 P-CS, Angle	A	2 1/4	2 1/2	2 15/16	3 1/2	4 1/8	4 3/4	5 1/4	6 3/8	7 1/2	8 1/2
	B	1 1/8	1 1/4	1 1/2	1 3/4	2 1/16	2 3/8	2 5/8	3 3/16	3 3/4	4 1/4
	E—Open	4 3/8	5 1/8	5 5/8	6 5/8	7 1/4	8 1/4	9 3/8	10 5/8	12	13 3/8
	F—Open	4 1/4	4 7/8	5 3/8	6 3/8	7	8	9	10 1/4	11	12 3/8
	G	2 1/16	2 9/16	2 3/4	3 1/16	3 5/8	4 1/16	4 3/4	6	7	8

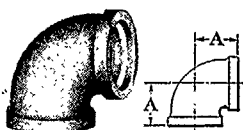


150-Pound Crane-Seal Brass Fittings

For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe

WORKING PRESSURES

150 pounds steam
300 pounds cold water, oil, or gas, non-shock
Air Tested



90° Elbows

Size	A
1/4	1 11/16
3/8	1 3/16
1/2	1
3/4	1 3/16
1	1 7/16
1 1/4	1 11/16
1 1/2	1 13/16
2	2 1/8
2 1/2	2 11/16
3	3 1/16
3 1/2	3 7/16
4	3 3/4
5	4 1/2
6	5 1/8
8	6 9/16

10 and 12" sizes can also be furnished.



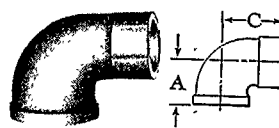
90° Reducing Elbows

3/8 x 1/4	1 1/2 x 3/4	3 x 1 1/2
1/2 x 3/8	1 1/2 x 1	3 x 2
1/2 x 3/8	1 1/2 x 1 1/4	3 x 2 1/2
3/4 x 1/4	2 x 3/4	4 x 2
3/4 x 3/8	2 x 1	4 x 2 1/2
3/4 x 1/2	2 x 1 1/4	4 x 3
1 x 3/8	2 x 1 1/2	5 x 3
1 x 1/2	2 1/2 x 1 1/4	5 x 4
1 x 3/4	2 1/2 x 1 1/2	6 x 2 1/2
1 1/4 x 1/2	2 1/2 x 2	6 x 4
1 1/4 x 3/4		8 x 6
1 1/4 x 1	Dimensions on request.	

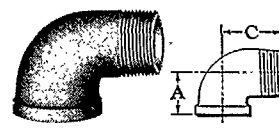


45° Elbows

Size	B	Size	B
1/4	9/16	2 1/2	1 15/16
3/8	5/8	3	2 3/16
1/2	3/4	3 1/2	2 3/8
3/4	7/8	4	2 5/8
1	1 1/16	5	3 1/16
1 1/4	1 1/4	6	3 7/16
1 1/2	1 5/16	8	4 1/4
2	1 7/16	10" and 12"	sizes can also be furnished.



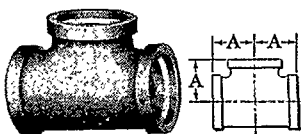
Female to Male Crane-Seal



Female Crane-Seal to Male Thread

90° Street Elbows

Size	A	C
1/4	1 11/16	1 1/8
3/8	1 3/16	1 1/4
1/2	1	1 1/2
3/4	1 3/16	1 11/16
1	1 7/16	2
1 1/4	1 11/16	2 1/4
1 1/2	1 13/16	2 7/16
2	2 1/8	2 7/8



Tees

Size	A
1/4	1 11/16
3/8	1 3/16
1/2	1
3/4	1 3/16
1	1 7/16
1 1/4	1 11/16
1 1/2	1 13/16
2	2 1/8
2 1/2	2 11/16
3	3 1/16
3 1/2	3 7/16
4	3 3/4
5	4 1/2
6	5 1/8
8	6 9/16

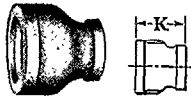
10 and 12" sizes can also be furnished.

1/4 x 1/4 x 3/8	1 x 1 1/2 x 3/4
3/8 x 1/4 x 1/4	1 x 1 1/2 x 1
3/8 x 1/4 x 3/8	1 x 3/4 x 3/8
3/8 x 3/8 x 1/4	1 x 3/4 x 1/2
3/8 x 3/8 x 1/2	1 x 3/4 x 3/4
1/2 x 1/4 x 1/2	1 x 3/4 x 1
1/2 x 3/8 x 3/8	1 x 1 x 1/4
1/2 x 3/8 x 1/2	1 x 1 x 3/8
1/2 x 1/2 x 1/4	1 x 1 x 1/2
1/2 x 1/2 x 3/8	1 x 1 x 3/4
1/2 x 1/2 x 1/2	1 x 1 x 1 1/4
3/4 x 3/8 x 3/8	1 x 1 x 1 1/2
3/4 x 3/8 x 1/2	1 1/4 x 1 1/4 x 1/2
3/4 x 1/2 x 3/8	1 1/4 x 1 1/4 x 3/4
3/4 x 1/2 x 1/2	1 1/4 x 1 1/4 x 1
3/4 x 1/2 x 3/4	1 1/4 x 1 1/4 x 1 1/2
3/4 x 3/4 x 3/8	1 1/2 x 1 1/2 x 1/2
3/4 x 3/4 x 1/2	1 1/2 x 1 1/2 x 1
3/4 x 3/4 x 3/4	1 1/2 x 1 1/2 x 1 1/4
3/4 x 1/2 x 1	1 1/2 x 1 1/2 x 2
1/2 x 1/2 x 1	1 1/2 x 1 1/2 x 3
1/2 x 1/2 x 1 1/4	1 1/2 x 1 1/2 x 4
1/2 x 1/2 x 1 1/2	1 1/2 x 1 1/2 x 5
1/2 x 1/2 x 2	1 1/2 x 1 1/2 x 6
1/2 x 1/2 x 3	1 1/2 x 1 1/2 x 8
1/2 x 1/2 x 4	1 1/2 x 1 1/2 x 10
1/2 x 1/2 x 6	1 1/2 x 1 1/2 x 12
1/2 x 1/2 x 8	1 1/2 x 1 1/2 x 14
1/2 x 1/2 x 10	1 1/2 x 1 1/2 x 16
1/2 x 1/2 x 12	1 1/2 x 1 1/2 x 18
1/2 x 1/2 x 14	1 1/2 x 1 1/2 x 20
1/2 x 1/2 x 16	1 1/2 x 1 1/2 x 22
1/2 x 1/2 x 18	1 1/2 x 1 1/2 x 24
1/2 x 1/2 x 20	1 1/2 x 1 1/2 x 26
1/2 x 1/2 x 22	1 1/2 x 1 1/2 x 28
1/2 x 1/2 x 24	1 1/2 x 1 1/2 x 30
1/2 x 1/2 x 26	1 1/2 x 1 1/2 x 32
1/2 x 1/2 x 28	1 1/2 x 1 1/2 x 34
1/2 x 1/2 x 30	1 1/2 x 1 1/2 x 36
1/2 x 1/2 x 32	1 1/2 x 1 1/2 x 38
1/2 x 1/2 x 34	1 1/2 x 1 1/2 x 40
1/2 x 1/2 x 36	1 1/2 x 1 1/2 x 42
1/2 x 1/2 x 38	1 1/2 x 1 1/2 x 44
1/2 x 1/2 x 40	1 1/2 x 1 1/2 x 46
1/2 x 1/2 x 42	1 1/2 x 1 1/2 x 48
1/2 x 1/2 x 44	1 1/2 x 1 1/2 x 50
1/2 x 1/2 x 46	1 1/2 x 1 1/2 x 52
1/2 x 1/2 x 48	1 1/2 x 1 1/2 x 54
1/2 x 1/2 x 50	1 1/2 x 1 1/2 x 56
1/2 x 1/2 x 52	1 1/2 x 1 1/2 x 58
1/2 x 1/2 x 54	1 1/2 x 1 1/2 x 60
1/2 x 1/2 x 56	1 1/2 x 1 1/2 x 62
1/2 x 1/2 x 58	1 1/2 x 1 1/2 x 64
1/2 x 1/2 x 60	1 1/2 x 1 1/2 x 66
1/2 x 1/2 x 62	1 1/2 x 1 1/2 x 68
1/2 x 1/2 x 64	1 1/2 x 1 1/2 x 70
1/2 x 1/2 x 66	1 1/2 x 1 1/2 x 72
1/2 x 1/2 x 68	1 1/2 x 1 1/2 x 74
1/2 x 1/2 x 70	1 1/2 x 1 1/2 x 76
1/2 x 1/2 x 72	1 1/2 x 1 1/2 x 78
1/2 x 1/2 x 74	1 1/2 x 1 1/2 x 80
1/2 x 1/2 x 76	1 1/2 x 1 1/2 x 82
1/2 x 1/2 x 78	1 1/2 x 1 1/2 x 84
1/2 x 1/2 x 80	1 1/2 x 1 1/2 x 86
1/2 x 1/2 x 82	1 1/2 x 1 1/2 x 88
1/2 x 1/2 x 84	1 1/2 x 1 1/2 x 90
1/2 x 1/2 x 86	1 1/2 x 1 1/2 x 92
1/2 x 1/2 x 88	1 1/2 x 1 1/2 x 94
1/2 x 1/2 x 90	1 1/2 x 1 1/2 x 96
1/2 x 1/2 x 92	1 1/2 x 1 1/2 x 98
1/2 x 1/2 x 94	1 1/2 x 1 1/2 x 100
1/2 x 1/2 x 96	1 1/2 x 1 1/2 x 102
1/2 x 1/2 x 98	1 1/2 x 1 1/2 x 104
1/2 x 1/2 x 100	1 1/2 x 1 1/2 x 106
1/2 x 1/2 x 102	1 1/2 x 1 1/2 x 108
1/2 x 1/2 x 104	1 1/2 x 1 1/2 x 110
1/2 x 1/2 x 106	1 1/2 x 1 1/2 x 112
1/2 x 1/2 x 108	1 1/2 x 1 1/2 x 114
1/2 x 1/2 x 110	1 1/2 x 1 1/2 x 116
1/2 x 1/2 x 112	1 1/2 x 1 1/2 x 118
1/2 x 1/2 x 114	1 1/2 x 1 1/2 x 120
1/2 x 1/2 x 116	1 1/2 x 1 1/2 x 122
1/2 x 1/2 x 118	1 1/2 x 1 1/2 x 124
1/2 x 1/2 x 120	1 1/2 x 1 1/2 x 126
1/2 x 1/2 x 122	1 1/2 x 1 1/2 x 128
1/2 x 1/2 x 124	1 1/2 x 1 1/2 x 130
1/2 x 1/2 x 126	1 1/2 x 1 1/2 x 132
1/2 x 1/2 x 128	1 1/2 x 1 1/2 x 134
1/2 x 1/2 x 130	1 1/2 x 1 1/2 x 136
1/2 x 1/2 x 132	1 1/2 x 1 1/2 x 138
1/2 x 1/2 x 134	1 1/2 x 1 1/2 x 140
1/2 x 1/2 x 136	1 1/2 x 1 1/2 x 142
1/2 x 1/2 x 138	1 1/2 x 1 1/2 x 144
1/2 x 1/2 x 140	1 1/2 x 1 1/2 x 146
1/2 x 1/2 x 142	1 1/2 x 1 1/2 x 148
1/2 x 1/2 x 144	1 1/2 x 1 1/2 x 150
1/2 x 1/2 x 146	1 1/2 x 1 1/2 x 152
1/2 x 1/2 x 148	1 1/2 x 1 1/2 x 154
1/2 x 1/2 x 150	1 1/2 x 1 1/2 x 156
1/2 x 1/2 x 152	1 1/2 x 1 1/2 x 158
1/2 x 1/2 x 154	1 1/2 x 1 1/2 x 160
1/2 x 1/2 x 156	1 1/2 x 1 1/2 x 162
1/2 x 1/2 x 158	1 1/2 x 1 1/2 x 164
1/2 x 1/2 x 160	1 1/2 x 1 1/2 x 166
1/2 x 1/2 x 162	1 1/2 x 1 1/2 x 168
1/2 x 1/2 x 164	1 1/2 x 1 1/2 x 170
1/2 x 1/2 x 166	1 1/2 x 1 1/2 x 172
1/2 x 1/2 x 168	1 1/2 x 1 1/2 x 174
1/2 x 1/2 x 170	1 1/2 x 1 1/2 x 176
1/2 x 1/2 x 172	1 1/2 x 1 1/2 x 178
1/2 x 1/2 x 174	1 1/2 x 1 1/2 x 180
1/2 x 1/2 x 176	1 1/2 x 1 1/2 x 182
1/2 x 1/2 x 178	1 1/2 x 1 1/2 x 184
1/2 x 1/2 x 180	1 1/2 x 1 1/2 x 186
1/2 x 1/2 x 182	1 1/2 x 1 1/2 x 188
1/2 x 1/2 x 184	1 1/2 x 1 1/2 x 190
1/2 x 1/2 x 186	1 1/2 x 1 1/2 x 192
1/2 x 1/2 x 188	1 1/2 x 1 1/2 x 194
1/2 x 1/2 x 190	1 1/2 x 1 1/2 x 196
1/2 x 1/2 x 192	1 1/2 x 1 1/2 x 198
1/2 x 1/2 x 194	1 1/2 x 1 1/2 x 200
1/2 x 1/2 x 196	1 1/2 x 1 1/2 x 202
1/2 x 1/2 x 198	1 1/2 x 1 1/2 x 204
1/2 x 1/2 x 200	1 1/2 x 1 1/2 x 206
1/2 x 1/2 x 202	1 1/2 x 1 1/2 x 208
1/2 x 1/2 x 204	1 1/2 x 1 1/2 x 210
1/2 x 1/2 x 206	1 1/2 x 1 1/2 x 212
1/2 x 1/2 x 208	1 1/2 x 1 1/2 x 214
1/2 x 1/2 x 210	1 1/2 x 1 1/2 x 216
1/2 x 1/2 x 212	1 1/2 x 1 1/2 x 218
1/2 x 1/2 x 214	1 1/2 x 1 1/2 x 220
1/2 x 1/2 x 216	1 1/2 x 1 1/2 x 222
1/2 x 1/2 x 218	1 1/2 x 1 1/2 x 224
1/2 x 1/2 x 220	1 1/2 x 1 1/2 x 226
1/2 x 1/2 x 222	1 1/2 x 1 1/2 x 228
1/2 x 1/2 x 224	1 1/2 x 1 1/2 x 230
1/2 x 1/2 x 226	1 1/2 x 1 1/2 x 232
1/2 x 1/2 x 228	1 1/2 x 1 1/2 x 234
1/2 x 1/2 x 230	1 1/2 x 1 1/2 x 236
1/2 x 1/2 x 232	1 1/2 x 1 1/2 x 238
1/2 x 1/2 x 234	1 1/2 x 1 1/2 x 240
1/2 x 1/2 x 236	1 1/2 x 1 1/2 x 242
1/2 x 1/2 x 238	1 1/2 x 1 1/2 x 244
1/2 x 1/2 x 240	1 1/2 x 1 1/2 x 246
1/2 x 1/2 x 242	1 1/2 x 1 1/2 x 248
1/2 x 1/2 x 244	1 1/2 x 1 1/2 x 250
1/2 x 1/2 x 246	1 1/2 x 1 1/2 x 252
1/2 x 1/2 x 248	1 1/2 x 1 1/2 x 254
1/2 x 1/2 x 250	1 1/2 x 1 1/2 x 256
1/2 x 1/2 x 252	1 1/2 x 1 1/2 x 258
1/2 x 1/2 x 254	1 1/2 x 1 1/2 x 260
1/2 x 1/2 x 256	1 1/2 x 1 1/2 x 262
1/2 x 1/2 x 258	1 1/2 x 1 1/2 x 264
1/2 x 1/2 x 260	1 1/2 x 1 1/2 x 266
1/2 x 1/2 x 262	1 1/2 x 1 1/2 x 268
1/2 x 1/2 x 264	1 1/2 x 1 1/2 x 270
1/2 x 1/2 x 266	1 1/2 x 1 1/2 x 272
1/2 x 1/2 x 268	1 1/2 x 1 1/2 x 274
1/2 x 1/2 x 270	1 1/2 x 1 1/2 x 276
1/2 x 1/2 x 272	1 1/2 x 1 1/2 x 278
1/2 x 1/2 x 274	1 1/2 x 1 1/2 x 280
1/2 x 1/2 x 276	1 1/2 x 1 1/2 x 282
1/2 x 1/2 x 278	1 1/2 x 1 1/2 x 284
1/2 x 1/2 x 280	1 1/2 x 1 1/2 x 286
1/2 x 1/2 x 282	1 1/2 x 1 1/2 x 288
1/2 x 1/2 x 284	1 1/2 x 1 1/2 x 290
1/2 x 1/2 x 286	1 1/2 x 1 1/2 x 292
1/2 x 1/2 x 288	1 1/2 x 1 1/2 x 294
1/2 x 1/2 x 290	1 1/2 x 1 1/2 x 296
1/2 x 1/2 x 292	1 1/2 x 1 1/2 x 298
1/2 x 1/2 x 294	1 1/2 x 1 1/2 x 300
1/2 x 1/2 x 296	1 1/2 x 1 1/2 x 302
1/2 x 1/2 x 298	1 1/2 x 1 1/2 x 304
1/2 x 1/2 x 300	1 1/2 x 1 1/2 x 306
1/2 x 1/2 x 302	1 1/2 x 1 1/2 x 308
1/2 x 1/2 x 304	1 1/2 x 1 1/2 x 310
1/2 x 1/2 x 306	1 1/2 x 1 1/2 x 312
1/2 x 1/2 x 308	1 1/2 x 1 1/2 x 314
1/2 x 1/2 x 310	1 1/2 x 1 1/2 x 316
1/2 x 1/2 x 312	1 1/2 x 1 1/2 x 318
1/2 x 1/2 x 314	1 1/2 x 1 1/2 x 320
1/2 x 1/2 x 316	1 1/2 x 1 1/2 x 322
1/2 x 1/2 x 318	1 1/2 x 1 1/2 x 324
1/2 x 1/2 x 320	1 1/2 x 1 1/2 x 326
1/2 x 1/2 x 322	1 1/2 x 1 1/2 x 328
1/2 x 1/2 x 324	1 1/2 x 1 1/2 x 330
1/2 x 1/2 x 326	1 1/2 x 1 1/2 x 332
1/2 x 1/2 x 328	1 1/2 x 1 1/2 x 334
1/2 x 1/2 x 330	1 1/2 x 1 1/2 x 336
1/2 x 1/2 x 332	1 1/2 x 1 1/2 x 338
1/2 x 1/2 x 334	1 1/2 x 1 1/2 x 340
1/2 x 1/2 x 336	1 1/2 x 1 1/2 x 342
1/2 x 1/2 x 338	1 1/2 x 1 1/2 x 344
1/2 x 1/2 x 340	1 1/2 x 1 1/2 x 346
1/2 x 1/2 x 342	1 1/2 x 1 1/2 x 348
1/2 x 1/2 x 344	1 1/2 x 1 1/2 x 350
1/2 x 1/2 x 346	1 1/2 x 1 1/2 x 352
1/2 x 1/2 x 348	1 1/2 x 1 1/2 x 354
1/2 x 1/2 x 350	1 1/2 x 1 1/2 x 356
1/2 x 1/2 x 352	1 1/2 x 1 1/2 x 358
1/2 x 1/2 x 354	1 1/2 x 1 1/2 x 360
1/2 x 1/2 x 356	1 1/2 x 1 1/2 x 362
1/2 x 1/2 x 358	1 1/2 x 1 1/2 x 364
1/2 x 1/2 x 360	1 1/2 x 1 1/2 x 366
1/2 x 1/2 x 362	1 1/2 x 1 1/2 x 368
1/2 x 1/2 x 364	1 1/2 x 1 1/2 x 370
1/2 x 1/2 x 366	1

150-Pound Crane-Seal Brass Fittings

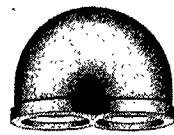
For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe

WORKING PRESSURES
(See the preceding page)

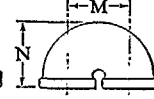


Taper Reducers

Size	K	Size	K	Size	K	Size	K
3/8 x 1/4	1	1 1/4 x 3/8	*	2 x 1	*	4 x 2	*
1/2 x 1/4	1 1/8	1 1/4 x 1/2	*	2 x 1 1/4	2	4 x 2 1/2	*
1/2 x 3/8	1 3/16	1 1/4 x 3/4	1 11/16	2 x 1 1/2	2 1/16	4 x 3	4 3/8
3/4 x 1/4	*	1 1/4 x 1	1 3/4	2 1/2 x 1	*	4 x 3 1/2	4 3/8
3/4 x 3/8	1 1/4	1 1/2 x 1/2	*	2 1/2 x 1 1/4	*	5 x 2	*
3/4 x 1/2	1 3/8	1 1/2 x 3/4	*	2 1/2 x 1 1/2	3 1/4	5 x 3	*
1 x 1/4	*	1 1/2 x 1	1 3/16	2 1/2 x 2	3 1/4	5 x 4	5
1 x 3/8	*	1 1/2 x 1 1/4	1 7/8	3 x 1 1/4	*	6 x 2	*
1 x 1/2	1 1/2	2 x 1/2	*	3 x 1 1/2	*	6 x 3	*
1 x 3/4	1 9/16	2 x 3/4	*	3 x 2	3 11/16	6 x 4	4 3/8
*Dimensions on application				3 x 2 1/2	3 11/16	8 x 6	5 1/4



Close Pattern



Open Pattern

Return Bends

Size	Close Pattern		Open Pattern	
	M	N	M	N
1/2	1	1 1/2	1 1/2	1 7/8
3/4	1 1/4	1 3/4	2	2 1/4
1	1 1/2	2 1/8	2 1/2	2 5/8
1 1/4	1 3/4	2 13/16	3	3 3/16
1 1/2	2 3/16	3	3 1/2	3 9/16
2	2 5/8	3 7/8	4	4 3/8



Caps

Size	H
1/4	9/16
3/8	5/8
1/2	3/4
3/4	13/16
1	1
1 1/4	1 1/8
1 1/2	1 1/8
2	1 5/16
2 1/2	1 11/16
3	1 13/16
3 1/2	1 7/8
4	2 1/16
5	2 5/16
6	2 3/8
8	3 1/8



Plugs
Square Head

Size
1/4
3/8
1/2
3/4
1
1 1/4
1 1/2
2
2 1/2
3
3 1/2
4
5



Couplings
Female Crane-Seal Ends

Size	J
1/4	1
3/8	1 1/16
1/2	1 5/16
3/4	1 7/16
1	1 11/16
1 1/4	1 7/8
1 1/2	1 15/16
2	2 3/16
2 1/2	2 7/8
3	3 3/16
3 1/2	3 7/16
4	3 11/16
5	4 3/16
6	4 3/4
8	5 3/4

10 and 12" on request

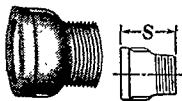


Bushings

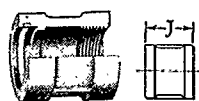
Female to Male Crane-Seal Ends

1/4 x 1/8	1 1/4 x 1/2	2 1/2 x 1
3/8 x 1/8	1 1/4 x 3/4	2 1/2 x 1 1/4
3/8 x 1/4	1 1/4 x 1	2 1/2 x 1 1/2
1/2 x 1/4	1 1/2 x 1/2	2 1/2 x 2
1/2 x 3/8	1 1/2 x 3/4	3 x 1
3/4 x 1/4	1 1/2 x 1	3 x 1 1/4
3/4 x 3/8	1 1/2 x 1 1/4	3 x 1 1/2
3/4 x 1/2	2 x 3/4	3 x 2
1 x 1/4	2 x 1	3 x 2 1/2
1 x 3/8	2 x 1 1/4	3 1/2 x 3
1 x 1/2	2 x 1 1/2	4 x 1 1/4
1 x 3/4		4 x 1 1/2
		4 x 2
		4 x 2 1/2
		4 x 3

These Bushings can be used with either 150 or 300-Pound Fittings.



Female Crane-Seal to Male I.P.S. Thread



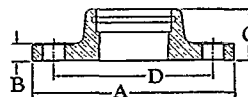
Female Crane-Seal to Female I.P.S. Thread

Adapters

Size	S	J	Size	S	J
1/4	1	1	2 1/2	2 5/8	2 7/8
3/8	1 1/16	1 1/16	3	2 3/4	3 3/16
1/2	1 5/16	1 5/16	3 1/2		3 7/16
3/4	1 3/8	1 7/16	4		3 11/16
1	1 5/8	1 11/16	5		4 3/16
1 1/4	1 11/16	1 7/8	6		4 3/4
1 1/2	1 7/8	1 15/16	8		5 3/4
2	2	2 3/16	10 and 12" Female Adapters on request.		

Prices on application

Sizes and dimensions are in inches.



Pipe Flanges
Iron Pipe Size

Size	A	B	C	D	Bolts No.	Dia.
1/2	3 1/2	5/16	1	2 3/8	4	1 1/2
3/4	3 7/8	11/32	1 1/16	2 3/4	4	1 1/2
1	4 1/4	3/8	1 5/32	3 1/8	4	1 1/2
1 1/4	4 5/8	13/32	1 9/32	3 1/2	4	1 1/2
1 1/2	5	7/16	1 7/16	3 3/8	4	1 1/2
2	6	1/2	1 17/32	4 3/4	4	5/8
2 1/2	7	9/16	1 25/32	5 1/2	4	5/8
3	7 1/2	5/8	1 27/32	6	4	5/8
3 1/2	8 1/2	11/16	2	7	8	5/8
4	9	1 1/16	2 3/32	7 1/2	8	5/8
5	10	3/4	2 5/16	8 1/2	8	3/4
6	11	13/16	2 1/2	9 1/2	8	3/4
8	13 1/2	1 5/16	3 1/16	11 3/4	8	3/4
10	16	1	3 1/2	14 1/4	12	7/8
12	19	1 1/16	3 25/32	17	12	7/8

Description of joint.....pages 489 to 491

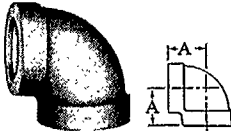
300-Pound Crane-Seal Brass Fittings

For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe

WORKING PRESSURES

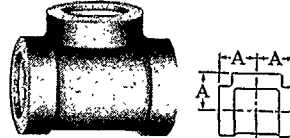
300 pounds steam

600 pounds cold water, oil, or gas, non-shock



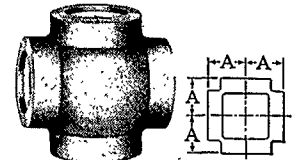
90° Elbows

Size	A
1/4	15/16
3/8	11/16
1/2	1 1/4
3/4	1 7/16
1	1 5/8
1 1/4	1 15/16
1 1/2	2 1/8
2	2 1/2
2 1/2	2 15/16
3	3 3/8



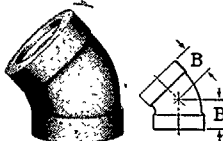
Tees

Size	A
1/4	15/16
3/8	11/16
1/2	1 1/4
3/4	1 7/16
1	1 5/8
1 1/4	1 15/16
1 1/2	2 1/8
2	2 1/2
2 1/2	2 15/16
3	3 3/8



Crosses

Size	A
1/4	15/16
3/8	11/16
1/2	1 1/4
3/4	1 7/16
1	1 5/8
1 1/4	1 15/16
1 1/2	2 1/8
2	2 1/2
2 1/2	2 15/16
3	3 3/8



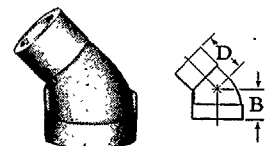
45° Elbows

Size	B
1/4	13/16
3/8	7/8
1/2	1
3/4	1 1/8
1	1 5/16
1 1/4	1 1/2
1 1/2	1 11/16
2	2
2 1/2	2 1/4
3	2 1/2



90° Street Elbows
Crane-Seal Female to Male

Size	A	C
1/4	15/16	1 7/16
3/8	11/16	1 5/8
1/2	1 1/4	2
3/4	1 7/16	2 3/16
1	1 5/8	2 9/16
1 1/4	1 15/16	2 7/8
1 1/2	2 1/8	3 1/8
2	2 1/2	3 11/16
2 1/2	2 15/16	4 1/2
3	3 3/8	5 1/8



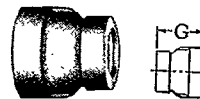
45° Street Elbows
Crane-Seal Female to Male

Size	B	D
1/4	13/16	1 1/8
3/8	7/8	1 1/4
1/2	1	1 3/8
3/4	1 1/8	1 9/16
1	1 5/16	1 13/16
1 1/4	1 1/2	2 1/8
1 1/2	1 11/16	2 5/16
2	2	2 11/16



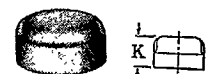
Couplings

Size	F
1/4	1 3/8
3/8	1 5/8
1/2	1 7/8
3/4	2 1/8
1	2 3/8
1 1/4	2 7/8
1 1/2	2 7/8
2	3 5/8
2 1/2	4 1/8
3	4 1/8



Taper Reducers

Size	G
3/8 x 1/4	1 7/16
1/2 x 3/8	1 11/16
3/4 x 1/2	1 3/4
1 x 3/4	2
1 1/4 x 1	2 3/8
1 1/2 x 1 1/4	2 11/16
2 x 1 1/2	3 3/16
2 1/2 x 2	3 11/16
3 x 2 1/2	4 1/16



Caps

Size	K
1/4	25/32
3/8	7/8
1/2	1 1/16
3/4	1 1/4
1	1 3/8
1 1/4	1 1/2
1 1/2	1 11/16
2	1 13/16
2 1/2	2 1/8
3	2 1/4

Prices on application

Sizes and dimensions are in inches.

Description of joint... pages 489 to 491

300-Pound Crane-Seal Brass Unions and Union Fittings

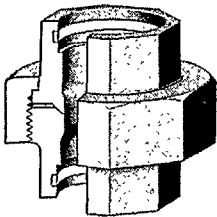
For Silbraz Joints with IRON PIPE SIZE Brass or Copper Pipe

WORKING PRESSURES

300 pounds steam
600 pounds cold water, oil, or gas, non-shock

Air Tested

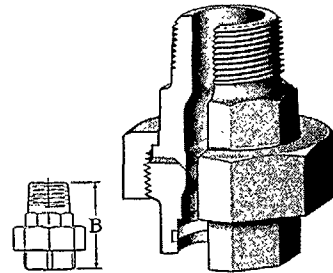
Unions With Ground Joint



No. 819 E-CS
Union
Female Crane-Seal Ends

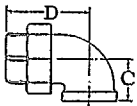
Size	A
1/4	1 5/8
3/8	1 13/16
1/2	1 15/16
3/4	2 1/4
1	2 7/16
1 1/4	2 13/16
1 1/2	3
2	3 3/8
2 1/2	4
3	4 5/16

Size	B
1/4	2 1/4
3/8	2 1/2
1/2	2 11/16
3/4	3 1/8
1	3 3/8
1 1/4	3 3/4
1 1/2	3 15/16
2	4 5/16
2 1/2	5 1/16
3	5 1/2

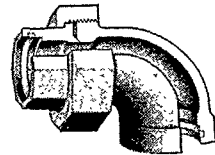


No. 819 1/2 E-CS
Union
Female Crane-Seal
to Male I.P.S. Thread

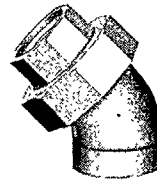
Union Fittings With Ground Joint



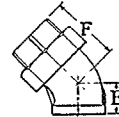
Size	C	D
1/4	1 5/16	2
3/8	1 11/16	2 1/4
1/2	1 13/16	2 7/16
3/4	1 7/8	2 3/4
1	1 15/16	3 1/16
1 1/4	2 1/16	3 11/16
1 1/2	2 1/8	3 15/16
2	2 1/2	4 1/2



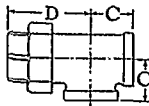
No. 890 E-CS
90° Union Elbow
Female Crane-Seal Ends



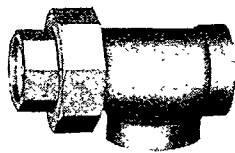
No. 891 1/2 E-CS
45° Union Elbow
Female Crane-Seal Ends



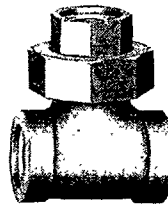
Size	E	F
1/4	1 3/16	1 5/8
3/8	1 1/8	1 3/4
1/2	1 1/4	1 15/16
3/4	1 1/2	2 3/16
1	1 5/8	2 1/2
1 1/4	1 3/4	2 7/8
1 1/2	1 11/16	3 1/16
2	2	3 11/16



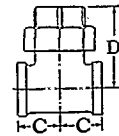
Size	C	D
1/4	1 5/16	2
3/8	1 11/16	2 1/4
1/2	1 13/16	2 7/16
3/4	1 7/8	2 3/4
1	1 15/16	3 1/16
1 1/4	2 1/16	3 11/16
1 1/2	2 1/8	3 15/16
2	2 1/2	4 1/2



No. 894 E-CS
Union Tee
Female Crane-Seal Ends
Union on Run



No. 898 E-CS
Union Tee
Female Crane-Seal Ends
Union on Outlet



Size	C	D
1/4	1 5/16	2
3/8	1 11/16	2 1/4
1/2	1 13/16	2 7/16
3/4	1 7/8	2 3/4
1	1 15/16	3 1/16
1 1/4	2 1/16	3 11/16
1 1/2	2 1/8	3 15/16
2	2 1/2	4 1/2

Prices on application

Sizes and dimensions are in inches.

Description of joint... pages 489 to 491

Copper Tubing and Brass and Copper Pipe

Iron Pipe Size Outside Diameter

For use with Crane-Seal Silbraz Joint Valves and Fittings

Brass and Copper Pipe and Tubing Dimensions and Weights — Prices on Application

Nominal Size, Inches	Type B, Thin Wall Copper Tubing (Iron Pipe Size Outside Diameter)				Standard Brass and Copper Pipe (Standard Iron Pipe Size Diameter and Thickness)				
	Diameters		Wall Thickness Inches	Weight Pounds Per Linear Foot	Diameters		Wall Thickness Inches	Weight, in Pounds Per Linear Foot	
	Outside Inches	Inside Inches			Outside Inches	Inside Inches		Red Brass	Copper
1/4	.540	.410	.065	.3760	.540	.375	.0825	.4496	.4596
3/8	.675	.545	.065	.4828	.675	.494	.0905	.6302	.6441
1/2	.840	.710	.065	.6134	.840	.625	.1075	.9381	.9588
3/4	1.050	.920	.065	.7796	1.050	.822	.1140	1.271	1.299
1	1.315	1.185	.065	.9894	1.315	1.062	.1265	1.791	1.831
1 1/4	1.660	1.530	.065	1.262	1.660	1.368	.1460	2.633	2.692
1 1/2	1.900	1.770	.065	1.452	1.900	1.600	.1500	3.127	3.196
2	2.375	2.245	.065	1.828	2.375	2.062	.1565	4.136	4.228
2 1/2	2.875	2.739	.068	2.324	2.875	2.500	.1875	6.003	6.136
3	3.500	3.334	.083	3.453	3.500	3.062	.2190	8.560	8.750
3 1/2	4.000	3.810	.095	4.517	4.000	3.500	.2500	11.17	11.42
4	4.500	4.286	.107	5.724	4.500	4.000	.2500	12.66	12.94
5	5.563	5.299	.132	8.729	5.563	5.063	.2505	15.85	16.20
6	6.625	6.309	.158	12.440	6.625	6.125	.2500	18.99	19.41
8					8.625	8.000	.3125	30.95	31.63
10					10.750	10.019	.3655	45.22	46.22
12					12.750	12.000	.3750	55.28	56.51

The ends of Crane-Seal Brass Valves and Fittings are bored to definite dimensions and tolerances, and are to be used with brass or copper pipe or tubing made to definite dimensions and tolerances as given in A.S.T.M. Specification B-75. These tolerances provide a small clearance area between the pipe and the fitting for the brazing alloy to occupy when the Silbraz joint is made up.

Only tubing or pipe having iron pipe size outside diameter, and tolerances in accordance with the above mentioned specification can be used with Crane-Seal Silbraz products.

Ordering: When ordering brass or copper pipe or tubing for use with Crane-Seal products, be sure to specify the weight required, i.e., Type B or Standard. If Standard is ordered, specify also whether Red Brass or Copper pipe is desired.

Orders must also state the A.S.T.M. Specification Number B-75, or advise that the pipe or tubing is for use with Crane-Seal Valves and Fittings.

When Brass Pipe is ordered, regular weight Red Brass Pipe in accordance with A.S.T.M. Specification B-75 will be furnished, unless another type of brass is specified.

Lengths: Brass or Copper Pipe is regularly available in commercial lengths of 12 and 20 feet. Intermediate or shorter lengths are cut to order only. Type B Thin Wall Copper Tubing is regularly furnished in 20 foot lengths.

Weights: Actual weights of Brass or Copper Pipe or of Copper Tubing will vary slightly from the theoretical weights shown in the table above.

Federal Specifications: Type B Copper Tubing conforms to the Federal Specification WW-T-797-Type B. Hard Drawn is always furnished, unless order specifically states Soft is required.

Gauge tubing: Seamless brass or copper tubing in nominal or outside diameters, sizes 1/8 to 10-inch, can be supplied in any gauge. Prices, based upon direct shipment from the mill, weights, and complete information are furnished on application.

Extra strong pipe: Brass and Copper pipe, made to the extra strong thicknesses and regular outside diameter up to 10-inch nominal pipe size can be furnished on special order, when so specified. Complete information and prices, based upon direct mill shipments, are furnished on application.

Solder-Joint Valves and Fittings

Description and Features of the Solder-Joint.....	page 500
Procedure for Making Solder-Joints.....	page 501
Brass Solder-Joint Globe and Angle Valves.....	page 502
Brass Solder-Joint Check Valves.....	page 503
Brass Solder-Joint Gate Valves.....	page 504
Brass Valves with Solder-Joint Adapters.....	page 505
Brass Solder-Joint Radiator Valves and Elbows.....	page 505
Pressure Ratings and Service Recommendations.....	page 506
Brass Solder-Joint Fittings.....	pages 507 to 511
Brass Range Boiler Fittings.....	page 509
Brass Solder-Joint Unions.....	page 509
Wrought Brass Solder-Joint Fittings.....	page 510
Brass Solder-Joint Flanges.....	page 510
Bends of Copper Tubing.....	page 510
Expansion of Copper Tubing.....	page 510
Brass Drainage Fittings.....	page 511
Solders, Fluxes, Tools, and Straps.....	page 511
Copper Tubing.....	page 512

The user of copper tubing for plumbing, heating, and industrial installations will appreciate the exceptionally complete line of solder-joint material offered by Crane Co. He can now purchase all of his requirements — valves, fittings, tubing, bends, and accessories — from one source.

The list of Crane Solder-Joint Valves includes globe, angle, gate, and check valves. In addition, a wide selection of Crane screwed end and flanged end valves, through the use of adaptors, is available for copper tubing piping systems.

The list of Crane Solder-Joint Fittings includes a diversified assortment of all regular and special type fittings, such as elbows, tees, crosses, couplings, bushings, caps, plugs, return bends, unions, and many others. The range of sizes, too, is unusually complete.

Crane Solder-Joint Fittings are interchangeable in every respect with those manufactured by the STREAMLINE Pipe and Fittings Division of the Mueller Brass Co. Crane Co. is licensed by the Mueller Brass Co., STREAMLINE Division, Port Huron, Michigan, to manufacture valves and fittings having the patented features of the Streamline Fitting.

Crane Solder-Joint Valves and Fittings

Description of a Solder-Joint

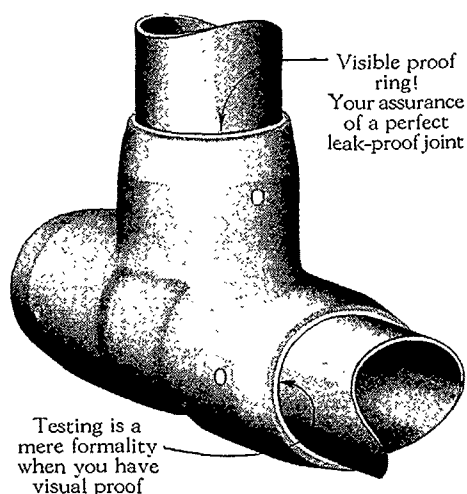
The term "Solder-Joint" as applied to Crane Valves and Fittings is descriptive of a particular type of connection through which valves and fittings are joined to copper tubing with solder. The method of making a joint can be briefly described as follows: the tubing is inserted in the end of the valve or fitting, the connection is heated, and the joint is soldered by feeding solder through a hole in the valve or fitting. The solder, liquefied by the heat, is carried thoroughly over the contacting surfaces by capillary action. It then cools and solidifies, sealing the joint.

Utilizing the natural law of capillarity is the basic principle of the joint used on Crane Solder-Joint

Valves and Fittings. Capillary action is that property displayed by liquids when they extend beyond their normal limits through close fitting surfaces.

In a solder-joint, the valve or fitting end and the copper tubing are the close fitting surfaces, and the liquefied solder travels between them by capillary action.

Crane Solder-Joint Valves and Fittings, illustrated on pages 502 to 511, are machined for use with "nominal size" copper tubing and are always listed under nominal size. The actual diameter of the tubing is $\frac{1}{8}$ -inch larger than the nominal size. As an example, 1-inch nominal size tubing is $1\frac{1}{8}$ -inches actual outside diameter.



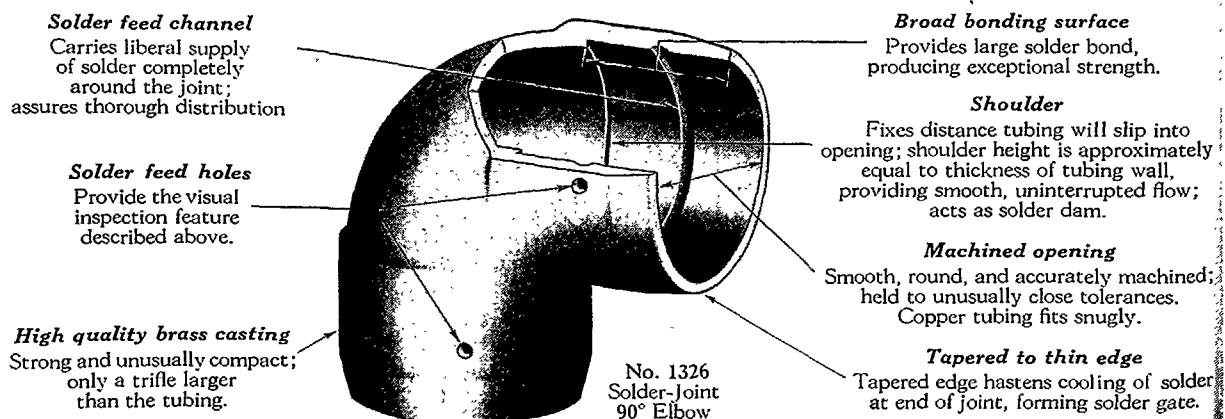
Visible Proof of a Perfect Connection

When soldering a joint, the valve or fitting end and the copper tubing are cleaned, coated with flux, assembled and heated; and solder is introduced through the feed hole in the valve or fitting. Capillarity carries the solder over the contacting surfaces.

The first indication that the solder has bonded the two surfaces is the appearance of a ring of tiny dark green bubbles around the outer edge of the connection. This is the hot flux being forced out by the outward flow of the solder. When these bubbles are wiped off, a continuous bright ring of solder appears.

The bright ring is visible and never-failing proof that a bonded, leak-tight joint has been made. Testing becomes a mere formality. The proof ring is the operator's assurance of a perfect connection.

Many Valuable Features



The features indicated above are found on all Crane Solder-Joint Valves and Fittings.

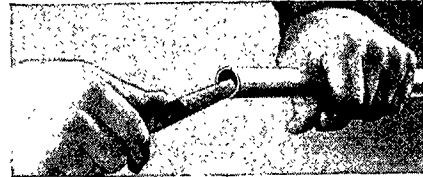
Crane Solder-Joint Valves and Fittings

Procedure for Making Joints

Cut Tubing to Length and Remove Burr

Cut the copper tubing off square, using a fine tooth hack saw (32-tooth blade preferred). Do not cut the tubing at an angle; use the Square-End Sawing Vise shown on page 511 or its equivalent.

Remove the burr from the end of the tubing with a file or scraper.

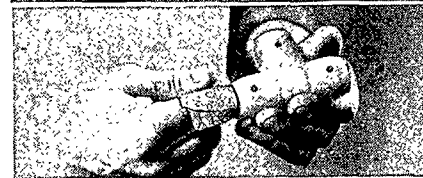
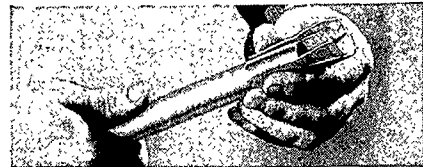


Clean Outside of Tubing and Inside of Valve or Fitting

Using sandpaper or sandcloth (Medium or No. 1 Grade), clean the outside of the tubing over the distance it will slip into the end of the valve or fitting.

Using sandpaper or sandcloth, clean the inside of the solder-joint end on the valve or fitting.

Do not solder dirty joints. Thoroughly clean the contacting surfaces with sandpaper or sandcloth, removing all dark spots. Wipe or brush away all foreign matter.

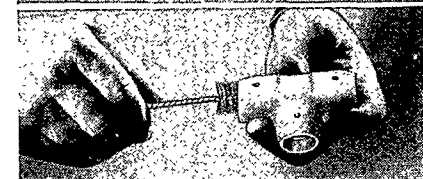
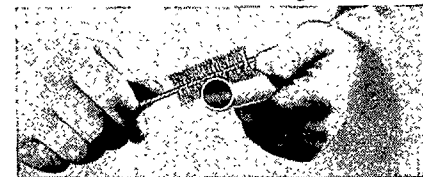


Apply Flux to Outside of Tubing and Inside of Valve or Fitting

Using a brush, apply a coat of solder flux to the outside of the tubing and to the inside of the valve or fitting. Distribute it evenly and thoroughly over the surfaces.

Before applying the flux, make certain that both parts are dry. In extremely cold weather, warm the valve or the fitting and the copper tubing slightly with a torch to approximately room temperature (from 70 to 80 degrees F.).

Slip the tubing into the valve or fitting until it will go no further, and turn it back and forth once or twice to assure an even distribution of the flux. The joint is ready to be soldered.



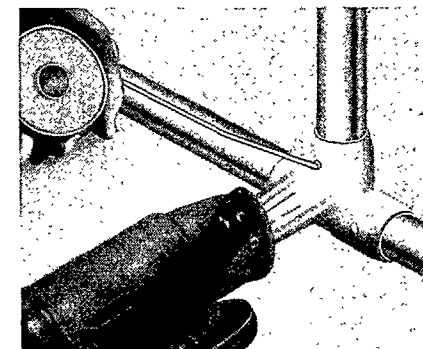
Solder the Connection

Melt a drop of solder into the solder feed hole of the valve or fitting. Apply heat around the valve or fitting end until the drop disappears, indicating that the proper temperature has been reached. Feed solder through the hole only until it appears around the end of the connection; the joint has been made. Fill the hole completely, removing any surplus with a piece of cloth.

When the hole is on the side or bottom, the drop-indicator method cannot be used. Determine the temperature by heating the connection and touching the valve or fitting end with solder. When the solder fuses readily, feed through the hole as before.

On sizes 1½-inch and larger, move the valve or fitting on the tubing or tap it lightly when the solder starts in. This breaks the surface tension of the solder and assures full distribution.

Do not solder too hot or too cold. Solder flows freely at the proper temperature, but burns when too hot.



For soldering, use a blow torch or a similar tool, never a soldering iron.

Making Joints on Sizes 3-Inch and Larger

The instructions for making joints on sizes 3-inch and larger, although fundamentally the same as those given here for the smaller sizes, are more detailed and include suggestions that facilitate the work. More

care must be exercised in assembling and in applying heat, two torches being recommended on the larger sizes to assure uniform heat distribution. Complete instructions will be furnished on request.

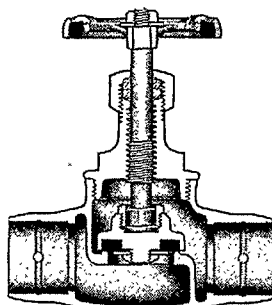
Solders page 511

Fluxes page 511

Square-End Sawing Vise page 511

Brass Solder-Joint Globe and Angle Valves Composition Disc

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F.



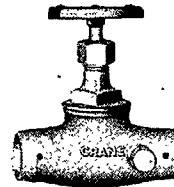
Cross Section
No. 1300, Globe

STEAM SERVICE

The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 511.



No. 1300, Globe



No. 1301, Globe
with Drain



No. 1302, Angle

When ordering No. 1301 Valves, specify whether right hand or left hand drain is wanted.

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1300, Globe or No. 1302, Angle	Each	1.75	2.00	2.50	3.25	4.25	5.50	8.00
No. 1301, Globe, with Drain	Each		2.10	2.60				
Extra disc holder, disc, nut, and disc stem ring, complete	Each	.50	.60	.70	.85	1.10	1.50	2.00

For list prices of Composition Discs, see page 178.

Solder-joint ends: These valves are made for use with copper tubing. Their end connections are the same as those used on the Crane Brass Solder-Joint Fittings shown on pages 507 to 510.

Service recommendations: Solder-Joint Globe and Angle Valves are recommended for steam or water service. They are well suited for plumbing and heating systems, for low pressure steam and water lines in industrial plants, and for similar service.

When valves are installed on steam lines, the solder used to make joints must have a melting point that is high enough to withstand the temperature of the steam. For recommendations on solders, see page 511.

Construction: The valves, although light in weight, are sturdily constructed. They are well proportioned and are amply reinforced to withstand piping and operating strains. All parts are made of good quality materials.

Discs: Unless otherwise ordered, these valves are furnished with a No. 8 Low Pressure Hot Water Disc, suitable for hot water or for cold water.

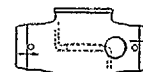
When ordered for steam, they will be furnished with a No. 7 Low Pressure Steam Disc.

For description and dimensions of discs, see page 178.

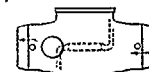
The valves have a metal plate, secured to the valve by the wheel nut, which identifies the type of disc.

Drain on No. 1301:

The No. 1301 Solder-Joint Globe Valve is furnished with either a right hand or a left hand drain; orders must specify which is wanted. The illustrations shown above indicate the position of a right hand and a left hand drain.



Right Hand



Left Hand

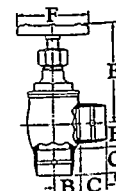
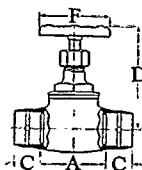
Repacking: These valves, when wide open, can be repacked while under pressure.

Larger sizes and higher pressure valves: When larger size valves or valves suitable for higher pressures are wanted, Crane screwed end or flanged end valves with solder-joint adaptors are recommended; see page 505.

These valves are furnished with a tag giving special instructions for soldering.

Dimensions, in Inches

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A	1 9/16	1 13/16	2	2 3/8	2 3/4	3 1/4	3 15/16
B	9/16	5/8	3/4	1 5/16	1 1/16	1 1/4	1 9/16
C	1 1/16	1 3/16	1	1 1/16	1 1/8	1 3/16	1 3/8
D—Open	3 1/8	3 5/8	4 1/8	4 5/8	5 1/8	5 7/8	6 1/4
E—Open	2 7/8	3 3/8	3 3/4	4 3/8	4 7/8	5 5/8	6 1/8
F	1 3/4	2 1/4	2 5/8	3	3 3/8	3 3/4	4 1/4

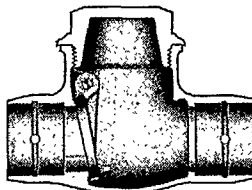


Brass Solder-Joint Check Valves

Swing or Horizontal

Swing Check Valves

Brass Disc



Cross Section
No. 1303

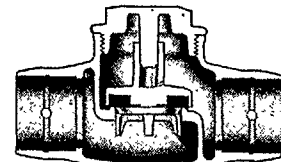


No. 1303
Swing Check

No. 1303 Swing Check Valves may be used either in a horizontal position or in a vertical position for upward flow.

Horizontal Check Valves

Composition Disc



Cross Section
No. 1304



No. 1304
Horizontal Check

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F.

STEAM SERVICE
The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 511.

List Prices

Size	Inches	3/8	1/2	3/4	1	1 1/4	1 1/2	2
No. 1303, Swing Check	Each		2.00	2.50	3.25	4.00	5.25	7.50
No. 1304, Horizontal Check	Each	1.50	1.75	2.25	3.00	4.00	5.00	7.00
Extra disc holder, disc, and nut, complete, for No. 1304	Each	.55	.80	1.10	1.40	1.75	2.25	3.00

For list prices of Composition Discs for No. 1304 Valves, see page 178.

Solder-joint ends: These valves are made for use with copper tubing. Their end connections are the same as those used on the Crane Brass Solder-Joint Fittings shown on pages 507 to 510.

Service recommendations: Crane Solder-Joint Check Valves are recommended for service on steam, hot water, and cold water. They are particularly well suited for plumbing and heating systems and for low pressure steam and water lines in industrial and process plants.

When valves are installed on steam lines, the solder used to make joints must have a melting point high enough to withstand the temperature of the steam. For recommendations on solders, see page 511.

Construction: The No. 1303 are swing check valves and have a brass disc. The No. 1304 are horizontal lift check valves and have a composition disc.

Both types are strong and well proportioned; they will easily withstand normal operating strains. All parts are made of good quality materials.

Discs in No. 1304 Valves: Unless otherwise ordered, the No. 1304 Valves are furnished with a No. 8 Low Pressure Hot Water Disc, suitable for hot water or for cold water.

When ordered for steam service, they will be furnished with a No. 7 Low Pressure Steam Disc.

For description and dimensions of discs, see page 178.

The disc number, stamped on the cap, identifies the type of disc.

Larger sizes and higher pressure valves: When larger size valves or valves suitable for higher pressures are wanted, Crane screwed end or flanged end valves with solder-joint adaptors are recommended; see page 505.

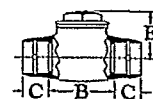
These valves are furnished with a tag giving special instructions for soldering.

Dimensions, in Inches



No. 1303
Swing Check

Size	3/8	1/2	3/4	1	1 1/4	1 1/2	2
A		1 3/8	1 11/16	2 1/16	2 7/16	2 7/8	3 1/2
B	1 9/16	1 13/16	2	2 3/8	2 3/4	3 1/4	3 15/16
C	1 1/16	1 3/16	1	1 1/16	1 1/8	1 3/16	1 3/8
D		1 9/16	1 13/16	2 3/16	2 9/16	2 13/16	3 1/4
E	1 1/4	1 3/8	1 5/8	1 3/4	2	2 1/4	2 1/2

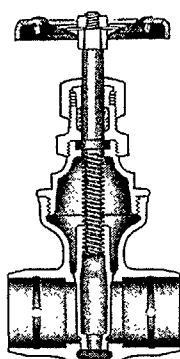


No. 1304
Horizontal Check

Brass Solder-Joint Gate Valves

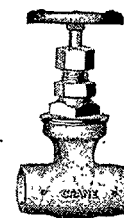
Wedge Disc—Non-Rising Stem

WORKING PRESSURES
100 pounds steam
125 pounds water, 200° F.



Cross Section

STEAM SERVICE
The solder used to make joints on steam lines must be capable of withstanding the temperature of the steam in the line; see page 511.



No. 1319

List Prices

Size	Inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
No. 1319, Gate Valve	Each	2.25	2.25	2.75	3.50	4.50	5.75	8.00

Solder-joint ends: The No. 1319 Brass Solder-Joint Gate Valves are made for use with copper tubing. Their end connections are the same as those used on the Crane Brass Solder-Joint Fittings shown on pages 507 to 510.

Service recommendations: The valves will give excellent results on installations where working conditions are not severe. They are recommended for general shut-off valve service on low pressure steam lines and on hot and cold water lines. They are well suited for use in plumbing and heating systems, on circulating water lines, on low pressure condensation return lines, and for similar low pressure services.

When Solder-Joint Valves and Fittings are installed on steam lines, the solder used to make the joints must have a melting point high enough to withstand the temperature of the steam. Recommendations for solders are shown on page 511.

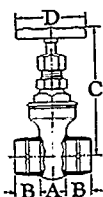
Construction: No. 1319 Gate Valves have a non-rising stem and a one-piece wedge disc. They are sturdily constructed and are amply reinforced at points subjected to greatest stress, to withstand piping and operating strains. All parts are made of good quality materials.

Stuffing box: The stuffing box is equipped with a gland and is filled with high grade packing.

Repacking: The valves, when wide open, can be repacked while under pressure.

Larger sizes and valves for higher pressures: When larger size valves or valves suitable for higher pressures are wanted, any of the wide variety of Crane screwed end or flanged end valves when equipped with solder-joint adaptors can be used. A few of the popular types are illustrated on page 505.

Instruction tag: These valves are furnished with a tag giving special instructions for soldering.



Dimensions, in Inches

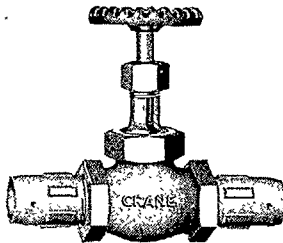
Size	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2
A	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{7}{8}$	1	$\frac{11}{16}$	$\frac{11}{8}$	$\frac{13}{8}$
B	$\frac{11}{16}$	$\frac{13}{16}$	1	$\frac{11}{16}$	$\frac{11}{8}$	$\frac{13}{16}$	$\frac{13}{8}$
C	$3\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$5\frac{1}{4}$	$5\frac{3}{4}$	$6\frac{1}{2}$	$7\frac{5}{8}$
D	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{5}{8}$	3	$3\frac{3}{8}$	$3\frac{3}{4}$	$4\frac{1}{4}$

Large Size, High Pressure, or Other Style Brass Solder-Joint Valves

Users may sometimes require Brass Solder-Joint Valves in larger sizes, other styles, or heavier construction than those shown on the preceding three pages. This is especially true when valves are wanted for industrial installations where pipe sizes are often large or where severe services frequently demand other styles of valves.

For such purposes, Crane Co. supplies a wide variety of screwed end and flanged end brass valves made suitable for copper tubing through the use of adaptors. A few of the popular types are illustrated below:

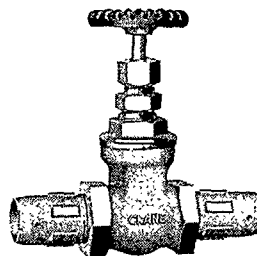
Screwed End Valves with Solder-Joint Adaptors



Globe Valve



Check Valve

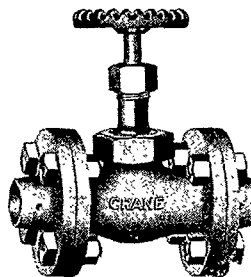


Gate Valve

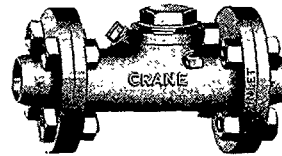
The No. 1353 Copper to Male Pipe Thread Couplings shown on page 508 are ideal adaptors for screwed end valves. They make available for copper tubing installations the complete Crane line of Screwed End Brass Valves, providing the user with an excellent selection of sizes, styles, and weights. They are easy and economical to use.

Flanged End Valves with Solder-Joint Adaptors

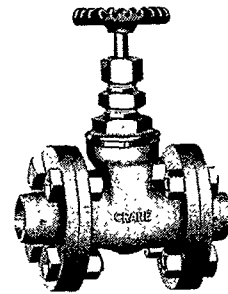
The No. 1385 Companion Flanges shown on page 510 are ideal adaptors for flanged end valves. They provide a quick, easy, and economical means of making any of the wide selection of Crane Flanged End 150-Pound Brass Valves suitable for copper tubing installations. With this combination, the entire valve can be removed at any time by simply taking out the end flange bolts.



Globe Valve



Check Valve



Gate Valve

Screwed End and Flanged End Brass Valves are shown on pages 13 to 81.

38

Brass Solder-Joint Radiator Valves and Union Elbows

Solder-Joint
Radiator Angle Valve

Brass Solder-Joint Radiator Valves and Radiator Union Elbows can be made to order; prices and dimensions are furnished on application. Inquiries should state quantity, size, style of valve, and service.

*Screwed End Brass Radiator Valves and
Union Elbows are shown on pages 77 to 81.*

Solder-Joint
Radiator Union Elbow

Brass Solder-Joint Fittings

Pressure Ratings and Service Recommendations

Unusually wide range of application: Brass Solder-Joint Fittings combined with copper tubing have an unusually wide range of application. They are ideally suited for hot and cold water lines, for low pressure steam lines, and for underground water lines such as are used in plumbing, heating, and air conditioning systems in homes, apartments, hotels, offices, public buildings, hospitals, and factories.

In addition, they are well suited for an almost endless variety of services in industrial and processing plants, as on water and air lines, low pressure steam lines, pressure lubricating systems, stock lines in paper mills, liquor lines in breweries and distilleries, certain dye lines in textile mills, and many others.

Service recommendations: Brass Solder-Joint Fittings are recommended for hot water, cold water, saturated steam, air, vacuum, liquors used in breweries and distilleries, and many similar services that are not corrosive to brass and copper and are non-hazardous.

Hazardous fluids: Because soldered joints are generally made with an open flame torch, and also because solders fuse at a comparatively low temperature, considerable danger attends the installation and use of soldered joints on noxious or inflammable liquids and gases. When all danger of fire is eliminated, Brass Solder-Joint Fittings can be used for such service. Detail recommendations will be furnished upon receipt of complete information regarding the proposed installation.

Steam service: The success of a solder-joint installation on steam service depends upon the quality of the solder used when making joints. The solder must have a melting point that is high enough to remain unaffected by the temperature of the steam. For recommendations on solders, see page 511.

Working pressure ratings: Working pressure ratings of Solder-Joint Fittings are given in the table shown below. For convenience, the ratings of Crane Solder-Joint Valves are repeated in the table.

Working Pressure Ratings, Pounds per Square Inch

Article	Catalog Numbers	Sizes	Working Pressures	
			*Saturated Steam	Water, 200° F.
Solder-Joint Valves	Nos. 1300, 1301, 1302, 1303, 1304, and 1319	All sizes	100 pounds	125 pounds
Solder-Joint Fittings	Nos. 1326 to 1371 inclusive Nos. 1380, 1381, 1383, and 1384	2-inch and smaller	200 pounds	250 pounds
		2½ and 3-inch	80 pounds	250 pounds
		3½-inch and larger	80 pounds	150 pounds
Solder-Joint Flanges	No. 1385	2-inch and smaller	150 pounds	225 pounds
		2½-inch and larger	80 pounds	225 pounds

*These saturated steam ratings are based upon the maximum recommendation for the valve or fitting. Users must select an appropriate solder for the service temperature in order to obtain a suitable installation; see page 511 for solders.

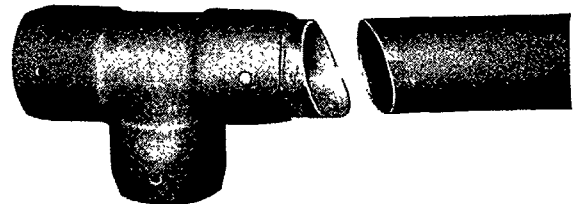
Crane Soldered Joints Are Unusually Strong

Photomicrographs and innumerable tests prove conclusively that a Crane Soldered Joint is actually a complete and perfect bond of tubing, solder, and valve or fitting.

The joint is unusually rugged and has an exceptionally high safety factor. The large bonding surface assures generous strength. Both pressure and tensile tests show that loads far in excess of those found in service are required to cause failure in an assembled connection, and that when failure finally does occur, it is generally in the tubing, not the joint,—even when Type K Extra Heavy Hard Copper Tubing is used.

Expansion and contraction tests conducted under extremely severe conditions left the soldered joints without the slightest indication of damage. Rigid

tests on a vibrator proved that the joints are ideal for services where vibration is present.



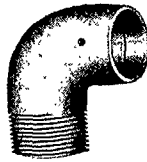
Photograph of a 1½-inch Solder-Joint Tee after being subjected to a tensile test. The copper tubing broke at 13,440 pounds.

Brass Solder-Joint Fittings

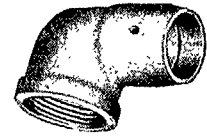
For working pressures, see page 506.



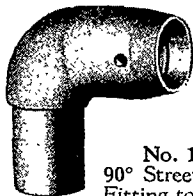
No. 1326, 90° Elbow
Copper to Copper
Straight sizes, $\frac{1}{4}$ to 6-inch
Reducing sizes, $\frac{3}{8}$ to 4-inch



No. 1327, 90° Elbow
Copper to Outside I. P. S.
Straight sizes, $\frac{1}{4}$ to 6-inch
Reducing sizes, $\frac{1}{4}$ to $3\frac{1}{2}$ -inch



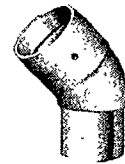
No. 1328, 90° Elbow
Copper to Inside I. P. S.
Straight sizes, $\frac{1}{4}$ to 4-inch
Reducing sizes, $\frac{3}{8}$ to 3-inch



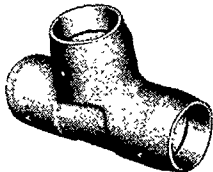
No. 1329
90° Street Elbow
Fitting to Copper
Straight sizes, $\frac{3}{8}$ to 4-inch



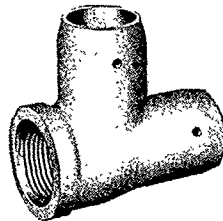
No. 1331, 45° Elbow
Copper to Copper
Straight sizes, $\frac{1}{4}$ to 6-inch



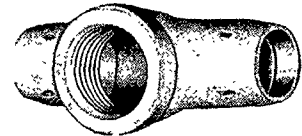
No. 1332, 45° Street Elbow
Fitting to Copper
Straight sizes, $\frac{3}{8}$ to 4-inch



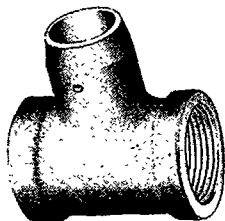
No. 1335, Tee
Copper to Copper to Copper
Straight sizes, $\frac{1}{4}$ to 6-inch
Reducing sizes, $\frac{3}{8}$ to 6-inch



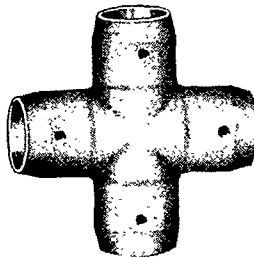
No. 1336, Tee
Inside I. P. S. to Copper to Copper
Straight sizes, $\frac{1}{2}$ to 6-inch
Reducing sizes, $\frac{1}{2}$ to 6-inch



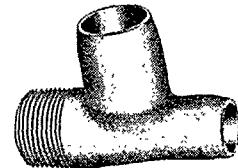
No. 1337, Tee
Copper to Copper to Inside I. P. S.
Straight sizes, $\frac{3}{8}$ to 6-inch
Reducing sizes, $\frac{3}{8}$ to 6-inch



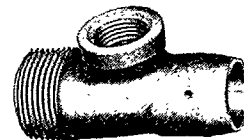
No. 1340, Tee
Inside I. P. S. to Inside I. P. S. to Copper
Straight sizes, $\frac{1}{2}$ to $1\frac{1}{2}$ -inch
Reducing size, $\frac{3}{8}$ to 1-inch



No. 1345, Cross
Copper to Copper
Straight sizes, $\frac{1}{2}$ to 6-inch
Reducing sizes, $\frac{1}{2}$ to 6-inch



No. 1338, Tee
Outside I. P. S. to Copper to Copper
 $\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4}$ Reducing size only



No. 1339, Tee
Outside I. P. S. to Copper to Inside I. P. S.
 $1 \times \frac{3}{4} \times \frac{1}{2}$ Reducing size only

All Crane Solder-Joint Fittings are licensed under
Mueller Brass Co., Streamline Division, Patents.

Prices, list of sizes, and dimensions will be furnished on application.

Brass Solder-Joint Fittings

For working pressures, see page 506.



No. 1350
Wrought Tube Coupling
Copper to Copper
Straight sizes, $\frac{1}{4}$ to 8-inch
Reducing sizes, $\frac{3}{8}$ to 4-inch
No. 1350 Couplings are made from copper tubing. They have a boss or stop located midway between the ends on the straight sizes and at the inner end of the smaller opening on reducing sizes.



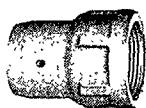
No. 1351, Cast Coupling
Copper to Copper
Straight sizes, $\frac{3}{8}$ to 8-inch
Reducing sizes, $\frac{1}{2}$ to 6-inch
No. 1351 Couplings are made from brass castings. They have an internal shoulder, positively limiting the distance to which the tubing can slip into the ends of the Coupling.



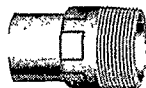
No. 1352
Eccentric Coupling
Copper to Copper
Reducing sizes, $\frac{1}{4}$ to 6-inch



No. 1353, Coupling
Copper to Outside I. P. S.
Straight sizes, $\frac{1}{4}$ to 8-inch
Reducing sizes, $\frac{3}{8}$ to 4-inch



No. 1354, Coupling
Copper to Inside I. P. S.
Straight sizes, $\frac{1}{4}$ to 6-inch
Reducing sizes, $\frac{3}{8}$ to $3\frac{1}{2}$ -inch



No. 1355, Fitting Nipple
Fitting to Outside I. P. S.
Straight sizes, $\frac{3}{8}$ to 6-inch
Reducing sizes, $\frac{1}{2}$ to 3-inch



Short Type Coupling
Copper to Outside I. P. S.
Straight sizes, $\frac{3}{8}$ to 1-inch



No. 1356, Fitting Coupling
Fitting to Inside I. P. S.
Straight sizes, $\frac{3}{8}$ to 5-inch
Reducing sizes, $\frac{1}{2}$ to 2-inch



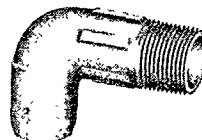
No. 1357, Bushing
Fitting to Copper
Reducing sizes, $\frac{1}{4}$ to 6-inch



Flush Bushing
Fitting to Copper
Reducing sizes, $\frac{3}{4}$ to 2-inch



No. 1366, Flanged Sink Elbow
Copper to Inside I. P. S.
Sizes $\frac{1}{2}$ x $\frac{1}{2}$ and $\frac{3}{8}$ x $\frac{1}{2}$ -inch
Flanged Sink Elbows are used with sinks, laundry trays, and similar fixtures installed close to a wall. The flange forms a positive bearing on the back of the fixture and permits a rigid faucet connection. The elbow has a short radius.



No. 1367, Water Meter Elbow
Copper to Outside I. P. S.
 $\frac{3}{4}$ -inch size only



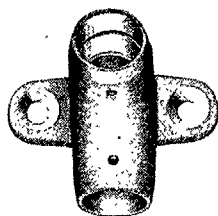
No. 1358, Plug
Sizes $\frac{1}{4}$ to 6-inch



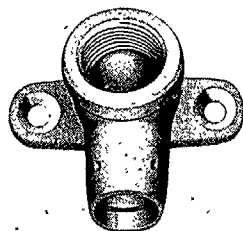
No. 1359, Cap
Sizes $\frac{1}{4}$ to 6-inch

Brass Solder-Joint Fittings

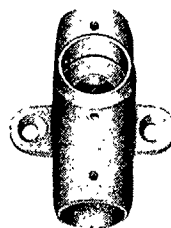
For working pressures, see page 506.



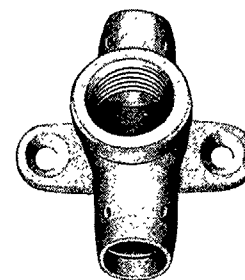
No. 1360, Drop Ear Elbow
Copper to Copper
Straight sizes, $\frac{3}{8}$ to $\frac{3}{4}$ -inch



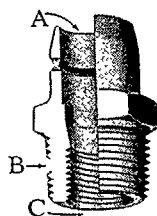
No. 1361, Drop Ear Elbow
Copper to Inside I. P. S.
Straight sizes, $\frac{3}{8}$ to $\frac{3}{4}$ -inch
Reducing sizes, $\frac{1}{2}$ and $1\frac{1}{4}$ -inch



No. 1362, Drop Ear Tee
Copper to Copper to Copper
Straight sizes, $\frac{1}{2}$ and $\frac{3}{4}$ -inch

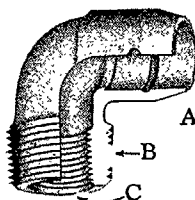


No. 1363, Drop Ear Tee
Copper to Copper to Inside I. P. S.
Straight sizes, $\frac{3}{8}$ and $\frac{1}{2}$ -inch
Reducing size, $\frac{1}{2} \times \frac{1}{2} \times \frac{3}{8}$ -inch



Size Copper x Outside x Inside		
A	B	C
$\frac{1}{2} \times 1 \times \frac{1}{2}$		
$\frac{3}{4} \times 1 \times \frac{1}{2}$		
$\frac{3}{4} \times 1 \times \frac{3}{4}$		

No. 1368, Range Boiler Coupling
Copper to Outside I. P. S. to Inside I. P. S.



Size Copper x Outside x Inside		
A	B	C
$\frac{1}{2} \times 1 \times \frac{1}{2}$		
$\frac{3}{4} \times 1 \times \frac{1}{2}$		
$\frac{3}{4} \times 1 \times \frac{3}{4}$		

No. 1369, Range Boiler 90° Elbow
Copper to Outside I. P. S. to Inside I. P. S.

The No. 1368 and No. 1369 Fittings are used on a tank or receiver that requires a length of pipe extending into it. The cold water supply to a range boiler or hot water tank is a common example. The internal pipe is screwed into the female thread at the male end of the fitting, and the male end is then screwed into the tank. The cold water supply tubing is soldered into the outer end of the fitting.

Range Boiler Dip Tubes consist of a Brass Fitting Nipple and a length of copper tubing soldered to the fitting end; they are used with the Range Boiler Couplings and Elbows shown above.



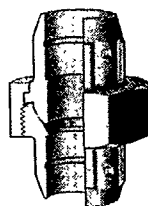
No. 1372, Range Boiler Dip Tube
Outside I. P. S.
Sizes $\frac{1}{2}$ and $\frac{3}{4}$ -inch



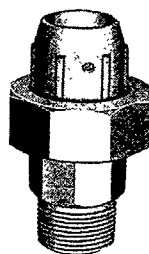
No. 1364, Crossover
Copper to Copper
Straight sizes, $\frac{1}{2}$ and $\frac{3}{4}$ -inch.
Crossovers are suitable for use in limited space back of laundry trays, sinks, or similar fixtures.



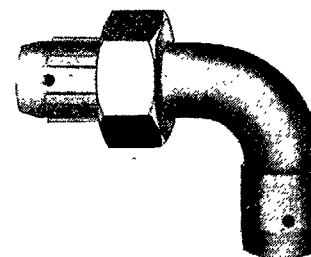
No. 1365, Short Type
Wash Tray Sink Tee
Copper to Copper to Inside I. P. S.
Made in $\frac{1}{2}$ -inch size only.
This Tee is a short radius fitting that can be installed in a very small space. The run has solder-joint openings; the outlet has a female iron pipe thread.



No. 1380, Union
Copper to Copper
Straight sizes, $\frac{1}{4}$ to $2\frac{1}{2}$ -inch



No. 1381, Union
Copper to Outside I. P. S.
Straight sizes, $\frac{3}{8}$ to $2\frac{1}{2}$ -inch

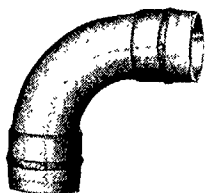


Union Elbow
Copper to Copper
Straight sizes, $\frac{3}{8}$ to 2-inch

Crane Solder-Joint Unions and Union Elbows are recommended for steam, water, and similar fluids. They have a non-corrosive ground joint seat. No gasket is necessary, and the unions can be taken apart and reassembled repeatedly without affecting their strength or tightness.

Prices, list of sizes, and dimensions will be furnished on application.

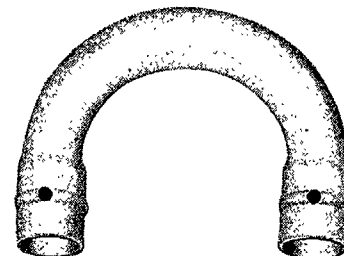
Brass Solder-Joint Fittings and Bends



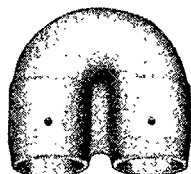
No. 1383, Wrought Tube 90° Elbow
Copper to Copper
Straight sizes, $\frac{3}{8}$ to 2-inch
Reducing sizes, $\frac{1}{2}$ to 2-inch



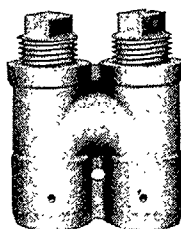
No. 1384, Wrought Tube 45° Elbow
Copper to Copper
Straight sizes, $\frac{3}{8}$ to 2-inch



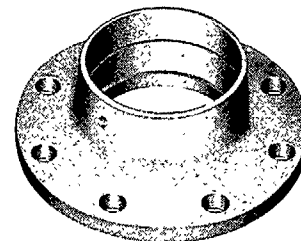
No. 1370, Wrought Tube Return Bend
Copper to Copper
Straight sizes, $\frac{1}{4}$ to 1-inch



No. 1371, Cast Return Bend
Copper to Copper
Straight sizes, $\frac{1}{2}$ to 3-inch



Short Radius Return Bend with
Brass Cleanout Plugs
Copper to Copper
Sizes on application.
Made to order only.



No. 1385, 150-Pound Companion Flange
Straight sizes, $\frac{1}{2}$ to 6-inch
Reducing sizes, on application

Prices, list of sizes, and dimensions will be furnished on application.

Copper Tubing Bends

To eliminate the need for special tools and equipment which are necessary to fabricate copper tubing bends in the field, Crane Co. has standardized upon the dimensions of several of the more popular types. These bends, made from Type K Extra Heavy Hard Copper Tubing, will meet the requirements of a majority of installations, and erectors will realize more convenience and more economy than in the field fabricated items. The task of installation is then reduced to its simplest form — that of making solder-joint connections.

90°, 45°, and U-Bends range in nominal tubing sizes

from $\frac{1}{2}$ to 8-inch inclusive; offset bends, in nominal tubing sizes from $\frac{1}{2}$ to 2 $\frac{1}{2}$ -inch, and expansion U-bends, in nominal tubing sizes from 1 to 6-inch. The dimensions of these bends provide proper tangents for erection, and the tubing ends are carefully sized to assure freedom from irregularities that might otherwise impair the effectiveness of the solder-joint.

In addition, Crane Co. is prepared to furnish bends or offsets made to special dimensions or made from other grades of tubing. Prices and information on application.

Expansion of Copper Tubing

In order to plan a solder-joint piping installation successfully, it is necessary, as in any other piping assembly, to make suitable provisions for the expansion of the pipe lines under actual service conditions. Expansion bends can be designed only when the amount of expansion is known.

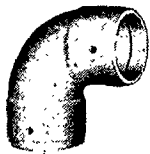
To find the number of inches of expansion in any length of copper tubing, proceed as follows:

- First, obtain from the table (Right) the expansion at the minimum line temperature and at the maximum line temperature.
- Second, subtract the former from the latter, which gives the expansion per foot through that temperature range.
- Third, multiply the expansion per foot by the number of feet of tubing.

Linear Expansion of Copper Tubing, per Foot

Temperature In Degrees F.	Expansion of Copper Tubing In Inches	Temperature In Degrees F.	Expansion of Copper Tubing In Inches
0	0	260	.0295
20	.0025	280	.0317
40	.0045	300	.0342
60	.0065	320	.0370
80	.0087	340	.0395
100	.0110	360	.0415
120	.0135	380	.0440
140	.0157	400	.0464
160	.0177	420	.0489
180	.0200	440	.0515
200	.0225	460	.0537
220	.0252	480	.0564
240	.0274	500	.0588

Brass Solder-Joint Drainage Fittings



No. 2301
90° Long Turn Elbow



No. 2304
45° Long Turn Elbow



No. 2380
Straight Adaptor



No. 2381
45° Adaptor



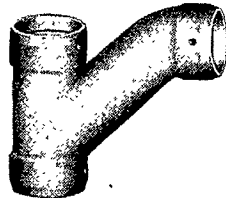
No. 2382
Adaptor Nut



No. 2383
Lead Adaptor Washer



No. 2320
90° Y-Branch
Tee Pattern



No. 2322
90° Y-Branch



No. 2328
45° Y-Branch



No. 2334
Caulking Connection
Copper to Hub

Slip Joint Adaptors provide an easy means of joining the tube ends of traps used on plumbing fixtures to copper waste tubing.

Caulking Connections are used to connect copper waste or vent lines to the hub end of cast iron soil pipe or fittings.

Crane Solder-Joint Fittings and copper tubing are ideal for drainage systems. They have excellent resistance to the normal corrosive action of this service, and being made with smooth and full flow

areas, they are non-clogging; foreign matter cannot accumulate. An installation of this type offers practically no resistance to flow, it has long service life, and it is particularly compact.

List of sizes, prices, and dimensions are furnished on application.

Solders and Fluxes

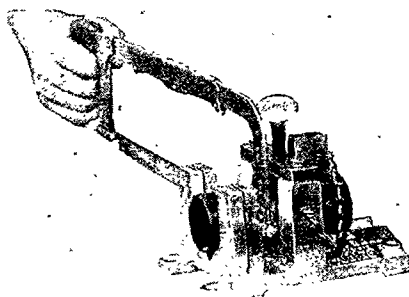
Solders and Fluxes should be carefully selected and used only on services for which they are suitable. They are made especially for Crane Solder-Joints, and when used properly, they produce tight and strong joints.

For higher pressures or special services, recommendations will be made on application.

Prices of Solders and Fluxes listed in the following table are furnished on application.

Solders				Fluxes	
Solder No.	Melting Range	Service Recommendation	Form Supplied	Flux No. and Uses	Form Supplied
No. 50 Solder	358 to 414° F.	400 pounds water 15 pounds saturated steam	$\frac{3}{32}$ -inch round wire in 1-pound spools and $\frac{1}{8}$ -inch round wire in 1-pound and 5-pound spools	No. 50 Flux Use with No. 50, No. 95, or No. 104 Solders	2-ounce, 8-ounce, 1-pound, and 5-pound tins
No. 95 Solder	450 to 460° F.	Air conditioning systems 35 pounds saturated steam	$\frac{3}{32}$ -inch and $\frac{1}{8}$ -inch round wire in 1-pound spools		
No. 104 Solder	460° F.	400 pounds water 80 pounds saturated steam	$\frac{5}{32}$ -inch round wire with flattened side in 20-inch lengths		

Tools and Straps for Copper Tubing



Square End Sawing Vise and Guide



Copper Straps
for Copper Tubing



Sizing Tool for Soft Copper Tubing

The Sizing Tool shown above is used to prepare the tube end to fit in the valve or fitting end. Soft copper tubing is easily deformed and the ends must be re-sized to assure good joints.

The Sawing Vise, a combination vise and saw guide for tubing 2 inches and smaller, is an ideal tool to use when making an installation; it makes square cutting easy. Any standard hack saw can be used; a 32-tooth blade is recommended.

Copper Straps are made especially for use with copper tubing.

Prices and sizes on application.

Copper Tubing Standard Specifications

Copper Tubing for general plumbing and heating purposes and for industrial uses is available in four weights, commonly known as Types K, L, M, and O. All four weights are furnished in hard temper, and in addition, Types K and L are furnished soft annealed.

Dimensions and Weights

Nominal Size of Tubing Inches	Outside Diameter of Tubing Inches	Hard Copper Tubing								Soft Copper Tubing			
		Type K Extra Heavy Hard		Type L Heavy Hard		Type M Standard Hard		Type O Light Hard		Type K Extra Heavy Soft		Type L Heavy Soft	
		Wall Thickness Inches	Weight per Foot Pounds	Wall Thickness Inches	Weight per Foot Pounds	Wall Thickness Inches	Weight per Foot Pounds	Wall Thickness Inches	Weight per Foot Pounds	Wall Thickness Inches	Weight per Foot Pounds	Wall Thickness Inches	Weight per Foot Pounds
1/4	3/8	.032	.1337	.030	.1260	.025	.107			.032	.1337	.030	.1260
3/8	1/2	.049	.2691	.035	.1982	.025	.145			.049	.2691	.035	.1982
1/2	5/8	.049	.3437	.040	.2849	.028	.204			.049	.3437	.040	.2849
3/4	7/8	.065	.6411	.045	.4548	.032	.328			.065	.6411	.045	.4548
1	1 1/8	.065	.8390	.050	.6545	.035	.465			.065	.8390	.050	.6545
1 1/4	1 3/8	.065	1.037	.055	.8840	.042	.682			.065	1.037	.055	.8840
1 1/2	1 5/8	.072	1.362	.060	1.143	.049	.940			.072	1.362	.060	1.143
2	2 1/8	.083	2.064	.070	1.752	.058	1.46			.083	2.064	.070	1.752
2 1/2	2 5/8	.095	2.927	.080	2.479	.065	2.03			.095	2.927	.080	2.479
3	3 1/8	.109	4.003	.090	3.326	.072	2.68	.049	1.835	.109	4.003	.090	3.326
3 1/2	3 5/8	.120	5.122	.100	4.292	.083	3.58	.049	2.134	.120	5.122	.100	4.292
4	4 1/8	.134	6.512	.110	5.378	.095	4.66	.058	2.872	.134	6.512	.110	5.378
5	5 1/8	.160	9.673	.125	7.611	.109	6.66	.065	4.005	.160	9.673	.125	7.611
6	6 1/8	.192	13.87	.140	10.20	.122	8.92	.072	5.307	.192	13.87	.140	10.20
8	8 1/8	.271	25.92	.200	19.30	.170	16.46	.083	8.128	.271	25.92	.200	19.30
10	10 1/8	.338	40.28	.250	30.06	.212	25.57	.109	13.29	.338	40.28	.250	30.06
12	12 1/8	.405	57.80	.280	40.39	.254	36.69	.134	19.57	.405	57.80	.280	40.39

WORKING PRESSURES, Pounds per Square Inch

	Type K Extra Heavy Hard	Type L Heavy Hard	Type M Standard Hard	Type O Light Hard	Type K Extra Heavy Soft	Type L Heavy Soft
Saturated steam	250 pounds	150 pounds	80 pounds	15 pounds	250 pounds	150 pounds
Hot water, cold water, air, and similar fluids	400 pounds	250 pounds	250 pounds	125 pounds	250 pounds	150 pounds

Service recommendations: Copper Tubing is recommended for many services, such as for steam, water, air, oil, gas, or similar fluids. The Types K, L, and M are used for general plumbing and heating purposes, and for industrial applications. In addition, the Type K Tubing soft annealed is especially adapted to service on underground lines. The Type O Tubing is recommended only for industrial uses.

On steam installations, the successful application of Copper Tubing depends not only upon the weight of tubing but also upon the solder used when making joints. For recommendations on solders, see page 511.

Hard Copper Tubing: Hard Copper Tubing is intended primarily for use in straight lengths. It is not recommended for field bending except when proper bending equipment is used.

Soft Copper Tubing: Soft Copper Tubing can be bent without special bending equipment; it is recommended for service where bends must be made in the field, as on concealed replacement work.

Soft Copper Tubing while in transit or when being handled may become flattened or distorted. Before being used, the ends of the tubing should be sized to

assure a tight soldered joint. For sizing tools, see page 511.

Standard lengths: 20-foot straight lengths for both hard and soft Copper Tubing and 60-foot coiled lengths for soft Copper Tubing are generally considered standard. Other lengths can be furnished.

Tinning: Copper Tubing can be furnished tinned on the outside, on the inside, or on both the outside and the inside.

Federal Specification: Type K hard and soft, Type L hard only, and Type M Copper Tubing in sizes 3/8 to 6-inch conforms to Federal Specification WW-T-799, dated October 18, 1932; the 1/4-inch and the 8, 10, and 12-inch sizes are not included in the Federal Specification.

American Standard: Type K hard and soft, Type L hard and soft, and Type M Copper Tubing in sizes 3/8 to 6-inch conforms to the American Standard for Copper Water Tube, A.S.A. No. H23.1-1934; the 1/4-inch and the 8, 10, and 12-inch sizes are not included in the Standard.

The American Standard designates tubing by "Class" letters instead of by "Type" letters, thus: Class K, and Class L, and Class M.

Pipe Hangers and Supports

Hangers

Standard Ring and Bolt Hangers.....	page 514
Adjustable Clips.....	page 514
Band Hangers.....	page 514
Clevis Hangers.....	page 514
Malleable Iron Ring Hangers.....	page 515
Adjustable Swivel Pipe Rolls.....	page 516
Spring Cushion Hangers.....	page 516
Single Pipe Rolls and Sockets.....	page 517
U-Hooks.....	page 518
Genspring Hangers.....	page 533

Hanger Extensions and Connections

Adjustable Swivel Couplings.....	page 518
Rod Couplings.....	page 518
Hanger Rod Couplings and Toggle Bolts.....	page 518
Turnbuckles.....	page 519
Perforated Extension Bars.....	page 519
Hanger Flanges.....	page 520
Extension Pieces.....	page 520
Hanger Rods.....	page 521
Coach Screw Rods.....	page 521
Hook Rods.....	page 521
Eye Rods.....	page 521
Square Head Hanger Rods.....	page 521
Extension Eye Bolts.....	page 523

Beam Clamps

I-Beam Clamps.....	pages 522 to 524
Channel Clamps.....	page 522
Clamps for Wide Flange Beam Sections...	pages 522 and 523

Brackets

Application of Welded Steel Brackets.....	page 524
Welded Steel Brackets.....	page 525
Bracket Clips.....	page 525

Supports

Pipe Roll Stands.....	page 526
Pipe Roller Supports.....	page 526
Adjustable Pipe Roll Stands.....	page 527
Pipe Rolls and Plates.....	page 528
Pipe Pole Supports for Outside Lines.....	page 528
Pipe Chairs.....	page 529
Anchor Chairs.....	page 529
Pipe Seats.....	page 529
Pipe Saddle Support.....	page 531
Pipe Stanchion Saddles.....	page 531
Wall Pipe Supports.....	page 531

Miscellaneous

Riser and Pipe Clamps.....	page 519
Pipe Covering Protection Saddles.....	page 530
Single Hooks.....	page 531
Hook Plates.....	page 532
Floor and Ceiling Plates.....	page 532

For general remarks and excerpts from Code for Pressure Piping, see page 534.

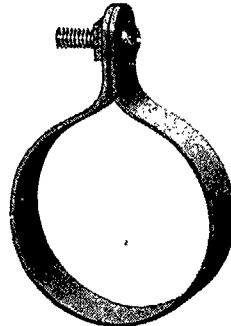
For deflection of horizontal pipe lines and spacing of pipe supports, see pages 642 and 643.

Standard Ring and Bolt Hangers

No. 2-C: These hangers are made of high quality soft steel. They can also be furnished galvanized or made of brass; special prices will apply.

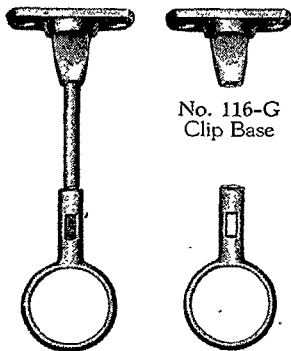
Standard Ring and Bolt Hangers can be used with No. 1-C Perforated Extension Bar, page 510, or with No. 110-G or No. 110 R-G Malleable Iron Sockets for use with pipe or rod extensions; see page 515.

Prices on application



No. 2-C
Standard
Ring and Bolt
Hanger

Pipe Size Inches	Size of Stock		Size of Bolt Inches	Size of No. 1-C Extension Bar to use Number
	Width Inches	Thick- ness		
1/2	3/4	16 Ga.	1/4	0
3/4	3/4	16 Ga.	1/4	0
1	7/8	16 Ga.	1/4	0
1 1/4	7/8	16 Ga.	1/4	1
1 1/2	1	15 Ga.	1/4	1
2	1	15 Ga.	1/4	1
2 1/2	1 1/8	12 Ga.	1/4	2
3	1 1/8	12 Ga.	1/4	2
3 1/2	1 1/8	12 Ga.	1/4	3
4	1 1/4	12 Ga.	1/4	3
5	1 1/4	12 Ga.	5/16	4 or 5
6	1 1/4	12 Ga.	5/16	4 or 5
8	1 1/4	3/16"	3/8	5 or 6
10	1 1/4	3/16"	3/8	5 or 6
12	1 1/4	3/16"	3/8	5 or 6



No. 116-G
Clip Base

No. 106-G
Adjustable Clip



No. 105-G
Clip Ring

Underwriters' Approved
Malleable Iron

Adjustable Clips

List Prices and Dimensions, in Inches

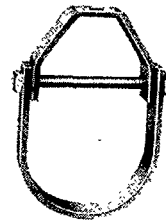
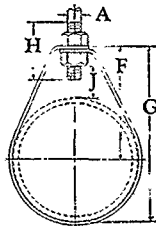
Pipe Size Inches	List Price per 100						Square Head Hanger Rod		Ceiling to Center of Pipe		Inside Diameter of Ring
	No. 106-G		No. 116-G		No. 105-G		Length	Diam.	Min.	Max.	
	Black	Galv.	Black	Galv.	Black	Galv.					
3/4	44.00	54.00	21.60	24.10	15.00	16.50	6 1/4	3/8	8	9 5/8	13 1/16
1	47.50	58.00	21.60	24.10	18.00	20.00	6 3/4	3/8	8 1/2	10 1/8	17 1/16
1 1/4	48.50	59.50	21.60	24.10	19.00	21.50	6 3/4	3/8	8 3/4	10 3/8	11 3/16
1 1/2	51.00	62.50	21.60	24.10	21.00	24.00	7	3/8	9	10 5/8	21 1/16
2	56.00	68.50	21.60	24.10	26.00	30.00	7 1/4	3/8	9 1/2	11 1/8	29 1/16

Band and Clevis Hangers

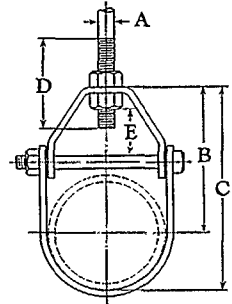
Adjustable



No. 269-G, Band Hanger, Wrought Steel



No. 260-G, Clevis Hanger, Wrought Steel
Underwriters' Approved

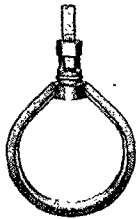


List Prices and Dimensions, in Inches

Pipe Size Inches	List Price per 100		*No. 260-G, Clevis Hanger					No. 269-G, Band Hanger			
	No. 260-G	No. 269-G	A	B	C	D	Adjust. E	F	G	H	Adjust. J
3/4	23.00	13.00	3/8	3 1/4	3 13/16	2 1/2	1 1/2	2	2 9/16	2 1/2	1
1	24.00	13.50	3/8	3 3/8	4 1/16	2 1/2	1 1/2	2 3/16	2 7/8	2 1/4	1
1 1/4	28.00	14.00	3/8	3 5/8	4 7/16	2 1/2	1 1/2	2 9/16	3 7/16	2 1/2	1 1/4
1 1/2	30.00	15.00	3/8	3 13/16	4 3/4	2 1/2	1 1/2	2 3/4	3 11/16	2 1/2	1 1/4
2	32.00	15.50	3/8	4	5 3/16	2 1/2	1 1/2	3	4 3/16	2 1/2	1 1/4
2 1/2	35.00	21.50	1/2	4 5/8	6 1/16	3	1 3/4	3 15/16	5 3/8	3 1/2	1 3/4
3	46.00	22.00	1/2	4 15/16	6 11/16	3	1 3/4	4 1/4	6	3 1/2	1 3/4
3 1/2	58.00	23.00	1/2	5 1/4	7 1/4	3	1 3/4	4 1/2	6 1/2	3 1/2	1 3/4
4	64.00	24.50	5/8	5 3/4	8	3 1/2	1 3/4	4 7/8	7 1/8	3 1/2	1 3/4
5	74.00	34.00	5/8	6 9/16	9 9/8	3 1/2	2	5 3/4	8 1/2	4	2
6	87.00	37.00	3/4	7 5/16	10 5/8	4	2	6 7/16	9 3/4	4 1/2	2
8	135.00	57.00	7/8	8 9/16	12 7/8	4 1/4	2	7 11/16	12	4 1/2	2
10	300.00		7/8	10 1/4	15 5/8	4 1/4	2 1/8				
12	400.00		7/8	11 5/8	18	4 3/4	2 3/8				
14	500.00		1	13	20	5 1/4	2 5/8				
16	700.00		1	14 5/8	22 3/8	6	3 1/4				

*Clevis Hangers, sizes 10-inch and larger, are provided with a Pipe Spacer on the bolt.

Malleable Iron Ring Hangers



No. 101-G
Adjustable Swivel Ring
Solid Ring Type
Underwriters Approved



No. 104-G
Adjustable Swivel Ring
Split Ring Type
Underwriters Approved



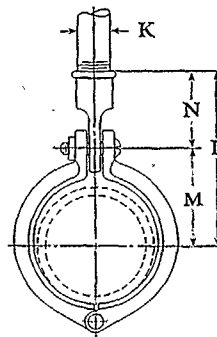
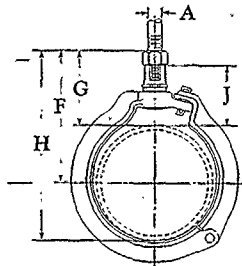
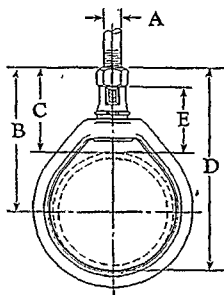
No. 107-G, Pipe Threaded
No. 107 R-G, Rod Threaded
Split Pipe Ring and Socket



No. 108-G
Split Pipe Ring



No. 110-G
Pipe Threaded
Socket
No. 110 R-G
Rod Threaded
Socket



Regularly furnished
in black.
Galvanized furnished
when ordered.

No. 101-G and No. 104-G Hangers can be adjusted by turning the swivel nut to raise or lower the pipe. When the pipe is in the desired position, the swivel shank automatically locks to prevent loosening due to vibration and to assure permanent alignment of the piping.

Split Ring Hangers can be applied after the pipe line is in place. No. 104-G is hinged off center to provide sufficient seating to hold the pipe before closing the ring. A wedge pin is loosely but inseparably cast into the hinged section for fastening after the pipe is in place.

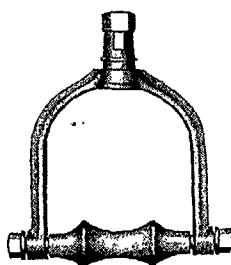
List Prices and Dimensions, in Inches, for Complete Hangers

Pipe Size Inches	List Price per 100				A	No. 101-G					No. 104-G				No. 107-G		No. 107R-G	
	No. 101-G		No. 104-G	No. 107 R-G		B	C	D	Adjust. E	F	G	H	Adjust. J	K	L	K	L	
	Black	Galv.	Black	Galv.														
1/2	22.80	27.20	41.40	21.50	23.50	3/8	2 15/16	2 7/16	3 1/2	2	2 7/8	2 3/8	3 7/16	1 15/16	1/8	2 3/16	3/8	2 3/16
3/4	24.60	29.10	43.40	24.50	27.00	3/8	2 3/4	2 1/8	3 7/16	1 11/16	2 7/8	2 1/4	3 9/16	1 3/4	1/8	2 3/8	3/8	2 3/8
1	25.40	30.00	46.40	27.00	30.00	3/8	3 1/16	2 3/16	3 7/8	1 3/4	3	2 3/16	3 7/8	1 11/16	1/4	2 1/2	3/8	2 1/2
1 1/4	25.40	30.00	46.40	27.00	30.00	3/8	3 1/16	2 3/16	3 7/8	1 3/4	3	2 3/16	3 7/8	1 11/16	1/4	2 1/2	3/8	2 1/2
1 1/2	26.40	31.20	52.40	30.00	33.50	3/8	3 1/16	2 1/8	4	1 11/16	3 1/8	2 3/16	4 1/8	1 11/16	1/4	2 1/2	3/8	2 1/2
2	29.00	34.40	58.40	32.00	36.00	1/2	3 7/16	2 1/4	4 5/8	1 13/16	3 1/2	2 5/16	4 11/16	1 13/16	1/4	3 1/16	3/8	3 1/16
2 1/2	41.20	50.00	67.20	39.00	44.00	1/2	4	2 9/16	5 7/16	2 1/16	3 15/16	2 1/2	5 3/8	1 7/8	1/4	3 15/16	1/2	3 15/16
3	51.20	61.00	77.20	45.00	51.00	1/2	4 3/8	2 5/8	6 1/8	2 1/8	4 3/8	2 5/8	6 1/8	2	1/4	4 3/8	1/2	4 3/8
3 1/2	53.20	65.00	105.20	53.50	63.50	1/2	4 9/16	2 9/16	6 9/16	2 1/16	4 3/4	2 3/4	6 3/4	2 1/8	3/8	4 3/4	1/2	4 3/4
4	67.00	84.00	124.00	63.50	74.50	5/8	5 1/8	3 3/16	7 1/16	2 9/16	5 13/16	3 9/16	8 1/16	2 7/8	3/8	5 1/8	5/8	5 1/8
5	84.00	104.00	172.00	88.00	108.00	5/8	6	3 1/4	8 13/16	2 5/8	6 3/8	3 3/8	9 3/16	2 15/16	1/2	6 9/16	5/8	6 9/16
6	132.00	164.00	218.00	103.00	130.00	3/4	7 1/8	3 13/16	10 7/16	3 1/16	7 5/8	4 5/16	10 15/16	3 1/2	1/2	7 5/16	3/4	7 1/2
8	231.00	318.00	375.00	173.00	224.00	7/8	8 13/16	4 1/2	13 1/8	3 3/8	9 3/8	4 7/8	13 1/2	3 7/8	1/2	8 3/16	7/8	8 9/16

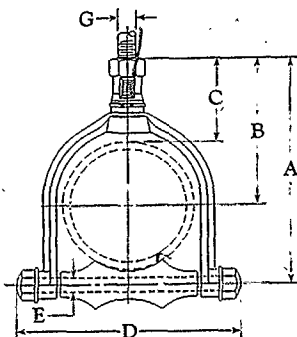
List Prices and Dimensions, in Inches, for Rings and Sockets Only

No. 108-G, Split Pipe Rings Only							Sockets Only										
Pipe Size	Price per 100		M	Pipe Size	Price per 100		M	Pipe Size	No. 110-G Pipe Threaded				Pipe Size	No. 110 R-G Rod Threaded			
	Black	Galv.			Black	Galv.			Price per 100	K	N	Price per 100		K	N		
								Inches	Black			Galv.				Inches	Black	Galv.
1/2	15.00	16.00	1 5/16	3	38.00	43.00	2 3/4	1/2-1	6.50	7.50	1/8	1 1/4	1 1/2-2	6.50	7.50	3/8	1 1/4
3/4	17.00	18.00	1 7/8	3 1/2	45.00	53.00	3 1/8	1 1/4-3	7.00	8.00	1/4	1 5/8	2 1/2-3 1/2	7.00	8.00	1/2	1 5/8
1	18.00	19.50	1 3/4	4	55.00	64.00	3 1/2	3 1/2-4	8.50	10.50	3/8	1 7/8	4-5	8.50	10.50	5/8	1 15/16
1 1/4	20.00	22.00	1 9/16	5	75.00	92.00	4 5/8	5-8	13.00	16.00	1/2	1 15/16	6	13.00	16.00	3/4	2 1/8
1 1/2	23.00	25.50	1 11/16	6	90.00	114.00	5 3/8	.....	18.00	22.00	3/4	2 1/8	8	18.00	22.00	7/8	2 1/2
2	25.00	28.00	2 1/16	8	160.00	208.00	6 1/4										
2 1/2	32.00	36.00	2 5/16														

Adjustable Swivel Pipe Rolls



No. 174-G
Adjustable Swivel
Pipe Roll



List Prices and Dimensions, in Inches

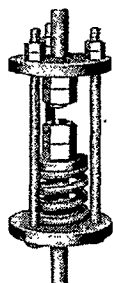
Pipe Size	*Size (covered)	Price per 100	A	B	C	D	E	G
2 1/2	3/4	152.00	6 5/8	4	2 9/16	5 1/2	7/16	1/2
3	1, 1 1/4	155.00	7 5/16	4 5/8	2 9/16	6 1/8	7/16	1/2
3 1/2	1 1/2	185.00	8	4 5/8	2 5/8	6 7/8	1/2	1/2
4	2	225.00	9 1/16	5 5/8	3 1/8	7 7/16	1/2	5/8
5	2 1/2, 3	295.00	10 3/8	5 15/16	3 1/8	8 3/4	5/8	5/8
6	3 1/2, 4	410.00	12 1/4	7 1/16	3 3/4	10 7/8	3/4	3/4
8	6	645.00	15 3/8	8 13/16	4 1/2	13 1/4	7/8	7/8
10	7	920.00	18 1/16	10	4 5/8	15 1/2	7/8	7/8
12	8	1250.00	20 1/2	11 1/8	4 3/4	17 3/4	1	7/8

*Pipe sizes used when covered with standard thickness covering.

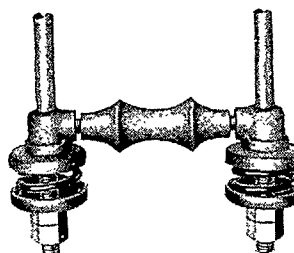
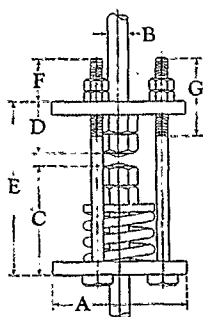
These Adjustable Swivel Pipe Rolls have a malleable iron yoke and a cast iron roll. Vertical adjustment is made by use of the swivel shank which automatically locks, preventing loosening due to vibration.

This type of hanger is primarily designed for use with uncovered pipe; but, covered pipe with Pipe Covering Protection Saddles can be used when proper pipe rolls are installed.

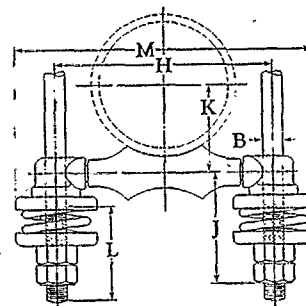
Spring Cushion Hangers



No. 255-G
Spring Cushion
Pipe Hanger



No. 256-G
Spring Cushion
Pipe Roll Hanger



Spring cushion hangers: No. 255-G and No. 256-G are recommended for service where constant support is required and compensation must be made for movement of the piping. The use of springs is an efficient means of absorbing vibration.

These hangers are designed to support ten feet of extra strong pipe filled with water or equivalent.

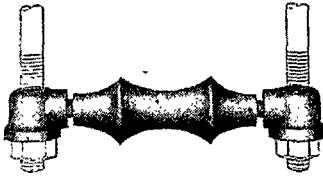
When pipe lines are subjected to vertical movement due to thermal conditions, Genspring Hangers are recommended; see page 533.

List prices for No. 255-G include steel flanges, spring, and outside bolts with nuts. List prices for No. 256-G include the roll, roll rod, adjustable sockets, springs, and cups.

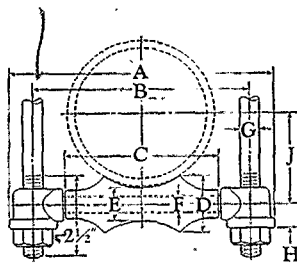
List Prices and Dimensions, in Inches

Pipe Size Inches	No. 255-G									No. 256-G						
	Price per 100	Spring Cushion Hanger Size No.	A	B	C	D	E	F	G	Price per 100	B	H	Max. J	K	L	M
1	380.00	1	3	3/8	2 5/8	1 1/8	4	1	2	180.00	3/8	3	2 13/16	1 1/16	2 1/2	4 3/16
1 1/4	380.00	1	3	3/8	2 5/8	1 1/8	4	1	2	182.00	3/8	3 3/8	2 13/16	1 1/4	2 1/2	4 9/16
1 1/2	380.00	1	3	3/8	2 5/8	1 1/8	4	1	2	184.00	3/8	3 3/8	2 13/16	1 3/8	2 1/2	4 13/16
2	380.00	1	3	3/8	2 5/8	1 1/8	4	1	2	187.00	3/8	4 1/8	2 13/16	1 5/8	2 1/2	5 5/16
2 1/2	470.00	2	3 1/2	1/2	3	1 1/2	4 3/4	1 1/4	2 1/2	220.00	1/2	4 7/8	3 1/4	1 15/16	3	6 11/16
3	470.00	2	3 1/2	1/2	3	1 1/2	4 3/4	1 1/4	2 1/2	230.00	1/2	5 1/2	3 1/4	2 1/4	3	7 5/16
3 1/2	470.00	2	3 1/2	1/2	3	1 1/2	4 3/4	1 1/4	2 1/2	252.00	1/2	6 1/8	3 5/16	2 9/16	3	7 15/16
4	620.00	3	4 1/4	5/8	3 1/2	1 3/4	5 5/8	1 3/8	2 1/2	370.00	5/8	6 3/4	3 5/16	2 13/16	3	9 1/4
5	620.00	3	4 1/4	5/8	3 1/2	1 3/4	5 5/8	1 3/8	2 1/2	382.00	5/8	8 1/16	3 11/16	3 7/16	3	10 9/16
6	725.00	4	4 1/4	3/4	4	2	6 1/2	1 1/2	3	471.00	3/4	9 9/16	4 1/2	4	3 1/2	12 1/4
8	960.00	5	4 5/8	7/8	5 1/4	2 1/4	8	1 1/2	3	605.00	7/8	11 15/16	5 3/16	5 1/8	3 1/2	14 3/4
10	960.00	5	4 5/8	7/8	5 1/4	2 1/4	8	1 1/2	3	660.00	7/8	14 1/16	5 3/16	6 3/8	3 1/2	16 7/8
12	960.00	5	4 5/8	7/8	5 1/4	2 1/4	8	1 1/2	3	760.00	7/8	16 5/16	5 3/16	7 7/16	3 1/2	19 1/8
14 OD	1160.00	6	4 5/8	1	6 5/8	2 1/2	9 5/8	1 7/8	3	1265.00	1	17 3/4	6 5/8	8 3/8	4	21
16 OD	1160.00	6	4 5/8	1	6 5/8	2 1/2	9 5/8	1 7/8	3	1390.00	1	19 3/4	6 3/4	9 7/16	4	23
18 OD	1250.00	7	5	1 1/8	6 1/8	2 3/8	9 1/2	2	3 1/2	1735.00	1 1/8	21 7/8	7 1/8	10 1/2	4 1/2	25 1/4
20 OD	1750.00	8	6	1 1/4	7 5/8	3 1/8	11 3/8	2 1/4	4	2250.00	1 1/4	24 1/4	8 5/8	11 5/8	4 1/2	27 3/8
24 OD	1900.00	9	6	1 1/2	8 1/8	3 5/8	12 3/8	2 5/8	4 1/2	3200.00	1 1/2	28 3/8	8 1/4	14	5	32 3/4

Single Pipe Rolls and Sockets



No. 171-G
Single Pipe Roll, Complete
No. 173-G
Pipe Roll Only
No. 171 A-G
Adjustable Socket Only



Cast Iron Pipe Roll and Sockets, No. 171-G, is designed to take care of expansion and contraction. The adjustable sockets permit vertical adjustment of the roll, and the nuts at the bottom of the sockets fit into a recess to prevent loosening or turning due to vibration.

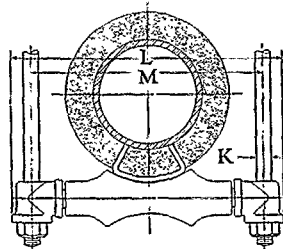
Hanger rods and nuts are to be ordered separately. Rolls of special lengths can be furnished on special order; prices on application.

List Prices and Dimensions, in Inches

Pipe Size	List Price per 100			Socket Number	A	B	C	D	E	F	G	H	J
	No. 171-G	No. 173-G	No. 171 A-G										
1	68.00	13.00	25.00		4 1/8	3	1 1/2	1					1 1/16
1 1/4	70.00	13.50	25.00		4 1/2	3 3/8	1 7/8	1 1/4					1 1/4
1 1/2	72.00	17.00	25.00		4 3/4	3 5/8	2 1/8	1 1/8	3/4	3/8	3/8	9/16	1 3/8
2	75.00	18.00	25.00		5 1/4	4 1/8	2 3/8	1 3/16					1 5/8
2 1/2	90.00	19.00	28.00	2-7/16	6 1/4	4 7/8	3 1/8	1 3/8	7/8	7/16	1/2	1 1/16	1 15/16
3	100.00	24.00	28.00	2-7/16	6 7/8	5 1/2	3 3/4	1 7/16	7/8	7/16	1/2	1 1/16	2 1/4
3 1/2	122.00	43.00	28.00	2-1/2	7 1/2	6 1/8	4 1/4	1 5/8	1	1/2	1/2	3/4	2 9/16
4	130.00	45.00	28.00	3-1/2	8 1/4	6 3/4	4 3/4	1 3/4	1	1/2	5/8	3/4	2 13/16
5	142.00	58.00	28.00	3-5/8	9 11/16	8 1/16	5 13/16	2	1 1/8	5/8	5/8	7/8	3 7/16
6	151.00	62.00	34.00	4-3/4	11 7/16	9 9/16	6 7/8	2 5/16	1 1/4	3/4	3/4	1	4
8	220.00	98.00	48.00	5-7/8	14 1/16	11 5/16	8 7/8	2 13/16	1 1/2	7/8	7/8	1 1/8	5 1/8
10	275.00	130.00	48.00	5-7/8	16 3/16	14 1/16	11	3 3/8	1 3/4	7/8	7/8	1 1/8	6 3/8
12	375.00	200.00	56.00	5-1	18 7/16	16 5/16	13	3 7/8	2	1	7/8	1 1/4	7 7/16
14 OD	700.00	400.00	64.00	6-1 1/8	20 1/8	17 3/4	14 1/4	4 5/8	2 1/2	1 1/8	1	1 3/8	8 3/8
16 OD	825.00	520.00	68.00	6-1 1/4	22 1/8	19 3/4	16 1/4	5	2 5/8	1 1/4	1	1 1/2	9 7/16
18 OD	1160.00	750.00	90.00	7-1 1/4	24 1/2	21 7/8	18 1/4	5 7/16	2 3/4	1 1/4	1 1/8	1 1/2	10 1/2
20 OD	1400.00	900.00	115.00	8-1 3/8	27 1/4	24 1/4	20 1/4	6	3	1 3/8	1 1/4	1 3/8	11 5/8
24 OD	2200.00	1500.00	160.00	9-1 1/2	32 1/8	28 5/8	24 1/4	7 3/16	3 5/8	1 1/2	1 1/2	1 3/4	14
30 OD	3300.00	2100.00	215.00	10-1 7/8	39 7/8	35 1/2	30 1/4	8 15/16	4 1/2	1 7/8	1 7/8	2 1/8	17 7/16

Single Pipe Rolls with Special Sockets

For use with Pipe Covering Protection Saddles



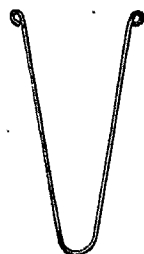
No. 171 S-G
Single Pipe Roll with Special Sockets
For use with Pipe Covering Protection Saddles
No. 171 AS-G
Special Socket Only

No. 171 S-G is a special adaptation of No. 171-G. The special sockets, No. 171 AS-G, are provided to permit the use of hanger rods of the same standard size as regularly used with each size of pipe, yet to allow the use of larger rolls to accommodate covered pipe with Pipe Covering Protection Saddles.

Protection Saddles... page 530

Roll Size	List Price per 100		Socket Number	Size of Covered Pipe	K	L	M
	No. 171 S-G	No. 171 AS-G					
4"	130.00	28.00	2-1/2	2 1/2-3"	1 1/2"	8"	6 5/8"
5	142.00	28.00	2-5/8 3-5/8	3 1/2 4	1 1/2 7/8	9 7/16 9 1/16	8 1/16
6	151.00	34.00	2-3/4 3-3/4	2 1/2 5	1 1/2 5/8	10 15/16 11 3/16	9 9/16
7	165.00	34.00	2-3/4 3-3/4 4-3/4	3-3 1/2 4 6	1 1/2 5/8 3/4	11 15/16 12 3/16 12 7/16	10 9/16
8	220.00	48.00	2-7/8 3-7/8	3-3 1/2 5	1 1/2 5/8	13 5/16 13 9/16	11 5/16
9	240.00	48.00	3-7/8 4-7/8 5-7/8	4 6 8	5/8 3/4 7/8	14 9/16 14 13/16 15 1/16	12 15/16
10	275.00	48.00	3-7/8	5	5/8	15 11/16	14 1/16
12	375.00	56.00	4-1 5-1	6 8-10	3/4 7/8	18 3/16 18 7/16	16 5/16
14 OD	700.00	64.00	5-1 1/8	10	7/8	19 7/8	17 3/4
15 OD	790.00	64.00	5-1 1/8	10-12	7/8	20 7/8	18 3/4
16 OD	825.00	68.00	5-1 1/4 6-1 1/4	10 14	7/8 1	21 7/8 22 1/8	19 3/4
18 OD	1160.00	68.00 68.00 90.00	5-1 1/4 6-1 1/4 7-1 1/4	12 14-16 18	7/8 1 1 1/8	23 7/8 24 1/8 24 1/2	21 3/4 21 3/4 21 7/8
24 OD	2200.00	160.00	6-1 1/2 7-1 1/2 8-1 1/2 9-1 1/2	16 18 20 24	1 1 1/8 1 1/4 1 1/2	31 31 1/4 31 5/8 32 1/8	28 5/8
30 OD	3300.00	215.00	9-1 7/8	24	1 1/2	39	35 1/2

U-Hooks



No. 205-G, U-Hook
Underwriters'
Approved

List Prices per 100 and Dimensions

Nominal Pipe Size Inches	Center of Eye to Bottom of Pipe, Inches											Dia. of Rod Inches	Size Screw
	6	8	10	12	14	16	18	20	24	30	36		
3/4-2	7.00	8.00	9.25	10.50	11.50	12.50	14.00	15.00	17.00	22.00	26.00	5/16	No. 16
2 1/2-3			12.50	14.00	15.50	17.00	19.00	21.00	24.00	30.00	36.00	3/8	3/8
3 1/2-4			18.00	20.00	22.00	24.00	26.00	28.00	32.00	38.00	44.00	7/16	1/2
5				30.00	33.00	36.00	39.00	42.00	48.00	57.00	66.00	9/16	1/2
6				35.00	39.00	43.00	47.00	51.00	60.00	70.00	80.00	5/8	1/2
8						60.00	65.00	70.00	80.00	95.00	110.00	3/4	5/8

Adjustable Swivel Couplings and Rod Couplings

List Prices and Dimensions

Size No.		1	2	3	4	5
No. 134-G	Price per 100	28.00	44.00	55.00	105.00	150.00
	Size, rod tappings	Inches 3/8	1/2	5/8	3/4	7/8
	Length, overall	Inches 3 1/16	3 5/8	4 5/8	5 3/16	6 3/8
No. 136-G	Price per 100	12.25	16.50	20.00	24.00	32.00
	Size, rod tappings	Inches 3/8	1/2	5/8	3/4	7/8
	Length, overall	Inches 1 5/16	2 1/4	2 1/2	2 13/16	3 1/8

No. 134-G Adjustable Swivel Coupling has the same adjustable and self-locking features as No. 101-G and No. 104-G Adjustable Swivel Rings; see page 515.

When No. 134-G is used as a hanger rod coupling, the large end should be locked to the rod with a check nut. No. 136-G is furnished with straight U.S. Standard Right Hand Threads unless otherwise specified.



No. 134-G
Adjustable
Swivel Coupling



No. 136-G
Rod
Coupling

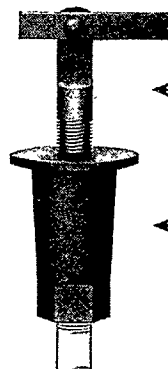
Hanger Rod Couplings and Toggle Bolts

List Prices and Dimensions, in Inches

Pipe Size	No. 208-G, Hanger Rod Coupling Only					
	Coupling No.	Price per 100	A	B	C	D
3/4-2	1	23.00	2 1/2	2	3/8	2
2 1/2-3 1/2	2	27.00	2 3/4	2 1/4	1/2	2 1/8
4-5	3	33.00	3 1/4	2 1/2	5/8	2 1/2
6	4	43.00	3 3/4	2 7/8	3/4	2 7/8
8-12	5	53.00	4 1/4	3 1/8	7/8	3 1/4

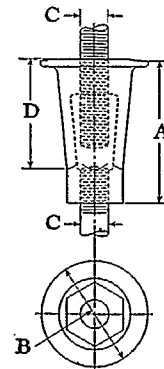
This type of hanger, designed for use under tile and cinder concrete construction, allows for adjustment to accommodate varying thicknesses of plaster.

The Toggle Bolt illustrated at the right is used for hanging pipe, up to the 3 1/2-inch size, from hollow tile construction. When hanging pipe larger than 3 1/2-inch from hollow tile construction, and for hanging all sizes of pipe from cinder concrete construction, the hanger rod coupling is used with a



No. 209-G
Toggle Bolt

No. 208-G
Hanger Rod
Coupling

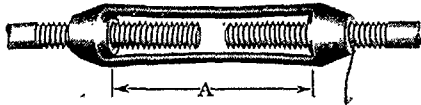


rod which is installed in a hole drilled through the entire slab. The nut or bolt head at the upper end of the rod rests on a plate washer.

List Prices for No. 209-G, Toggle Bolt Only

Length of Bolt	Inches	6	9	12	15	18	24	30	36	42	48	54	60	66	72
3/8-inch diameter	per 100	31.00	32.00	33.00	35.00	36.00	39.00	42.00	45.00	49.00	52.00	55.00	57.00	60.00	63.00
1/2-inch diameter	per 100	55.00	57.00	59.00	61.00	64.00	68.00	73.00	78.00	84.00	89.00	93.00	98.00	103.00	108.00

Forged Steel Turnbuckles



No. 230-G, Forged Steel Turnbuckles.

These drop forged steel turnbuckles will be furnished with stub ends unless definitely specified "without stub ends". For galvanized turnbuckles, add 25 per cent to the list price.

List Prices, Each

Diameter of Screw Inches	Dimension A, Inches					Diameter of Screw Inches	Dimension A, Inches			
	†6	9	12	18	24		†6	12	18	24
3/8	.45					1 3/8	2.10			
1/2	.50	.75	.88			1 1/2	2.50	4.38	6.25	8.75
5/8	.60	.90	1.05	1.50		1 5/8	3.25			
3/4	.75	1.13	1.31	1.88	2.63	1 3/4	4.00		10.00	14.00
7/8	.90		1.58	2.25	3.15	2	6.25			21.88
1	1.10		1.93	2.75	3.85	2 1/4	9.25			32.38
1 1/8	1.40		2.45	3.50	4.90	2 1/2	13.00			45.50
1 1/4	1.70		2.98	4.25	5.95					

†Standard length turnbuckles have a 6-inch opening; this length will be sent unless otherwise ordered.

Steel Perforated Extension Bars

Prices on application

Steel Perforated Extension Bars are made of high quality soft steel which can easily be cut with a cold chisel. These bars can be furnished galvanized or made of brass; prices on application.

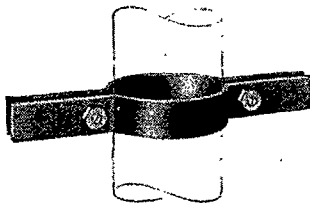


No. 1-C, Steel Perforated Extension Bar

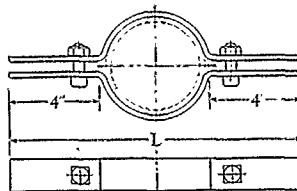
Size Number		00	0	1	2	3	4	5	6
Size of pipe to be supported	Inches	1/2-1	1/2-1	1 1/4-2	2 1/2-3	3 1/2-4	5-6	8-12	8-12
Width	Inches	3/4	3/4	7/8	1	1 1/8	1 1/4	1 1/4	1 1/4
Thickness		18 Ga.	16 Ga.	16 Ga.	15 Ga.	12 Ga.	12 Ga.	3/16"	1/4"
Length	Feet	5 & 10	5 & 10	5 & 10	5 & 10	5 & 10	5 & 10	8	8
Center to center of holes	Inches	5/8	5/8	5/8	5/8	5/8	5/8	1	1
Diameter of holes	Inches	9/32	9/32	9/32	11/32	11/32	11/32	7/16	7/16

Order by figure and size number; also specify the length, when two lengths are listed.

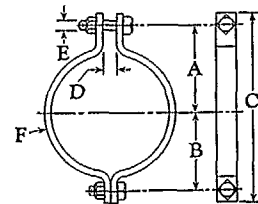
Riser Clamps and Pipe Clamps



No. 261-G, Extension Pipe or Riser Clamp
Wrought Steel—Underwriters' Approved



No. 212-G, Pipe Clamp
Wrought Steel—Underwriters' Approved

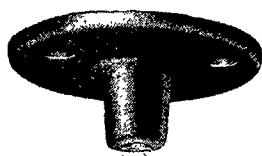


List Prices and Dimensions, in Inches

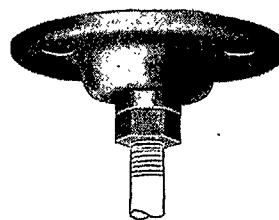
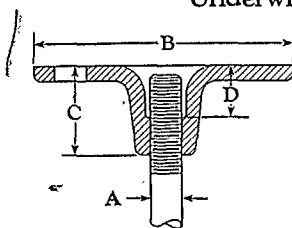
Pipe Size Inches	List Price per 100		No. 261-G			No. 212-G					
	No. 261-G	No. 212-G	L	Stock Size	Size Bolts	A	B	C	D	E	F
3/4	41.00		9 3/8	3/16 x 1 1/4	3/8 x 1 1/4						
1	43.00		9 5/8	3/16 x 1 1/4	3/8 x 1 1/4						
1 1/4	45.00		10	1/4 x 1 1/4	3/8 x 1 1/4						
1 1/2	47.00		10 3/8	1/4 x 1 1/4	3/8 x 1 1/4						
2	49.00	40.00	10 3/4	1/4 x 1 1/4	7/16 x 1 1/2	2 1/8	1 15/16	5 1/16	1 1/2	3/8	1/4 x 1
2 1/2	51.00	41.00	11 1/4	1/4 x 1 1/4	7/16 x 1 1/2	2 5/8	2 1/4	6	5/8	3/8	1/4 x 1
3	53.00	43.00	12	1/4 x 1 1/4	7/16 x 1 1/2	2 15/16	2 9/16	6 5/8	5/8	3/8	1/4 x 1
3 1/2	66.00	55.00	13	1/4 x 1 1/2	1/2 x 1 1/2	3 3/8	2 15/16	7 3/16	5/8	3/8	1/4 x 1 1/4
4	68.00	58.00	13 1/2	1/4 x 1 1/2	1/2 x 1 1/2	3 5/8	3 1/4	8 1/8	3/4	3/8	1/4 x 1 1/4
5	95.00	61.00	14 1/2	1/4 x 2	1/2 x 1 1/2	4 3/16	3 13/16	9 1/4	3/4	3/8	1/4 x 1 1/4
6	120.00	120.00	15 1/2	1/4 x 2	1/2 x 1 1/2	5	4 7/16	10 15/16	7/8	1/2	3/8 x 1 1/2
8	170.00	140.00	18 1/2	3/8 x 2	5/8 x 2	6 3/8	5 11/16	13 13/16	1	1/2	3/8 x 1 1/2
10	252.00	225.00	20 3/4	3/8 x 2	5/8 x 2	7 7/16	6 3/4	15 15/16	1	5/8	1/2 x 2
12	284.00	260.00	22 3/4	1/2 x 2	5/8 x 2 1/2	8 7/16	7 3/4	17 15/16	1	5/8	1/2 x 2
14 OD	320.00	300.00	24	1/2 x 2	5/8 x 2 1/2	9 1/8	8 7/8	20 3/8	1 1/8	5/8	1/2 x 2
16 OD	420.00	330.00	26	5/8 x 2 1/2	3/4 x 3	10 1/2	9 7/8	22 3/8	1 1/8	3/4	1/2 x 2
18 OD	440.00	460.00	28	5/8 x 2 1/2	3/4 x 3	11 7/8	11	25 1/4	1 1/4	1	1/2 x 2 1/2
20 OD	460.00	725.00	30	5/8 x 2 1/2	3/4 x 3	13 1/4	12 3/8	28 7/8	1 3/8	1 1/8	5/8 x 3
24 OD	.....	875.00	..	.....	.....	15 3/4	14 1/2	33	1 5/8	1 1/4	5/8 x 3

Hanger Flanges

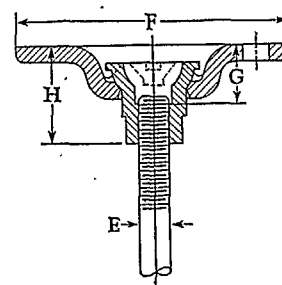
Underwriters' Approved



No. 153-G
Pipe Hanger Flange
(Malleable Iron)



No. 154-G
Swivel Hanger Flange
(Cast Iron)



These ceiling flanges allow for an adjustment of 1 inch where the rod enters the flange. No. 153-G is designed primarily for use on a level ceiling; No. 154-G is a semi-swiveling type hanger and can be

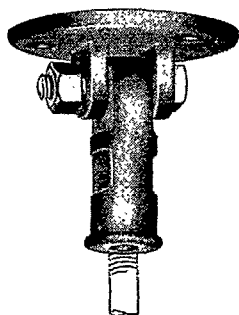
used on a ceiling having a slant of not more than five degrees from level. Size No. 1 has two holes for wood screws. Sizes 2, 3, 4, and 5 each have three holes for coach screws.

List Prices and Dimensions, in Inches

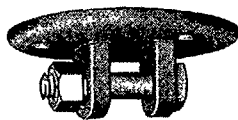
Pipe Size Inches	Size No.	List Price per 100		No. 153-G				No. 154-G				Size Screws
		No. 153-G	No. 154-G	A	B	C	D	E	F	G	H	
3/4-2	1	27.00	48.00	3/8	2 7/8	1 3/8	7/8	3/8	3 1/4	7/8	1 3/8	1 1/2 No. 18
2 1/2-3 1/2	2	51.00	75.00	1/2	4	1 1/2	1 5/16	1/2	4 1/8	7/8	1 1/2	3/8 x 2
4-5	3	68.00	91.00	5/8	4 3/4	1 5/8	1	5/8	5 1/4	7/8	1 5/8	1/2 x 2
6	4	82.00	130.00	3/4	5 1/4	1 7/8	1 1/16	3/4	5 7/8	1	1 7/8	9/16 x 2
8-12	5	137.00	194.00	7/8	6	2 1/8	1 1/8	7/8	6 1/2	1 1/8	2 1/8	5/8 x 2

Adjustable Swinging Hanger Flanges

Malleable Iron — Underwriters' Approved



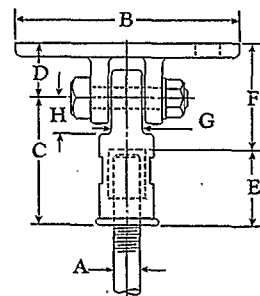
No. 155-G
Adjustable Swinging
Hanger Flange
(Complete)



No. 156-G
Flange with
Bolt, Nut, and
Spring Washer



No. 157-G
Extension
Piece
Rod
Threaded



These Adjustable Swinging Hanger Flanges provide a means of hanging pipe where a swing through a radius of 180° is required. No. 155-G is a combination of No. 156-G and No. 157-G. Size No. 1 has two holes for wood screws; Nos. 2, 3, 4, and 5 have three holes for coach screws.

Extension Piece No. 157-G provides for an adjustment of approximately 1 inch. This Extension Piece can also be used in conjunction with No. 225-G Universal Side I-Beam Clamps, and with No. 226-G Universal Channel Clamps; see pages 522 and 523. Order by figure number and size number.

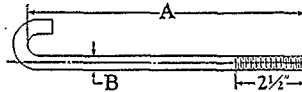
List Prices, and Dimensions, in Inches

Pipe Size	Size No.	List Price per 100			A	B	C	D	E	F	G	H	Size Screws	Size Bolt
		No. 155-G	No. 156-G	No. 157-G										
3/4-2	1	76.00	52.00	20.00	3/8	3 1/4	2 1/8	3/4	1 1/4	1 5/8	1/2	9/16	1 1/2 No. 18	3/8 x 1 1/2
2 1/2-3 1/2	2	107.00	75.00	28.00	1/2	4	2 3/8	1 5/16	1 3/8	1 15/16	5/8	1 1/16	3/8 x 2	3/8 x 1 3/4
4-5	3	142.00	105.00	32.00	5/8	4 3/4	2 9/16	1 1/8	1 9/16	2 1/8	5/8	1 1/16	1/2 x 2	7/16 x 2 1/8
6	4	181.00	136.00	39.00	3/4	5 1/4	2 7/8	1 5/16	1 3/4	2 7/16	5/8	1 3/16	9/16 x 2	7/16 x 2 1/8
8-12	5	261.00	202.00	53.00	7/8	6	3 1/16	1 7/16	1 7/8	2 5/8	3/4	7/8	5/8 x 2	1/2 x 2 3/8

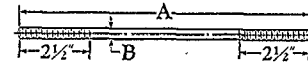
Hanger Rods



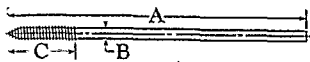
No. 142-G
Coach Screw Rod
Machine Threaded
on Opposite End



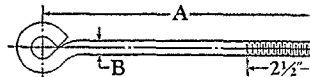
No. 148-G
Hook Rod
Machine Threaded



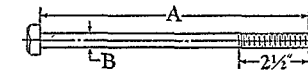
No. 140-G
Hanger Rod
Both Ends Machine Threaded
with Right Hand Threads



No. 143-G
Coach Screw Rod
Opposite End Not Threaded



No. 248-G
Eye Rod
Machine Threaded



No. 144-G
Square Head
Hanger Rod
Machine Threaded

The following rods, not illustrated, can be furnished; prices on application.

- No. 253-G Hanger Rod, right and left hand threads
- No. 141-G Hanger Rod, one end threaded (R. H. threads)
- No. 254-G Hanger Rod, one end threaded (L. H. threads)
- No. 149-G Hook Rod, not threaded
- No. 249-G Eye Rod, not threaded

Longer thread: All right hand threaded rods can be furnished with longer threads. An extra charge is made for each additional $2\frac{1}{2}$ inches of thread or

fraction thereof on each end. The extra charge is as follows:

$\frac{3}{8}$ -inch rods.....	4.00 per 100
$\frac{1}{2}$ and $\frac{5}{8}$ -inch rods.....	5.00 per 100
$\frac{3}{4}$, $\frac{7}{8}$, and 1-inch rods.....	6.00 per 100
$1\frac{1}{8}$, $1\frac{1}{4}$ and $1\frac{1}{2}$ -inch rods.....	7.00 per 100

Dimension "C": The lengths of Coach Screw threads are as follows: $\frac{3}{8}$ -inch rods...2 inches; $\frac{1}{2}$ -inch rods... $2\frac{1}{16}$ inches; $\frac{5}{8}$ and $\frac{3}{4}$ -inch rods... $2\frac{9}{16}$ inches.

List Prices, per 100, and Dimensions, for No. 142-G and No. 140-G

Length A Inches	No. 142-G Rod Size B, Inches				No. 140-G Rod Size B, Inches								
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$
8	11.50	15.25	20.00	24.00	11.25	16.25	20.00	23.00	28.00	39.00	83.00	108.00	142.00
10	12.50	16.50	22.00	27.00	12.00	17.50	21.00	26.00	32.00	45.00	90.00	117.00	155.00
12	13.50	18.00	24.00	30.00	13.00	19.00	23.00	29.00	36.00	51.00	98.00	126.00	168.00
14	14.50	19.50	26.00	33.00	14.00	20.50	25.00	32.00	40.00	57.00	105.00	135.00	181.00
18	16.00	22.00	31.00	39.00	16.00	23.00	29.50	38.00	48.00	68.00	119.00	153.00	207.00
24	18.50	26.50	37.00	48.00	18.50	27.50	35.50	47.00	59.00	85.00	141.00	180.00	246.00
30	21.00	31.00	43.00	57.00	21.00	32.00	42.00	56.00	71.00	102.00	163.00	207.00	285.00
36	24.00	35.00	49.00	66.00	24.00	36.00	48.00	65.00	83.00	120.00	185.00	234.00	325.00
42	30.00	45.00	64.00	84.00	35.00	49.00	66.00	87.00	113.00	142.00	210.00	265.00	366.00
48	34.00	50.00	71.00	94.00	38.00	54.00	73.00	97.00	126.00	160.00	235.00	295.00	408.00
54	37.00	56.00	79.00	104.00	41.00	59.00	81.00	107.00	140.00	178.00	260.00	325.00	450.00
60	41.00	61.00	86.00	115.00	44.00	64.00	88.00	117.00	153.00	196.00	285.00	355.00	492.00
66	44.00	66.00	94.00	125.00	48.00	69.00	95.00	127.00	167.00	214.00	310.00	385.00	533.00
72	47.00	71.00	102.00	135.00	51.00	74.00	102.00	137.00	180.00	232.00	335.00	415.00	575.00

List Prices, per 100, and Dimensions, for Nos. 143-G, 148-G, 248-G, and 144-G

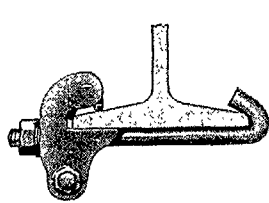
Length A Inches	No. 143-G Rod Size B, Inches				No. 148-G and No. 248-G Rod Size B, Inches					No. 144-G Rod Size B, Inches				
	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$
8	5.50	8.25	13.00	16.00	15.00	19.00	23.00	29.00	40.00	8.50	13.00	16.00	20.00	29.00
10	6.50	9.50	15.00	19.00	16.00	20.00	25.00	32.00	44.00	10.00	15.00	18.00	23.00	33.00
12	7.50	11.00	17.00	22.00	17.00	22.00	27.00	35.00	48.00	12.00	17.00	20.00	26.00	37.00
14	8.50	12.50	19.00	25.00	18.00	23.00	29.00	38.00	52.00	14.00	19.00	22.00	29.00	41.00
18	10.00	15.00	24.00	31.00	20.00	26.00	33.00	43.00	60.00	17.00	23.00	27.00	35.00	50.00
24	12.50	19.50	30.00	40.00	23.00	30.00	39.00	52.00	72.00	22.00	30.00	34.00	44.00	65.00
30	15.00	24.00	36.00	49.00	26.00	34.00	45.00	60.00	84.00	27.00	36.00	42.00	54.00	80.00
36	18.00	28.00	42.00	58.00	29.00	38.00	51.00	68.00	96.00	33.00	43.00	50.00	64.00	95.00
42	23.00	37.00	56.00	75.00	35.00	48.00	66.00	87.00	120.00	40.00	50.00	60.00	75.00	120.00
48	27.00	42.00	63.00	85.00	38.00	53.00	73.00	97.00	133.00					
54	30.00	48.00	71.00	95.00	41.00	58.00	80.00	107.00	146.00					
60	34.00	53.00	78.00	106.00	44.00	63.00	87.00	117.00	159.00					
66	37.00	58.00	86.00	116.00	47.00	68.00	94.00	127.00	172.00					
72	40.00	63.00	94.00	126.00	50.00	73.00	101.00	137.00	185.00					

Universal Side I-Beam and Channel Clamps

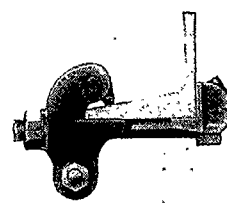
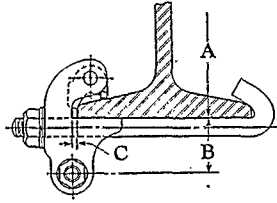
The tables on this page and on the following page show the beam dimensions and the corresponding clamp numbers for American Standard I-Beams and Channels, and for Wide Flange Beam sections.

These Clamps are made of malleable iron and can be

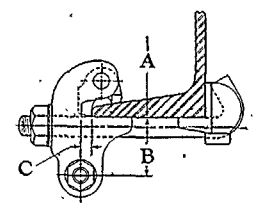
used with No. 220-G Extension Eye Bolts (page 523) or with No. 157-G Extension Pieces (page 520). For clamp numbers, the numerals indicate jaw sizes and the letters or actual dimensions indicate the length and type of hook rod. Orders must specify both the figure number and clamp number wanted.



No. 225-G, Universal Side I-Beam Clamp
Underwriters' Approved



No. 226-G, Universal Channel Clamp
Underwriters' Approved



List Prices and Clamp Numbers of I-Beam and Channel Clamps

Pipe Size Inches	No. 225-G			No. 226-G		
	Price per 100	American Standard I-Beams	Wide Flange Beam Sections	Price per 100	American Standard Channels	
3/4-2	88.00	1-A, B, C, D, E	1-C, D, T, U, V	107.00	1-A, B, C, D, E	
	90.00	2-E, F, G	2-C, I, T, U, V, W, X, Z, 14			
	92.00	3-G, H, I	3-I, W, X, Y, Z, 12 1/2, 13 1/2, 14, 16 1/2			
2 1/2-6	147.00	4-A, B, C, D, E	4-C, D, S, T, U	170.00	4-A, B, C, D, E	
	151.00	5-E, F, G	5-C, S, T, U, V, W, Z, 14 1/2			
	153.00	6-G, I	6-V, W, X, Y, Z, 13, 14, 14 1/2, 17, 17 1/2			
8-12	175.00	7-A, B, C, D, E	7-D, S, T, U, V	198.00	7-A, B, C, D, E	
	179.00	8-E, F, G	8-D, S, T, U, V, W, X, Z, 14 1/2			
	184.00	9-G, H, I	9-V, W, X, Y, Z, 13, 14 1/2, 17, 17 1/2			

DIMENSION "B"
1 1/8 inches for supporting
3/4 to 2-inch pipe.

1 5/8 inches for supporting
2 1/2 to 6-inch pipe.

1 3/4 inches for supporting
8 to 12-inch pipe.

DIMENSION "C"
Varies from 1/8 to 1/2-inch

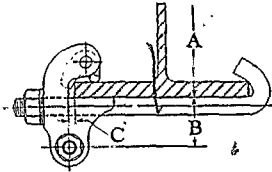
Clamp Numbers and Dimensions, in Inches, for American Standard I-Beams

Beam Dimensions			No. 225-G Clamp Numbers			Beam Dimensions			No. 225-G Clamp Numbers			Beam Dimensions			No. 225-G Clamp Numbers		
Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe
3	5.7	22 1/64	1-A	4-A	7-A	6	12.5	32 1/64	1-B	4-B	7-C	9	21.8	42 1/64	1-D	4-D	7-D
	6.5	21 3/32	1-A	4-A	7-A		14.75	37 1/16	1-C	4-C	7-C		25.0	47 1/16	1-D	4-D	7-D
	7.5	23 3/64	1-A	4-A	7-A		17.25	39 1/16	1-C	4-C	7-C		30.0	41 9/32	1-D	4-D	7-E
4	7.7	22 1/32	1-A	4-A	7-B	7	15.3	32 1/32	1-C	4-C	7-C	10	35.0	44 9/64	1-D	4-D	7-E
	8.5	22 3/32	1-B	4-A	7-B		17.5	33 3/4	1-C	4-C	7-C		25.4	42 1/32	1-D	4-D	7-E
	9.5	25 1/64	1-B	4-A	7-B		20.0	35 5/64	1-C	4-C	7-D		30.0	45 1/64	1-E	4-D	7-E
5	10.5	27 7/8	1-B	4-B	7-B	8	18.4	4	1-C	4-C	7-D	12	35.0	41 5/16	1-E	4-E	7-E
	12.25	39 5/64	1-B	4-B	7-B		20.5	45 5/64	1-C	4-C	7-D		40.0	53 3/32	1-E	4-E	7-E
	14.75	39 3/32	1-B	4-B	7-C		23.0	41 1/64	1-D	4-D	7-D		31.8	5	1-E	4-E	7-E
							25.5	41 7/64	1-D	4-D	7-D		35.0	5 5/64	1-E	4-E	7-E

Clamp Numbers and Dimensions, in Inches, for American Standard Channels

Channel Dimensions			No. 226-G Clamp Numbers			Channel Dimensions			No. 226-G Clamp Numbers			Channel Dimensions			No. 226-G Clamp Numbers		
Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht. A	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe
3	4.1	11 3/32	1-A	4-A	7-A	7	14.75	21 9/64	1-B	4-B	7-B	10	25.0	25 7/64	1-C	4-C	7-C
	5.0	11 1/2	1-A	4-A	7-A		17.25	21 3/32	1-B	4-B	7-B		30.0	31 3/32	1-C	4-C	7-C
	6.0	11 9/32	1-A	4-A	7-A		19.75	23 3/64	1-B	4-B	7-B		35.0	33 1/64	1-C	4-C	7-C
4	5.4	13 7/64	1-A	4-A	7-A	8	11.50	21 7/64	1-B	4-B	7-B	12	20.7	21 5/16	1-C	4-C	7-C
	6.25	14 1/64	1-A	4-A	7-A		13.75	21 1/32	1-B	4-B	7-B		25.0	33 3/64	1-C	4-C	7-C
	7.25	12 3/32	1-A	4-A	7-A		16.25	27 1/16	1-B	4-B	7-B		30.0	31 1/64	1-C	4-C	7-C
5	6.7	13 1/4	1-A	4-A	7-A	9	18.75	21 7/32	1-B	4-B	7-B	15	35.0	31 9/64	1-C	4-C	7-D
	9.0	15 7/64	1-A	4-A	7-B		21.25	29 7/8	1-B	4-B	7-C		40.0	32 7/64	1-C	4-C	7-D
	11.5	21 3/32	1-A	4-A	7-B		13.4	27 1/16	1-B	4-B	7-B		33.9	31 3/32	1-D	4-D	7-D
6	8.2	15 9/64	1-A	4-A	7-B	10	15.0	23 1/64	1-B	4-B	7-B		35.0	32 7/64	1-D	4-D	7-D
	10.5	21 1/32	1-A	4-A	7-B		20.0	24 1/64	1-B	4-B	7-C		40.0	33 3/64	1-D	4-D	7-D
	13.0	25 3/32	1-B	4-A	7-B		25.0	21 3/16	1-B	4-B	7-C		45.0	35 5/8	1-D	4-D	7-D
7	15.5	29 3/32	1-B	4-B	7-B								50.0	32 3/32	1-D	4-D	7-D
	9.8	23 3/32	1-A	4-A	7-B								55.0	31 3/16	1-D	4-D	7-E
	12.25	23 1/16	1-B	4-B	7-B												

Universal Side I-Beam Clamps



Wide flange beam sections: No. 225-G Universal Side I-Beam Clamps are used with wide flange beam sections as illustrated at the left. The clamps can be used with No. 220-G Extension Eye Bolts, illustrated below, or with No. 157-G Extension Pieces shown on page 520.

For list prices, general description, and dimensions "B" and "C" see page 522.

Clamp Numbers, and Dimensions, in Inches, for Wide Flange Beam Sections

Beam Dimensions			No. 225-G Clamp Numbers			Beam Dimensions			No. 225-G Clamp Numbers			Beam Dimensions			No. 225-G Clamp Numbers		
Ht.	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht.	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe	Ht.	Lbs. per Foot	Width	3/4 to 2-inch Pipe	2 1/2 to 6-inch Pipe	8 to 12-inch Pipe
5	13.5	4.990	1-T	4-S	7-S	10	41.0	8.000	2-I	5-W	8-W	14	68.0	10.040	3-Z	6-Z	9-Z
	16.0	5.000	1-T	4-S	7-S		45.0	8.022	2-I	5-W	8-X		74.0	10.072	3-Z	6-Z	9-Z
	18.5	5.025	2-T	5-S	8-S		49.0	10.000	2-Z	5-Z	8-Z		78.0	12.000	3-14	6-14 1/2	9-14 1/2
6	12.0	4.000	1-C	4-C	7-D	10	54.0	10.028	2-Z	5-Z	8-Z	14	84.0	12.023	3-14	6-14 1/2	9-14 1/2
	16.0	4.030	1-D	4-D	7-D		60.0	10.075	3-Z	6-Z	9-Z		87.0	14.500	3-16 1/2	6-17	9-17
	18.0	5.995	1-U	4-T	7-T		66.0	10.117	3-Z	6-Z	9-Z		95.0	14.545	3-16 1/2	6-17	9-17 1/2
6	20.0	6.000	1-U	4-T	7-U	10	72.0	10.170	3-Z	6-Z	9-Z	14	103.0	14.575	3-16 1/2	6-17 1/2	9-17 1/2
	22.5	6.020	2-U	5-T	8-T		16.5	4.000	1-C	4-C	7-D	16	36.0	6.992	2-V	5-U	8-V
	25.0	6.050	2-U	5-T	8-T		19.0	4.010	1-D	4-D	7-D		40.0	7.000	2-W	5-V	8-V
8	27.5	6.085	2-U	5-T	8-U	10	22.0	4.030	2-C	5-C	8-D		45.0	7.039	2-W	5-V	8-V
	13.0	4.000	1-C	4-C	7-D	12	25.0	6.500	1-V	4-U	7-U	16	50.0	7.073	3-W	6-V	9-V
	15.0	4.015	1-C	4-C	7-D		28.0	6.500	2-U	5-U	8-U		58.0	8.464	3-I	6-W	9-X
8	17.0	5.250	1-T	4-S	7-T		32.0	6.533	2-V	5-U	8-U	18	64.0	8.500	3-X	6-X	9-X
	19.0	5.264	1-T	4-S	7-T	12	36.0	6.565	2-V	5-U	8-U		71.0	8.543	3-X	6-X	9-X
	21.0	5.272	1-T	4-S	7-T		40.0	8.000	2-X	5-W	8-W	21	88.0	11.502	3-13 1/2	6-14	9-14 1/2
8	24.0	6.500	1-V	4-U	7-U	12	45.0	8.042	2-X	5-W	8-W		47.0	7.492	2-W	5-V	8-W
	27.0	6.528	2-U	5-U	8-U		48.0	8.077	3-W	6-W	9-W		50.0	7.500	2-W	5-V	8-W
	31.0	8.000	2-W	5-W	8-W	14	50.0	10.000	2-Z	5-Z	8-Z	21	55.0	7.532	3-W	6-V	9-V
10	33.0	8.012	2-W	5-W	8-W		58.0	10.014	3-Z	6-Z	9-Z		64.0	8.715	3-X	6-X	9-X
	35.0	8.027	2-I	5-W	8-W		64.0	10.060	3-Z	6-Z	9-Z	24	70.0	8.750	3-X	6-X	9-X
10	40.0	8.077	2-I	5-W	8-W	14	65.0	12.000	2-14	5-14 1/2	8-14 1/2		59.0	8.230	2-X	5-W	8-X
	48.0	8.117	3-I	6-W	9-W		72.0	12.040	3-14	6-14 1/2	9-14 1/2	27	63.0	8.250	3-I	6-W	9-W
	58.0	8.222	3-X	6-X	9-X		79.0	12.080	3-14	6-14 1/2	9-14 1/2		68.0	8.270	3-X	6-X	9-X
10	15.0	4.000	1-C	4-C	7-D	14	85.0	12.105	3-14	6-14 1/2	9-14 1/2	30	73.0	8.295	3-X	6-X	9-X
	17.0	4.010	1-D	4-D	7-D	14	30.0	6.733	1-V	4-U	7-V		82.0	8.962	3-Y	6-Y	9-Y
	19.0	4.020	1-D	4-D	7-D	14	34.0	6.750	2-V	5-U	8-U	33	74.0	8.975	3-X	6-X	9-X
10	21.0	5.750	1-U	4-T	7-T		38.0	6.776	2-V	5-U	8-V		80.0	9.000	3-Y	6-Y	9-Y
	23.0	5.750	1-U	4-T	7-T		42.0	6.801	2-V	5-U	8-V	33	87.0	9.025	3-Y	6-Y	9-Y
	26.0	5.769	2-U	5-T	8-T	14	43.0	8.000	2-X	5-W	8-W		100.0	12.000	3-14	6-14 1/2	9-14 1/2
10	29.0	5.799	2-U	5-T	8-T		48.0	8.031	2-X	5-W	8-W	33	91.0	9.983	3-Z	6-Z	9-Z
	33.0	7.964	2-W	5-W	8-W		53.0	8.062	3-X	6-W	9-W		98.0	10.000	3-Z	6-Z	9-Z
	37.0	7.978	2-I	5-W	8-W	14	58.0	8.098	3-X	6-W	9-W	33	108.0	10.484	3-12 1/2	6-13	9-13
10	15.0	4.000	1-C	4-C	7-D		61.0	10.000	3-Y	6-Y	9-Z		125.0	11.500	3-13 1/2	6-14	9-14 1/2
	17.0	4.010	1-D	4-D	7-D												
	19.0	4.020	1-D	4-D	7-D												

Extension Eye Bolts

List Prices and Dimensions

Pipe Size Inches	List Price per 100	Length of Eye Bolt Inches	Length of Thread Inches	Diameter of Eye Bolt Inches	Diameter of Hole Inches	Thickness of Metal at Eye
3/4-2	62.00	2 1/2	2	3/8	1 3/32	1/2
	64.00	4	2 1/4			
	66.00	5 1/2	2 1/4			
2 1/2-3 1/2	70.00	2 3/4	2	1/2	1 5/32	5/8
	72.00	4 1/4	2 1/2			
	74.00	5 3/4	2 1/2			
4-5	76.00	3	2 1/8	5/8	1 5/32	5/8
	80.00	4 1/2	3 1/4			
	84.00	6	3 1/4			
6	120.00	3	2 1/8	3/4	1 5/32	5/8
	125.00	4 1/2	3 1/2			
	130.00	6	3 3/4			
8	125.00	3 1/4	2 1/4	7/8	1 7/32	3/4
	132.00	4 3/4	3 3/4			
	140.00	6 1/4	4 1/2			

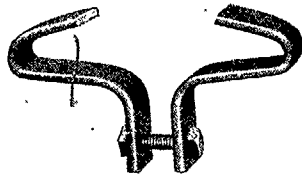


No. 220-G
Extension Eye Bolt
Underwriters' Approved

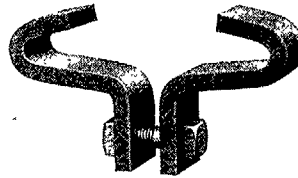
No. 220-G can be used with No. 225-G Side I-Beam Clamps and with No. 226-G Channel Clamps, illustrated above and on page 522. In addition, these Extension Eye Bolts can be used with No. 156-G Adjustable Swinging Hanger Flanges; see page 520.

Order by figure number and specify the length and diameter of eye bolt.

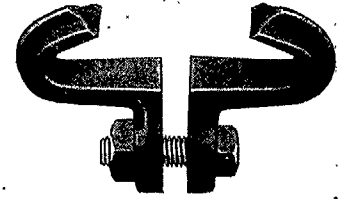
I-Beam Clamps



No. 40-C
Standard I-Beam Clamp



No. 41-C
Extra Heavy I-Beam Clamp



No. 131-G
I-Beam Clamp
Underwriters' Approved

List Prices, per 100, and Dimensions for No. 40-C and No. 41-C

Clamp No.	Maximum Load Pounds	Size of Stock Inches	Dia. of Bolt Inches	Space for Rod Inches	Width of I-Beam Flange, in. Inches										
					2	3	4	5	6	7	8	9	10	11	12
No. 40-C	1000	1 1/4 x 1/4	3/8	1/2	28.00	35.00	38.00	42.00	46.00	50.00	55.00				
	1250	1 1/2 x 1/4	1/2	1/2		50.00	55.00	60.00	65.00	70.00	75.00				
	1500	1 1/2 x 3/8	1/2	5/8		70.00	77.00	84.00	91.00	98.00	105.00				
No. 41-C	3000	2 x 1/2	5/8	3/4		80.00	85.00	95.00	100.00	110.00	120.00	140.00	150.00	170.00	180.00
	3250	2 1/2 x 1/2	5/8	3/4		90.00	95.00	110.00	125.00	135.00	145.00	155.00	165.00	180.00	195.00
	3500	2 1/2 x 5/8	3/4	3/4		100.00	115.00	130.00	150.00	170.00	190.00	210.00	225.00	250.00	275.00

List Prices for No. 131-G

Width of I-Beam Flange, Inches		2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
No. 131-G	Black per 100	31.00	33.00	36.00	38.00	39.00	40.00	43.00	44.00	53.00
	Galv. per 100	36.00	38.00	42.00	45.00	46.00	47.00	51.00	53.00	62.00

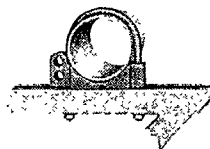
No. 40-C and No. 41-C: These clamps are made of strap steel; order by figure number and specify the width of I-beam flange and weight of maximum load.

No. 131-G: These malleable iron clamps have a

3/8 x 1 1/2-inch bolt. The vertical distance from the bottom of the beam to the bolt center is about 1 1/4 inches. Order by figure number; specify the width of I-beam flange on which the clamp is to be used and the required space between the halves of the clamp.

Applications of Welded Steel Brackets

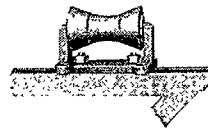
Used with Pipe Rolls and Supports



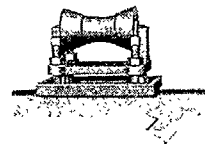
No. 197-G
Anchor Chair



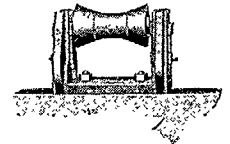
No. 198-G
Pipe Seat



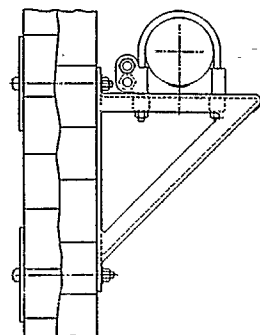
No. 271-G
Pipe Roll Stand



No. 274-G
Pipe Roll Stand
with Base Plate



No. 276-G
Adjustable Pipe
Roll Stand



Left: When a bracket is bolted to a wall, back plates must be ordered of such size and thickness to properly distribute the weight over the wall section.

The size and thickness of the plate will be governed by the load to be carried and the construction and condition of the wall.

In some installations it is advisable to reinforce the back plates with additional steel in the form of a plate or angle to distribute the load over an even greater wall area. This is especially desirable when Anchor Chairs are mounted on a bracket.

The above illustrations show various types of pipe supports mounted on welded steel brackets. Pipe supports and welded steel brackets must be ordered separately.

Pipe Supports: There are many types of pipe supports that can be used with welded steel brackets; for list prices, descriptions, and dimensions, see pages 526 to 529.

Welded Steel Brackets: Welded steel brackets can be furnished in three weight classifications; light weight, medium weight, and heavy weight. See page 525. List prices cover the cost of the bracket only; back plates and bolts must be ordered separately.

Welded Steel Brackets

Light Welded Steel Brackets—Steel Bracket Clips

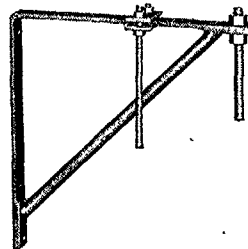
No. 193-G: These Bracket Clips will support $3\frac{1}{2}$ -inch pipe and smaller from any position along the arm of the bracket.

The clip consists of two steel plates, one nut, and one bolt. The hanger rod and two nuts, sold separately, serve as the second bolting member.

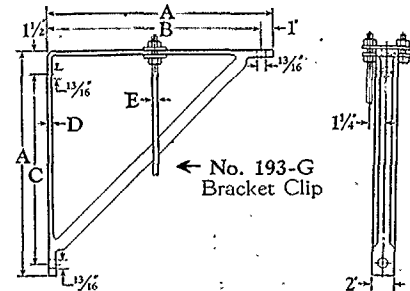
No. 194-G: Light Welded Steel Brackets are designed to support pipe lines up to and including the 6-inch size.

These brackets may be installed as illustrated or inverted for use as suspension brackets. The ends of the brackets are drilled to take hanger rods up to the $\frac{3}{4}$ -inch size.

Hanger rods and hex nuts are sold separately; for hanger rods, see page 521. Changes in drilling or dimensions are subject to an additional charge.



No. 194-G
Light Welded Steel Bracket



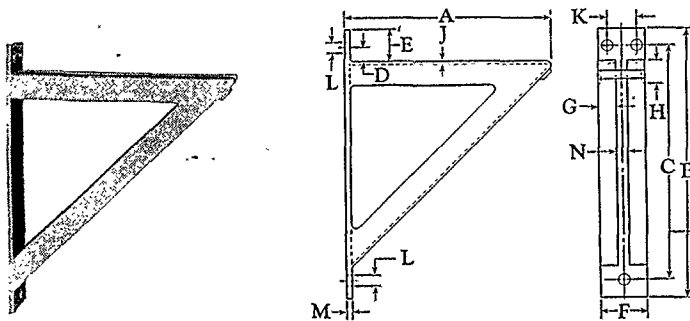
← No. 193-G
Bracket Clip

MAXIMUM LOAD — 750 pounds

List Prices and Dimensions, in Inches

No. 194-G, Bracket Only						No. 193-G, Clip Only			
Bracket No.	Price per 100	A	B	C	D	Clip No.	Price per 100	Pipe Size	E
1	550.00	9	8	$6\frac{1}{2}$	$\frac{5}{16}$	1	50.00	$\frac{3}{4}$ -2	$\frac{3}{8}$
2	560.00	13	12	$10\frac{1}{2}$	$\frac{5}{16}$	2	55.00	$2\frac{1}{2}$ - $3\frac{1}{2}$	$\frac{1}{2}$
3	615.00	19	18	$16\frac{1}{2}$	$\frac{3}{8}$				

Medium and Heavy Welded Steel Brackets



No. 195-G, Medium Welded Steel Bracket
No. 199-G, Heavy Welded Steel Bracket

Medium Weight Brackets
MAXIMUM LOAD — 1500 pounds

Heavy Weight Brackets
MAXIMUM LOAD — 3000 pounds

When brackets are bolted to a wall, back plates must be ordered of such size and thickness as to properly distribute the weight over a greater wall area. This installation is illustrated on page 524.

List Prices and Dimensions, in Inches

Figure No.	Bracket No.	Price per 100	A	B	C	D	E	F	G	H	J	*K	L	M	N
No. 195-G	0	1200.00	12	18	$15\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	4	$1\frac{1}{2}$	$1\frac{1}{2}$	$\frac{3}{16}$	*	$\frac{13}{16}$	$\frac{3}{8}$	1
	1	1500.00	18	24	$21\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{3}{16}$	*	$\frac{13}{16}$	$\frac{3}{8}$	1
	2	2060.00	24	30	$27\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{2}$	5	2	2	$\frac{1}{4}$	*	$\frac{13}{16}$	$\frac{3}{8}$	1
No. 199-G	0	1400.00	12	18	$15\frac{1}{4}$	$1\frac{1}{4}$	$2\frac{3}{4}$	4	$1\frac{1}{2}$	2	$\frac{1}{4}$	*	$\frac{13}{16}$	$\frac{1}{2}$	1
	1	2425.00	18	24	$21\frac{3}{8}$	$1\frac{3}{8}$	$2\frac{3}{4}$	5	2	2	$\frac{3}{8}$	$2\frac{3}{4}$	$\frac{15}{16}$	$\frac{1}{2}$	1
	2	2840.00	24	30	$27\frac{1}{2}$	$1\frac{1}{2}$	$2\frac{3}{4}$	5	2	$2\frac{1}{2}$	$\frac{5}{16}$	$2\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{2}$	1
	3	3100.00	30	36	$33\frac{1}{4}$	$1\frac{1}{2}$	3	5	2	$2\frac{1}{2}$	$\frac{5}{16}$	$2\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{2}$	1
	4	4800.00	36	42	39	$1\frac{1}{2}$	3	6	$2\frac{1}{2}$	$3\frac{1}{2}$	$\frac{3}{8}$	$3\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{2}$	1
	5	5330.00	42	50	46	$1\frac{1}{2}$	$3\frac{1}{2}$	6	$2\frac{1}{2}$	$3\frac{1}{2}$	$\frac{3}{8}$	$3\frac{1}{2}$	$\frac{11}{16}$	$\frac{1}{2}$	1

*Medium Weight Brackets and No. 0 Heavy Weight Brackets have only one bolt hole at the top.

These Welded Steel Brackets can be used with many types of pipe supports as illustrated on page 524. The brackets are comparatively light in weight, but are unusually strong and well constructed. The top of the bracket and the supporting brace are made of two angle irons with a one-inch space between them.

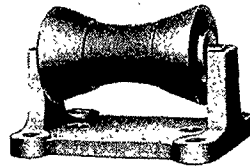
Welded steel brackets can be furnished in practically any size or type. Inquiries must be accompanied by a sketch showing essential dimensions and necessary details; prices on application.

Brackets are coated with a protective paint to prevent rust during shipment.

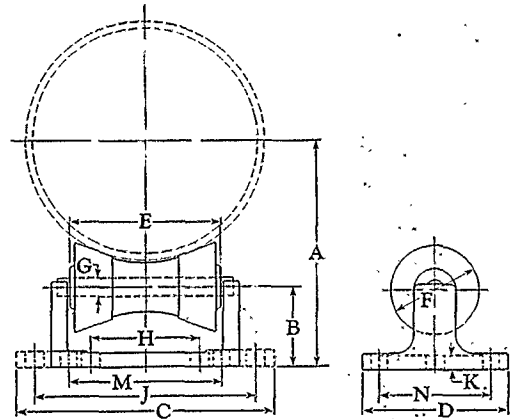
Pipe Roll Stands

These Cast Iron Pipe Roll Stands are designed for supporting piping in cases where vertical adjustment is not necessary, but where provision must be made for expansion and contraction of the pipe line.

There are two 1-inch cored holes located on the outside of the stands for 2 to 6-inch pipe, see dimension "J"; the stands for 8-inch pipe and larger have two 1-inch cored holes located inside of the uprights, see dimension "H".



No. 271-G
Pipe Roll Stand, Complete
No. 272-G, Pipe Roll and Rod Only
No. 273-G, Pipe Roll Only



There are four cored holes (diameter "L") located at the four corners of the stand. Dimensions "M" and "N" show the location of these holes.

List Prices and Dimensions, in Inches

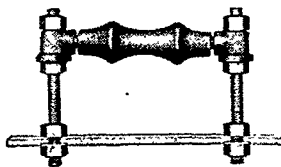
Pipe Size	Price per 100			A	B	C	D	E	F	G	H	J	K	L	M	N	Bolt Size
	No. 271-G	No. 272-G	No. 273-G														
2				$3\frac{9}{16}$													
2½	220.00	77.00	60.00	$3\frac{13}{16}$	1¾	8¾	5¾	2¾	17½	½		6¾	9/16	½	37/16	4	¾
3				$4\frac{1}{8}$													
3½				$4\frac{3}{8}$													
4				$4\frac{13}{16}$													
5	270.00	92.00	72.00	$5\frac{7}{16}$	21/16	97/8	55/8	3¾	21/16	½		77/8	¾	½	411/16	41/4	¾
6				$5\frac{1}{8}$													
8				$8\frac{11}{16}$													
10	390.00	180.00	135.00	$9\frac{13}{16}$	37/16	85/8	65/8	6	31/4	¾	4		¾	5/8	7	5	1½
12				$11\frac{3}{8}$													
14 OD	650.00	340.00	270.00	$12\frac{1}{2}$	37/8	1015/16	77/8	8	4	7/8	5¾		¾	¾	91/16	6	5/8
16 OD				$13\frac{1}{2}$													
18 OD	925.00	475.00	340.00	$14\frac{5}{8}$	41/4	123/8	85/8	9	41/2	11/8	6¾		7/8	13/16	101/4	61/2	5/8
20 OD				$15\frac{5}{8}$													
24 OD	1500.00	900.00	630.00	$17\frac{3}{4}$	43/8	131/2	85/8	10	47/16	13/8	71/2		1	13/16	113/8	61/2	5/8
30 OD	2750.00	1500.00	965.00	$21\frac{13}{16}$	51/8	17	103/4	121/2	51/2	13/4	10		1¾	111/16	141/4	8	7/8

Pipe Roller Support

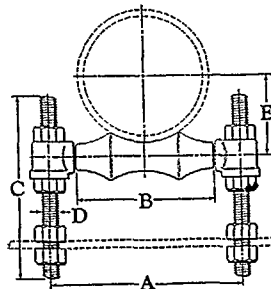
List Prices and Dimensions, in Inches

Pipe Size	Price per 100	A	B	C	D	E
1	70.00	3	1½	91/2	1/2	11/16
1¼	70.00	33/8	17/8	91/2	1/2	11/4
1½	70.00	35/8	21/8	91/2	1/2	13/8
2	75.00	41/8	25/8	91/2	1/2	15/8
2½	90.00	47/8	31/8	91/2	1/2	115/16
3	95.00	51/2	33/4	91/2	1/2	21/4
3½	95.00	61/8	41/4	10	5/8	29/16
4	135.00	63/4	43/4	10	5/8	213/16
5	155.00	81/16	513/16	10	5/8	37/16
6	160.00	99/16	67/8	11	3/4	4
8	290.00	1115/16	87/8	113/4	7/8	51/8
10	390.00	141/16	11	113/4	7/8	63/8
12	525.00	165/16	13	113/4	7/8	77/16
14 OD	635.00	173/4	141/4	113/4	7/8	83/8
16 OD	840.00	193/4	161/4	18	11/4	97/16
18 OD	1025.00	217/8	181/4	18	11/4	107/2
20 OD	1485.00	241/4	201/4	18	11/4	115/8
24 OD	1985.00	285/8	241/4	24	11/2	14
30 OD	3425.00	351/2	301/4	24	17/8	177/16

The list prices include the roll with sockets, roll rod, two vertical threaded rods, and eight nuts.

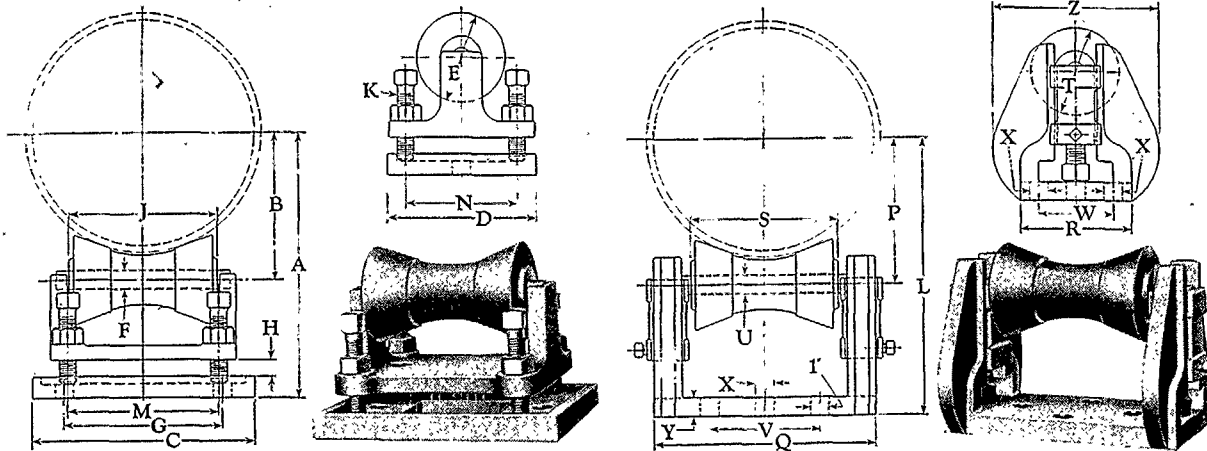


No. 17-C
Pipe Roller Support



The No. 17-C Cast Iron Adjustable Roller has a wide range of application. It can be used on welded steel brackets or on almost any type of steel construction. The support is readily adjustable; adjustment can be made while the pipe is in place, and the nuts lock the roller in position. All sizes provide a vertical adjustment of 6 inches.

Adjustable Pipe Roll Stands



No. 274-G
Adjustable Pipe Roll Stand with Base Plate
No. 275-G, Adjustable Pipe Roll Stand Only
No. 274 P-G, Base Plate Only

No. 276-G
Adjustable Pipe Roll Stand

No. 274-G: These Cast Iron Stands are designed for supporting piping where there must be provision for vertical adjustment and lateral movement as well as for expansion and contraction. Vertical adjustment is obtained by the four adjusting screws. Lateral movement of 1 inch on smaller sizes to 1 3/8 inches on larger sizes is secured by sliding the stand on the ends of the adjusting screws.

No. 276-G: These Cast Iron Stands are for supporting piping where vertical adjustment is needed as well as allowance for expansion and contraction. Vertical adjustment is secured by turning the two adjustment screws which raise and lower the adjusting slides located at either end of the stand. When proper alignment is obtained, the adjusting screws may be locked by tightening the small set screws.

List Prices and Dimensions, in Inches, for No. 274-G, No. 275-G, and No. 274 P-G

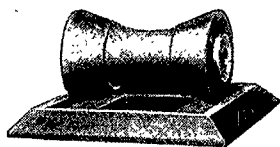
Pipe Size	List Price per 100			A		B	C	D	E	F	G	Max. H	J	K
	No. 274-G	No. 275-G	No. 274 P-G	Min.	Max.									
2				5 1/8	5 3/8	11 3/16								
2 1/2				5 3/8	5 5/8	21 1/16								
3	700.00	535.00	165.00	5 3/4	6	2 3/8	6 7/8	5 1/2	1 7/8	1/2	3 7/8	7/8	2 3/4	5/8
3 1/2				6	6 1/4	2 5/8								
4				6 1/2	7	2 3/4								
5	785.00	600.00	185.00	7	7 1/2	3 3/8	8 1/8	5 3/4	2 1/16	1/2	5 1/8	1 1/8	3 3/4	5/8
6				7 5/8	8 1/8	3 15/16								
8				10 3/8	11 5/8	5 1/4								
10	1150.00	900.00	250.00	11 1/2	12 3/4	6 3/8	10 5/8	6 3/4	3 1/4	3/4	7 3/8	1 3/4	6	3/4
12				13	14 1/4	7 1/2								
14 OD	1725.00	1385.00	340.00	13 3/8	14 7/8	8 1/8	13	8	4	7/8	9 1/2	1 3/4	8	7/8
16 OD				15 1/4	16 5/8	9 1/4								
18 OD	2450.00	1885.00	565.00	16 3/8	17 3/4	10 3/8	14 5/8	8 5/8	4 1/2	1 1/8	11 1/8	1 7/8	9	1
20 OD				17 3/8	18 3/4	11 3/8								
24 OD	3250.00	2550.00	700.00	19 5/8	21	13 3/8	15 3/4	8 5/8	4 7/16	1 3/8	12 1/4	1 7/8	10	1
30 OD	6500.00	5415.00	1085.00	24	26 3/4	16 11/16	19 1/4	10 1/2	5 1/2	1 3/4	15 3/4	3 1/4	12 1/2	1 1/4

The values of "M" and "N", locating the adjustment screws, correspond to dimensions "M" and "N" in the table and sketch for No. 271-G, page 526.

List Prices and Dimensions, in Inches, for No. 276-G

Pipe Size	Price per 100	L		P	Q	R	S	T	U	V	W	X	Y	Z
		Min.	Max.											
4		7 1/8	8 3/8	2 3/4										
5	925.00	7 3/4	9	3 3/8	7	6	3 3/4	2 1/16	1/2	2 1/2	4	7/8	3/4	7 1/8
6		8 5/16	9 9/16	3 15/16										
8		10 7/8	12 3/8	5 1/4										
10	1350.00	12	13 1/2	6 3/8	9 1/2	6	6	3 1/4	3/4	4 1/2	4	1	7/8	8 1/2
12		13 9/16	15 3/16	7 1/2										
14 OD	2300.00	14 3/16	15 13/16	8 7/8	12	6	8	4	7/8	6	4	1	1	9
16 OD		15 3/8	17	9 1/4										
18 OD	2650.00	16 1/2	18 1/8	10 3/8	13	6 1/2	9	4 1/2	1 1/8	7	4 1/2	1	1	9 1/8
20 OD		17 1/2	19 1/8	11 3/8										
24 OD	3300.00	19 11/16	21 5/8	13 3/8	14 1/8	6 1/2	10	4 7/16	1 3/8	8	4 1/2	1	1	9 1/8
30 OD	6500.00	24 3/4	27	16 11/16	17 1/4	8	12 1/2	5 1/2	1 3/4	10 1/4	6	1	1 1/4	11 1/2

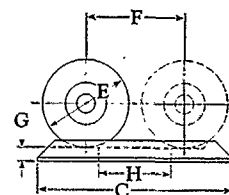
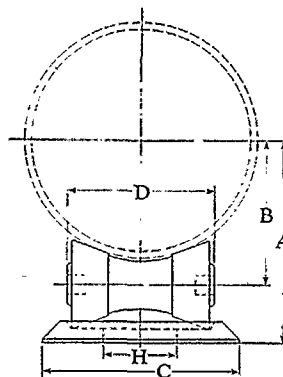
Pipe Roll and Plate



No. 277-G, Pipe Roll and Plate
No. 277 P-G, Base Plate Only

This Cast Iron Pipe Roll and Plate is used for supporting piping in installations where vertical adjustment is not necessary, but where provision must be made for expansion and contraction. In cases of necessity, these supports can be raised or lowered by blocking or shimming up the base plate.

These supports use pipe roll No. 273-G. For list prices and dimensions, see page 526.



List Prices and Dimensions, in Inches

Pipe Size	Price per 100		A	B	C	D	E	F	G	H
	No. 277-G	No. 277 P-G								
2	140.00	80.00	3 1/4	1 13/16	4 3/4	2 3/4	1 7/8	1 3/4	1/2	
2 1/2			3 1/2	2 1/16						
3			3 13/16	2 3/8						
3 1/2			4 1/16	2 5/8						
4	165.00	93.00	4 5/16	2 3/4	5 3/4	3 3/4	2 1/16	2 5/8	1/2	1 1/2
5			4 15/16	3 3/8						
6			5 1/2	3 15/16						
8	360.00	225.00	7 9/16	5 1/4	8 1/4	6	3 1/4	4	1 1/16	2 1/2
10			8 1/16	6 3/8						
12	625.00	355.00	10 1/4	7 1/2	10 3/4	8	4	5 5/8	3/4	4
14 OD			10 7/8	8 1/8						
16 OD			12 3/8	9 1/4	12	9	4 1/2	6 3/8	7/8	5
18 OD	820.00	480.00	13 1/2	10 3/8						
20 OD			14 1/2	11 3/8						
24 OD	1325.00	695.00	16 5/8	13 3/8	13 1/4	10	4 7/16	7 5/8	1	5 3/4
30 OD	2400.00	1435.00	20 9/16	16 11/16	16 1/2	12 1/2	5 1/2	9 1/2	1 1/8	7

Pipe Pole Supports for Outside Lines

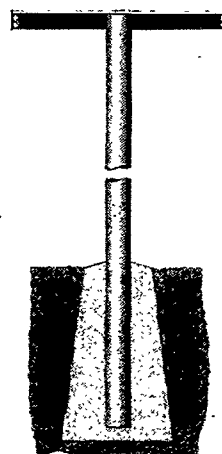
List Prices and Dimensions, in Inches

Pipe Size Inches	Size No.	Price per 100	A	B	C	D	Max. E	F
4-6	1	8500.00	32	5	2 1/2	4	14 1/4	1
8-12	2	12500.00	46	7	4	5	21	1
14-18	3	16500.00	59	8 1/4	5	6	27	1 1/4

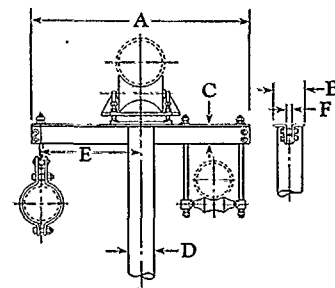
These Pipe Pole Supports provide a permanent, substantial method of supporting piping between buildings. No. 257-G can be used with many types of hangers and supports, three of which are illustrated in the sketch at the right.

Each Pipe Pole Support consists of a length of standard steel pipe with two angles securely welded onto the top. A steel plate, welded in, makes a weather-tight cap. The space between the angles allows for the insertion of hanger rods or bolts.

20-foot pipe poles are usually buried in a concrete foundation to a depth of approximately 4 feet. List prices are based on pipe poles 20 feet long. Poles longer than 20 feet can be furnished when ordered; prices on application.



No. 257-G
Pipe Pole Support
for Outside Lines

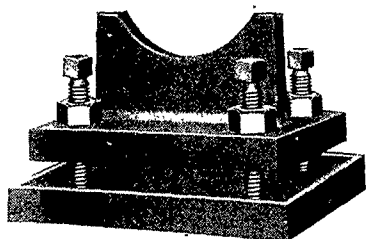


Left: Adjustable Wrought Pipe Clamp, No. 251-G

Center: Adjustable Pipe Roll Stand, No. 274-G

Right: Pipe Roll with Adjustable Sockets, No. 171-G

Pipe Chairs—Anchor Chairs—Pipe Seats

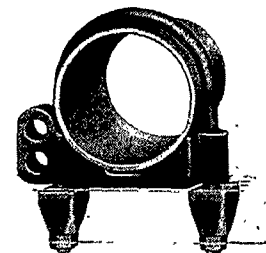
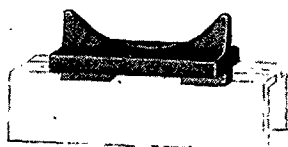


No. 184-G
Adjustable Pipe Chair
with Base Plate

No. 183-G
Pipe Chair



No. 198-G
Pipe Seat

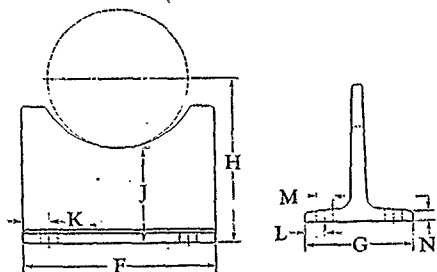
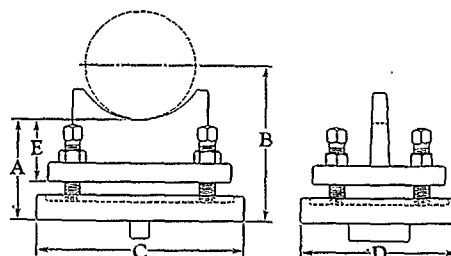


No. 197-G
Anchor Chair

List Prices and Dimensions, in Inches

Pipe Size	Price per 100	A		B		C	D	E
		Min.	Max.	Min.	Max.			
3	900.00	3 1/4	4 3/8	5	5 15/16	7 1/4	6	2 1/8
4	1025.00	3 5/8	4 7/8	5 7/8	6 11/16	8 1/2	6 1/2	2 1/2
5	1150.00	4	4 11/16	6 13/16	7 1/2	10	7	2 7/8
6	1150.00	3 7/8	4 5/8	7 3/16	7 15/16	10	7	2 3/4

No. 184-G: These Cast Iron Pipe Chairs are designed to meet the requirements of blow-off lines. The chairs are adjustable and can be brought securely against the pipe after erection.



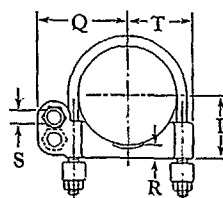
No. 183-G: These Cast Iron Pipe Chairs are suitable for service where a low-priced support is desired. The chairs have two bolt holes located on diagonal corners of the bottom member.

List Prices and Dimensions, in Inches

Pipe Size	Price per 100	F	G	H	J	K	L	M	N
2	32.00	3 1/2	2 7/8	3 3/4	2 9/16	5/8	1/2	7/16	3/8
2 1/2	36.00	4 1/4	3 1/8	4 3/16	2 3/4	3/4	1/2	7/16	3/8
3	53.00	5	3 1/4	4 11/16	2 15/16	3/4	1/2	7/16	3/8
3 1/2	80.00	5 1/2	3 1/2	4 7/8	2 7/8	3/4	1/2	7/16	3/8
4	80.00	6 1/4	3 1/2	5 3/16	3 1/16	7/8	5/8	9/16	7/16
5	105.00	7 1/2	4	6	3 3/16	1	5/8	9/16	1/2
6	145.00	8 3/4	4 1/2	6 7/16	3 3/8	1	5/8	9/16	1/2
8	205.00	10 3/4	5 1/2	7 3/4	3 7/16	1 1/4	3/4	1 1/16	9/16
10	410.00	13	6 1/2	9	3 3/8	1 1/4	3/4	1 1/16	5/8
12	550.00	15	7 1/2	10 1/2	4 1/8	1 1/2	1	1 1/16	5/8
14 OD	765.00	17	8 1/2	11 3/4	4 3/4	1 1/2	1	1 1/16	11/16
16 OD	1060.00	19	9 1/2	13	5	1 3/4	1 1/4	1 1/16	3/4
18 OD	1100.00	21	10 1/4	13 3/4	4 3/4	2	1 3/8	1 1/16	3/4
20 OD	1400.00	23 1/4	11 1/2	15	5	2 1/4	1 5/8	1 1/16	3/4

List Prices and Dimensions, in Inches

Pipe Size	Price per 100	P	Q	R	S	T
4	775.00	3	4 1/8	3/4	5/8	3 3/16
5	825.00	3 5/8	5	13/16	3/4	3 7/8
6	950.00	4 1/16	5 3/4	3/4	7/8	4 9/16
8	1300.00	5 5/16	7 1/8	1	1	5 3/4
10	1650.00	6 1/2	8 3/8	1 1/8	1 1/8	6 13/16
12	2300.00	7 5/8	9 1/2	1 1/4	1 1/4	7 13/16
14 OD	2800.00	8 1/2	10 1/8	1 1/2	1 1/2	8 7/16
16 OD	3300.00	9 5/8	11 1/2	1 5/8	1 1/2	9 7/16
18 OD	3600.00	10 7/8	12 1/2	1 7/8	1 1/2	10 7/16
20 OD	4000.00	12	13 1/2	2	1 1/2	11 7/16
24 OD	5000.00	14	15 1/2	2	1 1/2	13 7/16

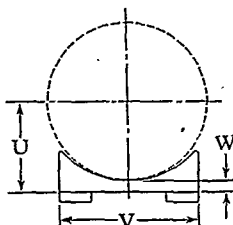


No. 197-G: These supports consist of a cast iron chair, a round iron yoke, two special cast iron washers, and two hexagonal nuts. A flat iron strap can be furnished in place of the round iron yoke at a slight additional charge.

These Anchor Chairs are well adapted for use with Welded Steel Brackets; see pages 524 and 525.

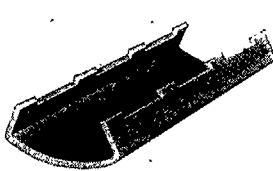
List Prices

Pipe Size	Price per 100	Dimensions, in Inches		
		U	V	W
4	220.00	2 13/16	4 1/2	9/16
5	260.00	3 3/8	5 1/4	9/16
6	290.00	3 15/16	6 1/4	5/8
8	320.00	5 1/16	8	3/4
10	370.00	6 1/8	9 3/8	3/4
12	460.00	7 1/8	11	3/4

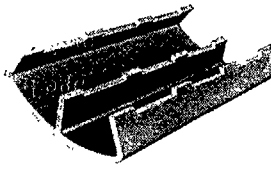


No. 198-G: These Pipe Seats conform to a relatively large portion of the pipe circumference which minimizes the tendency of the pipe to "jump out" of the seat. The seat offers little resistance to expansion and contraction, carries a heavy load, and will resist vibration. For sizes larger than 12-inch, prices and dimensions on application.

Pipe Covering Protection Saddles

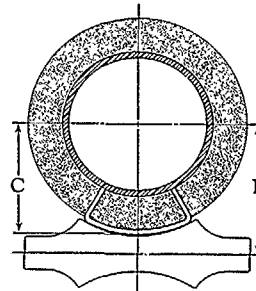


Type "A"
For 10-inch pipe
and smaller

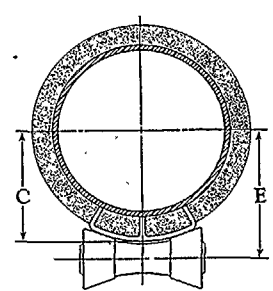


Type "B"
For 12-inch pipe
and larger

- No. 186-G, For Standard Thick Covering
No. 186 A-G, For 2-inch Thick Covering
No. 187-G, For Double Standard Thick Covering
No. 188-G, For Double 1½-inch Thick Covering



Application showing Saddle
on No. 173-G Pipe Roll



Application showing Saddle
on No. 273-G Pipe Roll

Pipe Covering Protection Saddles are used for reducing heat losses by providing a continuous, smooth, weather-tight covering.

All saddles are 12 inches long and are made of curved steel plates with the edges turned up. Type "B" saddles have a center plate welded in.

Saddles are furnished unfilled, and should be filled with plastic cement or covering material before being installed in position.

Saddles of special lengths, dimensions, or construction, not listed above, can be furnished on order; prices on application.

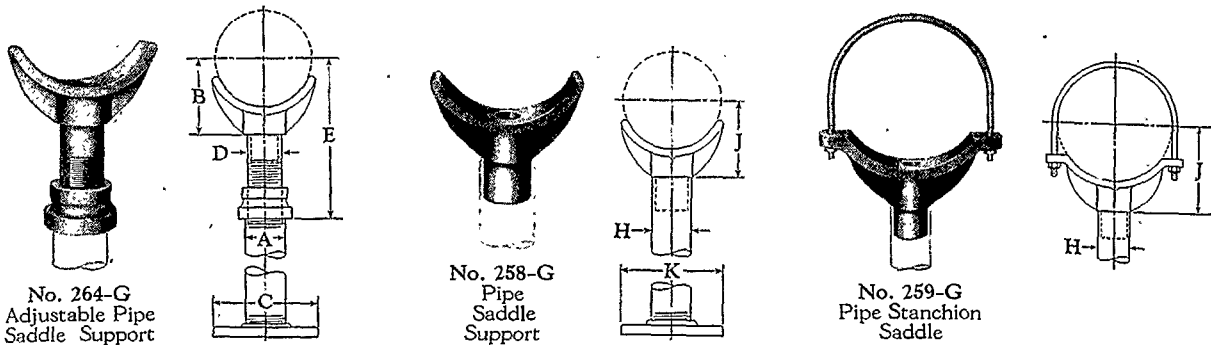
List Prices and Dimensions, in Inches

Nominal Size of Pipe Inches	No. 186-G, For Standard Thick Covering							No. 186 A-G, For 2-inch Thick Covering						
	List Price per 100	Thick- ness of Cover- ing	Size of Pipe Roll		C	D	E	List Price per 100	Thick- ness of Cover- ing	Size of Pipe Roll		C	D	E
			No. 173-G Inches	No. 273-G Inches						No. 173-G Inches	No. 273-G Inches			
3/4	185.00	7/8	2	2- 3 1/2	1 1/2	1 15/16	2 1/16	195.00	2	4	2- 3 1/2	2 1/16	3 1/4	3 3/8
1	185.00	7/8	2	2- 3 1/2	1 1/16	2 1/8	2 1/4	195.00	2	4	2- 3 1/2	2 1/16	3 3/8	3 1/2
1 1/4	210.00	7/8	2 1/2	2- 3 1/2	1 13/16	2 5/16	2 7/16	225.00	2	5	2- 3 1/2	3	3 5/8	3 11/16
1 1/2	210.00	7/8	3	2- 3 1/2	1 15/16	2 1/2	2 5/8	225.00	2	5	2- 3 1/2	3 1/16	3 11/16	3 3/4
2	235.00	1 1/32	3 1/2	2- 3 1/2	2 3/8	2 15/16	3	250.00	2	6	4- 6	3 5/16	4	3 15/16
2 1/2	235.00	1 1/32	4	2- 3 1/2	2 5/8	3 1/4	3 1/4	250.00	2	6	4- 6	3 5/16	4 1/4	4 3/16
3	270.00	1 1/32	4	2- 3 1/2	3	3 5/8	3 5/8	290.00	2	7	4- 6	3 15/16	4 13/16	4 5/8
3 1/2	270.00	1 1/32	5	4- 6	3 1/4	3 15/16	3 7/8	290.00	2	7	4- 6	4 3/16	5 1/16	4 7/8
4	280.00	1 1/8	5	4- 6	3 9/16	4 1/4	4 3/16	305.00	2	7	4- 6	4 7/16	5 5/16	5 1/8
5	280.00	1 1/8	6	4- 6	4 3/16	4 15/16	4 7/8	305.00	2	8	7-10	5 1/16	5 15/16	6
6	295.00	1 1/8	7	4- 6	4 11/16	5 9/16	5 3/8	320.00	2	9	7-10	5 9/16	6 9/16	6 5/8
8	370.00	1 1/4	9	7-10	5 13/16	6 13/16	6 13/16	420.00	2	12	7-10	6 9/16	7 11/16	7 11/16
10	450.00	1 1/4	12	7-10	6 15/16	8	8 1/16	500.00	2	14	12-15	7 11/16	9 1/16	8 7/8
12	480.00	1 1/2	15	12-15	8 3/16	9 5/8	9 7/16	560.00	2	15	12-15	8 11/16	10 3/16	9 7/8
14 OD	530.00	1 1/2	16	16-20	8 7/8	10 7/16	10 1/4	600.00	2	16	16-20	9 3/8	10 15/16	10 3/4
16 OD	575.00	1 1/2	18	16-20	9 7/8	11 7/16	11 1/4	670.00	2	18	16-20	10 3/8	12	11 3/4
18 OD	615.00	1 1/2	18	16-20	11	12 9/16	12 3/8	710.00	2	24	22-24	11 1/2	13 7/16	12 15/16
20 OD	660.00	1 1/2	24	22-24	12	13 13/16	13 3/8	760.00	2	24	22-24	12 1/2	14 7/16	13 15/16
24 OD	705.00	1 1/2	24	26-30	14	16 1/8	15 11/16	810.00	2	30	26-30	14 1/2	17	16 1/4

Nominal Size of Pipe Inches	No. 187-G, For Double Thick Covering							No. 188-G, For Double 1 1/2-inch Thick Covering						
	List Price per 100	Thick- ness of Cover- ing	Size of Pipe Roll		C	D	E	List Price per 100	Thick- ness of Cover- ing	Size of Pipe Roll		C	D	E
			No. 173-G Inches	No. 273-G Inches						No. 173-G Inches	No. 273-G Inches			
3/4	195.00	1 3/4	4	2- 3 1/2	2 3/8	2 15/16	3							
1	195.00	1 3/4	4	2- 3 1/2	2 9/16	3 1/8	3 1/4							
1 1/4	225.00	1 3/4	5	2- 3 1/2	2 3/4	3 3/8	3 7/16							
1 1/2	225.00	1 3/4	5	2- 3 1/2	2 13/16	3 7/16	3 1/2							
2	250.00	2 1/16	6	4- 6	3 3/8	4 1/16	4 1/16	285.00	3	7	4- 6	4 3/8	5 1/4	5 1/16
2 1/2	250.00	2 1/16	6	4- 6	3 5/8	4 5/16	4 5/16	285.00	3	7	4- 6	4 5/8	5 1/2	5 5/16
3	290.00	2 1/16	7	4- 6	4	4 7/8	4 5/8	325.00	3	8	7-10	4 15/16	5 13/16	5 15/16
3 1/2	290.00	2 1/16	7	4- 6	4 1/4	5 1/8	4 15/16	325.00	3	8	7-10	5 3/16	6 1/16	6 3/16
4	305.00	2 1/4	7	4- 6	4 11/16	5 9/16	5 3/8	335.00	3	9	7-10	5 7/16	6 7/16	6 1/2
5	305.00	2 1/4	8	7-10	5 5/16	6 3/16	6 5/16	335.00	3	10	7-10	6 1/16	7 1/8	7 7/8
6	320.00	2 1/4	9	7-10	5 13/16	6 13/16	6 13/16	350.00	3	12	7-10	6 9/16	7 5/8	7 11/16
8	420.00	2 1/2	12	12-15	7 1/16	8 1/4	8 1/4	450.00	3	12	12-15	7 9/16	8 3/4	8 11/16
10	500.00	2 1/2	15	12-15	8 3/16	9 11/16	9 7/16	545.00	3	16	16-20	8 11/16	10 3/16	10 1/16
12	560.00	3	18	16-20	9 1/16	11 5/16	11 1/16	12 to 24-inch, see No. 187-G						
14 OD	600.00	3	18	16-20	10 3/8	12	11 3/4							
16 OD	670.00	3	24	22-24	11 3/8	13 1/4	12 13/16							
18 OD	710.00	3	24	22-24	12 1/2	14 7/16	14							
20 OD	760.00	3	24	26-30	13 1/2	15 9/16	15 1/8							
24 OD	810.00	3	30	26-30	15 1/2	18	17 1/4							

12 to 24-inch, see No. 187-G

Cast Iron Pipe Supports



*List Prices and Dimensions, in Inches

Pipe Size Inches	†No. 264-G								No. 258-G and No. 259-G				
	Price per 100		A	B	C	D	E		Price per 100		H	J	K
	Complete	Saddle Only					Min.	Max.	No. 258-G	No. 259-G			
2½	662.00	112.00	2½	37/16	8½	1½	8	13	.....	.....	..	..	..
2	666.00	116.00	2½	311/16	8½	1½	8¼	13¼	.....	.....	..	..	..
3½	670.00	120.00	2½	315/16	8½	1½	8½	13½	.....	.....	..	..	..
4	825.00	145.00	3	43/16	9	2½	9¼	14	170.00	580.00	3	4¼	9
5	855.00	175.00	3	47/8	9	2½	10	14¾	190.00	600.00	3	47/8	9
6	910.00	230.00	3	51/16	9	2½	10½	15¼	250.00	620.00	3	5½	9
8	965.00	285.00	3	613/16	9	2½	11¾	16½	305.00	780.00	3	7	9
10	1025.00	345.00	3	87¼/16	9	2½	13½	18¼	365.00	920.00	3	8½	9
12	1080.00	400.00	3	915/16	9	2½	15	19¾	425.00	1100.00	3	10	9
14 OD	1525.00	725.00	4	1015/16	11	3	16¼	20¾	740.00	1660.00	4	11	11
16 OD	1725.00	925.00	4	123/8	11	3	17¾	22¼	950.00	1920.00	4	12½	11
18 OD	2325.00	1115.00	6	137/8	13½	3½	19½	24	1200.00	2120.00	4	14	11
20 OD	3510.00	2300.00	6	153/8	13½	3½	21	25½	2500.00	3700.00	6	15½	13½
24 OD	4500.00	3250.00	6	1715/16	13½	4	23¾	28¼	3600.00	5300.00	6	18	13½
30 OD	5700.00	4450.00	6	215/16	13½	4	27	31½	4800.00	7000.00	6	21½	13½
36 OD	7250.00	6000.00	6	24½	13½	4	30¼	34¾	7200.00	13500.00	8	24¾	16

*List Prices do not include Riser Pipe or Reducing Flange. †No. 264-G has retaining spots welded to the lower end of the nipple after assembly to prevent separation of the nipple and reducer during adjustment.

Wall Pipe Supports

List Prices and Dimensions

Pipe Size	Inches	3	3½	4	5	6	8	10	12
Price	per 100	100.00	125.00	150.00	200.00	275.00	450.00	550.00	700.00
Center to center of holes	Inches	10¾	11¼	11¾	12¾	13¾	16½	18¼	20¼
Size of stock	Inches	¼ x 1¼		¼ x 1½		½ x 2		½ x 2½	

Sizes 3 to 6-inch have holes for ½-inch bolt; sizes 8 to 12-inch for ¾-inch bolt

Application: No. 26-C Supports are used for supporting horizontal piping on walls when there is no appreciable movement. When pro-

vision must be made for expansion and contraction, a welded steel bracket and roll support should be used, see pages 524 to 528.

No. 26-C
Wall Pipe
Support

39

Single Hooks

List Prices and Dimensions

Pipe Size	Inches	½	¾	1	1¼	1½	2	2½	3
Price	per 100	18.00	21.00	24.00	26.00	40.00	59.00	95.00	130.00
Center to center of holes	Inches	127/32	27/8	27/16	3	35/16	37/8	413/16	5½
Size of screws	No. 14			No. 18			¾-inch		



No. 168-G
Single Hook

Application: No. 168-G Single Hooks are used mainly from sides of beams where no adjustment is necessary, and in cases where

there is no movement due to expansion and contraction. Single hooks are often used in conjunction with hook plates to carry wall coil.

Hook Plates



No. 166-G
Standard
Type



No. 167-G
Expansion
Type

List Price per 100

Nominal Pipe Size Inches	Center to Center Inches	No. 166-G Number of Branches					No. 167-G Number of Branches				
		2	3	4	5	6	2	3	4	5	6
1	2½	49.00	62.00	70.00	86.00	102.00	56.00	71.00	81.00	99.00	117.00
1¼	3	57.00	73.00	86.00	110.00	140.00	66.00	84.00	99.00	127.00	161.00
1½	3½	75.00	115.00	156.00	169.00	237.00	86.00	132.00	179.00	194.00	273.00
2	4½	115.00	175.00	243.00	310.00	364.00	135.00	205.00	280.00	360.00	420.00

No. 166-G and No. 167-G: These Standard and Expansion Type Hook Plates are made of high quality cast iron. They are furnished up to six branches; when a greater number of branches are required, order two or more plates.

List Price per 100

Nominal Pipe Size Inches	Center to Center Inches	No. 48-C Number of Hooks			Nominal Pipe Size Inches	Center to Center Inches	No. 49-C Number of Hooks			
		30	25	20			6	8	10	12
1	2½	325.00	.....	.....	1	2½	120.00	130.00	140.00	150.00
1¼	3	325.00	.....	.....	1¼	3	120.00	130.00	140.00	150.00
1½	3½	.....	375.00	.....	1½	3½	120.00	130.00	140.00	150.00
2	4½	.....	.....	425.00	2	4½	130.00	140.00	150.00	160.00

No. 48-C and No. 49-C: These Standard and Offset Type Hook Plates are made of strip steel. No. 48-C is made with a 1¼" x 12 ga. hook and a 2" x 10 ga. back-piece; these hook plates can be cut to any desired length. No. 49-C has a ¾ x 1¼" hook and a ¼ x 2" back-piece; specify the size of offset required.



No. 48-C
Standard
Steel
Hook
Plate



No. 49-C
Heavy
Offset
Steel
Hook
Plate

B & C Floor and Ceiling Plates

Black, Nickel-Plated, and Polished Brass

No. 10 and No. 20 are smooth faced Combination Floor and Ceiling Plates. No. 10 has both the hinge and catch concealed. The two plates are similar except that No. 20 is somewhat lighter in construction and the hinge is not concealed. Springs hold the plates in position on the pipe.

Nos. 3, 4, and 5 conform to government specifications. No. 3 is a Floor and Ceiling Plate which is held firmly to the pipe with a set screw. No. 4 and No. 5 are solid cast plates. No. 4 consists of a plate only, without a set screw, for floor use; No. 5 is a similar plate, with a set screw, for ceiling use.

Order by size and figure number.
State finish wanted; brass plates
will be furnished only when so ordered.



B & C No. 10
Pressed Steel
Pressed Brass
Sizes ¼ to 6-inch
Packed 12 in a box



B & C No. 20
Pressed Steel
Pressed Brass
Sizes ¾ to 4-inch
Packed 12 in a box



B & C No. 3
Cast Iron
Cast Brass
Sizes ¼ to 12-inch
Packed 12 in a box



B & C No. 4 or 5
Cast Iron
Cast Brass
Sizes ½ to 4-inch
Packed 12 in a box

*List Prices

Size of Pipe Inches	No. 10 and No. 20				No. 3, No. 4, and No. 5			
	Steel		Brass		Cast Iron		Cast Brass	
	Black Each	Nickel Plated Each	Polished Each	Nickel Plated Each	Black Each	Nickel Plated Each	Polished Each	Nickel Plated Each
¼	.15	.27	.60	.60	.15	.27	1.00	1.00
⅜	.16	.28	.60	.60	.16	.28	1.00	1.00
½	.17	.29	.62	.62	.17	.29	1.00	1.00
¾	.18	.30	.65	.65	.18	.30	1.20	1.20
1	.20	.32	.72	.72	.20	.32	1.30	1.30
1¼	.22	.35	.80	.80	.22	.35	1.60	1.60
1½	.25	.38	.85	.85	.25	.38	1.80	1.80
2	.30	.45	1.00	1.00	.30	.45	2.00	2.00
2½	.50	.65	1.50	1.50	.50	.65	2.50	2.50
3	.65	.80	1.80	1.80	.65	.80	3.00	3.00
3½	.80	1.00	2.25	2.25	.80	1.00	4.00	4.00
4	1.00	1.25	2.75	2.75	1.00	1.25	5.00	5.00
5	1.50	1.75	3.75	3.75	1.50	1.75	7.00	7.00
6	1.75	2.00	4.25	4.25	1.75	2.00	9.00	9.00
8					2.25	2.50	12.00	12.00
10					2.75	3.00	16.00	16.00
12					3.25	3.50	18.00	18.00

*The list prices only apply to the sizes regularly made and as indicated under each illustration.

Genspring Hangers For High Temperature Piping Installations

(Patented — Other Patents Pending)

*Recommended for High Temperature Piping in
Power Plant, Oil Refinery, and Marine Installations*

Genspring Constant Support Hangers are designed to reduce the total stresses of high temperature piping. The total supporting effort of these hangers is equal, in all positions, to the constant weight of the vertically shifting pipe line. These hangers "float" pipe lines, eliminate support stresses, protect expensive equipment, simplify piping design, and reduce the design costs.

To meet all conditions, Genspring Hangers are made in two sizes; the full-size Model H 11 (No. 286-G), and the half-size Model H 14 (No. 288-G). In turn, each model is designed to handle a number of different load capacities.

No. 286-G (Model H 11)

This model is made in eleven different sizes and having an over-all load range from 250 to 8500 pounds. Each size permits a total vertical travel of 2 to 4 inches.

Size No. 1, the smallest size, will support a 257 to 329-pound load with 4 inches of vertical travel, and will carry a 627 to 732-pound load with a vertical travel of 2 inches.

Size No. 11, the largest size, supports a 3538 to 4326-pound load with a 4-inch vertical travel, and supports a 7146 to 8350-pound load with a vertical travel of 2 inches.

Each size, of course, supports proportionate loads at all intermediate steps between the 2 and 4-inch limits of total vertical travel. Size No. 2 to No. 10 handle intermediate load ranges between those of Size No. 1 and Size No. 11.

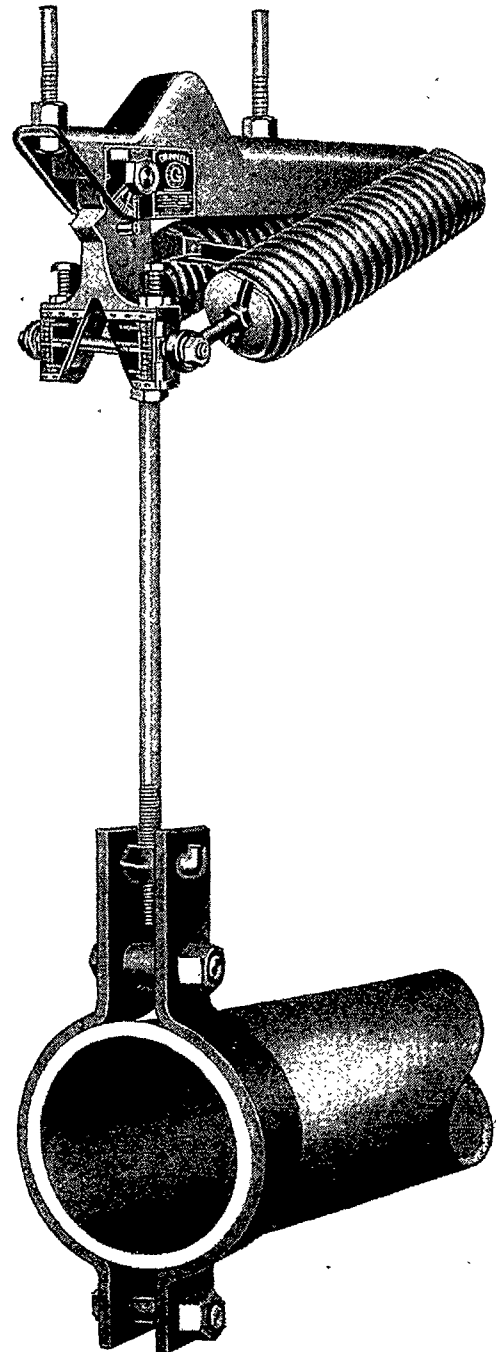
No. 288-G (Model H 14)

No. 288-G is a smaller model than No. 286-G and is made in five sizes having an over-all load range from 230 to 2300 pounds. Each size permits from $1\frac{1}{4}$ to $2\frac{1}{2}$ inches of vertical travel.

Size No. 1, the smallest size, will carry a 231 to 294-pound load with a total vertical travel of $2\frac{1}{2}$ inches, and will support a 531 to 611-pound load with a total vertical travel of $1\frac{1}{4}$ inches.

Size No. 5, the largest size, supports a 933 to 1183-pound load with a $2\frac{1}{2}$ -inch travel, and can support a 1983 to 2282-pound load with a vertical travel of $1\frac{1}{4}$ inches.

These hangers support proportionate loads between the $1\frac{1}{4}$ and $2\frac{1}{2}$ -inch limits of vertical travel. Sizes No. 2, No. 3, and No. 4 support loads between those of No. 1 and No. 5.



Standards and Specifications For Pipe Hangers and Supports

Hangers: The method of installing overhead hangers by means of hanger rods is governed by the type of construction to which the rod is applied.

For wooden construction, the hanger flanges or brackets are applied directly to the ceiling or beams with wood or coach screws, or by the use of hanger rods with coach screw threads.

Hangers are applied to steel construction by the use of Universal Side I-Beam Clamps or Channel Clamps. In addition, hangers can be used with welded steel brackets fastened to steel columns.

Concrete construction requires the use of Concrete Inserts or of Expansion Cases placed in the concrete.

Supports: Piping is supported from walls and columns by means of welded steel brackets and adjustable pipe roll stands.

Adjustable pipe rolls, chairs with bases, and saddle

stands or stanchions are used for supporting piping from floors or piers.

Regardless of the method of hanging, the size of the hanger rod is determined by the size of the pipe to be supported, where normal loads are involved, in accord with the following schedule:

$\frac{3}{4}$ to 2-inch pipe.....	$\frac{3}{8}$ -inch rod
2 $\frac{1}{2}$ to 3 $\frac{1}{2}$ -inch pipe.....	$\frac{1}{2}$ -inch rod
4 and 5-inch pipe.....	$\frac{5}{8}$ -inch rod
6-inch pipe.....	$\frac{3}{4}$ -inch rod
8 to 12-inch pipe.....	$\frac{7}{8}$ -inch rod
14 to 16-inch OD pipe.....	1-inch rod
18-inch OD pipe.....	1 $\frac{1}{8}$ -inch rod
20-inch OD pipe.....	1 $\frac{1}{4}$ -inch rod
24-inch OD pipe.....	1 $\frac{1}{2}$ -inch rod
30-inch OD pipe.....	1 $\frac{3}{4}$ -inch rod

Note: The above schedule for normal loads is based on not more than 12 feet of extra strong steel pipe filled with water, and with or without pipe covering.

For deflection of horizontal pipe lines and spacing of pipe supports, see pages 642 and 643.

The following excerpts from the "Code for Pressure Piping," American Tentative Standard, ASA B31-1935, will serve as a guide in the selection of hangers and supports.

Material requirements: "All equipment for permanent hangers, supports, and anchors shall be fabricated from durable materials suitable for the service conditions involved. Where this equipment is subject to atmospheric or other conditions likely to cause deterioration or corrosion, it shall be protected from such harmful effects by painting or other suitable preservative means".

Design limitations: "Pipe, straps, or bars of strength equal to the equivalent hanger rod may be fabricated for use instead of hanger rods for the support of piping of nominal sizes 3 $\frac{1}{2}$ -inch and smaller. Hangers used for the support of piping of 2-inch nominal pipe size and larger shall be fabricated to permit screw or equivalent adjustment after erection. Exception to this may be made in cases where hangers are to be used for the support of piping requiring exact grades, for which they may be fabricated as rigid hangers.

Screw adjustments shall be fabricated so that all threaded members will have a true and complete depth of thread. The turnbuckle or adjusting nut shall have its full length of thread in service while in use and the amount of adjustment shall be plainly visible at all times. All screw or equivalent adjustments shall be provided with suitable locking features".

Loading: "The required strength of all supporting equipment except springs shall be based on the combined weight of the piping filled with water or oil and the insulating covering if the latter is used. Where

piping is conveying a fluid which in the liquid state is heavier than water or oil, the combined weight shall include that of the piping filled with this liquid and the insulating covering if the latter is used.

Weight calculations for springs should be based upon the normal operating conditions of the piping".

Supports permitting pipe movement: "When expansion or contraction of piping will be produced by reason of conveying fluids at temperatures above 150° F. or by other causes, hanger and supporting equipment shall be fabricated and assembled to permit the free movement of this piping. This should be accomplished by the use of long rod hangers, spring hangers, chains, hangers or supports fitted with rollers Rollers shall be accurately made, properly guided, and shall roll freely".

Covering Protection Saddles: "When pipe is covered by insulation, a suitable metal shield properly constructed and secured to the covered pipe should be used to protect the covering at points where the pipe is supported on movable rollers or in large diameter rings".

Anchors: "Anchors shall be fabricated and assembled in such form as to secure the desired points of piping in relatively fixed positions. They shall permit the line to take up its expansion and contraction freely in opposite directions away from the anchored point, and shall be so arranged as to be structurally suitable for the particular location, line, and loading conditions in question".

Further information on the application of hangers and supports will be furnished on request.

Pipe Tools, Insulating Materials, and Thread Lubricants

Pipe Vises.....page 536
Stocks and Dies.....page 537

Pipe Threading Devices.....pages 538 to 541
Pipe Cutters.....page 542
Pipe End Reamers.....page 542
Pipe Taps and Reamers.....page 545

Pipe and Monkey Wrenches.....pages 543 and 544
Pipe Tongs.....page 544
Flue Brushes and Scrapers.....page 545

Insulating Materials.....pages 546 and 547
Thread Lubricants.....page 548

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In addition to the tools and supplies shown on pages 536 to 548, the following are shown in other sections of this catalog, in order to group them with allied products:

Tools

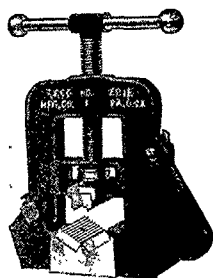
Sizing Tools for Soft Copper Tubing.....page 511
Square-End Sawing Vises.....page 511

Supplies

Machine Bolts.....page 556
Gaskets.....pages 564 to 571, and 485
Sheet Packings.....page 565
Hose.....page 73
Solders and Fluxes.....page 511

Pipe Vises

Reed Pipe Vises



Long Jaw Pipe Vise
For pipe, $\frac{1}{8}$ to $4\frac{1}{2}$ -inch

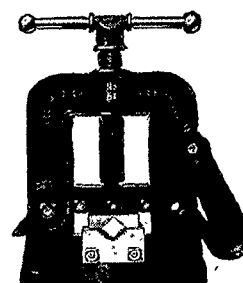
Reed "Long Jaw" Pipe Vises have long bearing alloy tool steel jaws which grip firmly without crushing, marring, or bending the pipe. Lower jaw is reversible. Automatic take up keeps the vise tight.

List Prices, Each, "Long Jaw"

Number of Vise	No. 00	No. 0	No. 1	No. 2	No. 3
For Pipe Inches	$\frac{1}{8}$ to $1\frac{1}{2}$	$\frac{1}{8}$ to 2	$\frac{1}{8}$ to $2\frac{1}{2}$	$\frac{1}{8}$ to $3\frac{1}{2}$	$\frac{1}{8}$ to $4\frac{1}{2}$
Vise, complete	3.60	4.25	5.00	7.50	11.00
Base	1.40	1.60	1.90	2.80	4.20
Handle and screw	1.00	1.20	1.40	2.20	3.00
Hook	.25	.30	.35	.50	.75
Upper jaw	.50	.60	.60	.85	1.20
Lower jaw	.50	.60	.60	.85	1.20
Yoke	.90	1.00	1.20	1.80	2.65

List Prices, Each, "Extra Heavy"

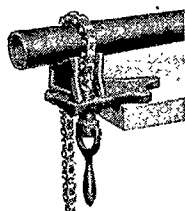
Number of Vise	No. 64	No. 65	No. 66
For Pipe Inches	$\frac{1}{8}$ to 6	1 to 8	$1\frac{1}{2}$ to 12
Vise, complete	23.50	47.50	70.00
Base	9.00	18.00	26.50
Handle and screw	6.60	13.00	19.50
Hook	1.60	3.30	5.00
Jaw clamp	1.20	2.80	4.20
Upper jaw	2.00	2.85	4.50
Lower jaw	2.00	2.85	4.50
Yoke	5.75	11.50	17.00



Extra Heavy Pipe Vise
Large Capacity
For pipe, $\frac{1}{8}$ to 12-inch

Reed "Extra Heavy" Pipe Vises have an extremely large capacity. They are available in various sizes to hold pipe ranging from $\frac{1}{8}$ to 12-inch. They will not crush or mar the pipe.

Williams Drop Forged Chain Pipe Vises



"Vulcan"
Chain Pipe Vise
For pipe, $\frac{1}{8}$ to 8-inch

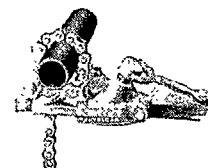
Williams "Vulcan" wrought steel chain pipe vises, adapted for use on bench or post, are rapid in action and positive in grip. The jaws are tempered for file sharpening.

List Prices, "Vulcan"

Number of Vise	No. 1	No. 2	No. 3	No. 4
For Pipe Inches	$\frac{1}{8}$ to 2	$\frac{1}{4}$ to 4	$\frac{1}{2}$ to 6	$\frac{1}{2}$ to 8
Vise, complete	7.00	15.00	27.00	36.00
Jaws, pair	3.00	7.00	12.00	18.00
Chain and screw, set	2.50	4.80	9.00	12.00
Screws, each	.80	1.40	2.50	2.50
Handle and nut, set	2.20	4.20	7.00	7.00
Nuts, each	1.40	2.70	4.00	4.00

List Prices, "Vulcan" Superior

Number of Vise		No. 11		No. 12	
For Pipe Inches		$\frac{1}{8}$ to $2\frac{1}{2}$		$\frac{1}{4}$ to $4\frac{1}{2}$	
Kind of Finish		Std.	Chrome	Std.	Chrome
Vise, complete		10.00	12.00	19.00	22.00
Jaws, pair		3.30	4.00	7.70	9.00
Chains, each		2.00	2.20	3.60	4.00
Chain arms, each		1.20	1.40	1.85	2.25
Screws, each		1.00	1.15	1.45	1.65
Handle and screw, set		2.35	2.80	3.50	4.15



"Vulcan" Superior
Chain Pipe Vise
For pipe, $\frac{1}{8}$ to $4\frac{1}{2}$ -inch

Williams "Vulcan" Superior chain vises are made from tough wrought steel. They are high grade, rapid acting, sure-grip vises. Reversible jaws provide long life. Overhead adjustment simplifies operation.

Combination Pipe Vises

Pipe jaws of highest grade steel, milled and tempered in oil, and the reversible front jaw which can be turned from end to end when worn, make these combination pipe vises ideal for general use.



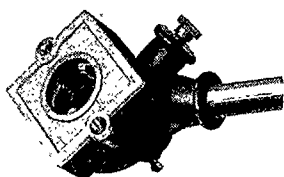
List Prices and Dimensions, "Combination"

Number of Vise	No. 433 $\frac{1}{2}$	No. 434 $\frac{1}{2}$	No. 435	No. 436
Price, complete	Each 17.50	24.00	38.00	60.00
Size of jaw	Inches $3\frac{1}{2}$	$4\frac{1}{2}$	5	6
Vise opens	Inches 3	5	6	$9\frac{1}{2}$
Max. pipe size	Inches 2	3	4	6

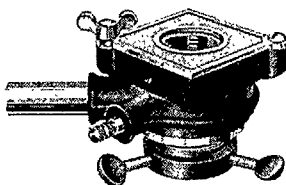
The vises bolt to a bench. The split ring swivel base construction assures ample gripping power. A tension spring holds the handle wherever it is placed.

Stocks and Dies

Nye Solid Ratchet Die Stocks



Solid Ratchet Die Stock
No. 1 and No. 1½



Solid Ratchet Die Stock
No. 2, with Leader Screw

List Prices

Catalog Number		1-RS-2	1½-RS-2	2-RS-2
For Pipe	Inches	¼ to 1	½ to 1½	1 to 2
Price, complete	Each	21.00	27.00	29.00
Stock with handle and screws		8.00	10.00	12.00
Dies	Each	3.00	4.00	5.00
Die heads	Each	2.00	3.00	4.00
Guides	Each	.40	.60	.75
Guide rings	Each	.40	.55	
Ratchet cases	Each	1.25	1.75	2.00
Ratchet pawls, complete	Each	.55	.60	.80
Handles	Each	.60	1.00	1.25
Name plates	Each	.55	.65	.75
Lock rings	Each			.50
Leader screws	Each			2.00
Thumb screws	Each			.20

Extra
Parts

The working parts on these Solid Ratchet Die Stocks are completely enclosed, protecting them from dirt and sand. The stocks are unusually compact and can be used in extremely close quarters. Handles are plated. Guides are machined throughout and are marked with the pipe size.

A complete set of bushings is furnished with each stock but any ordinary bushing will fit.

No. 1 Die Stocks use any make of die having outside dimensions of 2½ x 2½ x ¾".

No. 1½ Die Stocks use any make of die having outside dimensions of 3 x 3 x ¾".

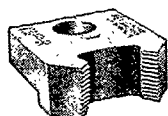
No. 2 Die Stocks use any make of die having outside dimensions of 4 x 4". The stocks are equipped with a leader screw which permits easy starting on 1 to 2-inch pipe.

Unless otherwise specified, American Standard right hand dies are furnished.

Armstrong Adjustable Stocks and Dies

Genuine Armstrong Adjustable Stocks and Dies with ring bushings are extremely serviceable. The dies can be quickly adjusted to accommodate any variation in fittings.

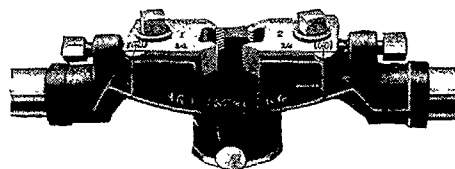
The stocks are fitted with removable bushings which permit the threading of close nipples of all sizes. Oiling spaces are located to assure easy, ample, and thorough lubrication.



Adjustable Die

A "double taper" lead with full size leading threads in the throat (see illustration at left) pulls the dies easily onto the pipe and quickly starts a clean, true thread over the meanest burr.

No. 1, No. 2, and No. 3 Stocks have single end dies requiring one set of two pieces to thread one size of pipe. No. 2½ Stocks have double end dies in which



Adjustable Stocks and Dies With Ring Bushings

No. 1½, No. 2, or No. 3 (Single End Dies)
No. 2½ (Double End Dies)

two pieces also comprise one set, but each set threads two sizes of pipe.

A complete set includes an adjustable stock, adjustable dies and ring bushings for each cutting size, as well as screws, handles, and a wrench.

Unless otherwise ordered, No. 1½ is furnished for ⅛ to ¾" pipe and No. 2, for ¼ to 1" pipe.

List Prices

Catalog Number		No. 1½			No. 2			No. 2½	No. 3
For Pipe	Inches	½ and ¾	¾ to 1	1 to 1½	¼ to 1	¾ to 1	1 to 1½	*1½ x ¾	1½ to 2
Price, complete (Right hand dies)	Each	6.20	7.60	9.00	12.00	10.50	8.75	14.00	18.00
Stock with screws, wrench, and handle	Each	3.40	3.40	3.40	4.00	4.00	4.00	5.25	7.00
Adjustable dies, right hand	Per pair	1.70	1.70	1.70	2.00	2.00	2.00	3.50	3.50
Bushings	Each	.30	.30	.30	.40	.40	.40	.60	.75

*These are double end dies

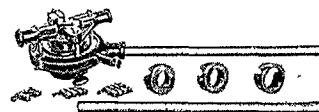
†Left hand dies per pair are twice the price of the right hand dies.

Toledo Pipe Threading Devices



Adjustable Threader
No. 1, Plain, Capacity 1 to 2-inch

The No. 1 is the first of the so-called easy-operating threaders. It utilizes the receding die principle. Instantly adjusted for cutting over or under size as well as standard threads. Uses a separate set of dies for each size of pipe.



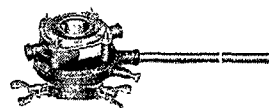
Adjustable Threader
No. 1A, with Ratchet, Capacity 1 to 2-inch

Like the No. 1 illustrated at the left, except equipped with a ratchet which makes it easy to thread pipe in restricted places. The No. 1A may be used with two handles as an ordinary die stock when desired. Exceptionally easy operating.



Super-Threader
No. 1B, Plain, Capacity 1 to 2-inch
No. 1BR, with Ratchet, Capacity 1 to 2-inch

The Nos. 1B and 1BR are similar to the No. 1 and No. 1A illustrated above except they do not use bushings. Clamped to the pipe by three broad-faced chuck jaws, they are easily and quickly centered. A separate set of dies is used for each size pipe.



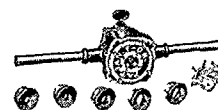
Super-Threader
No. 10B, Plain, Capacity 1 to 2-inch
No. 10BR, with Ratchet, Capacity 1 to 2-inch

The No. 10B and No. 10BR thread 1 to 2-inch pipe using but one set of dies. The pipe holder is similar in design to that of the No. 1B and No. 1BR. These threaders use no bushings. The No. 10B is plain; the No. 10BR is equipped with ratchet.



3-Way Pipe Threader
No. 30, Capacity $\frac{3}{8}$ to $\frac{3}{4}$ -inch
No. 31, Capacity $\frac{1}{2}$ to 1-inch

The lightest, the smallest and easiest to operate of all 3-way tools. Each die head is "on center", and the handles project from either side, thus producing a perfectly balanced tool. Dies easily reground or replaced at small cost. No adjustments necessary. No loose parts.



No. 0, Pipe Threader
Capacity, $\frac{1}{8}$ to $\frac{3}{4}$ -inch

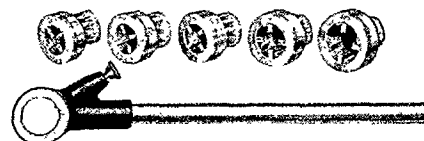
The No. 0 is but 24 inches from tip to tip of handle. Embodies the receding die feature for threading $\frac{1}{8}$ and $\frac{3}{4}$ -inch pipe. Produces perfectly tapered threads. Is a very easy-operating tool. Bushings make for perfect centering. Uses but three sets of dies.

Small Ratchet Threaders

These ratchet threading devices are small, compact, and easy to operate. They have an instant die change and will operate in close quarters. Dies are easily removed and reground or replaced at small cost. The threaders are ideal for close corner jobs.

The No. 00 can be furnished with $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ -inch left hand die heads and dies, $\frac{3}{4}$ -inch die heads and dies for Boston Brass fine thread tubing, or $\frac{3}{4}$ -inch brass pipe dies.

The No. 11 can be furnished with special $\frac{1}{2}$ to 1-inch bolt die heads and dies, special dies for cutting straight threads on electric conduit, or with brass pipe dies.



No. 00, Capacities from $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, or $\frac{1}{2}$ to $\frac{3}{4}$ -inch

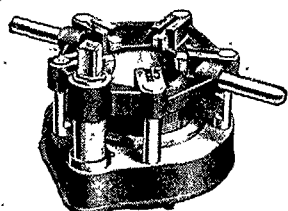
No. 11, Capacities from
 $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, or $\frac{1}{2}$ to 1-inch or to $1\frac{1}{4}$ -inch

No. 12, Capacities from $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, or 1 to 2-inch

The No. 12 can be furnished with special $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{3}{8}$ -inch die head and pipe dies, and special $\frac{7}{8}$ to $1\frac{1}{2}$ -inch bolt dies and die heads.

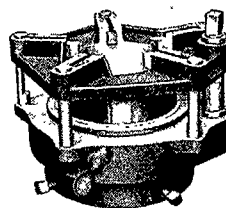
Additional information and prices for complete threading devices, dies, or die heads will be furnished on application.

Toledo Pipe Threading Devices



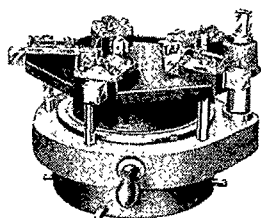
Geared Adjustable Threader
No. 2, Capacity $2\frac{1}{2}$ to 4-inch

The No. 2 Geared Adjustable Threader is considerably lighter than other tools of similar capacity. The tools use the receding die principle. A separate set of dies is used for each size.



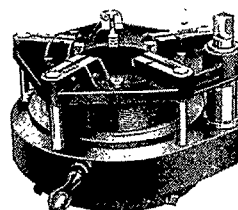
Geared Adjustable Threader
No. $2\frac{1}{2}$, Capacity $4\frac{1}{2}$ to 6-inch

The No. $2\frac{1}{2}$ Geared Adjustable Threader is similar in design, construction, and operation to the No. 2 described at the left. It enables the user of the No. 2 to thread up to 6 inches.



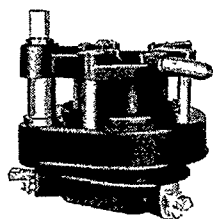
Geared Adjustable Threader
No. 25, Capacity $2\frac{1}{2}$ to 6-inch

These tools thread seven sizes of pipe with one set of dies. Adjustment is positive and quickly accomplished. They utilize the receding die principle. Special long-barreled bushings on the threaders permit easy centering.



Geared Adjustable Threader
No. 3, Capacity $4\frac{1}{2}$ to 8-inch
No. 4, Capacity 9 to 12-inch

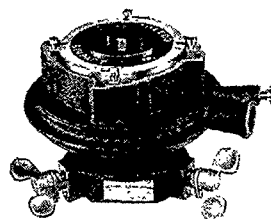
These are compact threaders. They use a separate set of dies for each pipe size. The No. 3 can be furnished with special 4-inch dies and bushings, and the No. 4, with special 8-inch dies and bushings, when so desired.



Geared Adjustable Super-Threader
No. 2BR, Capacity $2\frac{1}{2}$ to 4-inch
No. 25BR, Capacity $2\frac{1}{2}$ to 6-inch

The No. 2BR is similar to the No. 2 illustrated at the top of the page, except it is equipped with a new type 3-jaw pipe holder. No bushings are required. Offers more positive action and longer life than any cam operated mechanism. It is quickly and easily centered to the pipe.

The No. 25BR is similar to the No. 25 illustrated above, except it is equipped with four broad faced chuck jaws and requires no bushings. These tools thread all sizes of pipe from $2\frac{1}{2}$ to 6-inch with one set of dies. Adjustment is positive and quickly accomplished. The tools feature the receding die principle. An extra set of dies is furnished with each tool.



Simpact Self-Contained Pipe Threaders
With Ratchet, Capacity 1 to 2-inch

Accuracy, simplified operation, and easy adjustability make these new Simpact self-contained ratchet threaders the ideal pipe threading device. They are used to thread 1 to 2-inch pipe.

Light in weight and rugged in design, they feature larger wearing service with a minimum amount of internal friction or lost motion.

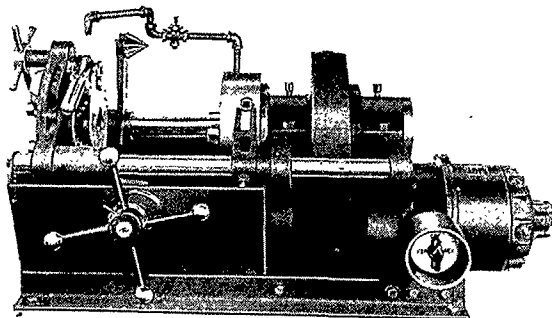
The Simpact provides direct action. The dies bear directly against the tapered steps. There are fewer moving parts. Cleaning is simplified.

The Simpact has short over-all, a distinct advantage when threading projecting pipe. The dies used on these threaders are made of high speed steel.

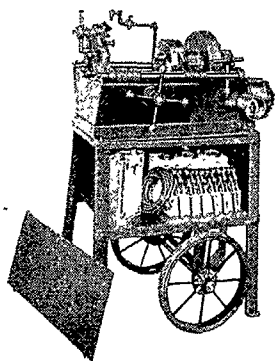
Additional information and prices for complete threading devices, dies, or die heads will be furnished on application.

Toledo Power Pipe Machines

No. 999 Standard and Super Models



Super Model



Super Model with enclosed steel stand, rubber tired wheels, and partitioned die head box.

Types Available (For 1/2 to 2-inch Pipe)

No. 999, Standard Model
With 6 Non-Opening Die Heads and Dies

No. 999, Super Model
With 6 Quick-Opening Die Heads and Dies

Models are equipped with motor. Replacement parts such as cutter blades, bushings, die heads, and dies, or special reamer for use on the standard model are available.

Furnished in two models, super and standard. The super model is equipped with quick-opening die heads. The standard model is equipped with non-opening die heads. In all other respects the machines are identical.

Both machines are equipped with rack and pinion, carriage feed wheel, thread length indicator, and heavy guard protecting switch.

All gears run in oil. A safety friction gear will slip in the event of overload and protect the machine from damage. The three-jaw universal chuck is equipped with chuck wrench ejector fingers. Centrifugal type oil pump assures a constant flow of oil.

2-inch pipe is cut off in 14 seconds and threaded in 20 seconds with the super model, and in 30 seconds with the standard model machine.

Wrenches, die heads and dies, cable, bushings, and one gallon of black sulphur base oil are furnished.

No. 1-2-4 and 2" High Speed Models

Types Available

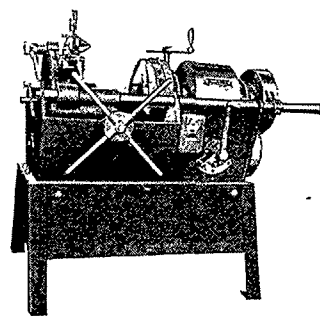
No. 1-2-4, complete, 1 to 4-inch Power Pipe Machine, with A.C. 60, 50, or 40 cycle, 3 phase, 220-240 volt motor.

2" High Speed, complete, 1/2 to 2-inch Power Pipe Machine, with A.C. 60 cycle, 3 phase, 220-240 volt motor.

Motors of other current specifications can be furnished.

No. 1-2-4 Pipe Machines can be equipped for 1/2 and 3/4-inch pipe, and with 3/8 to 2-inch bolt dies when ordered special.

2" High Speed Machines can be equipped for 1/8, 1/4, and 3/8-inch pipe, and with 3/8 to 1 1/2-inch bolt dies or 1/2 to 2-inch left hand pipe dies, when ordered special.



No. 1-2-4 Power Pipe Machine

40

No. 1-2-4—Very efficient, high speed, high production. Cuts off 4-inch pipe in 9 seconds; threads 4-inch pipe in 42 seconds. Cuts off 2-inch pipe in 3 1/2 seconds; threads 2-inch pipe in 18 seconds. Separate quick-opening die head and dies for each size pipe from 1 to 4-inch inclusive, furnished with machine. Four blade cutter head, six spindle speeds, forward and reverse, controlled by one clutch and gear shift lever. Electrical reverse. Multiple disc clutch. Safety friction gear. Motor protected by fuses. Gears all hardened steel and run in oil.

Centrifugal type oil pump — no relief valves. Automatic lubrication. All steel construction.

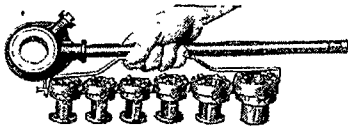
2" High Speed — Threads, cuts, and reams 1/2 to 2-inch pipe. Similar in design to No. 1-2-4, except smaller.

Requires less than 30 seconds to cut, thread, and ream 2-inch pipe, completing all three operations. Other sizes in proportion. Separate quick-opening die head and dies for each size pipe furnished with machine.

Prices and additional information will be furnished on application.

Beaver Pipe Tools

No. 3 Beaver Ratchet

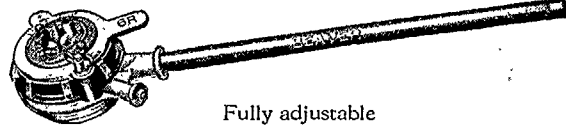


Bolt dies
 $\frac{1}{8}$ to 1-inch

Ratchet mechanism fully enclosed, no teeth on die heads to become mutilated. Oil holes in die heads for easy oiling and chip clearance. Dies square in shape, no weak sections to break. For iron, steel, brass, or copper pipe. Right or left. Uses any range of die heads.

Specials: Bolt Die Heads $\frac{1}{8}$ to 1-inch; Straight Thread Conduit Dies $\frac{1}{2}$ to 1-inch; $\frac{3}{4}$ -inch OD 20-thread Brass Pipe Dies.

No. 6 R Beaverette Ratchet

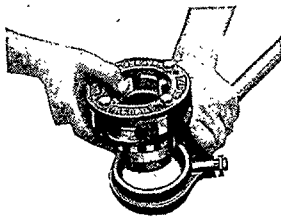


Fully adjustable

The only "one-piece" ratchet tool threading $\frac{1}{4}$ to $\frac{3}{4}$ -inch

No. 6 Plain and No. 6-R Ratchet are fully self-contained and fully adjustable. The two sets of dies required for this range ($\frac{1}{4}$ x $\frac{3}{8}$ -inch), and ($\frac{1}{2}$ x $\frac{3}{4}$ -inch) are always in the stock and are set to size by a single cam, or may be set to cut standard, oversize, or undersize threads without affecting the length of thread. A three-jaw Universal pipe guide eliminates loose bushings. ($\frac{1}{8}$ -inch dies extra.) Improved locking device, now on top, is more accessible.

No. 17 Ratchet and Die Heads

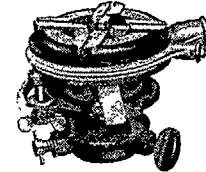


Range
 $\frac{1}{8}$ to 2-inch

A rugged fool-proof unit type tool. Four large oil holes, bridged across the top to prevent spreading of die slots, facilitate oiling, provide ample chip clearance, and insure good threads. Die segments square in shape; no weak sections to break off. Dies removable for regrinding over and over again. Extra long handle and special die grinding assist easy operation. For steel, iron, cast iron, brass, or copper pipe. Uses any range of die heads.

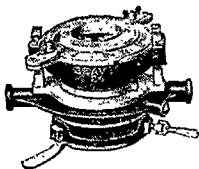
Nos. 12 and 13 Ratchet Series Beavers

1 to 2-inch
Fully adjustable



Fully self-contained. Right hand only. Dies adjustable for oversize, undersize, or standard thread — of full length. No. 12 Series uses grooved bolt and washer centering device; No. 13 Series uses Universal chuck centering device. Made in plain type, one-handle ratchet, and two-handle ratchet.

No. 25 and No. 26

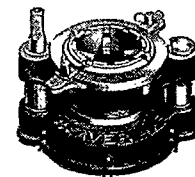


A heavy-duty tool
1 to 2-inch
Fully adjustable

No. 25 Plain and No. 26 Ratchet Beaver Die Stocks are fully self-contained (no loose parts); they thread 1-inch, $1\frac{1}{4}$ -inch, $1\frac{1}{2}$ -inch and 2-inch pipe without changing dies or bushings. Adjustable for standard, oversize, or undersize threads without affecting the length of thread. Will cut drip threads or close nipples. A number of important improvements have been made in these tools. Improved die grinding enable these new models to pull with greater smoothness.

Nos. 41-E, 61-E, 80-E, and 90 Beaver Geared Threaders

$2\frac{1}{2}$ to 12-inch
Fully adjustable



No. 41 E threads $2\frac{1}{2}$ to 4-inch; No. 61 E, $2\frac{1}{2}$ to 6-inch; No. 80 E, $4\frac{1}{2}$ to 8-inch; No. 90, 9 to 12-inch. Nos. 41 E and 61 E gears are fully enclosed (packed with graphite grease), preventing damage to gear and pinion and eliminating costly repair bills. Lower end of pinion rides in bronze bushings.

Pipe Cutters and Pipe-End Reamers



Barnes Three-Wheel Pipe Cutters

Saunders Pipe Cutters

Trimo Pipe Cutter

The Barnes, Trimo, and Saunders Pipe Cutters shown above are furnished with plain edge thin blade wheels unless knurled wheels are specified.

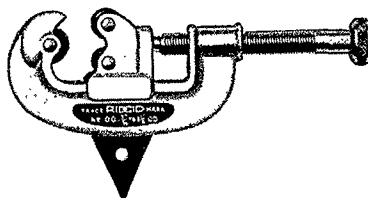
List Prices, Each

No.	Barnes Cutters			Saunders Cutters				Trimo Cutters		
	Cuts pipe	Price, complete	Extra wheels	Cuts pipe	Price, complete	Extra wheels	Extra rollers	Cuts pipe	Price, complete	Extra wheels
1	$\frac{1}{8}$ to 1"	4.50	.50	$\frac{1}{8}$ to 1"	3.00	.50	.24	$\frac{1}{8}$ to 1 $\frac{1}{4}$ "	5.00	.60
2	$\frac{1}{2}$ to 2"	6.00	.60	1 to 2"	4.50	.60	.32	$\frac{1}{8}$ to 2"	6.00	.60
3	1 $\frac{1}{2}$ to 3"	10.00	.80	2 to 3"	7.50	1.10	.50	1 to 3"	10.00	.90
4	2 $\frac{1}{2}$ to 4"	20.00	1.00	2 $\frac{1}{2}$ to 4"	15.00	1.10	.50	2 to 4"	20.00	1.20
5	4 to 6"	30.00	1.10	4 to 6"	22.50	1.10	.60			
6	6 to 8"	40.00	1.10							



"Beaver" Square End Pipe Cutter

No. 1 — For pipe, $\frac{1}{8}$ to 1-inch
No. 5 — For pipe, $\frac{1}{2}$ to 2-inch



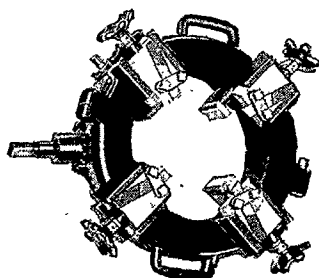
Ridgid Tubing Cutter

No. 000 — For tubing, $\frac{1}{8}$ to 1-inch
No. 00 — For tubing, $\frac{3}{16}$ to 1 $\frac{1}{8}$ -inch
No. 0 — For tubing, $\frac{1}{2}$ to 2 $\frac{3}{8}$ -inch



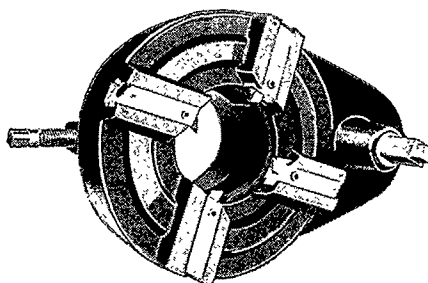
Ridgid Pipe Cutter

No. 1 — For pipe, $\frac{1}{8}$ to 1 $\frac{1}{4}$ -inch
No. 2 — For pipe, $\frac{1}{8}$ to 2-inch
No. 3 — For pipe, 1 to 3-inch
No. 4 — For pipe, 2 to 4-inch



Toledo Geared Pipe Cutters

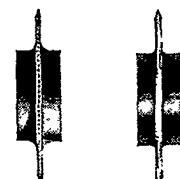
No. 250 — For pipe, 2 $\frac{1}{2}$ to 6-inch
No. 300 — For pipe, 4 $\frac{1}{2}$ to 8-inch
No. 350 — For pipe, 7 to 10-inch
No. 400 — For pipe, 9 to 12-inch



Toledo Automatic Pipe Cutters

No. 40 — For pipe, 2 to 4-inch
No. 80 — For pipe, 4 $\frac{1}{2}$ to 8-inch

Knife Blade Cutter Wheels



Knurled Edge

Smooth Edge

Knife blade cutter wheels with knurled or smooth edges for Barnes, Saunders, or Trimo Cutters are listed in the table above. Prices of wheels not listed will be furnished on application.

Pipe-End Reamers



Hand Pipe-End Reamer

For Pipe $\frac{1}{4}$ to 3-inch

List Price
7.50 each



Self-Feeding Ratchet Reamer

List Prices, Each

No. 271, For pipe, $\frac{1}{4}$ to 2-inch	10.00
No. 272, For pipe, $\frac{1}{4}$ to 2-inch	11.00

Prices of Beaver, Ridgid, and Toledo Cutters furnished on application.

Pipe Wrenches



Stillson Pipe Wrench

Stillson Pipe Wrenches are made to Federal Specifications GGG-W-651a for Type I, Normal Duty Pipe Wrenches.

Wrenches with steel handle are regularly furnished; sizes 14-inch and smaller can be furnished with wood handle when orders so specify.

Genuine "Stillson" Pipe Wrenches (List Prices, Each)

Length open	Inches	6	8	10	14	18	24	26	48
Takes pipe	Inches	1/8 to 1/2	1/8 to 3/4	1/8 to 1	1/4 to 1 1/2	1/4 to 2	1/4 to 2 1/2	1/4 to 3 1/2	1 to 5
Wrench	Steel handle	1.90	2.20	2.85	3.85	5.50	9.50	20.00	30.00
	Wood handle	2.00	2.30	3.15	4.25				
Bar with springs		1.00	1.15	1.60	2.20	3.25	5.15	10.50	17.00
Jaw		.65	.70	1.10	1.50	2.15	3.50	5.70	9.00
Frame and pin		.45	.55	.70	.80	.95	1.75	2.75	3.50
Frame pin		.03	.03	.04	.04	.04	.04	.05	.05
Adjusting nut		.15	.15	.20	.30	.35	.55	1.10	2.00
Wood handle and ferrule		.23	.25	.30	.36				
End nut		.15	.15	.20	.20				
Front spring		.10	.10	.10	.10	.10	.11	.13	.13
Back springs (Pair)				.20	.20	.20	.22		
Spring pin or rivet		.01	.01	.02	.02	.02	.02	.02	.02



Walco Pipe Wrench

Made to Federal Specifications GGG-W-651a for Type II, Heavy Duty Adjustable Pipe Wrenches. Large sizes feature renewable lower jaw that will not loosen.

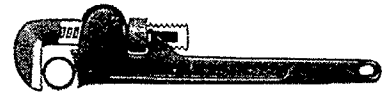
"Walco" Pipe Wrenches (List Prices, Each)

Length open	Inches	6	8	10	14	18	24	36	48
Takes pipe	Inches	1/8 to 1/2	1/8 to 3/4	1/8 to 1	1/4 to 1 1/2	1/4 to 2	1/4 to 2 1/2	1/4 to 4	1 to 6
Wrench, complete		1.90	2.20	2.85	3.85	5.50	9.50	20.00	30.00
Movable jaws		.65	.70	1.10	1.50	2.15	3.50	5.70	9.00
Lower jaw and pin				.65	.85	.95	1.10	1.50	2.00
Nuts		.15	.15	.20	.30	.35	.55	1.10	2.00
Springs		.25	.30	.35	.40	.50	.60	.70	.80
Pins, for lower jaw				.04	.04	.04	.04	.05	.05
Rubber grips			.30	.40	.50				

"Ridgid" Pipe Wrenches (List Prices, Each)

Size	Inches	6	8	10	12	14	18	24	36	48	60
Wrench	"Straight"	1.90	2.20	*2.85	3.35	*3.85	5.50	9.50	20.00	30.00	45.00
	"End"	1.90	2.20	*2.85	3.35	*3.85	5.50	9.50	20.00		
Handle Assembly	"Straight"	1.75	1.95	2.50	2.85	3.45	4.95	7.95	15.00	25.00	35.00
	"End"	1.75	1.95	2.50	2.85	3.45	4.95	7.95	15.00		
Hook jaw		.65	.70	1.10	1.25	1.50	2.15	3.50	5.70	9.00	17.00
Heel jaw & pin (Set)		.40	.45	.55	.65	.65	.75	.85	1.15	2.05	4.55
Pin		.03	.03	.04	.04	.04	.04	.04	.05	.05	.05
Coil spring		.03	.03	.03	.03	.03	.04	.04	.04	.04	.04
Flat spring		.20	.20	.20	.25	.30	.40	.50	.60	.80	1.50
Nut		.15	.15	.20	.25	.30	.35	.55	1.10	2.00	4.00
Capacity, inches		3/4	1	1 1/2	2	2	2 1/2	3	4 1/2	6	8

*Wrenches in the 10-inch size can be furnished complete with rubber grip for \$3.15 each, and in the 14-inch size for \$4.25 each. 10-inch rubber grips are listed at \$4.80 per dozen (.40 each); 14-inch rubber grips are listed at \$6.00 per dozen (.50 each).

Ridgid Pipe Wrench
Straight PatternRidgid Pipe Wrench
End Pattern (Style E)

"Trimo" Pipe Wrenches (List Prices, Each)

Size	Inches	6	8	10	12	14	18	24	36	48
Wrench	Steel handle	1.90	2.20	2.85	3.35	3.85	5.50	9.50	20.00	30.00
	Wood handle	2.00	2.30	3.15	3.60	4.25				
Movable jaw		.65	.70	1.10	1.25	1.50	2.15	3.50	5.70	9.00
Nut		.15	.15	.20	.25	.30	.35	.55	1.10	2.00
Insert jaw and pin		.50	.55	.65	.75	.85	.95	1.10	1.50	2.00
Frame and pin		.45	.55	.70	.75	.80	.95	1.75	2.75	3.50
Spring and pin		.03	.03	.03	.03	.03	.04	.04	.04	.04
Frame or jaw pin		.03	.03	.04	.04	.04	.04	.04	.05	.05
Steel handle		1.00	1.15	1.60	1.80	2.20	3.25	5.15	10.50	17.00
Wood handle & ferrule		.23	.25	.30	.35	.36				
Nut guards	Per pair	.15	.15	.20	.30	.30	.35	.45	.55	.65

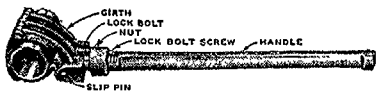


Trimo Pipe Wrench

Trimo Pipe Wrenches are furnished with a wood handle in sizes 6 to 14-inch and with a steel handle in sizes 6 to 48-inch. Orders should specify which type of handle is required.

Wrenches

"Parmelee"
Pipe Wrench



For brass pipe, smooth rods, or tubing. Made to Federal Specifications GGG-W-651a for Type IV, Girth Pipe Wrenches.

List Prices, "Parmelee"

No.	Takes Pipe	Length	Each Complete
1	$\frac{3}{8}$ to 1"	10"	8.50
2	1 to 2"	20"	15.00
3	2 to 3"	20"	17.00
4	3 to 4"	37"	52.00

"Warnock"
Strap Wrench



A special wrench, ideal for handling finished, turned, and polished work in the machine shop.

List Prices, "Warnock"

Length Inches	Takes Pipe	Each Complete	Extra straps Each
12	$\frac{1}{8}$ to 2"	5.00	.75
18	1 to 5"	10.00	1.50

"Trimo"
Monkey Wrench

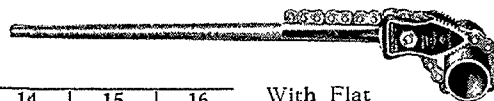


List Prices, "Trimo"

Size Inches	Wrench opens	Price per dozen
6	1"	15.00
8	$1\frac{5}{16}$ "	18.00
10	$1\frac{3}{4}$ "	22.00
12	$2\frac{1}{4}$ "	28.00
15	$2\frac{5}{8}$ "	38.00
18	$3\frac{1}{4}$ "	48.00
21	$4\frac{1}{8}$ "	58.00

Chain Pipe Tongs

"Vulcan" Drop-Forged Chain Pipe Tongs



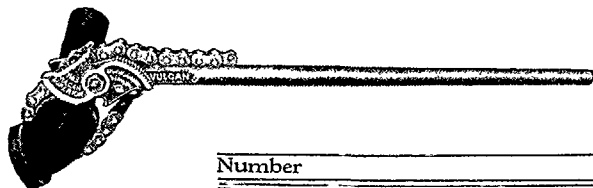
List Prices, Each

Number	10	11	12	13	$13\frac{1}{2}$	14	15	16
For pipe, size, inches	$\frac{1}{8}$ to $\frac{3}{4}$	$\frac{1}{8}$ to $1\frac{1}{2}$	$\frac{1}{4}$ to $2\frac{1}{2}$	$\frac{3}{4}$ to 4	1 to 6	$1\frac{1}{2}$ to 8	2 to 12	4 to 18
Length	$13\frac{3}{4}$	20	27	37	$44\frac{1}{2}$	$50\frac{1}{2}$	$64\frac{1}{2}$	87
Flat chain, length	$9\frac{1}{2}$	$13\frac{1}{2}$	$17\frac{1}{2}$	$22\frac{1}{2}$	32	$40\frac{1}{2}$	$55\frac{1}{2}$	$74\frac{1}{2}$
Breaking strain, lbs.	3,600	6,700	9,800	12,500	14,300	15,700	21,800	40,000
Cable chain, length	$9\frac{3}{4}$	$14\frac{1}{2}$	18	27	$33\frac{1}{2}$	42	57	76
Breaking strain, lbs.	1,800	6,000	9,000	12,500	14,300	15,700	21,800	40,000
Price, complete	5.00	7.00	10.00	14.00	18.00	22.00	36.00	80.00
Extra chain	1.50	2.00	3.00	5.00	7.00	9.00	15.00	40.00
Jaws, pair	2.00	3.50	5.50	8.00	9.50	11.00	15.00	32.00
Bolt and nut, per set	.28	.36	.46	.60	.70	.90	1.30	2.50

With Flat
Link Chain

These pipe tongs are furnished with either flat link or cable chain. Each flat chain is individually "proof-tested" to two-thirds of breaking strain listed in table.

"Vulcan Superior" Drop-Forged Pipe and Fittings Tongs



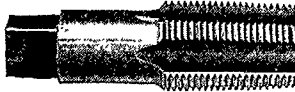
Reversible jaws give double life. The tongs can be supplied with either flat link or cable chain, the former being proof-tested. "V" recess in the jaws, combined with general design, make possible a greater number of grips or bites on both pipe and fittings.

List Prices, Each

Number	0	1	2	3	$3\frac{1}{2}$	4	5
For pipe and fittings, inches	$\frac{1}{8}$ to $\frac{3}{4}$	$\frac{1}{8}$ to $1\frac{1}{2}$	$\frac{1}{4}$ to $2\frac{1}{2}$	$\frac{3}{4}$ to 4	1 to 6	$1\frac{1}{2}$ to 8	2 to 12
Extreme length, inches	$13\frac{3}{4}$	20	27	37	$44\frac{1}{2}$	$50\frac{1}{2}$	$64\frac{1}{2}$
Flat link chain, breaking strain, lbs.	3,600	6,700	9,800	12,500	14,300	15,700	21,800
Cable chain, breaking strain, lbs.	1,800	6,000	9,000	12,500	14,300	15,700	21,800
Price, complete	5.00	7.00	10.00	14.00	18.00	22.00	36.00
Chains, each	1.50	2.00	3.00	5.00	7.00	9.00	15.00
*Jaws, per pair	2.00	3.50	5.50	8.00	9.50	11.00	15.00
Bolt and nut, per set	.28	.36	.46	.60	.70	.90	1.30

*Extra jaws supplied in pairs unless otherwise called for. If only a single jaw is wanted, specify right or left.

Pipe Taps and Pipe Reamers



Pipe Tap



Pipe Reamer



Combined Drill and Tap

Pipe Taps, List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Price	Each	1.00	1.20	1.60	2.00	2.80	4.40	5.00	6.60	10.00	15.00	22.50
Threads per Inch		27	18	18	14	14	11 1/2	11 1/2	11 1/2	11 1/2	8	8
Number of Flutes		4	4	4	4	5	5	5	6	6	8	8
Overall Length	Inches	2 1/8	2 7/16	2 9/16	3 1/8	3 1/4	3 3/4	4	4 1/4	4 1/2	5 1/2	6

These taps are regularly furnished with right or left hand American Standard Threads.

Pipe Reamers, List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Price	Each	1.00	1.20	1.60	2.00	2.80	4.40	5.00	6.60	10.00	15.00	22.50
Diameter, Large End	Inches	.362	.472	.606	.751	.962	1.212	1.553	1.793	2.268	2.722	3.347
Diameter, Small End	Inches	.316	.406	.540	.665	.876	1.103	1.444	1.684	2.159	2.561	3.183
Length of Flutes	Inches	3/4	1 1/16	1 1/16	1 3/8	1 3/8	1 3/4	1 3/4	1 3/4	1 3/4	2 9/16	2 5/8
Diameter of Shank	Inches	.4375	.5625	.7000	.6875	.9063	1.125	1.3125	1.500	1.875	2.250	2.625
Size of Square	Inches	.328	.421	.531	.515	.679	.843	.984	1.125	1.406	1.687	1.968
Overall Length	Inches	2 1/8	2 7/16	2 9/16	3 1/8	3 1/4	3 3/4	4	4 1/4	4 1/2	5 1/2	6

These reamers are tapered 3/4 of an inch to the foot. Prices and dimensions of larger sizes on application.

Combined Drill and Tap, List Prices

Size	Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Price	Each	2.25	2.50	3.00	3.75	5.00	6.25	7.50	9.25	12.00
Size of Square	Small End	Inches	1/2	1/2	1/2	1/2	1/2	1/2	1/2	3/4
	Large End	Inches	3/4	3/4	3/4	3/4	3/4	3/4	3/4	1
Length	Square	Inches	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	2
	Thread	Inches	3/4	1 1/16	1 1/16	1 3/8	1 3/8	1 3/4	1 3/4	1 3/4
	Overall	Inches	3 5/8	3 7/8	3 7/8	4 1/4	4 1/4	4 5/8	4 3/4	5 3/8

These taps are furnished with National Standard form of threads. Left hand taps, and taps with special shanks, are special.

Flue Brushes and Flue Scrapers



Flue Brush
Round Steel Wire, Single Spiral
For flues from 1 to 6-inch



Flue Brush
Round Steel Wire, Double Spiral
For flues from 1 to 6-inch



Engineers' Favorite Flue Scraper
For flues from 1 3/4 to 6-inch

List Prices

Flue Brush	Single Spiral	Per diameter inch	1.00
	Double Spiral	Per diameter inch	1.00
Flue Scraper		Per diameter inch	1.00

Sizes smaller than 2-inch, same price as 2-inch size.

Flue brushes are supplied with single or double spiral round steel wire.

The brushes are made to fit standard sizes of flues which are measured from the outside. Thus, the actual diameter of the brush is 1/4-inch less than the

O.D. flue size. For example, a brush for a 3-inch flue is actually 2 3/4 inches in diameter.

Flue scrapers are made of high grade malleable iron and spring steel. The scrapers are adjustable and will clean the entire flue.

Insulating Materials

Pre-Shrunk Asbestocel Pipe Insulation

For temperatures to 300° F.



Pre-Shrunk Asbestocel, made of alternate layers of plain and corrugated asbestos felts, is an improved cellular type of insulation, ideal for use on low pressure steam and hot water lines. The specially-treated asbestos paper composition effectively resists moisture and prevents "breathing", thus removing the cause of objectionable shrinkage cracks.

***Sizes and finishes:** For standard pipe sizes. Furnished in 3-foot sections, and in thicknesses of 2 to 8 plies; each ply is approximately 1/4-inch thick. Canvas, asbestos, or aluminum finish.

Pre-Shrunk Wool Felt Pipe Insulation

For hot and cold water service.

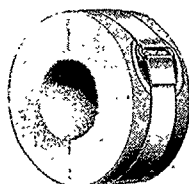


Pre-Shrunk Wool Felt Insulation is composed of moisture-resistant felt, a material which minimizes drying shrinkage and pulling apart at the joints after application. Dual service liners, a water-proof, asphalt saturated felt makes this type of insulation ideal for cold water lines or hot water lines subject to temperatures as high as 225° F.

***Sizes and finishes:** For standard pipe sizes. Furnished in 3-foot sections, and in thicknesses of 1/2, 3/4, 1, Double 1/2, and Double 3/4-inch. Canvas or aluminum finish.

85% Magnesia Pipe Insulation

For temperatures to 600° F.



85% Magnesia Pipe Insulation combines the high insulating qualities of basic carbonate of magnesia and asbestos. The insulation is composed of a maximum number of voids or minute dead-air cells, a feature which increases its natural resistance to heat transmission and reduces its weight. Actual service conditions have proved 85% Magnesia to be the most durable, as well as the most efficient, of moulded insulations.

***Sizes and finish:** For standard pipe sizes. Furnished in 3-foot sections or in segments, and in Standard, 1 1/2-inch, 2-inch, 2 1/2-inch, Double Standard, and 3-inch thicknesses. Canvas finish.

Zero Pipe Insulation

For cold water service.

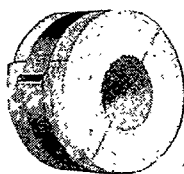


Zero Pipe Insulation is ideally used to prevent cold water pipes from freezing under ordinary conditions or for insulating lines where the surrounding air is subject to below freezing temperatures for only a short time. The insulation is not recommended for use where extremely low temperatures prevail. The insulation is composed of hair felt, one of the best of insulating materials. When applied to pipes running out of doors, special provision should be made for a separate jacket of Double Coated Flexstone.

***Sizes and finish:** For standard pipe sizes. Furnished in 3-foot sections, and in one thickness, approximately 1 1/4-inch. Canvas finish.

Asbestos-Sponge Felted Pipe Insulation

For temperatures to 700° F.



Asbestos-Sponge Felted Insulation is especially designed to withstand, permanently and without disintegration, the high temperatures, severe wear, and vibrations encountered in modern steam and fluid pipe lines. Fabricated of felts composed of asbestos fibres and small particles of spongy cellular material, the insulation maintains its high efficiency indefinitely. Its efficiency is not impaired by exposure to water.

***Sizes and finish:** For standard pipe sizes. Furnished in 3-foot sections, and in thicknesses of 1 to 3-inch. Also available in sheet or block form. Canvas finish.

Anti-Sweat Pipe Insulation

For cold water service.



Anti-Sweat, a cold water pipe insulation, is recommended to keep water cold and to prevent condensation and damage due to dripping. The insulation is unusually well suited for use in textile and paper mills, packing plants, etc. Made of pre-shrunk insulating felts and waterproofing felts, the material is ideal for use on lines subject to impact or shock. When used in the proper thickness, the insulation is suitable for the entire range of cold and ice water service.

***Sizes:** For standard pipe sizes. Furnished in 3-foot sections, and in thicknesses of 1/2 to 2-inch. Double layer construction on larger sizes.

*The insulations shown on this page can also be furnished in sizes to fit straight runs of copper pipe or tubing having outside diameters of 3/8-inch or larger.

Prices and additional information will be furnished on application.

Insulating Materials

85% Magnesia Blocks



85% Magnesia Blocks are recommended for the insulation of flat, curved, or irregular surfaces where the temperature does not exceed 600° F. The material is particularly adaptable where high insulating value and light weight are necessary, or where an extremely irregular surface necessitates the use of an easily cut insulation.

Composed of hydrated basic carbonate of magnesia bonded with asbestos fibre, the material is moulded and machined into block form.

Sizes: 85% Magnesia Blocks are furnished in flat blocks of 3, 6, 9, and 12 inches in width and either 18 or 36 inches in length. Other sizes and curved blocks can be furnished to order. The blocks are made in thicknesses of 1 to 4-inch.

Asbestos Sheet Millboard



Asbestos Sheet Millboard is recommended for protection against fire, heat, acid fumes, etc. It is frequently used as a fireproof lining for floors, partitions, ceilings, elevator shafts, ranges, stoves, grates, and for various other industrial uses.

Millboard is made in a number of grades of varying densities, resiliency, and fire-resistant properties and can be furnished in grades to withstand effectively temperatures ranging as high as 1800° F.

Millboard can be cut with shears to any size desired and fastened with nails or screws.

Sizes: The size of a standard sheet of millboard is 42 x 48 inches, but the material can also be furnished in cut pieces.

Asbestos Paper and Roll Board



Asbestos Paper and Roll Board are recommended for use where an insulating material of minimum thickness is required.

Asbestos Paper is used principally in the manufacture of corrugated insulation in various forms. It is also used in locations where little room is available, serving as a protection against heat or as a fire retardant between walls, floors, and ceilings. Special grades are supplied for use in filtration of chemicals and in electrolytic and allied processes.

Asbestos Roll Board is similar to Asbestos Paper but is used where a heavier material is required.

Sizes: Asbestos Paper is regularly furnished in 18, 24, and 36-inch widths and in 50 or 100 pound rolls.

Asbestos Roll Board is furnished in standard rolls, 18 and 36-inch wide, weighing 50 or 100 pounds.

Other sizes will be furnished to order.

Insulating Cements



Insulating cements provide excellent coverage, durable finish, and good insulating value. They are made in various grades and forms of asbestos, vermiculite, mineral wool, and magnesia.

Insulating cements are well suited for insulation of irregular surfaces where it would be difficult to apply sectional insulation, sheets, or blocks.

Asbestos insulating cements are generally used as a surface finish over block or sheet forms of insulation to seal all joints between the blocks and to provide a smooth, attractive finish or a surface to which canvas may be applied, if desired.

Several of the many types of cements available are:

No. 352 Asbestos and No. 0352 Asbestos. Suitable for temperatures as high as 1000° F. Furnished in 100 pound bags. Covering capacity is 19 square feet and 1-inch thick per bag of cement, applied and dried. No. 352 also furnished in 50 pound bags.

No. 400, Asbestos. Furnished in 100 pound bags. Covering capacity is 25 square feet and 1-inch thick per bag of cement, applied and dried.

Crane Thread Lubricants

For Threaded Pipe Joints, Bolt Threads, and Gasket Coating



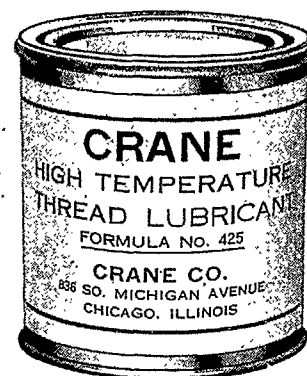
Crane Black
Thread Lubricant

Sold in
1, 5, 10, and 20-Pound Cans



Crane White
Thread Lubricant

Sold in
1 and 5-Pound Cans



Crane High-Temperature
Thread Lubricant

Sold in
1½ and 7½-Pound Cans

List Prices

For industrial purposes.....	Crane Black Thread Lubricant	Per Pound	.50
For plumbing installations.....	Crane White Thread Lubricant	Per Pound	.50
For high temperature service.....	Crane High-Temperature Thread Lubricant	Per Pound	1.00

Use of thread lubricants: In the making up of tight threaded pipe joints, the first requisite is that both threads be smooth and of the proper taper and pitch in order to form a substantial metal to metal joint. Friction incidental to the assembly of a threaded joint generates heat which tends to encourage "seizing" or "galling" of the metal between the male and female threads. To minimize this friction and avoid its damaging action upon the threads, it is desirable to use a lubricant that will facilitate assembly and retain the smoothness of the threads in an intimate metal to metal contact. For this purpose, Crane Thread Lubricants are ideal; they are not recommended for conditions requiring a material that will harden and cement, or provide a seal against leakage resulting from imperfect threading.

Cranite or corrugated metal gaskets, when coated with a thread lubricant prior to being inserted in a flanged joint, are adapted much more readily to the facing to make a pressure tight joint. Removal of gaskets is facilitated without sticking or damage, and they can be used over again with excellent results.

Crane "Black" Thread Lubricant: Formerly known as Crane Cement, Crane "Black" Thread Lubricant has excellent lubricating quality, spreads readily through the threads, and is of a consistent and uniform composition. It gives satisfactory results on innumerable services in industrial pipe thread applications. Having been in popular use for the past fifty odd years, the merits of this material are well known; it has been ordered in ton lots for threaded joints on oil and gas lines.

Crane "White" Thread Lubricant: Crane "White" Thread Lubricant is especially recommended for plumbing installations where the Black may be objectionable. It has superior lubricating and spreading qualities, and is uniform and consistent in composition. It is not affected by hot or cold water, steam, or gas; and the ingredients are non-poisonous.

Crane "High Temperature" Thread Lubricant: Crane "High Temperature" Thread Lubricant is the result of years of development and research in an endeavor to find a lubricant having low frictional qualities with particular suitability for high temperature service. The tendency of metal to seize or gall is more pronounced under high temperatures and high loading, and only a proper lubricant can avoid these damaging effects. Threaded pipe joints, made up with Crane High-Temperature Thread Lubricant, after having been in service under temperatures as high as 1000° F., can be taken apart readily and re-used; threads are kept smooth and a pressure tight metal to metal contact is maintained.

On bolt-studs used in flanged joints for high pressure-temperature installations, the tendency of seizing or galling of the threads is a common failing because of the high bolt loads and increased friction. Crane High-Temperature Thread Lubricant is ideal for use on bolt-studs; it enables the maximum stress to be obtained with a minimum of power applied to the nut. Bolted joints are more easily assembled to tightness under high pressures, and damage of threads incidental to high loading is avoided.

*Crane Black and Crane White Thread Lubricants always are furnished in 1-Pound Cans unless otherwise ordered.
Crane High-Temperature Thread Lubricant always is furnished in 1½-Pound Cans unless otherwise ordered.*

Drilling Templates; Bolts; Flange Facings; Gaskets; Galvanizing

Templates for Drilling, Brass, Iron, and Steel.....	pages 550 to 555
Machine Bolts.....	pages 556 and 557
Triplex and Templex Steel Bolt-Studs.....	pages 558 and 559
Bolting on Companion Flanges.....	page 557
Wooden Flange Protectors.....	page 557
Special Facings for Flanges, Valves, and Fittings.....	pages 560 to 563
Gaskets for Iron, Brass, and Steel Flanged Joints.....	pages 564 to 570
Ring Gaskets for Unions.....	page 571
Sheet Packing, Cranite and C. C. Rubber.....	page 565
Galvanized Flanged Fittings and Flanges.....	page 572

Pages 550 to 572 are devoted to a variety of subjects, not wholly related, but having in common the fact that they apply to nearly all Crane products and are referred to frequently. In addition, other sections of this catalog include data on subjects of a somewhat similar nature, but more specialized or technical in character. Among these are found the following:

Normal Engagement Between Male and Female Threads.....	page 591
Threaded Pipe Joints.....	page 592
Flange Finishes.....	pages 612 and 613
Assembly and Maintenance of Flanged Joints.....	page 624
Crane Bolting, Engineering Data on.....	pages 622 and 623
Taps and Drains for Flanged Fittings.....	page 645
Taps and Drains for Flanged Valves.....	page 646

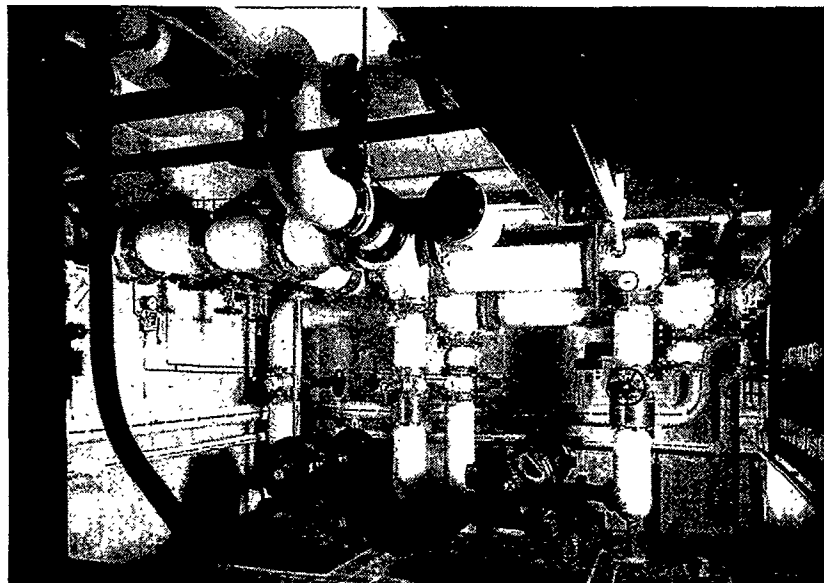
Pipe and Fabricated Piping.....	pages 573 to 619
Engineering Data.....	pages 621 to 667

Thread Lubricants... page 548

Gaskets for valves, fittings, and flanges for ammonia....page 485

A portion of the basement piping in a large office building—Crane products were used throughout.

Crane Valves and Fittings can be found in all industries, on all services, wherever fluids are conveyed in pipe lines.



Templates for Drilling Brass Flanged Valves, Flanged Fittings, and Flanges

150-Pound MSS Standard

Size Inches	Dimensions, in Inches						
	Diameter of Flange	Thickness of Flange	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts	Length of Bolt-Studs with 2 Nuts
1/2	3 1/2	5/16	2 3/8	4	1/2	1 1/4	1 7/8
3/4	3 7/8	11/32	2 3/4	4	1/2	1 1/2	1 7/8
1	4 1/4	3/8	3 1/8	4	1/2	1 1/2	2
1 1/4	4 5/8	13/32	3 1/2	4	1/2	1 1/2	2
1 1/2	5	7/16	3 7/8	4	1/2	1 1/2	2 1/8
2	6	1/2	4 3/4	4	5/8	1 3/4	2 1/2
2 1/2	7	9/16	5 1/2	4	5/8	2	2 5/8
3	7 1/2	5/8	6	4	5/8	2	2 3/4
3 1/2	8 1/2	11/16	7	8	5/8	2 1/4	2 7/8
4	9	11/16	7 1/2	8	5/8	2 1/4	2 7/8
5	10	3/4	8 1/2	8	3/4	2 1/2	3 1/4
6	11	13/16	9 1/2	8	3/4	2 1/2	3 3/8
8	13 1/2	15/16	11 3/4	8	3/4	2 3/4	3 5/8
10	16	1	14 1/4	12	7/8	3 1/4	4 1/8
12	19	1 1/16	17	12	7/8	3 1/4	4 1/4

This Standard is known as MSS 150-Pound SP Bronze Flange Standard (No. SP-2-1937). It was developed and adopted as "Standard Practice" by the Manufacturers' Standardization Society of the Valve and Fittings Industry.

The flange diameter, bolt circle, and number and diameter of bolts are the same as for the Cast Iron Class 125 and 150-Pound Steel American Standards, but the thickness and facing of the flanges are different.

250-Pound and 300-Pound MSS Standards

These Standards are known as MSS 250 and 300-Pound SP Bronze Flange Standards (No. SP-2-1937). They were developed and adopted as "Standard Practice" by the Manufacturers' Standardization Society of the Valve and Fittings Industry. Except for flange thickness, bolt lengths, and bolt-stud lengths, the two Standards are alike.

The flange diameter, bolt circle, and number and diameter of bolts are the same as for the 250-Pound Cast Iron and 300-Pound Steel American Standards, but the thickness and facing of the flanges are different.

Size Inches	Dimensions, in Inches								
	Diameter of Flange	Thickness of Flange		Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Bolts		Length of Bolt-Studs with 2 Nuts
		250-Pound	300-Pound				250-Pound	300-Pound	
1/2	3 3/4	13/32	1/2	2 5/8	4	1/2	1 1/2	1 3/4	2
3/4	4 5/8	7/16	1 7/32	3 1/4	4	5/8	1 3/4	2	2 3/8
1	4 7/8	1/2	1 9/32	3 1/2	4	5/8	1 3/4	2	2 1/2
1 1/4	5 1/4	17/32	5/8	3 7/8	4	5/8	2	2	2 1/2
1 1/2	6 1/8	9/16	1 1/16	4 1/2	4	3/4	2	2 1/4	2 7/8
2	6 1/2	5/8	3/4	5	8	5/8	2	2 1/4	2 3/4
2 1/2	7 1/2	11/16	13/16	5 7/8	8	3/4	2 1/4	2 1/2	3 1/8
3	8 1/4	3/4	2 9/32	6 5/8	8	3/4	2 1/2	2 3/4	3 1/4
3 1/2	9	13/16	3 1/32	7 1/4	8	3/4	2 1/2	3	3 3/8
4	10	7/8	1 1/16	7 7/8	8	3/4	2 3/4	3	3 1/2
5	11	15/16	1 1/8	9 1/4	8	3/4	2 3/4	3 1/4	3 5/8
6	12 1/2	1	1 3/16	10 5/8	12	3/4	3	3 1/4	4 1/8
8	15	1 1/8	1 3/8	13	12	7/8	3 1/2	3 3/4	4 5/8
10	17 1/2	1 3/16		15 1/4	16	1	3 3/4		4 3/4
12	20 1/2	1 1/4		17 3/4	16	1 1/8	4		5 1/4

Facing: All 150, 250, and 300-Pound flange faces are plain faced, with two V-shaped concentric grooves between the port and the bolt holes.

Bolt holes: Bolt holes are drilled 1/8-inch larger than the diameter of the bolt.

The bolt holes are in multiples of four, so that valves or fittings can be turned to face in any quarter when being installed. They are drilled to straddle the center line unless otherwise ordered.

Spot facing: Bolt holes in all Crane Brass Flanged Valves, Flanged Fittings, and Flanges are spot faced.

Gaskets: Full face gaskets should be used. For list prices of gaskets, see page 567.

When brass flanged material is bolted to iron or steel flanges that normally have a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cranelap Flanged Pipe Joints.

Templates for Drilling 25-Pound and 125-Pound Cast Iron

Dimensions, in Inches

Size	25-Pound Cast Iron							125-Pound Cast Iron						
	Diam- eter of Flange	Thick- ness of Flange	Diam- eter of Bolt Circle	Num- ber of Bolts	Diam- eter of Bolts	Length of Bolts		Diam- eter of Flange	Thick- ness of Flange	Diam- eter of Bolt Circle	Num- ber of Bolts	Diam- eter of Bolts	Length of Bolts	Length of Bolt-Studs with 2 Nuts
						A	B							
1								4 1/4	7/16	3 1/8	4	1/2	1 3/4	
1 1/4								4 5/8	1/2	3 1/2	4	1/2	2	
1 1/2								5	9/16	3 7/8	4	1/2	2	
2	6	1/2	4 3/4	4	5/8	1 3/4	2	6	5/8	4 3/4	4	5/8	2 1/4	
2 1/2	7	9/16	5 1/2	4	5/8	2	2	7	1 1/16	5 1/2	4	5/8	2 1/2	
3	7 1/2	5/8	6	4	5/8	2	2 1/4	7 1/2	3/4	6	4	5/8	2 1/2	
3 1/2	8 1/2	1 1/16	7	8	5/8	2 1/4	2 1/4	8 1/2	1 3/16	7	8	5/8	2 3/4	
4	9	3/4	7 1/2	8	5/8	2 1/4	2 1/2	9	1 5/16	7 1/2	8	5/8	3	
5	10	3/4	8 1/2	8	5/8	2 1/4	2 1/2	10	1 5/16	8 1/2	8	3/4	3	
6	11	3/4	9 1/2	8	5/8	2 1/4	2 1/2	11	1	9 1/2	8	3/4	3 1/4	
8	13 1/2	3/4	11 3/4	8	5/8	2 1/4	2 3/4	13 1/2	1 1/8	11 3/4	8	3/4	3 1/2	
10	16	7/8	14 1/4	12	5/8	2 1/2	3	16	1 3/16	14 1/4	12	7/8	3 3/4	
12	19	1	17	12	5/8	2 3/4	3	19	1 1/4	17	12	7/8	3 3/4	
14	21	1 1/8	18 3/4	12	3/4	3 1/4	3 1/2	21	1 3/8	18 3/4	12	1	4 1/4	
16	23 1/2	1 1/8	21 1/4	16	3/4	3 1/4	3 1/2	23 1/2	1 7/16	21 1/4	16	1	4 1/2	
18	25	1 1/4	22 3/4	16	3/4	3 1/2	3 3/4	25	1 9/16	22 3/4	16	1 1/8	4 3/4	
20	27 1/2	1 1/4	25	20	3/4	3 1/2	4	27 1/2	1 11/16	25	20	1 1/8	5	
24	32	1 3/8	29 1/2	20	3/4	3 3/4	4 1/4	32	1 7/8	29 1/2	20	1 1/4	5 1/2	
30	38 3/4	1 1/2	36	28	7/8	4 1/4		38 3/4	2 1/8	36	28	1 1/4	6 1/4	
36	46	1 5/8	42 3/4	32	7/8	5		46	2 3/8	42 3/4	32	1 1/2	7	
42	53	1 3/4	49 1/2	36	1	5 1/4		53	2 5/8	49 1/2	36	1 1/2	7 1/2	
48	59 1/2	2	56	44	1	5 1/2		59 1/2	2 3/4	56	44	1 1/2	7 3/4	
54	66 1/4	2 1/4	62 3/4	44	1	5 3/4		66 1/4	3	62 3/4	44	1 3/4		10 1/2
60	73	2 1/4	69 1/4	52	1 1/8	6		73	3 1/8	69 1/4	52	1 3/4		10 3/4
72	86 1/2	2 1/2	82 1/2	60	1 1/8	6 1/4		86 1/2	3 1/2	82 1/2	60	1 3/4		11 1/2
84	99 3/4	2 3/4	95 1/2	64	1 1/4	7 1/4		99 3/4	3 7/8	95 1/2	64	2		12 3/4
96	113 1/4	3	108 1/2	68	1 1/4	7 3/4		113 1/4	4 1/4	108 1/2	68	2 1/4		14

Length of Bolts

- A — Valve to valve.
 B — Valve to screwed companion flange, or
 — Valve to special 125-pound fitting with 25-pound drilling.

25-Pound Cast Iron: In sizes 4-inch and larger, the 25-Pound templates for drilling conform to the American Tentative Standard for Cast Iron Pipe Flanges and Flanged Fittings for 25 pounds steam working pressure (B16b2-1931). In sizes 3 1/2-inch and smaller, they are Crane Standard, proportioned from the American Tentative Standard.

Screwed Companion Flanges sizes 24-inch and smaller are 125-Pound Standard thickness, with 25-Pound Standard diameter and drilling. See page 291.

125-Pound Cast Iron: The 125-Pound templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (B16a-1939).

Facing: 25-Pound Flanges and 125-Pound Flanges are plain faced, with a smooth finish.

Bolt holes: For bolts smaller than 1 3/4-inch diameter, bolt holes are drilled 1/8-inch larger than the diameter of the bolt. For bolts 1 3/4-inch diameter and larger, bolt holes are drilled 1/4-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: Bolt holes are not spot faced except on 125-Pound Cast Iron Flanged Fittings sizes 18 to 24-inch inclusive, unless so ordered. An extra charge is made for spot facing.

Templates for Drilling 250-Pound and 800-Pound Hydraulic Cast Iron

Dimensions, in Inches

Size	250-Pound Cast Iron							800-Pound Hydraulic Cast Iron						
	Diam-eter of Flange	Thick-ness of Flange	Diam-eter of Bolt Circle	Num-ber of Bolts	Diam-eter of Bolt	Length of Bolts A	Length of Bolt-Studs with 2 Nuts A	Diam-eter of Flange	Thick-ness of Flange	Diam-eter of Bolt Circle	Num-ber of Bolts	Diam-eter of Bolt	Length of Bolts	
													B	C
1	4 $\frac{7}{8}$	1 $\frac{1}{16}$	3 $\frac{1}{2}$	4	5 $\frac{5}{8}$	2 $\frac{1}{2}$		For sizes smaller than 2-inch, use 600-Pound Steel material.						
1 $\frac{1}{4}$	5 $\frac{1}{4}$	3 $\frac{3}{4}$	3 $\frac{3}{8}$	4	5 $\frac{5}{8}$	2 $\frac{1}{2}$								
1 $\frac{1}{2}$	6 $\frac{1}{8}$	1 $\frac{3}{16}$	4 $\frac{1}{2}$	4	3 $\frac{3}{4}$	2 $\frac{3}{4}$								
2	6 $\frac{1}{2}$	7 $\frac{7}{8}$	5	8	5 $\frac{5}{8}$	2 $\frac{3}{4}$								
2 $\frac{1}{2}$	7 $\frac{1}{2}$	1	5 $\frac{7}{8}$	8	3 $\frac{3}{4}$	3 $\frac{1}{4}$		6 $\frac{1}{2}$	1 $\frac{1}{4}$	5	8	5 $\frac{5}{8}$	3 $\frac{3}{4}$	3 $\frac{1}{2}$
3	8 $\frac{1}{4}$	1 $\frac{1}{8}$	6 $\frac{5}{8}$	8	3 $\frac{3}{4}$	3 $\frac{1}{2}$		7 $\frac{1}{2}$	1 $\frac{3}{8}$	5 $\frac{7}{8}$	8	3 $\frac{3}{4}$	4 $\frac{1}{4}$	4
3 $\frac{1}{2}$	9	1 $\frac{3}{16}$	7 $\frac{1}{4}$	8	3 $\frac{3}{4}$	3 $\frac{1}{2}$		8 $\frac{1}{4}$	1 $\frac{1}{2}$	6 $\frac{5}{8}$	8	3 $\frac{3}{4}$	4 $\frac{1}{2}$	4 $\frac{1}{4}$
4	10	1 $\frac{1}{4}$	7 $\frac{7}{8}$	8	3 $\frac{3}{4}$	3 $\frac{3}{4}$		9	1 $\frac{5}{8}$	7 $\frac{1}{4}$	8	7 $\frac{7}{8}$	5	4 $\frac{3}{4}$
5	11	1 $\frac{3}{8}$	9 $\frac{1}{4}$	8	3 $\frac{3}{4}$	4		10 $\frac{3}{4}$	1 $\frac{7}{8}$	8 $\frac{1}{2}$	8	7 $\frac{7}{8}$	5 $\frac{1}{2}$	5 $\frac{1}{4}$
6	12 $\frac{1}{2}$	1 $\frac{7}{16}$	10 $\frac{5}{8}$	12	3 $\frac{3}{4}$	4		13	2 $\frac{1}{8}$	10 $\frac{1}{2}$	8	1	6	5 $\frac{3}{4}$
8	15	1 $\frac{5}{8}$	13	12	7 $\frac{7}{8}$	4 $\frac{1}{2}$		14	2 $\frac{1}{4}$	11 $\frac{1}{2}$	12	1	6 $\frac{1}{4}$	6
10	17 $\frac{1}{2}$	1 $\frac{7}{8}$	15 $\frac{1}{4}$	16	1	5 $\frac{1}{4}$		16 $\frac{1}{2}$	2 $\frac{1}{2}$	13 $\frac{3}{4}$	12	1 $\frac{1}{8}$	7	6 $\frac{3}{4}$
12	20 $\frac{1}{2}$	2	17 $\frac{3}{4}$	16	1 $\frac{1}{8}$	5 $\frac{1}{2}$		20	2 $\frac{7}{8}$	17	16	1 $\frac{1}{4}$	7 $\frac{3}{4}$	7 $\frac{1}{2}$
14	23	2 $\frac{1}{8}$	20 $\frac{1}{4}$	20	1 $\frac{1}{8}$	6		22	3	19 $\frac{1}{4}$	20	1 $\frac{1}{4}$	8	7 $\frac{3}{4}$
16	25 $\frac{1}{2}$	2 $\frac{1}{4}$	22 $\frac{1}{2}$	20	1 $\frac{1}{4}$	6 $\frac{1}{4}$		For sizes larger than 12-inch, use 600-Pound Steel material.						
18	28	2 $\frac{3}{8}$	24 $\frac{3}{4}$	24	1 $\frac{1}{4}$	6 $\frac{1}{2}$								
20	30 $\frac{1}{2}$	2 $\frac{1}{2}$	27	24	1 $\frac{1}{4}$	6 $\frac{3}{4}$								
24	36	2 $\frac{3}{4}$	32	24	1 $\frac{1}{2}$	7 $\frac{3}{4}$								
30	43	3	39 $\frac{1}{4}$	28	1 $\frac{3}{4}$	10 $\frac{1}{2}$								
36	50	3 $\frac{3}{8}$	46	32	2	11 $\frac{3}{4}$								
42	57	3 $\frac{11}{16}$	52 $\frac{3}{4}$	36	2	12 $\frac{1}{2}$								
48	65	4	60 $\frac{3}{4}$	40	2	13								

Length of Bolts or Bolt-Studs

- A — $\frac{1}{16}$ " raised face to $\frac{1}{16}$ " raised face valve, fitting, or companion flange
 B — $\frac{1}{4}$ " male to $\frac{1}{4}$ " male valve, fitting, or companion flange
 C — $\frac{1}{4}$ " large male to $\frac{3}{16}$ " large female valve, fitting, or companion flange
 $\frac{1}{4}$ " tongue to $\frac{3}{16}$ " groove valve, fitting, or companion flange

250-Pound Cast Iron Standard: The 250-Pound templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings for 250 pounds steam working pressure (B16b-1928).

These templates apply also to 175-Pound Ferrosteel Gate, Globe, Angle, and Cross Valves, and to 400-Pound W.O.G. and 500-Pound W.O.G. Ferrosteel Double Disc Gate Valves.

The flanges have a $\frac{1}{16}$ -inch raised face. The raised face is included in the dimension for thickness of flange.

Large male, large female, large tongue, or large groove facing can be supplied to order.

In sizes 24-inch and smaller, these templates are the same as for the 300-Pound Steel American Standard.

800-Pound Hydraulic Cast Iron Standard: The 800-Pound Hydraulic templates for drilling conform to the American Standard for Cast Iron Pipe Flanges and Flanged Fittings for a maximum non-shock hydraulic working pressure of 800 pounds at ordinary air temperatures (B16b1-1931).

800-Pound Hydraulic and 800-Pound W.O.G. Valves are regularly furnished with a $\frac{1}{4}$ -inch male (large male) face on the flanges.

The height of the male ($\frac{1}{4}$ ") is not included in the dimension for thickness of flange.

Valves with large female, large tongue, or large groove faces can be supplied to order.

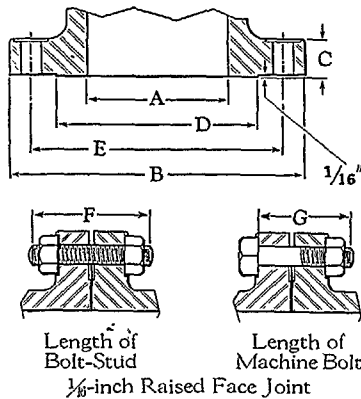
Except for flange thickness and length of bolts, these templates are the same as for the 600-Pound Steel American Standard.

Bolt holes: For bolts smaller than 1 $\frac{3}{4}$ -inch diameter, bolt holes are drilled $\frac{1}{8}$ -inch larger than the diameter of the bolt. For bolts 1 $\frac{3}{4}$ -inch diameter and larger, bolt holes are drilled $\frac{1}{4}$ -inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes straddle the center line unless otherwise ordered.

Spot facing: Bolt holes are not spot faced unless so ordered. An extra charge is made for spot facing.

Templates for Drilling 150 and 300-Pound Steel Standards



American Standard: The 150 and 300-Pound flange dimensions, drilling templates, and bolt-stud lengths shown in the table at the right conform, respectively, to the American Standard for 150 and 300-Pound Steel Pipe Flanges and Flanged Fittings, B16e-1939.

Facing: Unless otherwise ordered, 150 and 300-Pound Steel Flanged Valves, Fittings, and Companion Flanges are regularly furnished with a $\frac{1}{16}$ -inch high raised face.

The thickness of flange dimension (dimension "C") includes the $\frac{1}{16}$ -inch high raised face.

Bolt holes: Bolt holes are drilled $\frac{1}{8}$ -inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when installed. Bolt holes are drilled to straddle the center-line unless otherwise ordered.

The bolt holes are spot faced.

Bolt and bolt-stud lengths: The lengths indicated as dimensions F and G in the above table apply for flanged joints other than Cranelaps, made up of combinations of 150-Pound or of 300-Pound valves, fittings, or companion flanges with $\frac{1}{16}$ -inch high raised faces.

For flanged joints made up of Cranelaps, or for Cranelaps in combination with valves, fittings, or companion flanges having $\frac{1}{16}$ -inch raised faces, add to dimension F or G the thickness of the lap for each Cranelap used.

150-Pound Class: The bolt-stud lengths established by the American Standard are adequate for all

Dimensions, in Inches

Class	Size	A	B	C		D	E	No. of bolts or bolt-studs	Dia. of bolts or bolt-studs	F	G
				For Companion Flange	For Valve or Fitting						
150 Pound	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{1}{2}$	$\frac{7}{16}$		$1\frac{3}{8}$	$2\frac{3}{8}$	4	$\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{3}{4}$
	$\frac{3}{4}$	$\frac{3}{4}$	$3\frac{7}{8}$	$\frac{1}{2}$		$1\frac{11}{16}$	$2\frac{3}{4}$	4	$\frac{1}{2}$	$2\frac{1}{4}$	2
	1	1	$4\frac{1}{4}$	$\frac{9}{16}$	$\frac{7}{16}$	2	$3\frac{1}{8}$	4	$\frac{1}{2}$	$2\frac{1}{2}$	2
	$1\frac{1}{4}$	$1\frac{1}{4}$	$4\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	4	$\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{4}$
	$1\frac{1}{2}$	$1\frac{1}{2}$	5	$1\frac{1}{16}$	$\frac{9}{16}$	$2\frac{7}{8}$	$3\frac{3}{8}$	4	$\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{1}{4}$
	2	2	6	$\frac{3}{4}$	$\frac{5}{8}$	$3\frac{5}{8}$	$4\frac{3}{4}$	4	$\frac{5}{8}$	$3\frac{1}{4}$	$2\frac{1}{2}$
	$2\frac{1}{2}$	$2\frac{1}{2}$	7	$\frac{7}{8}$	$1\frac{1}{16}$	$4\frac{1}{8}$	$5\frac{1}{2}$	4	$\frac{5}{8}$	$3\frac{1}{2}$	$2\frac{3}{4}$
	3	3	$7\frac{1}{2}$	$1\frac{5}{16}$	$\frac{3}{4}$	5	6	4	$\frac{5}{8}$	$3\frac{1}{2}$	3
	$3\frac{1}{2}$	$3\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{5}{16}$	$1\frac{3}{16}$	$5\frac{1}{2}$	7	8	$\frac{5}{8}$	$3\frac{1}{2}$	3
	4	4	9	$1\frac{5}{16}$		$6\frac{3}{16}$	$7\frac{1}{2}$	8	$\frac{5}{8}$	$3\frac{1}{2}$	3
	5	5	10	$1\frac{5}{16}$		$7\frac{5}{16}$	$8\frac{1}{2}$	8	$\frac{3}{4}$	$3\frac{3}{4}$	3
	6	6	11		1	$8\frac{1}{2}$	$9\frac{1}{2}$	8	$\frac{3}{4}$	4	$3\frac{1}{4}$
	8	8	$13\frac{1}{2}$		$1\frac{1}{8}$	$10\frac{5}{8}$	$11\frac{3}{4}$	8	$\frac{3}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$
	10	10	16		$1\frac{3}{16}$	$12\frac{3}{4}$	$14\frac{1}{4}$	12	$\frac{7}{8}$	$4\frac{3}{4}$	$3\frac{3}{4}$
	12	12	19		$1\frac{1}{4}$	15	17	12	$\frac{7}{8}$	$4\frac{3}{4}$	$3\frac{3}{4}$
300 Pound	14	$13\frac{1}{4}$	21		$1\frac{3}{8}$	$16\frac{1}{4}$	$18\frac{3}{4}$	12	1	$5\frac{1}{4}$	$4\frac{1}{4}$
	16	$15\frac{1}{4}$	$23\frac{1}{2}$		$1\frac{7}{16}$	$18\frac{1}{2}$	$21\frac{1}{4}$	16	1	$5\frac{1}{2}$	$4\frac{1}{2}$
	18	$17\frac{1}{4}$	25		$1\frac{9}{16}$	21	$22\frac{3}{4}$	16	$1\frac{1}{8}$	6	$4\frac{3}{4}$
	20	$19\frac{1}{4}$	$27\frac{1}{2}$		$1\frac{11}{16}$	23	25	20	$1\frac{1}{8}$	$6\frac{1}{4}$	5
	24	$23\frac{1}{4}$	32		$1\frac{7}{8}$	$27\frac{1}{4}$	$29\frac{1}{2}$	20	$1\frac{1}{4}$	7	$5\frac{1}{2}$
	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{4}$	$\frac{9}{16}$		$1\frac{3}{8}$	$2\frac{3}{8}$	4	$\frac{1}{2}$	$2\frac{1}{2}$	2
	$\frac{3}{4}$	$\frac{3}{4}$	$4\frac{5}{8}$	$\frac{5}{8}$		$1\frac{11}{16}$	$3\frac{1}{4}$	4	$\frac{5}{8}$	3	$2\frac{1}{4}$
	1	1	$4\frac{7}{8}$	$1\frac{1}{16}$		2	$3\frac{1}{2}$	4	$\frac{5}{8}$	3	$2\frac{1}{2}$
	$1\frac{1}{4}$	$1\frac{1}{4}$	$5\frac{1}{4}$	$\frac{3}{4}$		$2\frac{1}{2}$	$3\frac{7}{8}$	4	$\frac{5}{8}$	$3\frac{1}{4}$	$2\frac{1}{2}$
	$1\frac{1}{2}$	$1\frac{1}{2}$	$6\frac{1}{8}$	$1\frac{3}{16}$		$2\frac{7}{8}$	$4\frac{1}{2}$	4	$\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{3}{4}$
	2	2	$6\frac{1}{2}$	$\frac{7}{8}$		$3\frac{5}{8}$	5	8	$\frac{5}{8}$	$3\frac{1}{2}$	$2\frac{3}{4}$
	$2\frac{1}{2}$	$2\frac{1}{2}$	$7\frac{1}{2}$	1		$4\frac{1}{8}$	$5\frac{7}{8}$	8	$\frac{3}{4}$	4	$3\frac{1}{4}$
	3	3	$8\frac{1}{4}$	$1\frac{1}{8}$		5	$6\frac{5}{8}$	8	$\frac{3}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$
	$3\frac{1}{2}$	$3\frac{1}{2}$	9	$1\frac{3}{16}$		$5\frac{1}{2}$	$7\frac{1}{4}$	8	$\frac{3}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$
	4	4	10	$1\frac{1}{4}$		$6\frac{3}{16}$	$7\frac{7}{8}$	8	$\frac{3}{4}$	$4\frac{1}{2}$	$3\frac{3}{4}$
	5	5	11	$1\frac{3}{8}$		$7\frac{5}{16}$	$9\frac{1}{4}$	8	$\frac{3}{4}$	$4\frac{3}{4}$	4
	6	6	$12\frac{1}{2}$	$1\frac{7}{16}$		$8\frac{1}{2}$	$10\frac{5}{8}$	12	$\frac{3}{4}$	$4\frac{3}{4}$	4
	8	8	15	$1\frac{5}{8}$		$10\frac{5}{8}$	13	12	$\frac{7}{8}$	$5\frac{1}{2}$	$4\frac{1}{2}$
	10	10	$17\frac{1}{2}$	$1\frac{7}{8}$		$12\frac{3}{4}$	$15\frac{1}{4}$	16	1	$6\frac{1}{4}$	$5\frac{1}{4}$
	12	12	$20\frac{1}{2}$	2		15	$17\frac{3}{4}$	16	$1\frac{1}{8}$	$6\frac{3}{4}$	$5\frac{1}{2}$
	14	$13\frac{1}{4}$	23	$2\frac{1}{8}$		$16\frac{1}{4}$	$20\frac{1}{4}$	20	$1\frac{1}{8}$	7	6
	16	$15\frac{1}{4}$	$25\frac{1}{2}$	$2\frac{1}{4}$		$18\frac{1}{2}$	$22\frac{1}{2}$	20	$1\frac{1}{4}$	$7\frac{1}{2}$	$6\frac{1}{4}$
	18	17	28	$2\frac{3}{8}$		21	$24\frac{3}{4}$	24	$1\frac{1}{4}$	$7\frac{3}{4}$	$6\frac{1}{2}$
	20	19	$30\frac{1}{2}$	$2\frac{1}{2}$		23	27	24	$1\frac{1}{4}$	$8\frac{1}{4}$	$6\frac{3}{4}$
	24	23	36	$2\frac{3}{4}$		$27\frac{1}{4}$	32	24	$1\frac{1}{2}$	$9\frac{1}{4}$	$7\frac{3}{4}$

150-Pound joints, made up of any combination of valves, fittings, or flanges having the regular $\frac{1}{16}$ -inch raised face.

300-Pound Class: For male to female or tongue to groove flanged joints, add the height of the male or tongue ($\frac{1}{4}$ -inch) to dimension F or G.

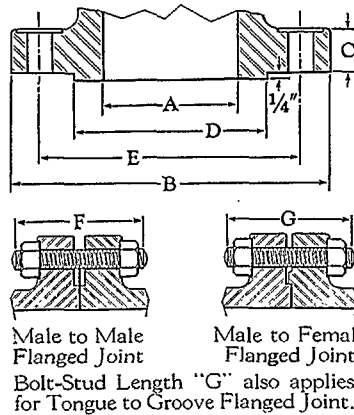
When Cranelaps are used in combinations of male to female flanged joints, add the thickness of the lap for each Cranelap. *Caution:* the male Cranelap must have a minimum lap thickness of $\frac{1}{4}$ -inch.

For Cranelaps of tongue to groove flanged joints, add to dimension F or G the thickness of each lap, plus $\frac{1}{4}$ -inch.

List prices of bolt-studs pages 558 and 559
List prices of machine bolts page 556

Special facings pages 560 and 562
Length of bolt-studs for ring joints page 562

Templates for Drilling 400, 600, and 900-Pound Steel Standards



American Standard: The 400, 600, and 900-Pound flange dimensions, drilling templates, and bolt-stud lengths shown in the table at the right conform, respectively, to the American Standard for 400, 600, and 900-Pound Steel Pipe Flanges and Flanged Fittings, B16-1939. The Standard does not include 900-Pound Flanges and Flanged Fittings in the $3\frac{1}{2}$ -inch size.

Facing: Unless otherwise ordered, 400, 600, and 900-Pound Steel Flanged Valves and Fittings are regularly furnished with a $\frac{1}{4}$ -inch high large male face. Companion Flanges are regularly furnished with $\frac{1}{4}$ -inch high large male or $\frac{3}{16}$ -inch deep large female facing, as ordered.

The thickness of flange dimension (dimension "C") does not include the $\frac{1}{4}$ -inch high large male face.

Bolt holes: Bolt holes are drilled $\frac{1}{8}$ -inch larger than the diameter of the bolt. Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any quarter when being installed. Bolt holes are drilled to straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

Bolt-stud lengths: The bolt-stud lengths shown in the table at the right apply for flanged joints other than Cranelap, made up of combinations of valves, fittings, or companion flanges with male, female, tongue, or groove faces. Male or tongue faces are $\frac{1}{4}$ -inch high; female or groove faces are $\frac{3}{16}$ -inch deep.

Dimensions, in Inches

Class	Size	A	B	C	D	E	No. of bolt-studs	Dia. of bolt-studs	F	G
400 Pound	4	4	10	$1\frac{3}{8}$	$6\frac{3}{16}$	$7\frac{7}{8}$	8	$\frac{7}{8}$	$5\frac{1}{2}$	$5\frac{1}{4}$
	5	5	11	$1\frac{1}{2}$	$7\frac{5}{16}$	$9\frac{1}{4}$	8	$\frac{7}{8}$	$5\frac{3}{4}$	$5\frac{1}{2}$
	6	6	$12\frac{1}{2}$	$1\frac{5}{8}$	$8\frac{1}{2}$	$10\frac{5}{8}$	12	$\frac{7}{8}$	6	$5\frac{3}{4}$
	8	8	15	$1\frac{7}{8}$	$10\frac{5}{8}$	13	12	1	$6\frac{3}{4}$	$6\frac{1}{2}$
	10	10	$17\frac{1}{2}$	$2\frac{1}{8}$	$12\frac{3}{4}$	$15\frac{1}{4}$	16	$1\frac{1}{8}$	$7\frac{1}{2}$	$7\frac{1}{4}$
	12	12	$20\frac{1}{2}$	$2\frac{1}{4}$	15	$17\frac{3}{4}$	16	$1\frac{1}{4}$	8	$7\frac{3}{4}$
	14	$13\frac{1}{8}$	23	$2\frac{3}{8}$	$16\frac{1}{4}$	$20\frac{1}{4}$	20	$1\frac{1}{4}$	$8\frac{1}{4}$	8
	16	15	$25\frac{1}{2}$	$2\frac{1}{2}$	$18\frac{1}{2}$	$22\frac{1}{2}$	20	$1\frac{3}{8}$	$8\frac{3}{4}$	$8\frac{1}{2}$
	18	17	28	$2\frac{5}{8}$	21	$24\frac{3}{4}$	24	$1\frac{3}{8}$	9	$8\frac{3}{4}$
	20	$18\frac{7}{8}$	$30\frac{1}{2}$	$2\frac{3}{4}$	23	27	24	$1\frac{1}{2}$	$9\frac{3}{4}$	$9\frac{1}{2}$
600 Pound	24	$22\frac{5}{8}$	36	3	$27\frac{1}{4}$	32	24	$1\frac{3}{4}$	$10\frac{3}{4}$	$10\frac{1}{2}$
	$\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{4}$	$\frac{9}{16}$	$1\frac{3}{8}$	$2\frac{5}{8}$	4	$\frac{1}{2}$	3	$2\frac{3}{4}$
	$\frac{3}{4}$	$\frac{3}{4}$	$4\frac{5}{8}$	$\frac{5}{8}$	$1\frac{11}{16}$	$3\frac{1}{4}$	4	$\frac{5}{8}$	$3\frac{1}{2}$	$3\frac{1}{4}$
	1	1	$4\frac{7}{8}$	$1\frac{1}{16}$	2	$3\frac{1}{2}$	4	$\frac{5}{8}$	$3\frac{1}{2}$	$3\frac{1}{4}$
	$1\frac{1}{4}$	$1\frac{1}{4}$	$5\frac{1}{4}$	$1\frac{3}{16}$	$2\frac{1}{2}$	$3\frac{3}{8}$	4	$\frac{5}{8}$	$3\frac{3}{4}$	$3\frac{1}{2}$
	$1\frac{1}{2}$	$1\frac{1}{2}$	$6\frac{1}{8}$	$\frac{7}{8}$	$2\frac{7}{8}$	$4\frac{1}{2}$	4	$\frac{3}{4}$	$4\frac{1}{4}$	4
	2	2	$6\frac{1}{2}$	1	$3\frac{3}{8}$	5	8	$\frac{5}{8}$	$4\frac{1}{4}$	4
	$2\frac{1}{2}$	$2\frac{1}{2}$	$7\frac{1}{2}$	$1\frac{1}{8}$	$4\frac{1}{8}$	$5\frac{7}{8}$	8	$\frac{3}{4}$	$4\frac{3}{4}$	$4\frac{1}{2}$
	3	3	$8\frac{1}{4}$	$1\frac{1}{4}$	5	$6\frac{5}{8}$	8	$\frac{3}{4}$	5	$4\frac{3}{4}$
	$3\frac{1}{2}$	$3\frac{1}{2}$	9	$1\frac{3}{8}$	$5\frac{1}{2}$	$7\frac{1}{4}$	8	$\frac{7}{8}$	$5\frac{1}{2}$	$5\frac{1}{4}$
900 Pound	4	4	$10\frac{3}{4}$	$1\frac{1}{2}$	$6\frac{3}{16}$	$8\frac{1}{2}$	8	$\frac{7}{8}$	$5\frac{3}{4}$	$5\frac{1}{2}$
	5	5	13	$1\frac{3}{4}$	$7\frac{5}{16}$	$10\frac{1}{2}$	8	1	$6\frac{1}{2}$	$6\frac{1}{4}$
	6	6	14	$1\frac{7}{8}$	$8\frac{1}{2}$	$11\frac{1}{2}$	12	1	$6\frac{3}{4}$	$6\frac{1}{2}$
	8	$7\frac{7}{8}$	$16\frac{1}{2}$	$2\frac{3}{16}$	$10\frac{5}{8}$	$13\frac{3}{4}$	12	$1\frac{1}{8}$	$7\frac{3}{4}$	$7\frac{1}{2}$
	10	$9\frac{3}{4}$	20	$2\frac{1}{2}$	$12\frac{3}{4}$	17	16	$1\frac{1}{4}$	$8\frac{1}{2}$	$8\frac{1}{4}$
	12	$11\frac{3}{4}$	22	$2\frac{5}{8}$	15	$19\frac{1}{4}$	20	$1\frac{1}{4}$	$8\frac{3}{4}$	$8\frac{1}{2}$
	14	$12\frac{7}{8}$	$23\frac{3}{4}$	$2\frac{3}{4}$	$16\frac{1}{4}$	$20\frac{3}{4}$	20	$1\frac{3}{8}$	$9\frac{1}{4}$	9
	16	$14\frac{3}{4}$	27	3	$18\frac{1}{2}$	$23\frac{3}{4}$	20	$1\frac{1}{2}$	10	$9\frac{3}{4}$
	18	$16\frac{1}{2}$	$29\frac{1}{4}$	$3\frac{1}{4}$	21	$25\frac{3}{4}$	20	$1\frac{5}{8}$	$10\frac{3}{4}$	$10\frac{1}{2}$
	20	$18\frac{1}{4}$	32	$3\frac{1}{2}$	23	$28\frac{1}{2}$	24	$1\frac{5}{8}$	$11\frac{1}{2}$	$11\frac{1}{4}$
400 Pound	24	22	37	4	$27\frac{1}{4}$	33	24	$1\frac{7}{8}$	13	$12\frac{3}{4}$
	3	$2\frac{7}{8}$	$9\frac{1}{2}$	$1\frac{1}{2}$	5	$7\frac{1}{2}$	8	$\frac{7}{8}$	$5\frac{3}{4}$	$5\frac{1}{2}$
	$3\frac{1}{2}$	$3\frac{3}{8}$	$10\frac{3}{4}$	$1\frac{5}{8}$	$5\frac{1}{2}$	$8\frac{1}{2}$	8	1	$6\frac{1}{4}$	6
	4	$3\frac{7}{8}$	$11\frac{1}{2}$	$1\frac{3}{4}$	$6\frac{3}{16}$	$9\frac{1}{4}$	8	$1\frac{1}{8}$	$6\frac{3}{4}$	$6\frac{1}{2}$
	5	$4\frac{3}{4}$	$13\frac{3}{4}$	2	$7\frac{5}{16}$	11	8	$1\frac{1}{4}$	$7\frac{1}{2}$	$7\frac{1}{4}$
	6	$5\frac{3}{4}$	15	$2\frac{3}{16}$	$8\frac{1}{2}$	$12\frac{1}{2}$	12	$1\frac{1}{8}$	$7\frac{3}{4}$	$7\frac{1}{2}$
	8	$7\frac{1}{2}$	$18\frac{1}{2}$	$2\frac{1}{2}$	$10\frac{5}{8}$	$15\frac{1}{2}$	12	$1\frac{3}{8}$	$8\frac{3}{4}$	$8\frac{1}{2}$
	10	$9\frac{3}{8}$	$21\frac{1}{2}$	$2\frac{3}{4}$	$12\frac{3}{4}$	$18\frac{1}{2}$	16	$1\frac{3}{8}$	$9\frac{1}{4}$	9
	12	$11\frac{1}{8}$	24	$3\frac{1}{8}$	15	21	20	$1\frac{3}{8}$	10	$9\frac{3}{4}$
	14	$12\frac{1}{4}$	$25\frac{1}{4}$	$3\frac{3}{8}$	$16\frac{1}{4}$	22	20	$1\frac{1}{2}$	$10\frac{3}{4}$	$10\frac{1}{2}$
900 Pound	16	14	$27\frac{3}{4}$	$3\frac{1}{2}$	$18\frac{1}{2}$	$24\frac{1}{4}$	20	$1\frac{5}{8}$	$11\frac{1}{4}$	11
	18	$15\frac{3}{4}$	31	4	21	27	20	$1\frac{7}{8}$	13	$12\frac{3}{4}$
	20	$17\frac{1}{2}$	$33\frac{3}{4}$	$4\frac{1}{4}$	23	$29\frac{1}{2}$	20	2	$13\frac{3}{4}$	$13\frac{1}{2}$
	24	21	41	$5\frac{1}{2}$	$27\frac{1}{4}$	$35\frac{1}{2}$	20	$2\frac{1}{2}$	$17\frac{1}{4}$	17

For flanged joints made up of Cranelaps or for Cranelaps in combination with valves, fittings, or companion flanges, new bolt-stud lengths must be established in the following manner:

Bolt-Stud Lengths for Cranelap Joints (Based on length "G" for bolt-studs).

- Cranelap to Cranelap.....Deduct $\frac{1}{4}$ -inch and add thickness of both laps
- Cranelap to $\frac{1}{4}$ -inch male.....Add thickness of one lap
- Cranelap to female.....Deduct $\frac{1}{4}$ -inch and add thickness of one lap*
- Cranelap to female Cranelap.....Deduct $\frac{1}{4}$ -inch and add thickness of both laps*
- Tongue or groove Cranelaps.....Add thickness of each lap

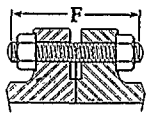
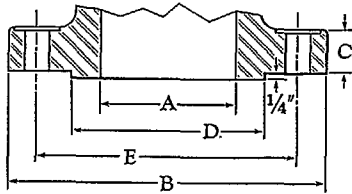
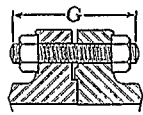
*The Cranelap serving as the male must have a minimum lap thickness of $\frac{1}{4}$ -inch.

Special facings...pages 561 to 563

List prices of bolt-studs...pages 558 and 559

Length of bolt-studs for ring joints...pages 562 and 563

Templates for Drilling 1500 and 2500-Pound Steel Standards

Male to Male
Flanged JointMale to Female
Flanged Joint

Bolt-Stud Length "G" also applies
for Tongue to Groove Flanged Joint.

American Standard: The 1500 and 2500-Pound flange dimensions, drilling templates, and bolt-stud lengths shown in the table at the right conform, respectively, to the American Standard for 1500 and 2500-Pound Steel Pipe Flanges and Flanged Fittings, B16e-1939. This Standard does not include 1500-Pound Flanges and Flanged Fittings in the 3 1/2-inch size.

Facing: Unless otherwise ordered, 1500 and 2500-Pound Steel Flanged Valves and Fittings are regularly furnished with 1/4-inch high large male facing.

Companion Flanges are regularly furnished with 1/4-inch high large male or 3/16-inch deep large female facing, as ordered.

The thickness of flange dimension (dimension "C") does not include the 1/4-inch high large male face.

Bolt holes: Bolt holes are drilled 1/8-inch larger than the diameter of the bolt.

Drilling templates are in multiples of four, so that valves or fittings may be turned to face in any

Dimensions, in Inches

Class	Size	A	B	C	D	E	No. of bolt-studs	Dia. of bolt-studs	F	G
1500 Pound	1/2	1/2	4 3/4	7/8	1 3/8	3 1/4	4	3/4	4 1/4	4
	3/4	1 1/16	5 1/8	1	1 11/16	3 1/2	4	3/4	4 1/2	4 1/4
	1	7/8	5 7/8	1 1/8	2	4	4	7/8	5	4 3/4
	1 1/4	1 1/8	6 1/4	1 1/8	2 1/2	4 3/8	4	7/8	5	4 3/4
	1 1/2	1 3/8	7	1 1/4	2 7/8	4 7/8	4	1	5 1/2	5 1/4
	2	1 7/8	8 1/2	1 1/2	3 5/8	6 1/2	8	7/8	5 3/4	5 1/2
	2 1/2	2 1/4	9 5/8	1 5/8	4 1/8	7 1/2	8	1	6 1/4	6
	3	2 3/4	10 1/2	1 7/8	5	8	8	1 1/8	7	6 3/4
	3 1/2	3 1/8	11	2	5 1/2	8 1/2	8	1 1/8	7 1/4	7
	4	3 5/8	12 1/4	2 1/8	6 3/16	9 1/2	8	1 1/4	7 3/4	7 1/2
	5	4 3/8	14 3/4	2 7/8	7 5/16	11 1/2	8	1 1/2	9 3/4	9 1/2
	6	5 5/8	15 1/2	3 1/4	8 1/2	12 1/2	12	1 3/8	10 3/4	10
	8	7	19	3 5/8	10 5/8	15 1/2	12	1 5/8	11 1/2	11 1/4
	10	8 3/4	23	4 1/4	12 3/4	19	12	1 7/8	13 1/2	13 1/4
	12	10 3/8	26 1/2	4 7/8	15	22 1/2	16	2	15	14 3/4
	14	11 3/8	29 1/2	5 1/4	16 1/4	25	16	2 1/4	16 1/4	16
	16	13	32 1/2	5 3/4	18 1/2	27 3/4	16	2 1/2	17 3/4	17 1/2
	18	14 5/8	36	6 3/8	21	30 1/2	16	2 3/4	19 1/2	19 1/4
	20	16 3/8	38 3/4	7	23	32 3/4	16	3	21 1/2	21 1/4
	24	19 5/8	46	8	27 1/4	39	16	3 1/2	24 1/4	24
2500 Pound	1/2	7/16	5 1/4	1 3/16	1 3/8	3 1/2	4	3/4	4 3/4	4 1/2
	3/4	9/16	5 1/2	1 1/4	1 11/16	3 3/4	4	3/4	5	4 3/4
	1	3/4	6 1/4	1 3/8	2	4 1/4	4	7/8	5 1/2	5 1/4
	1 1/4	1	7 1/4	1 1/2	2 1/2	5 1/8	4	1	6	5 3/4
	1 1/2	1 1/8	8	1 3/4	2 7/8	5 3/4	4	1 1/8	6 3/4	6 1/2
	2	1 1/2	9 1/4	2	3 5/8	6 3/4	8	1	7	6 3/4
	2 1/2	1 7/8	10 1/2	2 1/4	4 1/8	7 3/4	8	1 1/8	7 3/4	7 1/2
	3	2 1/4	12	2 5/8	5	9	8	1 1/4	8 3/4	8 1/2
	4	2 7/8	14	3	6 3/16	10 3/4	8	1 1/2	10	9 3/4
	5	3 5/8	16 1/2	3 5/8	7 5/16	12 3/4	8	1 3/4	12	11 3/4
	6	4 3/8	19	4 1/4	8 1/2	14 1/2	8	2	13 3/4	13 1/2
	8	5 3/4	21 3/4	5	10 5/8	17 1/4	12	2	15 1/4	15
	10	7 1/4	26 1/2	6 1/2	12 3/4	21 1/4	12	2 1/2	19 1/4	19
	12	8 5/8	30	7 1/4	15	24 3/8	12	2 3/4	21 1/4	21

quarter when being installed. The bolt holes are drilled to straddle the center line unless otherwise ordered.

Spot facing: The bolt holes are spot faced.

* * * * *

Bolt-stud lengths: The bolt-stud lengths shown in the above table apply for flanged joints other than Cranelap, made up of combinations of valves, fittings, or companion flanges with male, female, tongue, or groove faces. Male or tongue faces are 1/4-inch

high; female or groove faces are 3/16-inch deep. For flanged joints made up of Cranelaps or for Cranelaps in combination with valves, fittings, or companion flanges, new bolt-stud lengths must be established in the following manner:

Bolt-Stud Lengths for Cranelap Joints (Based on length "G" for bolt-studs).

- Cranelap to Cranelap.....Deduct 1/4-inch and add thickness of both laps
- Cranelap to 1/4-inch male.....Add thickness of one lap
- Cranelap to female.....Deduct 1/4-inch and add thickness of one lap*
- Cranelap to female Cranelap.....Deduct 1/4-inch and add thickness of both laps*
- Tongue or groove Cranelaps.....Add thickness of each lap

*The Cranelap serving as the male must have a minimum lap thickness of 1/4-inch.

Special facings....page 561 and 563

List prices of bolt-studs....pages 558 and 559

Length of bolt-studs for ring joints....page 563

Machine Bolts



For a variety of services and for temperatures up to a maximum of 500° F., Machine Bolts with square heads and hexagon nuts are the standard practice of the Pipe and Fitting Industry.

Length Inches	List Prices, Per 100								List Prices, Per 100. Quantities of 500 or more of one diameter	
	1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.	1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.	
1 1/4	5.90	9.55								
1 1/2	6.10	9.80	12.65	19.45	27.05					
2	6.45	10.30	13.30	20.35	28.20					
2 1/2	6.85	10.80	13.95	21.25	29.35					
3	7.25	11.30	14.60	22.15	30.50	49.90	59.75	72.80	88.45	
3 1/2	7.60	11.80	15.25	23.05	31.65	51.20	61.40	74.80	90.85	
4	7.95	12.30	15.90	23.95	32.80	52.50	63.05	76.80	93.20	
4 1/2	8.35	12.80	16.55	24.85	33.95	53.80	64.70	78.80	95.60	
5	8.75	13.30	17.20	25.75	35.10	55.10	66.35	80.80	97.95	
5 1/2	9.15	13.80	17.85	26.65	36.25	56.40	68.00	82.80	100.35	
6	9.55	14.30	18.50	27.55	37.40	57.70	69.65	84.80	102.70	
6 1/2	11.25	14.80	19.15	28.45	38.55	59.00	71.30	86.80	105.10	
7	11.70	15.30	19.80	29.35	39.70	60.30	72.95	88.80	107.45	
7 1/2	12.15	15.80	20.45	30.25	40.85	61.60	74.60	90.80	109.85	
8	12.60	16.30	21.10	31.15	42.00	62.90	76.25	92.80	112.20	
8 1/2	13.05	16.80	21.75	32.05	43.15	64.20	77.90	94.80	114.55	
9	13.50	17.30	22.40	32.95	44.30	65.50	79.55	96.80	116.95	
9 1/2	13.95	17.80	23.05	33.85	45.45	66.80	81.20	98.80	119.35	
10	14.40	18.30	23.70	34.75	46.60	68.10	82.85	100.80	121.70	
11	15.80	19.30	25.00	36.55	48.90	70.70	86.15	104.80	126.45	
12	16.70	20.30	26.30	38.35	51.20	73.30	89.45	108.80	131.20	
13	17.60	21.30	27.60	40.15	53.50	75.90	92.75	112.80	135.95	
14	18.50	22.30	28.90	41.95	55.80	78.50	96.05	116.80	140.70	
15	19.40	23.30	30.20	43.75	58.10	81.10	99.35	120.80	145.45	

For intermediate lengths, use the list price for the next longer length.

List Prices: The list prices shown in the table above cover Machine Bolts having a Regular Unfinished Square Head and equipped with a Heavy Unfinished Hot Pressed Hexagon Nut. Unless otherwise specified on the order, Machine Bolts and Nuts of this description will be regularly furnished.

When so specified, Machine Bolts can be supplied without nuts, with other types of bolt heads, or with several different kinds of nuts. List prices for these different types or combinations are adjusted according to the following table of deductions from or additions to the above list prices:

Deductions from or Additions to the List Prices in the above table, Per 100

		1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.	1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.
Bolts	Regular Unfin. Sq. Head, Without Nuts	Deduct	2.05	3.10	4.10	6.65	9.10	12.75	16.90	20.20
	Regular Hexagon Head, Unfinished	Add	.65	1.00	1.40	2.20	3.00	5.00	7.00	
	Heavy Hexagon Head, Unfinished	Add	1.30	2.00	2.50	3.50	5.00	7.50	10.50	
Nuts	Heavy Hexagon, Unfinished, C.P.	Add	.20	.45	.90	1.35	2.00	2.00	4.00	
	Heavy Hexagon, Semi-finished, C.P.	Add	.50	1.00	1.60	2.05	2.90	3.10	5.40	
	Regular Hexagon, Unfinished, C.P.	Deduct	.60	.25	.05					
		Add				.50	.70	1.25	1.20	5.00
	Regular Square, Unfinished, H.P.	Deduct	1.10	1.20	1.70	2.75	3.80	4.00	5.30	2.80

41

Standards: Machine Bolts and Nuts are made from open-hearth steel conforming to the ASTM Specification A-107.

The dimensions of bolt heads and nuts conform to the American Standard ASA-B18.2.

Bolt and nut threads conform to the American Standard ASA-B1.1—1935 Standard on Screw Threads, Coarse Thread Series, Class 2 Fit.

Machine Bolts with Nuts—per Set...page 557

For engineering data on Machine Bolts, see pages 622 and 623.

Extra List Prices, Per 100
For less than 500 of one diameter

Quantities	1 3/8" Dia.	1 1/2" Dia.
400 to 499	2.00	2.25
300 to 399	3.20	3.50
200 to 299	7.20	7.50
100 to 199	19.20	19.60
50 to 99	44.00	44.50
25 to 49	92.00	92.50
10 to 24	240.00	241.00

Machine Bolts with Nuts, per Set

The following table will be found convenient when ordering Machine Bolts and when figuring prices. It shows the number, diameter, and length of bolts used in the more popular sizes and types of brass and iron flanged joints, and includes the list prices per set applying thereto.

Similar prices for other joints can be computed from the pages showing templates for drilling (pp. 550 to

555) and the pages showing list prices of bolts or bolt-studs (pp. 556, 558, and 559).

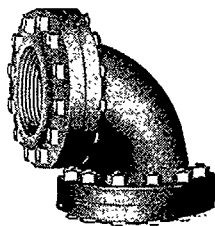
The prices shown cover the number, diameter, and length required for each joint and apply to Regular Unfinished Square Head Machine Bolts equipped with a Heavy Unfinished Hot Pressed Hexagon Nut. These are the standard practice in the pipe and fitting industry. See page 556.

Size Inches	Brass Flanged Joints				Cast Iron Flanged Joints					
	150-Pound		300-Pound		25-Pound		125-Pound		250-Pound	
	Number Diameter and *Length	List Price Per Set	Number Diameter and *Length	List Price Per Set	Number Diameter and †Length	List Price Per Set	Number Diameter and *Length	List Price Per Set	Number Diameter and †Length	List Price Per Set
1/2	4-1/2 x 1 1/4	.24	4-1/2 x 1 3/4	.26						
3/4	4-1/2 x 1 1/2	.24	4-5/8 x 2	.41						
1	4-1/2 x 1 1/2	.24	4-5/8 x 2	.41			4-1/2 x 1 3/4	.26	4-5/8 x 2 1/2	.43
1 1/4	4-1/2 x 1 1/2	.24	4-5/8 x 2	.41			4-1/2 x 2	.26	4-5/8 x 2 1/2	.43
1 1/2	4-1/2 x 1 1/2	.24	4-3/4 x 2 1/4	.56			4-1/2 x 2	.26	4-3/4 x 2 3/4	.58
2	4-5/8 x 1 3/4	.41	8-5/8 x 2 1/4	.86	4-5/8 x 2	.41	4-5/8 x 2 1/4	.43	8-5/8 x 2 3/4	.90
2 1/2	4-5/8 x 2	.41	8-3/4 x 2 1/2	1.12	4-5/8 x 2	.41	4-5/8 x 2 1/2	.43	8-3/4 x 3 1/4	1.22
3	4-5/8 x 2	.41	8-3/4 x 2 3/4	1.17	4-5/8 x 2 1/4	.43	4-5/8 x 2 1/2	.43	8-3/4 x 3 1/2	1.22
3 1/2	8-5/8 x 2 1/4	.86	8-3/4 x 3	1.17	8-5/8 x 2 1/4	.86	8-5/8 x 2 3/4	.90	8-3/4 x 3 1/2	1.22
4	8-5/8 x 2 1/4	.86	8-3/4 x 3	1.17	8-5/8 x 2 1/2	.86	8-5/8 x 3	.90	8-3/4 x 3 3/4	1.27
5	8-3/4 x 2 1/2	1.12	8-3/4 x 3 1/4	1.22	8-5/8 x 2 1/2	.86	8-3/4 x 3	1.17	8-3/4 x 4	1.27
6	8-3/4 x 2 1/2	1.12	12-3/4 x 3 1/4	1.83	8-5/8 x 2 1/2	.86	8-3/4 x 3 1/4	1.22	12-3/4 x 4	1.91
8	8-3/4 x 2 3/4	1.17	12-7/8 x 3 3/4	2.87	8-5/8 x 2 3/4	.90	8-3/4 x 3 1/2	1.22	12-7/8 x 4 1/2	2.98
10	12-7/8 x 3 1/4	2.77			12-5/8 x 3	1.36	12-7/8 x 3 3/4	2.87	16-1 x 5 1/4	5.80
12	12-7/8 x 3 1/4	2.77			12-5/8 x 3	1.36	12-7/8 x 3 3/4	2.87	16-1 1/8 x 5 1/2	9.02
14					12-3/4 x 3 1/2	1.83	12-1 x 4 1/4	4.07	20-1 1/8 x 6	11.54
16					16-3/4 x 3 1/2	2.44	16-1 x 4 1/2	5.43	20-1 1/4 x 6 1/4	14.26
18					16-3/4 x 3 3/4	2.54	16-1 1/8 x 4 3/4	8.82	24-1 1/4 x 6 1/2	17.11
20					20-3/4 x 4	3.18	20-1 1/8 x 5	11.02	24-1 1/4 x 6 3/4	17.51
24					20-3/4 x 4 1/4	3.31	20-1 1/4 x 5 1/2	13.60		

*For any combination of valves, fittings, or flanges with regular (plain) facing. (150 and 300-Pound Brass are MSS Standard; 125-Pound Iron is A.S.A. Class 125 Standard.)

†For 25-Pound Valve to 25-Pound Flange or to special 125-Pound Fitting with 25-Pound drilling; not for combination of 25-Pound Valves, which take shorter lengths. (A.S.A. Standard.)

‡For any combination of valves, fittings, or flanges with regular (1/16-inch raised) facing. (A.S.A. Standard.)

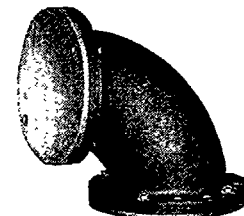


Bolting On Companion Flanges

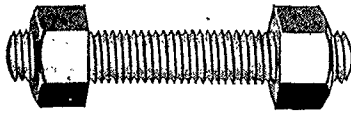
Orders for valves, fittings, or other products with companion flanges bolted on should indicate clearly what is wanted: catalog number of flange; style of facing on flanges, if necessary, as in the case of high pressure steel material; kind of bolts or bolt-studs; and kind of gasket, if gaskets are required. An additional charge is made for the labor involved in bolting on the flanges; see the Crane Discount Sheet for prices.

Wooden Flange Protectors

Damaged flange faces may make it difficult or impossible to make up tight joints. Wooden protectors are a worthwhile investment, offering ample protection to flange faces while in transit and prior to installation. In addition, in the case of valves, they keep out foreign matter that might otherwise injure the seating surfaces. For complete information on protectors for the ends of valves and fittings, refer to the Crane Discount Sheet.



Crane Triplex and Templex Alloy Steel Bolt-Studs



Bolt-Stud
Threaded Entire Length
With Two Nuts

The list prices apply to alloy steel bolt-studs made either of Triplex Steel or of Templex Steel; see the Crane Discount Sheet for discounts.

Each Triplex or Templex Steel Bolt-Stud is equipped with two medium carbon, oil-quenched, semi-finished, heavy, steel hexagon nuts; these are included in the list prices.

The lengths shown below do not include the crowned ends.

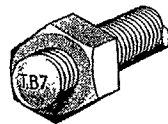
Triplex Steel Bolt-Studs: The merits of Crane Triplex Steel are well known. Triplex Steel Bolt-Studs have been used with uniformly satisfactory results in thousands of steel valve and fitting installations, many of which—particularly in oil refineries—have been operating under extreme pressures and temperatures.

Made to rigid manufacturing tolerances of a high quality chrome-molybdenum steel, they provide liberal strength for the bolting of steel flanged joints.

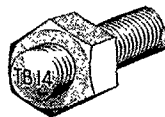
Templex Steel Bolt-Studs: Templex Steel, a recent Crane development in bolting materials, is superior to Triplex Steel in creep resistance. On temperatures over 850° F., especially where joints are made up for permanent, long-time service, as in steam power plants, Crane Templex Steel will be found ideal.

A specially heat treated chrome-molybdenum-vanadium steel, Templex exhibits greater resistance to creep than any other bolting material offered on the market today.

Marking: On one end of each bolt-stud is stamped the identification of the material; Crane Triplex is marked with the symbol "T B7", and Crane



Triplex Steel



Templex Steel

Templex is marked with the symbol "T B14". These markings are shown in the accompanying illustrations.

Standard lengths: The lengths of bolt-studs are standardized in increments of 1/4-inch in accordance with the American Standard ASA B16e-1939; other lengths (in 1/8-inch increments) shown in the price tables are for replacements for bonnet joints of Crane Steel Valves.

When ordering bolt-studs for Cranelap requirements, lengths should be selected as follows:

- A. If calculated length is 1/16-inch or more longer than a standardized length, use the next longer standard 1/4-inch length.
- B. If calculated length is less than 1/16-inch longer than a standardized length, use the next shorter standard 1/4-inch length.

Bolt-stud lengths in 1/8-inch increments, other than those shown in the price tables, can be made to order at the price of the next longer 1/4-inch increment.

Threads: Crane Alloy Steel Bolt-Studs are threaded their entire length. The bolt-studs and nuts are threaded to dimensions within those of the MSS Standard SP-29-1939. This Standard agrees with ASA Standard B1.1-1935 Coarse-Thread Series diameters 1-inch and smaller, and

Length Inches	List Prices, Each				
	7/16" Dia.	1/2" Dia.	5/8" Dia.	3/4" Dia.	7/8" Dia.
2	.39	.39	.43		
2 1/8	.40				
2 1/4	.40	.40	.44		
2 3/8	.41				
2 1/2	.41	.41	.45	.53	
2 5/8		.42	.46		
2 3/4		.42	.46	.55	
2 7/8		.43	.47	.57	
3		.43	.47	.57	.72
3 1/8			.48		
3 1/4		.44	.48	.59	.74
3 3/8			.49		
3 1/2		.45	.49	.61	.76
3 5/8			.50		
3 3/4			.50	.63	.78
3 7/8			.51	.64	
4			.51	.65	.80
4 1/8				.66	
4 1/4			.52	.67	.82
4 1/2			.53	.69	.84
4 3/4			.54	.71	.86
4 7/8				.72	
5			.55	.73	.88
5 1/4				.75	.90
5 1/2			.57	.77	.92
5 3/4				.79	.94
6			.59	.81	.96
6 1/4				.83	.98
6 1/2				.85	1.00
6 3/4				.87	1.02
7				.89	1.04
7 1/4				.91	1.06
7 1/2				.93	1.08
7 3/4				.95	1.10
8				.97	1.12
8 1/4					1.14
8 1/2					1.16
8 3/4					1.18
9					1.20
9 1/4					1.22
9 1/2					1.24

8-Pitch Thread Series diameters 1 1/8-inch and larger.

In the manufacture of these products, Crane Co. maintains closer tolerances than those allowed by the MSS Standard, to provide a "clearance" at all times between bolt-stud and nut, thereby insuring against freezing or seizing of the two parts.

Crane Triplex and Templex Alloy Steel Bolt-Studs (Cont.)



Bolt-Stud
Threaded Entire Length
With Two Nuts

The list prices apply to alloy steel bolt-studs made either of Triplex Steel or of Templex Steel; see the Crane Discount Sheet for discounts.

Each Triplex or Templex Steel Bolt-Stud is equipped with two medium carbon, oil-quenched, semi-finished, heavy, steel hexagon nuts; these are included in the list prices.

The lengths shown below do not include the crowned ends.

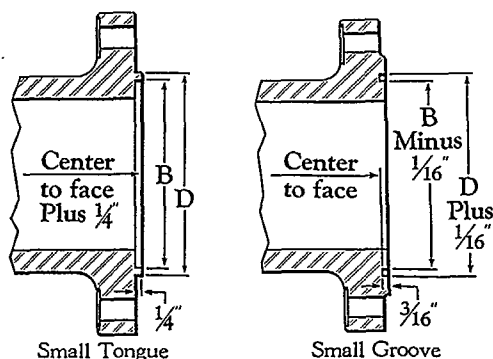
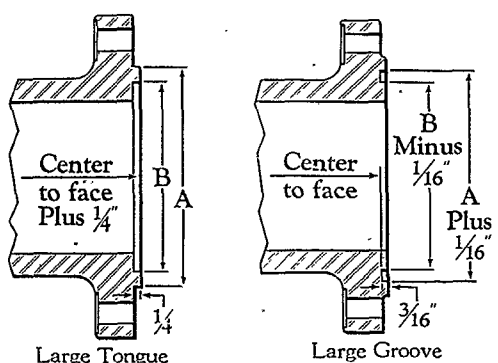
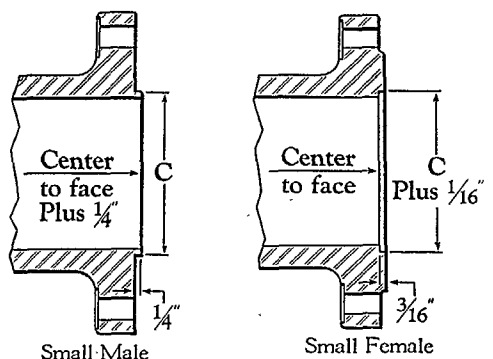
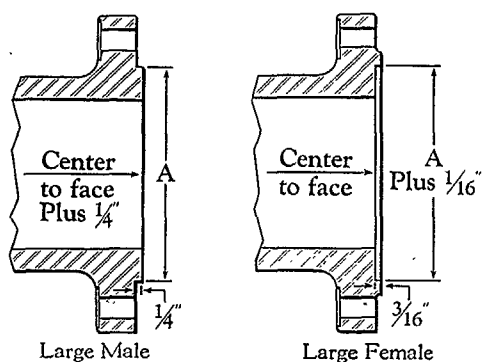
Length Inches	List Prices, Each					Length Inches	List Prices, Each			Length Inches	List Prices, Each		
	1" Dia.	1 1/8" Dia.	1 1/4" Dia.	1 3/8" Dia.	1 1/2" Dia.		1 5/8" Dia.	1 3/4" Dia.	1 7/8" Dia.		2" Dia.	2 1/4" Dia.	2 1/2" Dia.
5	1.21					9 1/2	6.46			12	14.00		
5 1/4	1.24					9 3/4	6.59			12 1/4	14.20		
5 1/2	1.27	1.74				10	6.72	8.55		12 1/2	14.40		
5 3/4	1.30	1.78				10 1/4	6.85	8.70		12 3/4	14.60		
6	1.33	1.82				10 1/2	6.98	8.85		13	14.80		
6 1/4	1.36	1.86				10 3/4	7.11	9.00		13 1/4	15.00		
6 1/2	1.39	1.90	2.45			11	7.24	9.15		13 1/2	15.20		
6 3/4	1.42	1.94	2.50			11 1/4	7.37	9.30	11.30	13 3/4	15.40		
7	1.45	1.98	2.55			11 1/2	7.50	9.45	11.45	14	15.60		
7 1/4	1.48	2.02	2.60			11 3/4	7.63	9.60	11.60	14 1/4	15.80		
7 1/2	1.51	2.06	2.65			12	7.76	9.75	11.75	14 1/2	16.00		
7 3/4	1.54	2.10	2.70			12 1/4	7.89	9.90	11.90	14 3/4	16.20		
8	1.57	2.14	2.75	3.31		12 1/2	8.02	10.05	12.05	15	16.40	21.40	
8 1/4	1.60	2.18	2.80	3.39		12 3/4	8.15	10.20	12.20	15 1/4	16.60	21.60	
8 1/2	1.63	2.22	2.85	3.47	4.35	13	8.28	10.35	12.35	15 1/2	16.80	21.80	
8 3/4	1.66	2.26	2.90	3.55	4.45	13 1/4	8.41	10.50	12.50	15 3/4	17.00	22.00	
9	1.69	2.30	2.95	3.63	4.55	13 1/2	8.54	10.65	12.65	16	17.20	22.20	
9 1/4	1.72	2.34	3.00	3.71	4.65	13 3/4	8.67	10.80	12.80	16 1/4	17.40	22.40	
9 1/2	1.75	2.38	3.05	3.79	4.75	14	8.80	10.95	12.95	16 1/2	17.60	22.60	27.60
9 3/4	1.78	2.42	3.10	3.87	4.85	14 1/4	8.93	11.10	13.10	16 3/4	17.80	22.80	27.80
10	1.81	2.46	3.15	3.95	4.95	14 1/2	9.06	11.25	13.25	17	18.00	23.00	28.00
10 1/4	1.84	2.50	3.20	4.03	5.05	14 3/4	9.19	11.40	13.40	17 1/4	18.20	23.20	28.20
10 1/2	1.87	2.54	3.25	4.11	5.15	15	9.32	11.55	13.55	17 1/2	18.40	23.40	28.40
10 3/4		2.58	3.30	4.19	5.25	15 1/4			13.70	17 3/4	18.60	23.60	28.60
11		2.62	3.35	4.27	5.35	15 1/2	9.58	11.85	13.85	18	18.80	23.80	28.80
11 1/4		2.66	3.40	4.35	5.45	15 3/4			14.00	18 1/4	19.00	24.00	29.00
11 1/2		2.70	3.45	4.43	5.55	16	9.84	12.15	14.15	18 1/2	19.20	24.20	29.20
11 3/4		2.74	3.50	4.51	5.65	16 1/4			14.30	18 3/4	19.40	24.40	29.40
12		2.78	3.55	4.59	5.75	16 1/2		12.30	14.45	19	19.60	24.60	29.60
12 1/4			3.60	4.67	5.85	16 3/4				19 1/4	19.80	24.80	29.80
12 1/2			3.65	4.75	5.95	17			14.75	19 1/2	20.00	25.00	30.00
12 3/4			3.70	4.83	6.05	17 1/4				19 3/4	20.20	25.20	30.20
13			3.75	4.91	6.15	17 1/2			15.05	20	20.40	25.40	30.40
13 1/4			3.80	4.99	6.25	17 3/4				20 1/4	20.60	25.60	30.60
13 1/2			3.85	5.07	6.35	18			15.35	20 1/2	20.80	25.80	30.80
13 3/4				5.15	6.45	18 1/4				21	21.00	26.00	31.00
14				5.23	6.55	18 1/2				21 1/4	21.20	26.20	31.20
14 1/4				5.31	6.65	18 3/4				21 1/2	21.40	26.40	31.40
14 1/2				5.39	6.75	19				22	21.60	26.60	31.60
14 3/4				5.47	6.85	19 1/4				22 1/2	21.80	26.80	31.80
15				5.55	6.95	19 1/2				23	22.00	27.00	32.00

Standards: Crane Triplex and Templex Steel Bolt-Studs and Nuts conform to the American Standard B16-1939 and to various A.S.T.M. Specifications. Triplex Steel conforms to A.S.T.M. A 96 for Class C Bolting and to A.S.T.M. A 193, Grade B7. Templex Steel conforms to A.S.T.M. A 96 for Class C Bolting and to A.S.T.M. A 193, Grade B14. The nuts conform to A.S.T.M. Specifications A 96, Class 1, and A 194, Class 2H; they are made to American Standard "Heavy" Hexagon Nut dimensions, ASA B18.2.

Thread lubricant: Crane High Temperature Thread Lubricant is recommended for use with alloy steel bolt-studs. On bolting subjected to high temperatures, this lubricant is unsurpassed. Because it reduces friction, maximum stress can be obtained in the bolt-stud with a minimum amount of power applied to the nut. In addition, by minimizing the tendency of the metals to gall or seize, joints can be more readily assembled and taken apart without injuring the bolting. See page 548.

Male, Female, Tongue, and Groove Flange Facings

For 250-Pound Cast Iron and 300-Pound Steel



Dimensions, in Inches

Class	Size	A	B	C	D
175-Pound Cast Iron	$\frac{1}{2}$	$1\frac{3}{8}$	1	$\frac{23}{32}$	$1\frac{3}{8}$
	$\frac{3}{4}$	$1\frac{11}{16}$	$1\frac{5}{16}$	$\frac{15}{16}$	$1\frac{11}{16}$
	1	2	$1\frac{1}{2}$	$1\frac{3}{16}$	$1\frac{7}{8}$
	$1\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$2\frac{1}{4}$
	$1\frac{1}{2}$	$2\frac{7}{8}$	$2\frac{1}{8}$	$1\frac{3}{4}$	$2\frac{1}{2}$
250-Pound Cast Iron	2	$3\frac{5}{8}$	$2\frac{7}{8}$	$2\frac{1}{4}$	$3\frac{1}{4}$
	$2\frac{1}{2}$	$4\frac{1}{8}$	$3\frac{3}{8}$	$2\frac{11}{16}$	$3\frac{3}{4}$
400-Pound WOG Cast Iron	3	5	$4\frac{1}{4}$	$3\frac{5}{16}$	$4\frac{5}{8}$
	$3\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{3}{4}$	$3\frac{13}{16}$	$5\frac{1}{8}$
	4	$6\frac{3}{16}$	$5\frac{3}{16}$	$4\frac{5}{16}$	$5\frac{11}{16}$
500-Pound WOG Cast Iron	5	$7\frac{5}{16}$	$6\frac{5}{16}$	$5\frac{3}{8}$	$6\frac{13}{16}$
	6	$8\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{3}{8}$	8
	8	$10\frac{5}{8}$	$9\frac{3}{8}$	$8\frac{3}{8}$	10
	10	$12\frac{3}{4}$	$11\frac{1}{4}$	$10\frac{1}{2}$	12
300-Pound Steel	12	15	$13\frac{1}{2}$	$12\frac{1}{2}$	$14\frac{1}{4}$
	14	$16\frac{1}{4}$	$14\frac{3}{4}$	$13\frac{3}{4}$	$15\frac{1}{2}$
	16	$18\frac{1}{2}$	$16\frac{3}{4}$	$15\frac{3}{4}$	$17\frac{5}{8}$
	18	21	$19\frac{1}{4}$	$17\frac{3}{4}$	$20\frac{1}{8}$
	20	23	21	$19\frac{3}{4}$	22
	24	$27\frac{1}{4}$	$25\frac{1}{4}$	$23\frac{3}{4}$	$26\frac{1}{4}$

Refer to the Crane Discount Sheet for prices.

The dimensions shown above conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939.

The large male, large female, large tongue, and large groove facings can be applied to end flanges on cast iron valves and fittings, and to cast iron loose flanges conforming to the 250-Pound American Cast Iron Flange Standard, B16b-1928. This includes 175-Pound, 250-Pound, 400-Pound W.O.G., and 500-Pound W.O.G. products.

All of the types of facings can be applied to flanged products in the 300-Pound steel class, conforming to the American Steel Flange Standard, B16e-1939.

Center to face: The illustrations show how regular valve or fitting center to face dimensions are affected by these special facings. Notice: the male or tongue facing increases the regular center to face $\frac{1}{4}$ -inch; the female or groove facing does not alter the regular center to face.

Regular facing and finish: Flanged valves, flanged fittings, and flanges of the classes indicated are regularly furnished with a $\frac{1}{16}$ -inch raised face.

$\frac{1}{16}$ -inch raised faces and $\frac{1}{4}$ -inch male faces are finished with concentric grooves, approximately 16 grooves per inch on the iron and 32 grooves per inch on the steel, known as a "serrated" finish. Female, tongue, and groove faces are regularly furnished with a smooth finish.

Caution: Small male and female facing, when used with steel screwed flanges, makes the joint directly on the end of the pipe. In these cases the pipe must be thick enough to provide a bearing surface of ample width to prevent crushing of the gasket.

Gaskets for male and female and for tongue and groove joints should cover the bottom of the recess with minimum clearances, allowing for the plus or minus tolerance of 0.016 inch ($\frac{1}{64}$ ") which is permitted by the American Standard on the inside and outside diameters of all facings.

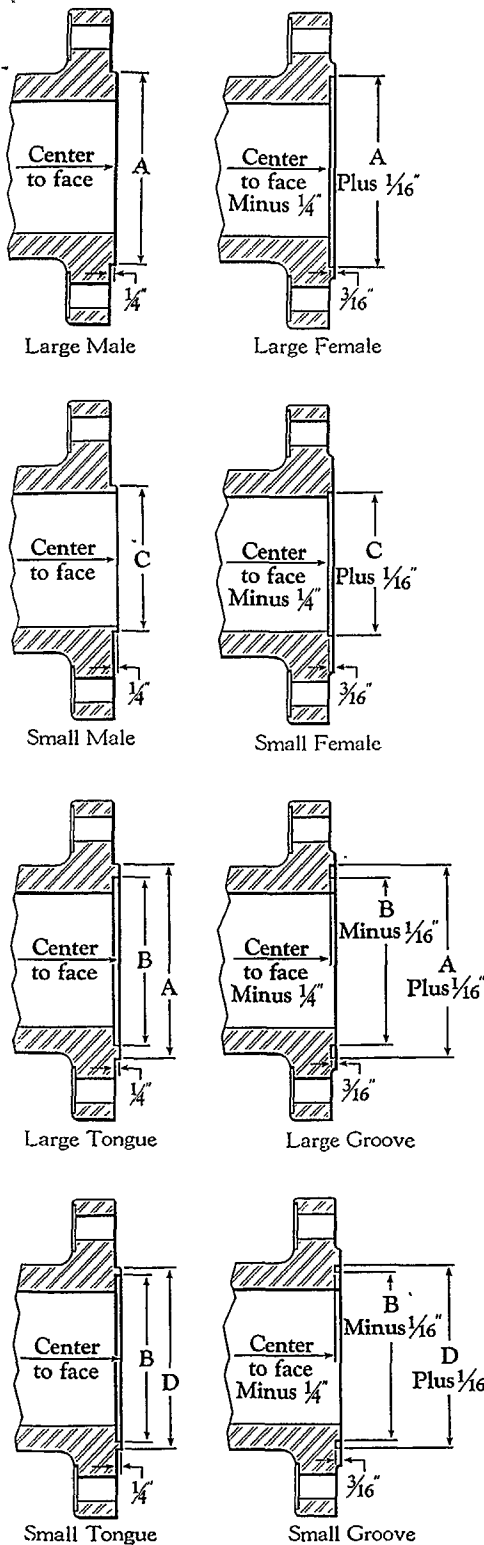
Dimensions of ring joint facing . . . pages 562 and 563

Facings on Cranelap Joints . . . pages 607 and 608

Templates for drilling . . . pages 552 and 553

Male, Female, Tongue, and Groove Flange Facings

For 800-Pound Hydraulic Cast Iron and 400 to 2500-Pound Steel



Dimensions, in Inches

Class	Size	A	B	C	D
800-Pound Hydraulic Cast Iron	1/2	1 3/8	1	2 3/32	1 3/8
	3/4	1 11/16	1 5/16	1 5/16	1 11/16
	1	2	1 1/2	1 3/16	1 7/8
	1 1/4	2 1/2	1 7/8	1 1/2	2 1/4
	1 1/2	2 7/8	2 1/8	1 3/4	2 1/2
	2	3 5/8	2 7/8	2 1/4	3 1/4
	2 1/2	4 1/8	3 3/8	2 11/16	3 3/4
	3	5	4 1/4	3 5/16	4 5/8
800-Pound WOG Cast Iron	3 1/2	5 1/2	4 3/4	3 13/16	5 1/8
	4	6 3/16	5 3/16	4 5/16	5 11/16
	5	7 5/16	6 5/16	5 3/8	6 13/16
	6	8 1/2	7 1/2	6 3/8	8
	8	10 5/8	9 3/8	8 3/8	10
	10	12 3/4	11 1/4	10 1/2	12
	12	15	13 1/2	12 1/2	14 1/4
	14	16 1/4	14 3/4	13 3/4	15 1/2
400, 600, 900, 1500, or 2500-Pound Steel	16	18 1/2	16 3/4	15 3/4	17 5/8
	18	21	19 1/4	17 3/4	20 1/8
	20	23	21	19 3/4	22
	24	27 1/4	25 1/4	23 3/4	26 1/4

Refer to the Crane Discount Sheet for prices.

The dimensions shown above conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16e-1939.

The large male, large female, large tongue, and large groove facings can be applied to the end flanges on cast iron valves conforming to the 800-Pound Hydraulic American Cast Iron Flange Standard, B16b-1931. This includes 800-Pound Hydraulic and 800-Pound W.O.G. Valves.

All of the types of facings can be applied to flanged products in the 400, 600, 900, 1500, and 2500-Pound steel classes, conforming to the American Steel Flange Standard, B16e-1939.

Center to face: The illustrations show how regular valve or fitting center to face dimensions are affected by these special facings. Notice particularly: the male and tongue facings are included in the regular center to face; the female and groove facings require a deduction of 1/4-inch from the regular center to face.

Regular facing and finish: Flanged valves and flanged fittings of the classes indicated are regularly furnished with a 1/4-inch male face. Steel Companion Flanges have a 1/4-inch male face or a 3/16-inch female face, as ordered.

The male faces are finished with concentric grooves, approximately 16 grooves per inch on the iron and 32 grooves per inch on the steel, known as a "serrated" finish. Female, tongue, and groove faces regularly have a smooth finish.

Caution: Small male and female facing, when used with steel screwed flanges, makes the joint directly on the end of the pipe. In these cases the pipe must be thick enough to provide a bearing surface of ample width to prevent crushing of the gasket.

Gaskets for male and female and for tongue and groove joints should cover the bottom of the recess with minimum clearances, allowing for the plus or minus tolerance of 0.016 inch (1/64") which is permitted by the American Standard on the inside and outside diameters of all facings.

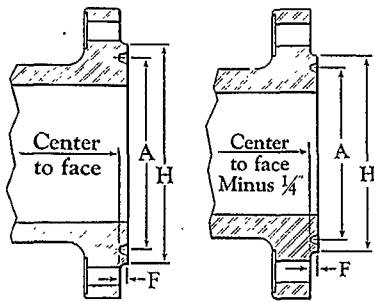
Dimensions of ring joint facing . . . pages 562 and 563

Facings on Cranelap Joints . . . pages 607 and 608

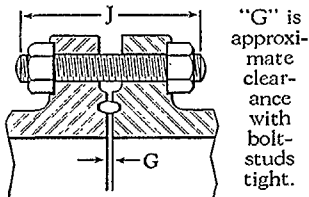
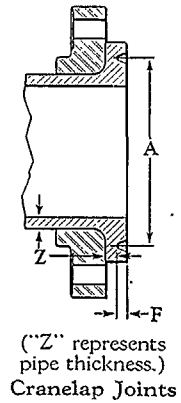
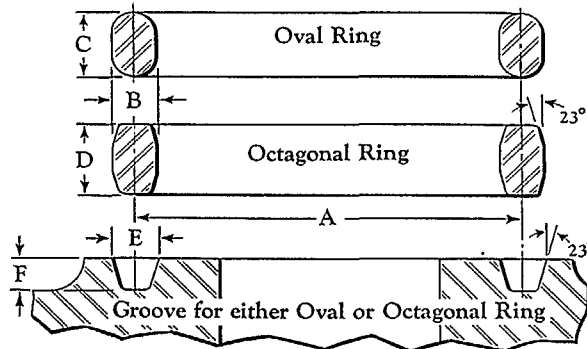
Templates for drilling . . . pages 552, 554, and 555

Ring Joint Facing and Rings

A.P.I. and American Standard — Dimensions, in Inches



150 and 300-Pound and 400, 600, 900, 1500 and 2500-Pound
(See explanation of "Center to face" on next page.)
For Valves, Fittings, and Flanges



Assembled Ring Joint

*Dimension "J" does not apply to Cranelap Joints; see "Bolt-stud lengths" on next page.

†**Caution:** The 3-inch 300 and 600-Pound Cranelap Ring Joints use Ring No. R 30, having a pitch diameter of 4 1/8 inches. When 3-inch 300 or 600-Pound ring joint valves, fittings, or flanges are to be bolted to Cranelap joints, orders must so specify; they will be machined special.

Class	Size	Ring Number	A	B	C	D	E	F	G	H	*J	No. of Bolt-Studs	Dia. of Bolt-Studs
150 Pound	1	R 15	1 7/8	5/16	9/16	1/2	11/32	1/4	5/32	2 1/2	3	4	1/2
	1 1/4	R 17	2 1/4	5/16	9/16	1/2	11/32	1/4	5/32	2 7/8	3 1/4	4	1/2
	1 1/2	R 19	2 9/16	5/16	9/16	1/2	11/32	1/4	5/32	3 1/4	3 3/4	4	1/2
	2	R 22	3 1/4	5/16	9/16	1/2	11/32	1/4	5/32	4	3 3/4	4	5/8
	2 1/2	R 25	4	5/16	9/16	1/2	11/32	1/4	5/32	4 3/4	4	4	5/8
	3	R 29	4 1/2	5/16	9/16	1/2	11/32	1/4	5/32	5 1/4	4 1/4	4	5/8
	3 1/2	R 33	5 3/16	5/16	9/16	1/2	11/32	1/4	5/32	6 1/16	4 1/4	8	5/8
	4	R 36	5 7/8	5/16	9/16	1/2	11/32	1/4	5/32	6 3/4	4 1/4	8	5/8
	5	R 40	6 3/4	5/16	9/16	1/2	11/32	1/4	5/32	7 5/8	4 1/2	8	3/4
	6	R 43	7 5/8	5/16	9/16	1/2	11/32	1/4	5/32	8 5/8	4 1/2	8	3/4
	8	R 48	9 3/4	5/16	9/16	1/2	11/32	1/4	5/32	10 3/4	4 3/4	8	3/4
	10	R 52	12	5/16	9/16	1/2	11/32	1/4	5/32	13	5 1/4	12	7/8
	12	R 56	15	5/16	9/16	1/2	11/32	1/4	5/32	16	5 1/2	12	7/8
	14	R 59	15 5/8	5/16	9/16	1/2	11/32	1/4	1/8	16 3/4	6	12	1
	16	R 64	17 7/8	5/16	9/16	1/2	11/32	1/4	1/8	19	6	16	1
	18	R 68	20 3/8	5/16	9/16	1/2	11/32	1/4	1/8	21 1/2	6 1/2	16	1 1/8
	20	R 72	22	5/16	9/16	1/2	11/32	1/4	1/8	23 1/2	7	20	1 1/8
	24	R 76	26 1/2	5/16	9/16	1/2	11/32	1/4	1/8	28	7 3/4	20	1 1/4

Class	Size	Ring Number	A	B	C	D	E	F	G			H	*J			No. of Bolt-Studs			Dia..of Bolt-Studs		
									300 Lb.	400 Lb.	600 Lb.		300 Lb.	400 Lb.	600 Lb.	300 Lb.	400 Lb.	600 Lb.	300 Lb.	400 Lb.	600 Lb.
300, 400, and 600 Pound	1/2	R 11	1 11/32	1/4	7/16	3/8	9/32	7/32	1/8	1/8	2	3	3	4	4	4	1/2	1/2	1/2		
	3/4	R 13	1 11/16	5/16	9/16	1/2	1 11/32	1/4	5/32	5/32	2 1/2	3 1/2	3 1/2	4	4	4	5/8	5/8	5/8		
	1	R 16	2	5/16	9/16	1/2	1 11/32	1/4	5/32	5/32	2 3/4	3 1/2	3 1/2	4	4	4	5/8	5/8	5/8		
	1 1/4	R 18	2 3/8	5/16	9/16	1/2	1 11/32	1/4	5/32	5/32	3 1/8	3 3/4	3 3/4	4	4	4	5/8	5/8	5/8		
	1 1/2	R 20	2 11/16	5/16	9/16	1/2	1 11/32	1/4	5/32	5/32	3 9/16	4	4 1/4	4	4	4	3/4	3/4	3/4		
	2	R 23	3 1/4	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	4 1/4	4 1/4	4 1/2	8	8	8	5/8	5/8	5/8		
	2 1/2	R 26	4	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	5	4 3/4	5	8	8	8	3/4	3/4	3/4		
	3	R 31	4 7/8	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	5 3/4	5	5 1/4	8	8	8	3/4	3/4	3/4		
	3 1/2	R 34	5 3/16	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	6 1/4	5 1/4	5 3/4	8	8	8	3/4	3/4	3/4		
	4	R 37	5 7/8	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	6 7/8	5 1/4	5 3/4	6	8	8	3/4	7/8	7/8		
	5	R 41	7 1/8	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	8 1/4	5 1/2	6	6 3/4	8	8	8	3/4	7/8	1	
	6	R 45	8 5/16	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	9 1/2	5 3/4	6 1/4	7	12	12	12	3/4	7/8	1	
	8	R 49	10 5/8	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	11 7/8	6 1/4	7	8	12	12	12	7/8	1	1 1/8	
	10	R 53	12 3/4	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	14	7 1/4	7 3/4	8 3/4	16	16	16	1	1 1/8	1 1/4	
	12	R 57	15	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	16 1/4	7 1/2	8 1/2	9	16	16	20	1 1/8	1 1/4	1 1/4	
	14	R 61	16 1/2	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	18	7 3/4	8 3/4	9 1/2	20	20	20	1 1/8	1 1/4	1 3/8	
	16	R 65	18 1/2	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	20	8 1/2	9 1/4	10 1/4	20	20	20	1 1/4	1 3/8	1 1/2	
	18	R 69	21	7/16	1 11/16	5/8	1 15/32	5/16	7/32	3/16	22 5/8	8 3/4	9 1/2	11	24	24	20	1 1/4	1 3/8	1 5/8	
	20	R 73	23	1/2	3/4	1 11/16	17/32	3/8	7/32	3/16	25	9 1/4	10 1/4	11 3/4	24	24	24	1 1/4	1 1/2	1 5/8	
	24	R 77	27 1/4	5/8	7/8	1 13/16	21/32	7/16	1/4	1/4	29 1/2	10 1/4	11 1/4	13 1/2	24	24	24	1 1/2	1 3/4	1 7/8	

Dimensions, in Inches (Cont.)

Class	Size	Ring Numbers	A	B	C	D	E	F	G	H	*J	No. of Bolt-Studs	Dia. of Bolt-Studs
900 Pound	3	R 31	4 $\frac{7}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	6 $\frac{1}{8}$	6	8	7 $\frac{7}{8}$
	3 $\frac{1}{2}$	R 34	5 $\frac{3}{16}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	6 $\frac{5}{8}$	6 $\frac{1}{2}$	8	1
	4	R 37	5 $\frac{7}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	7 $\frac{1}{8}$	7	8	1 $\frac{1}{8}$
	5	R 41	7 $\frac{1}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	8 $\frac{1}{2}$	7 $\frac{3}{4}$	8	1 $\frac{1}{4}$
	6	R 45	8 $\frac{5}{16}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	9 $\frac{1}{2}$	8	12	1 $\frac{1}{8}$
	8	R 49	10 $\frac{5}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	12 $\frac{1}{8}$	9	12	1 $\frac{3}{8}$
	10	R 53	12 $\frac{3}{4}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	14 $\frac{1}{4}$	9 $\frac{1}{2}$	16	1 $\frac{3}{8}$
	12	R 57	15	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	5 $\frac{3}{32}$	16 $\frac{1}{2}$	10 $\frac{1}{4}$	20	1 $\frac{3}{8}$
	14	R 62	16 $\frac{1}{2}$	5 $\frac{5}{8}$	7 $\frac{1}{8}$	13 $\frac{1}{16}$	21 $\frac{1}{32}$	7 $\frac{1}{16}$	5 $\frac{3}{32}$	18 $\frac{3}{8}$	11 $\frac{1}{4}$	20	1 $\frac{1}{2}$
	16	R 66	18 $\frac{1}{2}$	5 $\frac{5}{8}$	7 $\frac{1}{8}$	13 $\frac{1}{16}$	21 $\frac{1}{32}$	7 $\frac{1}{16}$	5 $\frac{3}{32}$	20 $\frac{5}{8}$	11 $\frac{3}{4}$	20	1 $\frac{5}{8}$
	18	R 70	21	3 $\frac{3}{4}$	1	15 $\frac{1}{16}$	25 $\frac{1}{32}$	1 $\frac{1}{2}$	3 $\frac{1}{16}$	23 $\frac{3}{8}$	13 $\frac{1}{2}$	20	1 $\frac{7}{8}$
	20	R 74	23	3 $\frac{3}{4}$	1	15 $\frac{1}{16}$	25 $\frac{1}{32}$	1 $\frac{1}{2}$	3 $\frac{1}{16}$	25 $\frac{1}{2}$	14 $\frac{1}{2}$	20	2
1500 Pound	24	R 78	27 $\frac{1}{4}$	1	15 $\frac{1}{16}$	1 $\frac{1}{4}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	7 $\frac{1}{32}$	30 $\frac{3}{8}$	18 $\frac{1}{4}$	20	2 $\frac{1}{2}$
	1 $\frac{1}{2}$	R 12	19 $\frac{1}{16}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	2 $\frac{3}{8}$	4 $\frac{1}{4}$	4	3 $\frac{3}{4}$
	3 $\frac{1}{4}$	R 14	13 $\frac{3}{4}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	2 $\frac{5}{8}$	4 $\frac{1}{2}$	4	3 $\frac{3}{4}$
	1	R 16	2	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	2 $\frac{1}{8}$	4 $\frac{1}{2}$	4	7 $\frac{7}{8}$
	1 $\frac{1}{4}$	R 18	23 $\frac{3}{8}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	3 $\frac{3}{16}$	5	4	7 $\frac{7}{8}$
	1 $\frac{1}{2}$	R 20	21 $\frac{1}{16}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	3 $\frac{5}{8}$	5 $\frac{1}{2}$	4	1
	2	R 24	33 $\frac{3}{4}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	4 $\frac{7}{8}$	6	8	7 $\frac{7}{8}$
	2 $\frac{1}{2}$	R 27	41 $\frac{1}{4}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	5 $\frac{3}{8}$	6 $\frac{1}{2}$	8	1
	3	R 35	5 $\frac{3}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	6 $\frac{5}{8}$	7 $\frac{1}{4}$	8	1 $\frac{1}{8}$
	3 $\frac{1}{2}$	R 37	5 $\frac{7}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	7 $\frac{1}{8}$	7 $\frac{1}{2}$	8	1 $\frac{1}{8}$
	4	R 39	6 $\frac{3}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	7 $\frac{5}{8}$	8	8	1 $\frac{1}{4}$
	5	R 44	7 $\frac{5}{8}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	9	10	8	1 $\frac{1}{2}$
2500 Pound	6	R 46	8 $\frac{5}{16}$	1 $\frac{1}{2}$	3 $\frac{3}{4}$	11 $\frac{1}{16}$	17 $\frac{1}{32}$	3 $\frac{1}{8}$	1 $\frac{1}{8}$	9 $\frac{3}{4}$	10 $\frac{3}{4}$	12	1 $\frac{3}{8}$
	8	R 50	10 $\frac{5}{8}$	5 $\frac{5}{8}$	7 $\frac{1}{8}$	13 $\frac{1}{16}$	21 $\frac{1}{32}$	7 $\frac{1}{16}$	5 $\frac{3}{32}$	12 $\frac{1}{2}$	12	12	1 $\frac{5}{8}$
	10	R 54	12 $\frac{3}{4}$	5 $\frac{5}{8}$	7 $\frac{1}{8}$	13 $\frac{1}{16}$	21 $\frac{1}{32}$	7 $\frac{1}{16}$	5 $\frac{3}{32}$	14 $\frac{5}{8}$	13 $\frac{3}{4}$	12	1 $\frac{7}{8}$
	12	R 58	15	7 $\frac{1}{8}$	1 $\frac{1}{8}$	11 $\frac{1}{16}$	29 $\frac{1}{32}$	9 $\frac{1}{16}$	3 $\frac{1}{16}$	17 $\frac{1}{4}$	15 $\frac{3}{4}$	16	2
	14	R 63	16 $\frac{1}{2}$	1	15 $\frac{1}{16}$	1 $\frac{1}{4}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	7 $\frac{1}{32}$	19 $\frac{1}{4}$	17 $\frac{1}{4}$	16	2 $\frac{1}{4}$
	16	R 67	18 $\frac{1}{2}$	1 $\frac{1}{8}$	1 $\frac{7}{16}$	1 $\frac{3}{8}$	13 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{1}{16}$	21 $\frac{1}{2}$	19	16	2 $\frac{1}{2}$
	18	R 71	21	1 $\frac{1}{8}$	1 $\frac{7}{16}$	1 $\frac{3}{8}$	13 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{1}{16}$	24 $\frac{1}{8}$	20 $\frac{3}{4}$	16	2 $\frac{3}{4}$
	20	R 75	23	1 $\frac{1}{4}$	1 $\frac{9}{16}$	1 $\frac{1}{2}$	15 $\frac{1}{16}$	11 $\frac{1}{16}$	3 $\frac{1}{8}$	26 $\frac{1}{2}$	22 $\frac{3}{4}$	16	3
	24	R 79	27 $\frac{1}{4}$	1 $\frac{3}{8}$	1 $\frac{3}{4}$	1 $\frac{5}{8}$	17 $\frac{1}{16}$	13 $\frac{1}{16}$	7 $\frac{1}{16}$	31 $\frac{1}{4}$	26	16	3 $\frac{1}{2}$
	1 $\frac{1}{2}$	R 13	11 $\frac{1}{16}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	2 $\frac{9}{16}$	4 $\frac{1}{4}$	4	3 $\frac{3}{4}$
	3 $\frac{1}{4}$	R 16	2	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	2 $\frac{7}{8}$	5	4	3 $\frac{3}{4}$
	1	R 18	23 $\frac{3}{8}$	5 $\frac{1}{16}$	9 $\frac{1}{16}$	1 $\frac{1}{2}$	11 $\frac{1}{32}$	1 $\frac{1}{4}$	5 $\frac{3}{32}$	3 $\frac{1}{4}$	5 $\frac{1}{2}$	4	7 $\frac{7}{8}$
2500 Pound	1 $\frac{1}{4}$	R 21	22 $\frac{7}{32}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	4	6 $\frac{1}{4}$	4	1
	1 $\frac{1}{2}$	R 23	31 $\frac{1}{4}$	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	4 $\frac{1}{2}$	7	4	1 $\frac{1}{8}$
	2	R 26	4	7 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{5}{8}$	15 $\frac{5}{32}$	5 $\frac{1}{16}$	1 $\frac{1}{8}$	5 $\frac{1}{4}$	7 $\frac{1}{4}$	8	1
	2 $\frac{1}{2}$	R 28	43 $\frac{3}{8}$	1 $\frac{1}{2}$	3 $\frac{3}{4}$	11 $\frac{1}{16}$	17 $\frac{1}{32}$	3 $\frac{1}{8}$	1 $\frac{1}{8}$	5 $\frac{7}{8}$	8	8	1 $\frac{1}{8}$
	3	R 32	5	1 $\frac{1}{2}$	3 $\frac{3}{4}$	11 $\frac{1}{16}$	17 $\frac{1}{32}$	3 $\frac{1}{8}$	1 $\frac{1}{8}$	6 $\frac{5}{8}$	9 $\frac{1}{4}$	8	1 $\frac{1}{4}$
	4	R 38	63 $\frac{1}{16}$	5 $\frac{5}{8}$	7 $\frac{1}{8}$	13 $\frac{1}{16}$	21 $\frac{1}{32}$	7 $\frac{1}{16}$	5 $\frac{3}{32}$	8	10 $\frac{1}{2}$	8	1 $\frac{1}{2}$
	5	R 42	71 $\frac{1}{2}$	3 $\frac{3}{4}$	1	15 $\frac{1}{16}$	25 $\frac{1}{32}$	1 $\frac{1}{2}$	5 $\frac{3}{32}$	9 $\frac{1}{2}$	12 $\frac{1}{2}$	8	1 $\frac{3}{4}$
	6	R 47	9	3 $\frac{3}{4}$	1	15 $\frac{1}{16}$	25 $\frac{1}{32}$	1 $\frac{1}{2}$	5 $\frac{3}{32}$	11	14 $\frac{1}{4}$	8	2
	8	R 51	11	7 $\frac{1}{8}$	1 $\frac{1}{8}$	11 $\frac{1}{16}$	29 $\frac{1}{32}$	9 $\frac{1}{16}$	3 $\frac{1}{16}$	13 $\frac{3}{8}$	16	12	2
	10	R 55	13 $\frac{1}{2}$	1 $\frac{1}{8}$	1 $\frac{1}{16}$	1 $\frac{3}{8}$	13 $\frac{1}{16}$	11 $\frac{1}{16}$	1 $\frac{1}{4}$	16 $\frac{3}{4}$	20 $\frac{1}{4}$	12	2 $\frac{1}{2}$
	12	R 60	16	1 $\frac{1}{4}$	1 $\frac{9}{16}$	1 $\frac{1}{2}$	15 $\frac{1}{16}$	11 $\frac{1}{16}$	5 $\frac{1}{16}$	19 $\frac{1}{2}$	22 $\frac{1}{4}$	12	2 $\frac{3}{4}$

Rings: See page 564. Type "A" or "B" Rings $\frac{1}{4}$, $\frac{5}{16}$, or $\frac{1}{16}$ -inch wide are regularly furnished oval shape; $\frac{1}{2}$ -inch wide or wider, are octagonal shape. All Type "C" Rings are octagonal shape.

Standards: The dimensions of the ring joint facing and of the rings conform to the American Standard for Steel Pipe Flanges and Flanged Fittings, B16-1939 and Addendum B16-1940, and to the American Petroleum Institute Standard on Ring Joints, No. 5-G-3, Second Edition, April, 1940, except that the American Standard does not define octagonal rings of widths less than $\frac{1}{2}$ -inch.

List prices of rings... page 564
Dimensions of Cranelap Joints... page 608

List prices of bolt-studs... pages 558 and 559
Templates for drilling and flange dimensions... pages 553 to 555

The dimensions shown on this and the preceding page apply to ring joint facing and rings for the end flanges of steel valves and flanged fittings, and for steel flanges. The groove (smooth finish) for the ring is cut in a raised face as illustrated on the preceding page.

Center to face: When ring joint facing is applied to 150 and 300-Pound valves and fittings, the center to the raised face is equal to the regular center to face dimension (which includes the $\frac{1}{16}$ -inch raised face) plus the depth of the groove on sizes 2-inch and larger, or plus the depth of the groove minus $\frac{1}{32}$ -inch on smaller sizes.

On higher pressure ring joint valves and fittings, the center to the raised face is equal to the regular center to face dimension minus $\frac{1}{4}$ -inch (the height of the large male), plus the depth of the groove on 400, 600, 900, and 1500-Pound sizes 2-inch and larger and on 2500-Pound sizes $1\frac{1}{4}$ -inch and larger, or plus the depth of the groove minus $\frac{1}{32}$ -inch on the smaller sizes.

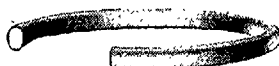
This practice also applies to loose flanges; that is, the raised face which is equal to the depth of the groove is added to the flange thickness (dimension "B" on pages 366 and 367) except that on the smaller sizes the groove cuts $\frac{1}{32}$ -inch into the flange thickness.

On Cranelap joints with ring joint facing the depth of the groove is added to the minimum thickness of the lap. See pages 605 to 608 for Cranelap joints.

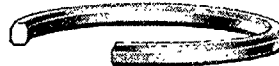
***Bolt-stud lengths:** The length of bolt-studs indicated as dimension "J" in the tables applies for all combinations of ring joint valves, fittings, and flanges other than Cranelap.

For ring joint combinations made up of valves, fittings, or flanges bolted to Cranelaps, add the pipe thickness to dimension "J". For Cranelap to Cranelap ring joints, add twice the pipe thickness to dimension "J".

Rings for Ring Joints



Oval Ring
Types A and B



Octagonal Ring
Types A, B, and C

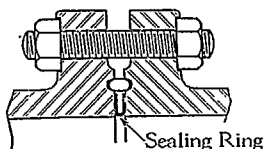
Crane Oval and Octagonal Rings are made in a variety of high grade materials, suitable for use in 150, 300, 400, 600, 900, 1500, and 2500-Pound ring joints. The shape of the ring regularly furnished for various sizes and pressure classes of joints is indicated in the table at the right.

Ordering: Orders for rings should specify the Ring Number and the Type: "A", "B", or "C". When Type is not specified, Type A Rings will regularly be supplied.

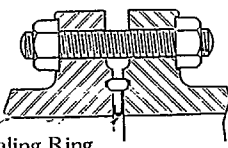
Type A Rings are made of Armco Iron (90 Brinell maximum hardness), in oval or octagonal shape; see table above.

Type B Rings, made of 4 to 6% Chrome with 1/2% Molybdenum (130 Brinell maximum hardness), are recommended for corrosive services, as in oil refinery work, and for use with Chrome-Molybdenum Steel products. They have the same shape as Type A Rings, being distinguished by a square bead (or fin) on the outer periphery.

Type C Rings are made octagonal shape only, of Soft Steel (130 Brinell maximum hardness) and are recommended for use in all steam or water installations.



Sealing Ring



Sealing Ring

For unusually corrosive fluids, **Corrosion Sealing Rings** are recommended for protection of rings. Prices on application.

Shape of Ring Regularly Furnished
For Various Size Ring Joints

Pressure Class	Oval Rings Type A or B	Octagonal Rings	
		Type A or B	Type C
150-Pound	All sizes		
300-Pound	18" and smaller	*20 and 24"	All sizes
400-Pound			
600-Pound			
900-Pound	12" and smaller	*14" and larger	
1500-Pound	5" and smaller	*6" and larger	
2500-Pound	Information furnished on request.		

*Oval-shaped rings can be furnished for these sizes when so ordered; prices on application.

List Prices, Each

Class	Size Inches	Ring Num- ber	Type A Rings	Type B Rings	Type C Rings	Class	Size Inches	Ring Num- ber	Type A Rings	Type B Rings	Type C Rings
For 150 Pound Ring Joints	1	R 15	.75	2.60	.82	For 900 Pound Ring Joints	For sizes 2 1/4-inch and smaller, use 1500-Pound Rings.				
	1 1/4	R 17	.80	2.90	.88		3	R 31	1.60	4.90	1.76
	1 1/2	R 19	1.00	3.55	1.10		3 1/2	R 34	1.70	4.90	1.87
	2	R 22	1.20	4.15	1.32		4	R 37	1.90	5.40	2.09
	2 1/2	R 25	1.30	4.15	1.43		5	R 41	2.30	6.50	2.53
	3	R 29	1.45	4.35	1.59		6	R 45	2.65	7.30	2.91
	3 1/2	R 33	1.65	4.90	1.81		8	R 49	5.00	13.00	5.50
	4	R 36	1.85	5.40	2.03		10	R 53	6.60	16.80	7.26
	5	R 40	2.25	6.30	2.47		12	R 57	11.40	22.40	12.54
	6	R 43	2.40	6.70	2.64		14	R 62	18.04	36.08	18.04
	8	R 48	4.20	10.45	4.62		16	R 66	22.77	40.48	22.77
	10	R 52	6.00	16.00	6.60		18	R 70	27.50	66.55	27.50
	12	R 56	11.00	20.40	12.10		20	R 74	34.10	75.02	34.10
	14	R 59	11.40	22.40	12.54		24	R 78	70.40	135.52	70.40
	16	R 64	12.80	29.00	14.08	For 1500 Pound Ring Joints	1/2	R 12	.70	2.40	.77
	18	R 68	15.40	38.50	16.94		3/4	R 14	.70	2.60	.77
	20	R 72	15.90	45.00	17.49		1	R 16	.75	2.60	.82
	24	R 76	27.50	57.60	30.25		1 1/4	R 18	.85	3.20	.93
For 300, 400, and 600 Pound Ring Joints	1/2	R 11	.70	2.40	.77		1 1/2	R 20	1.05	3.55	1.15
	3/4	R 13	.70	2.40	.77		2	R 24	1.30	4.15	1.43
	1	R 16	.75	2.60	.82		2 1/2	R 27	1.35	4.35	1.48
	1 1/4	R 18	.85	3.20	.93		3	R 35	1.70	5.25	1.87
	1 1/2	R 20	1.05	3.55	1.15		3 1/2	R 37	1.90	5.40	2.09
	2	R 23	1.30	4.15	1.43		4	R 39	2.05	5.95	2.25
	2 1/2	R 26	1.30	4.15	1.43		5	R 44	2.45	6.75	2.69
	3	R 31	1.60	4.90	1.76		6	R 46	3.96	11.88	3.96
	3 1/2	R 34	1.70	4.90	1.87		8	R 50	8.58	16.83	8.58
	4	R 37	1.90	5.40	2.09		10	R 54	10.67	25.08	10.67
	5	R 41	2.30	6.50	2.53		12	R 58	18.37	48.40	18.37
	6	R 45	2.65	7.30	2.91		14	R 63	27.28	54.23	27.28
	8	R 49	5.00	13.00	5.50		16	R 67	36.74	64.02	36.74
	10	R 53	6.60	16.80	7.26		18	R 71	41.80	90.75	41.80
	12	R 57	11.40	22.40	12.54		20	R 75	66.00	121.00	66.00
	14	R 61	12.80	27.00	14.08		24	R 79	108.90	181.59	108.90
	16	R 65	14.10	31.60	15.51	2500 Pound Ring Joints.	Prices are furnished on application. Sizes, ring numbers, and dimensions are shown on page 563.				
	18	R 69	16.00	40.00	17.60						
	20	R 73	26.07	57.20	26.07						
	24	R 77	36.85	73.70	36.85						

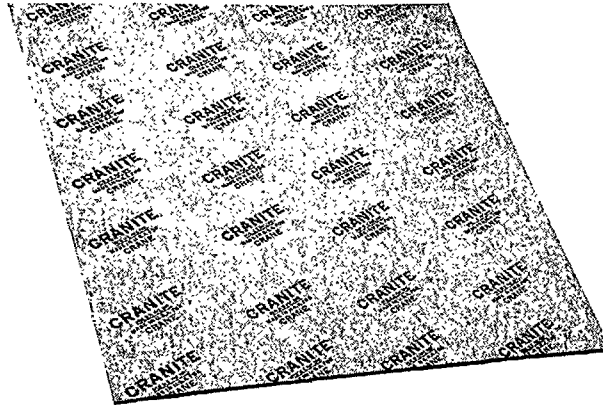
†Ring R 30 in Types A, B, and C is for 300 or 600-Pound Ring Joints only; use when one or both halves of the joint are Cranelap.

Cranite Sheet Packing

An Asbestos Composition Manufactured Solely for Crane Co.

CRANITE is the highest grade of sheet packing obtainable.

The name "CRANITE" is registered in the United States Patent Office.



*The list price of
Cranite Sheet Packing
is \$1.00 per pound.*

*The 1/16-inch thickness
averages .62 pound
to the square foot.*

Cranite Sheet Packing: Cranite Sheet Packing is made of an asbestos composition, using only selected long fiber asbestos, cross laminated to provide unusual tensile strength. It offers a very uniform and high resistance to compression, is exceptionally strong and rugged, and will not deteriorate with age.

This packing is unhesitatingly recommended for a multitude of services, such as steam, water, oil, dry air, acids, ammonia, alkali, gases, etc., and for temperatures up to 750° F.

Because of the great number of services for which Cranite Sheet Packing can be used, its unusually

high quality, and its ability to withstand deterioration, users will find it economical to purchase the packing in quantities and to carry it in stock.

For best results, gaskets cut from Cranite Sheet Packing should be coated with Crane-Thread Lubricant when being installed. See page 548 for Crane Thread Lubricants.

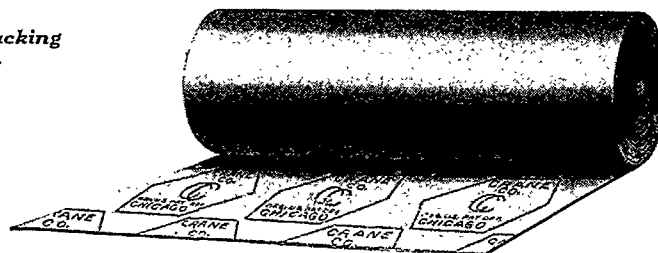
Sizes: Cranite Sheet Packing in the 1/16-inch thickness is regularly furnished in sheets 36 or 48 inches square. Other thicknesses from 1/64 to 1/4-inch, or other sizes up to 120 inches square can be made to order; prices on application.

Cranite Packing has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

"CC" Rubber Sheet Packing

Manufactured Solely for Crane Co.

*The list price of
"CC" Rubber Sheet Packing
is \$.50 per pound.*



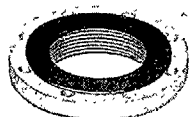
*The 1/16-inch thickness
averages .61 pound
to the square foot.*

"CC" Rubber Sheet Packing, manufactured solely for Crane Co., is especially well adapted for high or low pressure service on saturated steam, hot and cold water, air, gases, etc. It is made up in rolls 36

inches wide, weighing approximately 200 pounds each, and in thicknesses of 1/16-inch and 1/8-inch. "CC" Rubber Sheet Packing can be furnished in rolls up to 72 inches wide.

Gaskets

For 25-Pound Cast Iron Flanged Joints



Ring Gaskets cover the face of the flange to the inside edge of the bolts, and will always be furnished unless otherwise ordered.



Full Face Gaskets are furnished without bolt holes unless otherwise ordered; an extra charge is made for punching bolt holes.

Size Inches	Ring Gaskets				Full Face Gaskets			
	List Prices, Each			Inside and Outside Diameters Inches	List Prices, Each			Inside and Outside Diameters Inches
	1/16-inch Cloth Inserted Rubber	1/16-inch "CC" Rubber	4-ounce Canvas		1/16-inch Cloth Inserted Rubber	1/16-inch "CC" Rubber	4-ounce Canvas	
2	.07	.17	.06	2 x 4 1/8	.18	.34	.14	2 x 6
2 1/2	.09	.21	.07	2 1/2 x 4 7/8	.23	.42	.18	2 1/2 x 7
3	.12	.25	.09	3 x 5 3/8	.28	.50	.21	3 x 7 1/2
3 1/2	.14	.35	.10	3 1/2 x 6 3/8	.30	.67	.22	3 1/2 x 8 1/2
4	.16	.39	.11	4 x 6 7/8	.35	.75	.24	4 x 9
5	.19	.50	.13	5 x 7 7/8	.42	1.00	.28	5 x 10
6	.23	.59	.15	6 x 8 7/8	.47	1.20	.30	6 x 11
8	.30	.75	.18	8 x 11 1/8	.65	1.45	.40	8 x 13 1/2
10	.42	1.00	.25	10 x 13 3/8	.88	2.00	.55	10 x 16
12	.58	1.25	.35	12 x 16 3/8	1.15	2.50	.70	12 x 19
14	.70	1.56	.42	14 x 18	1.30	2.80	.80	14 x 21
16	.82	2.00	.49	16 x 20 1/2	1.65	3.55	1.00	16 x 23 1/2
18	.86	2.30	.52	18 x 22	1.85	4.00	1.12	18 x 25
20	1.02	2.50	.61	20 x 24 1/4	2.00	4.40	1.20	20 x 27 1/2
24	1.40	2.90	.85	24 x 28 3/4	2.55	5.25	1.55	24 x 32
30	2.10	4.40	1.27	30 x 35 1/8	3.80	8.90	2.30	30 x 38 3/4
36	2.90	6.80	1.75	36 x 41 7/8	5.10	13.55	3.10	36 x 46
42	3.50	8.05	2.10	42 x 48 1/2		16.15	3.75	42 x 53
48		9.40	2.75	48 x 55		18.75	4.85	48 x 59 1/2

For 125-Pound Cast Iron Flanged Joints

Size Inches	Ring Gaskets					Full Face Gaskets				
	List Prices, Each				Inside and Outside Diameters Inches	List Prices, Each				Inside and Outside Diameters Inches
	1/16-inch Cloth Inserted Rubber	1/16-inch "CC" Rubber	4-ounce Canvas	1/16-inch Cranite		1/16-inch Cloth Inserted Rubber	1/16-inch "CC" Rubber	4-ounce Canvas	1/16-inch Cranite	
1	.05	.09	.04	.12	1 x 2 5/8	.10	.17	.09	.29	1 x 4 1/4
1 1/4	.07	.13	.06	.15	1 1/4 x 3	.14	.25	.12	.31	1 1/4 x 4 5/8
1 1/2	.07	.13	.06	.19	1 1/2 x 3 3/8	.14	.25	.12	.35	1 1/2 x 5
2	.07	.17	.06	.22	2 x 4 1/8	.18	.34	.14	.50	2 x 6
2 1/2	.09	.21	.07	.27	2 1/2 x 4 7/8	.23	.42	.18	.70	2 1/2 x 7
3	.12	.25	.09	.32	3 x 5 3/8	.28	.50	.21	.78	3 x 7 1/2
3 1/2	.14	.35	.10	.46	3 1/2 x 6 3/8	.30	.67	.22	.98	3 1/2 x 8 1/2
4	.16	.39	.11	.50	4 x 6 7/8	.35	.75	.24	1.05	4 x 9
5	.19	.50	.13	.58	5 x 7 3/4	.42	1.00	.28	1.15	5 x 10
6	.23	.59	.15	.65	6 x 8 3/4	.47	1.20	.30	1.30	6 x 11
8	.30	.75	.18	.90	8 x 11	.65	1.45	.40	1.90	8 x 13 1/2
10	.42	1.00	.25	1.20	10 x 13 3/8	.88	2.00	.55	2.70	10 x 16
12	.58	1.25	.35	1.80	12 x 16 3/8	1.15	2.50	.70	3.70	12 x 19
14	.70	1.56	.42	1.85	14 x 17 3/4	1.30	2.80	.80	4.15	14 x 21
16	.82	2.00	.49	2.25	16 x 20 1/4	1.65	3.55	1.00	4.95	16 x 23 1/2
18	.86	2.30	.52	1.95	18 x 21 5/8	1.85	4.00	1.12	5.00	18 x 25
20	1.02	2.50	.61	2.35	20 x 23 7/8	2.00	4.40	1.20	5.60	20 x 27 1/2
24	1.40	2.90	.85	4.00	24 x 28 1/4	2.55	5.25	1.55	6.80	24 x 32
30	2.10	4.40	1.27	On Appli- cation	30 x 34 3/4	3.80	8.90	2.30	On Appli- cation	30 x 38 3/4
36	2.90	6.80	1.75		36 x 41 1/4	5.10	13.55	3.10		36 x 46
42	3.50	8.05	2.10		42 x 48		16.15	3.75		42 x 53
48		9.40	2.75		48 x 54 1/2		18.75	4.85		48 x 59 1/2

Canvas Gaskets: Canvas Gaskets are furnished uncoated. They should be coated with Crane Thread Lubricant or with red lead and oil when installed.

Cranite Gaskets: When installing Cranite Gaskets, they should be coated with Crane Thread

Lubricant in order to facilitate making tight joints. Cranite Gaskets are satisfactory for use in oil lines where asbestos gaskets are permitted.

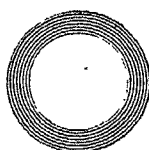
Other materials: Other commercial sheet packing gaskets are made to order; prices on application.

Gaskets

For 175-Pound or 250-Pound Cast Iron Flanged Joints



Ring Gaskets extend to the inside edge of the bolts.



Corrugated Copper Gasket
These gaskets also are used with 400-Pound W.O.G. and 500-Pound W.O.G. Valves.

For
Large Tongue
and
Groove Gaskets,
see page 570.

Size Inches	Ring Gaskets						Large Male and Female Gaskets					
	1/16-inch Cranite or "CC" Rubber			27-Gauge Corrugated Copper		O.D. In.	1/16-inch Cranite or "CC" Rubber			27-Gauge Corrugated Copper		O.D. In.
	List Prices		I.D. In.	List Price Each	I.D. In.		List Prices		I.D. In.	List Price Each	I.D. In.	
	"CC"	Cran- ite Each					"CC"	Cran- ite Each				
1	.17	.15	.1	.16	1½	2⅞	.11	.08	1	.14	1½	2
1¼	.17	.18	1¼	.17	1⅞	3¼	.11	.10	1¼	.16	1⅞	2½
1½	.17	.22	1½	.18	2⅞	3¾	.11	.11	1½	.17	2⅞	2⅞
2	.19	.24	2	.20	2⅞	4⅜	.11	.18	2	.18	2⅞	3⅝
2½	.25	.31	2½	.29	3⅞	5⅞	.13	.19	2½	.20	3⅞	4⅞
3	.32	.42	3	.40	4¼	5⅞	.17	.23	3	.29	4¼	5
3½	.35	.48	3½	.42	4¾	6½	.21	.26	3½	.32	4¾	5½
4	.38	.57	4	.45	5⅜	7⅞	.23	.38	4	.40	5⅜	6⅜
5	.52	.75	5	.60	6⅝	8½	.32	.46	5	.54	6⅝	7⅝
6	.63	.98	6	.84	7½	9⅞	.35	.58	6	.63	7½	8½
8	.90	1.30	8	1.04	9⅞	12⅞	.52	.75	8	.90	9⅞	10⅝
10	1.15	1.65	10	1.45	11¼	14¼	.67	.98	10	1.20	11¼	12¾
12	1.50	2.00	12	1.88	13½	16⅝	.92	1.30	12	1.70	13½	15
14	2.10	3.30	13¼	1.94	14¾	19⅞	1.00	1.40	13¼	1.80	14¾	16¼
16	2.50	3.70	15¼	2.88	16¾	21¼	1.20	1.70	15¼	2.20	16¾	18½
18	2.85	4.15	17	2.96	19¼	23½	1.45	2.15	17	2.70	19¼	21
20	3.05	4.85	19	3.54	21	25¾	1.70	2.30	19	3.18	21	23
24	4.00	6.30	23	4.88	25¼	30½	2.40	3.75	23	3.50	25¼	27¼

Gaskets for 800-Pound Hydraulic Cast Iron Flanged Joints . . . page 570

For Brass Flanged Joints



Full Face Gaskets are furnished without bolt holes unless otherwise ordered; an extra charge is made for punching bolt holes.

Size Inches	150-Pound MSS Standard Full Face Gaskets				300-Pound MSS Standard Full Face Gaskets		
	List Prices, Each			Inside and Outside Diameters Inches	List Prices, Each		Inside and Outside Diameters Inches
	$\frac{1}{16}$ -inch Cloth Inserted Rubber	$\frac{1}{16}$ -inch "CC" Rubber	$\frac{1}{16}$ -inch Cranite		$\frac{1}{16}$ -inch "CC" Rubber	$\frac{1}{16}$ -inch Cranite	
$\frac{1}{2}$	.10	.17	.23	$\frac{1}{2} \times 3\frac{1}{2}$	.36	.26	$\frac{1}{2} \times 3\frac{3}{4}$
$\frac{3}{4}$	.10	.17	.27	$\frac{3}{4} \times 3\frac{7}{8}$	.36	.33	$\frac{3}{4} \times 4\frac{5}{8}$
1	.10	.17	.29	1 $\times 4\frac{1}{4}$	.38	.35	1 $\times 4\frac{7}{8}$
$1\frac{1}{4}$	.14	.25	.31	$1\frac{1}{4} \times 4\frac{5}{8}$	.38	.41	$1\frac{1}{4} \times 5\frac{1}{4}$
$1\frac{1}{2}$	.14	.25	.35	$1\frac{1}{2} \times 5$	.38	.55	$1\frac{1}{2} \times 6\frac{1}{8}$
2	.18	.34	.50	2 $\times 6$	.45	.60	2 $\times 6\frac{1}{2}$
$2\frac{1}{2}$	.23	.42	.70	$2\frac{1}{2} \times 7$	.55	.84	$2\frac{1}{2} \times 7\frac{1}{2}$
3	.28	.50	.78	3 $\times 7\frac{1}{2}$	.67	.97	3 $\times 8\frac{1}{4}$
$3\frac{1}{2}$	.30	.67	.98	$3\frac{1}{2} \times 8\frac{1}{2}$	.75	1.10	$3\frac{1}{2} \times 9$
4	.35	.75	1.05	4 $\times 9$	.95	1.40	4 $\times 10$
5	.42	1.00	1.15	5 $\times 10$	1.05	1.60	5 $\times 11$
6	.47	1.20	1.30	6 $\times 11$	1.25	1.90	6 $\times 12\frac{1}{2}$
8	.65	1.45	1.90	8 $\times 13\frac{1}{2}$	1.70	2.55	8 $\times 15$
10	.88	2.00	2.70	10 $\times 16$			
12	1.15	2.50	3.70	12 $\times 19$			

Cranite Gaskets: When installing Cranite Gaskets, they should be coated with Crane Thread Lubricant in order to facilitate making tight joints. Cranite Gaskets are satisfactory for use in oil lines where asbestos gaskets are permitted.

Corrugated Copper Gaskets: Corrugated Copper Gaskets are recommended only when used with smooth faced flanges, and should be coated with Crane Thread Lubricant when installed.

Other materials: Gaskets made from other com-

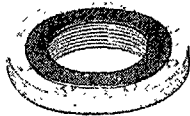
mercial gasket materials can be made to order; prices on application.

Gaskets for Brass Flanged Joints: Full face gaskets should always be used for Brass Flanged Joints. Metallic gaskets are not recommended.

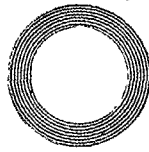
When brass flanged material is bolted to iron or steel material which normally has a raised face, the raised face should be removed to provide a full face bearing for the gasket. Brass flanged material should not be bolted to Cannelap Flanged Pipe Joints.

Gaskets

For Steel Flanged Joints



Ring Gaskets extend to the inside edge of the bolts



Corrugated Metallic Gasket

Class	Size Inches	Ring Gaskets			
		1/16-inch Cranite		Corrugated Copper	
		List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches
150 Pound	1/2	.10	1/2 x 1 7/8	.13	1 x 1 7/8
	3/4	.11	3/4 x 2 1/4	.15	1 5/16 x 2 1/4
	1	.12	1 x 2 5/8	.16	1 1/2 x 2 5/8
	1 1/4	.15	1 1/4 x 3	.16	1 7/8 x 3
	1 1/2	.19	1 1/2 x 3 3/8	.17	2 1/8 x 3 3/8
	2	.22	2 x 4 1/8	.19	2 7/8 x 4 1/8
	2 1/2	.27	2 1/2 x 4 7/8	.29	3 3/8 x 4 7/8
	3	.32	3 x 5 3/8	.29	4 1/4 x 5 3/8
	3 1/2	.46	3 1/2 x 6 3/8	.42	4 3/4 x 6 3/8
	4	.50	4 x 6 7/8	.45	5 3/16 x 6 7/8
	5	.58	5 x 7 3/4	.55	6 5/16 x 7 3/4
	6	.65	6 x 8 3/4	.63	7 1/2 x 8 3/4
	8	.90	8 x 11	.89	9 3/8 x 11
	10	1.20	10 x 13 3/8	1.19	11 1/4 x 13 3/8
	12	1.80	12 x 16 1/8	1.76	13 1/2 x 16 1/8
	14	2.15	13 1/4 x 17 3/4	1.87	14 3/4 x 17 3/4
	16	2.80	15 1/4 x 20 1/4	2.42	16 3/4 x 20 1/4
	18	2.50	17 1/4 x 21 5/8	2.58	19 1/4 x 21 5/8
	20	2.85	19 1/4 x 23 7/8	2.77	21 x 23 7/8
	24	4.70	23 1/4 x 28 1/4	3.49	25 1/4 x 28 1/4

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F. When being installed, they should be coated with Crane Thread Lubricant in order to facilitate making tight joints.

Cranite Gaskets are satisfactory for use in oil lines where asbestos gaskets are permitted.

Corrugated Metallic Gaskets: These gaskets are recommended only for use with smooth faced flanges and for best results should be coated with Crane High Temperature Thread Lubricant when installed.

Corrugated Copper Gaskets are made of 27-gauge copper; Corrugated Soft Iron Gaskets, of 22-gauge iron. They have a large inside diameter to assure a high unit compressive load.

Other materials: Gaskets of other commercial materials can be made to order; prices on application.

800-Pound Hydraulic Cast Iron Joints: 800-Pound Hydraulic Cast Iron Flanged Joints use the same gaskets as the 600-Pound Steel. For greater convenience, these are listed separately on page 570.

175 and 250-Pound Cast Iron Joints: The dimensions of gaskets for 175 and 250-Pound Cast Iron Flanged Joints are the same as for 300-Pound Steel. These are listed on page 567.

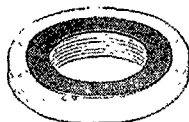
Class	Size Inches	Ring Gaskets				Large Male and Female Gaskets			
		1/16-inch Cranite		Corrugated Copper or Soft Iron		1/16-inch Cranite		Corrugated Copper or Soft Iron	
		List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches
300 Pound	1/2	.12	1/2 x 2 1/8	.14	1 x 2 1/8	.07	1/2 x 1 3/8	.10	1 x 1 3/8
	3/4	.13	3/4 x 2 5/8	.16	1 5/16 x 2 5/8	.08	3/4 x 1 11/16	.12	1 5/16 x 1 11/16
	1	.15	1 x 2 7/8	.16	1 1/2 x 2 7/8	.08	1 x 2	.14	1 1/2 x 2
	1 1/4	.18	1 1/4 x 3 1/4	.17	1 7/8 x 3 1/4	.10	1 1/4 x 2 1/2	.16	1 7/8 x 2 1/2
	1 1/2	.22	1 1/2 x 3 3/4	.18	2 1/8 x 3 3/4	.11	1 1/2 x 2 7/8	.17	2 1/8 x 2 7/8
	2	.24	2 x 4 3/8	.20	2 7/8 x 4 3/8	.18	2 x 3 5/8	.18	2 7/8 x 3 5/8
	2 1/2	.31	2 1/2 x 5 1/8	.29	3 3/8 x 5 1/8	.19	2 1/2 x 4 1/8	.20	3 3/8 x 4 1/8
	3	.42	3 x 5 7/8	.40	4 1/4 x 5 7/8	.23	3 x 5	.29	4 1/4 x 5
	3 1/2	.48	3 1/2 x 6 1/2	.42	4 3/4 x 6 1/2	.26	3 1/2 x 5 1/2	.32	4 3/4 x 5 1/2
	4	.57	4 x 7 1/8	.45	5 3/16 x 7 1/8	.38	4 x 6 3/16	.40	5 3/16 x 6 3/16
	5	.75	5 x 8 1/2	.60	6 5/16 x 8 1/2	.46	5 x 7 5/16	.54	6 5/16 x 7 5/16
	6	.98	6 x 9 7/8	.84	7 1/2 x 9 7/8	.58	6 x 8 1/2	.63	7 1/2 x 8 1/2
	8	1.30	8 x 12 1/8	1.04	9 3/8 x 12 1/8	.75	8 x 10 5/8	.90	9 3/8 x 10 5/8
	10	1.65	10 x 14 1/4	1.45	11 1/4 x 14 1/4	.98	10 x 12 3/4	1.20	11 1/4 x 12 3/4
	12	2.00	12 x 16 5/8	1.88	13 1/2 x 16 5/8	1.30	12 x 15	1.70	13 1/2 x 15
	14	3.30	13 1/4 x 19 1/8	1.94	14 3/4 x 19 1/8	1.40	13 1/4 x 16 1/4	1.80	14 3/4 x 16 1/4
	16	3.70	15 1/4 x 21 1/4	2.88	16 3/4 x 21 1/4	1.70	15 1/4 x 18 1/2	2.20	16 3/4 x 18 1/2
	18	4.15	17 x 23 1/2	2.96	19 1/4 x 23 1/2	2.15	17 x 21	2.70	19 1/4 x 21
	20	4.85	19 x 25 3/4	3.54	21 x 25 3/4	2.30	19 x 23	3.18	21 x 23
	24	6.30	23 x 30 1/2	4.88	25 1/4 x 30 1/2	3.75	23 x 27 1/4	3.50	25 1/4 x 27 1/4

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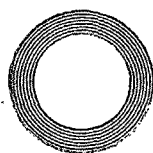
Class	Size	Ring Gaskets				Large Male and Female Gaskets				
		1/16-inch Cranite		Corrugated Copper or Soft Iron		1/16-inch Cranite		Corrugated Copper or Soft Iron		
	Inches	List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches	List Price Each	I.D. and O.D. Inches	
400 Pound	For sizes 3 1/2-inch and smaller, use 600-Pound Gaskets.									
	4	.54	4 x 7	.45	5 3/16 x 7	.38	4 x 6 3/16	.40	5 3/16 x 6 3/16	
	5	.72	5 x 8 3/8	.63	6 5/16 x 8 3/8	.46	5 x 7 5/16	.54	6 5/16 x 7 5/16	
	6	.95	6 x 9 3/4	.80	7 1/2 x 9 3/4	.58	6 x 8 1/2	.63	7 1/2 x 8 1/2	
	8	1.25	8 x 12	1.00	9 3/8 x 12	.75	8 x 10 5/8	.90	9 3/8 x 10 5/8	
	10	1.60	10 x 14 1/8	1.36	11 1/4 x 14 1/8	.98	10 x 12 3/4	1.20	11 1/4 x 12 3/4	
	12	1.95	12 x 16 1/2	1.84	13 1/2 x 16 1/2	1.30	12 x 15	1.70	13 1/2 x 15	
	14	3.25	13 1/8 x 19	2.26	14 3/4 x 19	1.45	13 1/8 x 16 1/4	1.80	14 3/4 x 16 1/4	
	16	3.75	15 x 21 1/8	2.80	16 3/4 x 21 1/8	1.80	15 x 18 1/2	2.20	16 3/4 x 18 1/2	
	18	4.10	17 x 23 3/8	3.12	19 1/4 x 23 3/8	2.15	17 x 21	2.70	19 1/4 x 21	
	20	4.80	18 7/8 x 25 1/2	3.46	21 x 25 1/2	2.40	18 7/8 x 23	3.18	21 x 23	
	24	6.35	22 5/8 x 30 1/4	4.72	25 1/4 x 30 1/4	4.00	22 5/8 x 27 1/4	3.50	25 1/4 x 27 1/4	
600 Pound	1/2	.12	1/2 x 2 1/8	.14	1 x 2 1/8	.07	1/2 x 1 3/8	.10	1 x 1 3/8	
	3/4	.13	3/4 x 2 5/8	.16	1 5/16 x 2 5/8	.08	3/4 x 1 11/16	.12	1 5/16 x 1 11/16	
	1	.15	1 x 2 7/8	.16	1 1/2 x 2 7/8	.08	1 x 2	.14	1 1/2 x 2	
	1 1/4	.18	1 1/4 x 3 1/4	.17	1 7/8 x 3 1/4	.10	1 1/4 x 2 1/2	.16	1 7/8 x 2 1/2	
	1 1/2	.22	1 1/2 x 3 3/4	.18	2 1/8 x 3 3/4	.11	1 1/2 x 2 7/8	.17	2 1/8 x 2 7/8	
	2	.24	2 x 4 3/8	.20	2 7/8 x 4 3/8	.18	2 x 3 5/8	.18	2 7/8 x 3 5/8	
	2 1/2	.31	2 1/2 x 5 1/8	.29	3 3/8 x 5 1/8	.19	2 1/2 x 4 1/8	.20	3 3/8 x 4 1/8	
	3	.42	3 x 5 7/8	.40	4 1/4 x 5 7/8	.23	3 x 5	.29	4 1/4 x 5	
	3 1/2	.46	3 1/2 x 6 3/8	.42	4 3/4 x 6 3/8	.26	3 1/2 x 5 1/2	.32	4 3/4 x 5 1/2	
	4	.70	4 x 7 5/8	.55	5 3/16 x 7 5/8	.38	4 x 6 3/16	.40	5 3/16 x 6 3/16	
	5	1.05	5 x 9 1/2	.92	6 5/16 x 9 1/2	.46	5 x 7 5/16	.54	6 5/16 x 7 5/16	
	6	1.10	6 x 10 1/2	.94	7 1/2 x 10 1/2	.58	6 x 8 1/2	.63	7 1/2 x 8 1/2	
	8	1.60	7 7/8 x 12 5/8	1.18	9 3/8 x 12 5/8	.80	7 7/8 x 10 5/8	.90	9 3/8 x 10 5/8	
	10	2.60	9 3/4 x 15 3/4	1.58	11 1/4 x 15 3/4	1.05	9 3/4 x 12 3/4	1.20	11 1/4 x 12 3/4	
	12	3.20	11 3/4 x 18	2.20	13 1/2 x 18	1.40	11 3/4 x 15	1.70	13 1/2 x 15	
	14	3.60	12 7/8 x 19 3/8	2.44	14 3/4 x 19 3/8	1.55	12 7/8 x 16 1/4	1.80	14 3/4 x 16 1/4	
	16	4.60	14 3/4 x 22 1/4	3.30	16 3/4 x 22 1/4	1.90	14 3/4 x 18 1/2	2.20	16 3/4 x 18 1/2	
	18	5.10	16 1/2 x 24 1/8	3.62	19 1/4 x 24 1/8	2.50	16 1/2 x 21	2.70	19 1/4 x 21	
20	6.10	18 1/4 x 26 7/8	3.84	21 x 26 7/8	2.85	18 1/4 x 23	3.18	21 x 23		
24	7.60	22 x 31 1/8	5.30	25 1/4 x 31 1/8	4.50	22 x 27 1/4	3.50	25 1/4 x 27 1/4		
900 Pound	For sizes 2 1/2-inch and smaller, use 1500-Pound Gaskets.									
	3	.57	2 7/8 x 6 5/8	.47	4 1/4 x 6 5/8	.24	2 7/8 x 5	.29	4 1/4 x 5	
	3 1/2	.73	3 3/8 x 7 1/2	.55	4 3/4 x 7 1/2	.28	3 3/8 x 5 1/2	.32	4 3/4 x 5 1/2	
	4	.87	3 7/8 x 8 1/8	.58	5 3/16 x 8 1/8	.40	3 7/8 x 6 3/16	.40	5 3/16 x 6 3/16	
	5	1.15	4 3/4 x 9 3/4	.92	6 5/16 x 9 3/4	.50	4 3/4 x 7 5/16	.54	6 5/16 x 7 5/16	
	6	1.60	5 3/4 x 11 3/8	1.14	7 1/2 x 11 3/8	.62	5 3/4 x 8 1/2	.63	7 1/2 x 8 1/2	
	8	2.25	7 1/2 x 14 1/8	1.74	9 3/8 x 14 1/8	.89	7 1/2 x 10 5/8	.90	9 3/8 x 10 5/8	
	10	3.35	9 3/8 x 17 1/8	2.62	11 1/4 x 17 1/8	1.15	9 3/8 x 12 3/4	1.20	11 1/4 x 12 3/4	
	12	4.15	11 1/8 x 19 5/8	3.15	13 1/2 x 19 5/8	1.60	11 1/8 x 15	1.70	13 1/2 x 15	
	14	4.30	12 1/4 x 20 1/2	3.20	14 3/4 x 20 1/2	1.80	12 1/4 x 16 1/4	1.80	14 3/4 x 16 1/4	
	16	5.25	14 x 22 5/8	3.70	16 3/4 x 22 5/8	2.25	14 x 18 1/2	2.20	16 3/4 x 18 1/2	
	18	6.00	15 3/4 x 25 1/8	4.50	19 1/4 x 25 1/8	3.10	15 3/4 x 21	2.70	19 1/4 x 21	
	20	7.05	17 1/2 x 27 1/2	4.92	21 x 27 1/2	3.50	17 1/2 x 23	3.18	21 x 23	
	24	10.20	21 x 33	6.88	25 1/4 x 33	5.10	21 x 27 1/4	3.50	25 1/4 x 27 1/4	
	1500 Pound	1/2	.13	1/2 x 2 1/2	.16	1 x 2 1/2	.07	1/2 x 1 3/8	.10	1 x 1 3/8
		3/4	.15	11/16 x 2 3/4	.16	1 5/16 x 2 3/4	.08	11/16 x 1 11/16	.12	1 5/16 x 1 11/16
		1	.18	7/8 x 3 1/8	.17	1 1/2 x 3 1/8	.09	7/8 x 2	.14	1 1/2 x 2
		1 1/4	.21	1 1/8 x 3 1/2	.17	1 7/8 x 3 1/2	.11	1 1/8 x 2 1/2	.16	1 7/8 x 2 1/2
1 1/2		.24	1 3/8 x 3 7/8	.18	2 1/8 x 3 7/8	.12	1 3/8 x 2 7/8	.17	2 1/8 x 2 7/8	
2		.44	1 7/8 x 5 5/8	.32	2 7/8 x 5 5/8	.19	1 7/8 x 3 5/8	.18	2 7/8 x 3 5/8	
2 1/2		.58	2 1/4 x 6 1/2	.42	3 3/8 x 6 1/2	.20	2 1/4 x 4 1/8	.20	3 3/8 x 4 1/8	
3		.63	2 3/4 x 6 7/8	.47	4 1/4 x 6 7/8	.26	2 3/4 x 5	.29	4 1/4 x 5	
3 1/2		.72	3 1/8 x 7 3/8	.55	4 3/4 x 7 3/8	.33	3 1/8 x 5 1/2	.32	4 3/4 x 5 1/2	
4		.93	3 5/8 x 8 1/4	.60	5 3/16 x 8 1/4	.43	3 5/8 x 6 3/16	.40	5 3/16 x 6 3/16	
5		1.30	4 3/8 x 10	.96	6 5/16 x 10	.57	4 3/8 x 7 5/16	.54	6 5/16 x 7 5/16	
6		1.60	5 3/8 x 11 1/8	1.08	7 1/2 x 11 1/8	.70	5 3/8 x 8 1/2	.63	7 1/2 x 8 1/2	
8		2.25	7 x 13 7/8	1.66	9 3/8 x 13 7/8	1.00	7 x 10 5/8	.90	9 3/8 x 10 5/8	
10		3.40	8 3/4 x 17 1/8	2.62	11 1/4 x 17 1/8	1.40	8 3/4 x 12 3/4	1.20	11 1/4 x 12 3/4	
12		4.85	10 3/8 x 20 1/2	3.74	13 1/2 x 20 1/2	1.85	10 3/8 x 15	1.70	13 1/2 x 15	
14		6.10	11 3/8 x 22 3/4	4.68	14 3/4 x 22 3/4	2.00	11 3/8 x 16 1/4	1.80	14 3/4 x 16 1/4	

Gaskets

For 800-Pound Hydraulic Cast Iron Flanged Joints



Ring Gaskets extend to the inside edge of the bolts.



Corrugated Metallic Gasket

Size Inches	Ring Gaskets					Large Male and Female Gaskets				
	1/16-inch Cranite		Corrugated Copper or Soft Iron		O.D. In.	1/16-inch Cranite		Corrugated Copper or Soft Iron		O.D. In.
	List Price Each	I.D. In.	List Price Each	I.D. In.		List Price Each	I.D. In.	List Price Each	I.D. In.	
2	.24	2	.20	2 7/8	4 3/8	.18	2	.18	2 7/8	3 5/8
2 1/2	.31	2 1/2	.29	3 3/8	5 1/8	.19	2 1/2	.20	3 3/8	4 1/8
3	.42	3	.40	4 1/4	5 7/8	.23	3	.29	4 1/4	5
3 1/2	.46	3 1/2	.42	4 3/4	6 3/8	.26	3 1/2	.32	4 3/4	5 1/2
4	.70	4	.55	5 3/16	7 5/8	.38	4	.40	5 3/16	6 3/16
5	1.05	5	.92	6 5/16	9 1/2	.46	5	.54	6 5/16	7 5/16
6	1.10	6	.94	7 1/2	10 1/2	.58	6	.63	7 1/2	8 1/2
8	1.60	7 7/8	1.18	9 3/8	12 5/8	.80	7 7/8	.90	9 3/8	10 5/8
10	2.60	9 3/4	1.58	11 1/4	15 3/4	1.05	9 3/4	1.20	11 1/4	12 3/4
12	3.20	11 3/4	2.20	13 1/2	18	1.40	11 3/4	1.70	13 1/2	15

For All Large Tongue and Groove Flanged Joints

Size Inches	List Prices, Each				Inside and Outside Diameters Inches
	1/16-inch "CC" Rubber	1/16-inch Cranite	27-Gauge Corrugated Copper	Corrugated Soft Iron	
1/2	.05	.05	.10	.10	1 x 1 3/8
3/4	.05	.05	.12	.12	1 5/16 x 1 11/16
1	.06	.05	.14	.14	1 1/2 x 2
1 1/4	.07	.06	.16	.16	1 7/8 x 2 1/2
1 1/2	.07	.07	.17	.17	2 1/8 x 2 7/8
2	.07	.08	.18	.18	2 7/8 x 3 5/8
2 1/2	.07	.09	.20	.20	3 3/8 x 4 1/8
3	.11	.14	.29	.29	4 1/4 x 5
3 1/2	.11	.16	.32	.32	4 3/4 x 5 1/2
4	.13	.19	.40	.40	5 3/16 x 6 3/16
5	.13	.21	.54	.54	6 5/16 x 7 5/16
6	.15	.25	.63	.63	7 1/2 x 8 1/2
8	.23	.40	.90	.90	9 3/8 x 10 5/8
10	.32	.57	1.20	1.20	11 1/4 x 12 3/4
12	.38	.67	1.70	1.70	13 1/2 x 15
14	.40	.73	1.80	1.80	14 3/4 x 16 1/4
16	.55	.97	2.20	2.20	16 3/4 x 18 1/2
18	.60	1.10	2.70	2.70	19 1/4 x 21
20	.75	1.40	3.18	3.18	21 x 23
24	1.00	1.65	3.50	3.50	25 1/4 x 27 1/4

Large Tongue and Groove Gaskets: The list prices and dimensions of the Large Tongue and Groove Gaskets, shown in the table at the left, apply to the following classes of flanged joints:

- 175-Pound Cast Iron
- 400-Pound W.O.G. Cast Iron
- 250-Pound Cast Iron
- 500-Pound W.O.G. Cast Iron
- 800-Pound Hydraulic Cast Iron
- 800-Pound W.O.G. Cast Iron
- 150-Pound Steel
- 300-Pound Steel
- 400-Pound Steel
- 600-Pound Steel
- 900-Pound Steel
- 1500-Pound Steel

Rubber Gaskets: "CC" Rubber Tongue and Groove Gaskets are recommended only for 175-Pound and 250-Pound Cast Iron Flanged Joints.

Cranite Gaskets: Cranite Gaskets are not recommended for temperatures higher than 750° F. When being installed, they should be coated with Crane Thread Lubricant in order to facilitate making tight joints.

Cranite Gaskets are satisfactory for use in oil lines where asbestos gaskets are permitted.

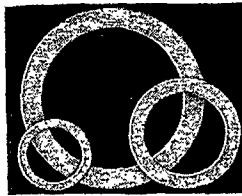
Corrugated Copper Gaskets: Corrugated Copper Gaskets (27-gauge) are recommended only when used

with smooth faced flanges, and should be coated with Crane High Temperature Thread Lubricant when installed.

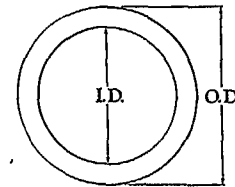
Corrugated Soft Iron Gaskets: Corrugated Soft Iron Gaskets are made of 22-gauge iron, and are recommended for use with smooth faced flanges only. For best results, they should be coated with Crane High Temperature Thread Lubricant when installed.

Other materials: Large Tongue and Groove Gaskets made of other commercial gasket materials can be made to order; prices on application.

Ring Gaskets for Unions



When ordering, always specify the gasket material, and state size and kind of union.



Gaskets for Screwed Unions and Union Fittings

List Prices and Dimensions

Size of union or union fitting		Inches	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4
Standard Malleable Iron Unions and Union Fittings and	Rubber	Per 100	.70	.90	1.10	1.30	1.60	2.00	2.40	3.00	4.00	5.25	6.75	8.50	11.00
	Cranite	Per 100	1.00	1.25	1.55	1.85	2.25	2.80	3.35	4.20	5.60	7.35	9.50	12.00	15.50
*Circulating Boiler Fittings	I. D.	Inches	15/32	17/32	21/32	13/16	1	1 1/4	1 19/32	1 27/32	2 5/16	2 3/4	3 3/8	3 7/8	4 7/16
	O. D.	Inches	25/32	29/32	1 1/16	1 1/4	1 1/2	1 27/32	2 1/8	2 15/32	3 1/32	3 5/8	4 7/32	4 7/8	5 1/2

Gaskets for Flange Unions

List Prices and Dimensions

Size of union	Inches	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12
Standard Brass Flange Unions	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42		
	I. D. Inches			15/16	1 1/16	1 3/8	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8		
	O. D. Inches			1 9/16	1 11/16	1 15/16	2 3/8	2 7/8	3 7/16	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2		
250-Pound Brass Flange Unions	CC Rubber Each			.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42			
	Granite Each			.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60			
	I. D. Inches			1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8			
	O. D. Inches			1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2			
Standard Cast Iron Flange Unions	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42	.55	.80
	I. D. Inches			13/16	1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8	10 3/4	12 3/4
	O. D. Inches			1 3/8	1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2	12 13/16	15 1/16
250-Pound Cast Iron or No. 95E Mall. Iron	CC Rubber Each			.05	.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42		
	Granite Each			.06	.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60		
	I. D. Inches			1 1/16	1 1/16	1 5/16	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8		
	O. D. Inches			1 7/8	1 7/8	2 1/8	2 5/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2		
5-Bolt Cast Iron Union	Rubber Each	(Cloth inserted rubber gasket)																
	I. D. Inches								2 1/4									
	O. D. Inches								3 3/8									
Standard Mall. Iron Flange Unions	CC Rubber Each			.05	.06	.07	.07	.08	.09	.11	.13	.15	.20	.30	.42	.55	.80	
	Granite Each			.06	.07	.08	.08	.10	.13	.16	.18	.21	.27	.42	.60	.75	1.10	
	I. D. Inches			1 1/16	1 3/8	1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	4	4 1/2	5 9/16	6 5/8	8 5/8	10 3/4	12 3/4	
	O. D. Inches			1 11/16	1 15/16	2 3/8	2 7/8	3 1/2	3 7/8	4 5/8	5 1/4	5 3/4	7	8 1/4	10 1/2	12 13/16	15 1/16	
Tongue & Groove Unions	Granite Dozen	.25	.30	.30	.40	.40	.50	.50	.55	.60	.70	.85	1.00	1.20	1.50	2.40	3.00	3.75
	Lead Dozen	.45	.50	.50	.70	.90	1.25	1.25	1.50	1.70	1.85	2.15	2.40	2.70	3.50	4.80	5.60	6.50
	I. D. Inches	1 9/32	2 3/32	7/8	1 1/8	1 3/8	1 11/16	1 15/16	2 7/16	2 15/16	3 9/16	4 1/16	4 9/16	5 5/8	6 11/16	9 3/8	11 1/4	13 1/2
	O. D. Inches	3 1/32	1 3/32	1 7/32	1 15/32	1 25/32	2 7/32	2 15/32	3 3/32	3 21/32	4 9/32	4 27/32	5 15/32	6 27/32	7 27/32	10 5/8	12 3/4	15

*Gaskets for Circulating Boiler Fittings: Circulating Boiler Fittings use the following size gaskets:

No. 585 Elbows —

1/2 x 1/2 x 3/4 and 1/2 x 1/2 x 1" 1/2" gasket
3/4 x 1/2 x 3/4, 3/4 x 1/2 x 1, and 3/4 x 3/4 x 1" .. 3/4" gasket

No. 586 Elbows and No. 589 Couplings

—all sizes..... 3/4" gasket

Thickness of gaskets: All gaskets listed on this page are 1/16-inch thick.

"CC" Rubber gaskets: "CC" Rubber is a superior grade of rubber packing, unusually tough and durable. It is made to a special formula and is given frequent and careful tests to assure the finest quality. CC Rubber is recommended for all pressures on

services such as saturated steam, hot and cold water, air, and gas.

"Cranite" gaskets: "Cranite", the highest grade of sheet packing obtainable, is an exceptionally strong and durable asbestos composition that does not deteriorate with age. Only especially selected long fibre is used in its manufacture. It is recommended for service on saturated and superheated steam, oil, gas, air, gasoline, ammonia, and similar fluids.

Cranite packing has been inspected and is listed by the Underwriters' Laboratories (National Board of Fire Underwriters), Chicago, for use on hazardous liquids.

Galvanized Flanged Fittings and Flanges

125-Pound and 250-Pound Cast Iron Flanged Fittings or Flanges, 125-Pound Malleable Iron Flanges, and 150-Pound and 300-Pound Cast Steel Flanged Fittings or Forged Steel Flanges will be galvanized to order at the extra list prices shown below.

Prices for galvanizing cast steel flanged fittings and

forged steel flanges in the 400 to 1500-Pound pressure classes will be furnished on application.

Cast iron flanged fittings and flanges are described on pages 273 to 295; malleable iron flanges, on page 292; cast steel flanged fittings, on pages 343 to 349; and forged steel flanges, on pages 361 to 367.

Extra List Prices for Galvanizing

Size	125-Pound Cast Iron Fittings and Flanges Malleable Iron Flanges					250-Pound Cast Iron Fittings and Flanges				
	No. 525 No. 527 No. 545 Elbows No. 547 No. 548 Reducers	No. 526 No. 528 No. 538 No. 540 No. 546 No. 549 No. 550 No. 551 Elbows No. 529 No. 531 No. 533 No. 534 No. 535 No. 536 Tees	No. 530 No. 532 Tees No. 537 No. 539 Crosses No. 541 No. 543 Laterals	No. 553 No. 559 Screwed Flanges	No. 555 Blind Flanges No. 557 Reducing Screwed Flanges	No. 101 E No. 103 E No. 121 E Elbows No. 123 E No. 123½ E Reducers	No. 122 E No. 125 E No. 125½ E No. 127 E No. 131 E No. 133 E No. 139 E No. 141 E Elbows No. 105 E No. 107 E No. 109 E No. 111 E No. 112 E No. 112½ E Tees	No. 135 E No. 137 E Tees No. 113 E No. 115 E Crosses No. 117 E No. 119 E Laterals	No. 151 E Screwed Flanges	No. 153 E Blind Flanges No. 155 E Reducing Screwed Flanges
Inches	150-Pound Cast Steel Fittings and Forged Steel Flanges					300-Pound Cast Steel Fittings and Forged Steel Flanges				
	No. 525 D No. 527 D No. 545 D Elbows No. 547 D No. 548 D Reducers	No. 550 D No. 551 D Elbows No. 531 D No. 534 D Tees	No. 537 D No. 539 D Crosses No. 541 D No. 543 D Laterals	No. 556 Screwed Flanges No. 554 Slip-On Welding Flanges	No. 556½ Blind Flanges No. 554½ Reducing Slip-On Welding Flanges No. 558½ Reducing Screwed Flanges No. 568 Welding Neck Flanges	No. 401 D No. 403 D No. 421 D Elbows No. 423 D No. 423½ D Reducers	No. 425½ D No. 427 D Elbows No. 407 D No. 412 D Tees	No. 413 D No. 415 D Crosses No. 417 D No. 419 D Laterals	No. 291 E Screwed Flanges No. 294 E Slip-On Welding Flanges	No. 297 E Blind Flanges No. 290 E Reducing Slip-On Welding Flanges No. 292 E Reducing Screwed Flanges No. 296 E Welding Neck Flanges
	Extra Each	Extra Each	Extra Each	Extra Each	O.D. Extra In. Each	Extra Each	Extra Each	Extra Each	Extra Each	O.D. Extra In. Each
1	2.40	3.60	4.80	.60	4¼ .90	3.00	4.50	6.00	.85	4⅞ 1.25
1¼	2.40	3.60	4.80	.60	4⅞ .90	3.00	4.50	6.00	.85	5¼ 1.25
1½	2.40	3.60	4.80	.60	5 .90	3.00	4.50	6.00	.85	6⅛ 1.25
2	2.40	3.60	4.80	.70	6 1.00	3.00	4.50	6.00	1.00	6½ 1.50
2½	2.50	3.75	5.00	.75	7 1.10	3.10	4.65	6.25	1.05	7¼ 1.60
3	2.75	4.15	5.50	.85	7½ 1.25	3.50	5.25	7.00	1.15	8¼ 1.75
3½	3.25	4.90	6.50	1.00	8½ 1.50	4.10	6.15	8.25	1.40	9 2.10
4	3.65	5.50	7.25	1.20	9 1.80	4.50	6.75	9.00	1.65	10 2.50
5	4.85	7.25	9.75	1.35	10 2.00	6.00	9.00	12.00	1.90	11 2.85
6	6.00	9.00	12.00	1.65	11 2.50	7.50	11.25	15.00	2.30	12½ 3.50
8	9.00	13.50	18.00	2.50	13½ 3.75	11.25	16.75	22.50	3.50	15 5.25
10	14.50	22.00	29.00	3.75	16 5.75	18.00	27.00	36.00	5.25	17½ 8.00
12	21.00	31.00	42.00	5.00	19 7.50	26.00	39.00	52.00	7.00	20½ 10.50
14	30.00	45.00	60.00	7.00	21 10.50	37.50	56.00	75.00	10.00	23 15.00
16	40.00	60.00	80.00	10.50	23½ 16.00	50.00	75.00	100.00	15.00	25½ 22.50

Pipe, Pipe Data, and Thread Information

Pipe, Casing, and Boiler Tubes	
General Notes, Pipe Trade Practice.....	page 574
Double Random Lengths Carried In Stock.....	page 574
Standard Pipe.....	page 575
Extra Strong Pipe.....	page 576
Double Extra Strong Pipe.....	page 577
Hydraulic Pipe.....	page 577
Reamed and Drifted Pipe.....	page 578
Large O.D. Pipe.....	page 579
A.P.I. Line Pipe.....	page 580
Brass and Copper Pipe.....	page 583
Boiler Tubes.....	page 583
Merchant Casing.....	page 581
Inserted Joint Casing.....	page 582
Bundling Schedule for Pipe.....	page 578
American Standard for Pipe.....	pages 584 to 587
Pipe Data.....	page 588
Internal Fluid Pressures for Pipe.....	page 589
Thread Information	
American Standard Pipe Threads.....	page 590
British Standard Pipe Threads.....	page 591
Normal Thread Engagement Between Pipe Threads.....	page 591
Discussion of Threaded Pipe Joints.....	page 592
Threading Material for Oil Country Use.....	page 593
Thread Data for Casing, Tubing, Etc.....	pages 594 and 595
Fittings with Casing Threads.....	page 596

Pages 574 to 596 constitute the section devoted to Pipe, Pipe Data, and Thread Information. In addition, this catalog contains useful engineering data on pipe and lists of sizes and weights of copper tubing; see the pages referred to below:

Calculating Working Pressure, Stress, or Wall Thickness of Pipe.....	pages 635 to 637
Thermal Expansion and Modulus of Elasticity of Pipe.....	page 641
Deflection of Horizontal Pipe Lines.....	page 643
Calculation of Pipe Bends.....	pages 638 and 639
Length of Pipe in Bends.....	page 640
Expansion of Pipe Lines.....	page 426
Expansion of Copper Tubing.....	page 510
Types K, L, M, and O Copper Tubing for Solder-Joints.....	page 512
Type B Copper Tubing for Crane-Seal Silbraz Joints.....	page 498

Wrought Steel and Genuine Wrought Iron Tubular Products

Butt-Welded, Lap-Welded, and Seamless Pipe
Casing, Boiler Tubes, and Tubing

General Notes

Pipe Trade Practice

All weights are figured on the basis of one cubic inch of steel weighing .2833 pound.

All material will be cut to length when so ordered, with extreme variation not exceeding one-eighth of an inch over or under, unless otherwise arranged.

All threads, unless otherwise indicated, are in accordance with American (Briggs') Standard.

The outside diameter of all classes of pipe, casing, tubing, tubes, etc., heavier than standards listed, is the same outside diameter as standards listed, the extra thickness always being on the inside and therefore reducing the inside diameter of the pipe.

Tubular material is known either by its nominal inside diameter or its outside diameter, and the tables of weights and dimensions should be consulted for the proper designation for each class of goods. When listed by nominal inside diameter, it is designated "Size", and when listed by outside diameter, "Size O.D."

When ordering pipe 12-inch and smaller designate weight desired, and when ordering tubes designate thickness desired.

Above 12-inch inside diameter, pipe and tubing are usually known and spoken of by their outside diameters, and when ordering, thickness desired must be specified.

All Boiler Tubes are known by their outside diameters.

All dimensions of tubular goods are subject to change without notice.

On orders calling for commercial sizes of pipe which are finished with threads and couplings, in sizes $\frac{1}{8}$ -inch to 12-inch, inclusive, and where orders specify quantity in lineal feet, it is understood that random lengths fitted with threads both ends and coupling one end will be shipped; and the measurement is charged from end to end, that is overall including coupling.

If cut lengths of any sizes are ordered, instructions must appear on the face of the order whether plain ends, threads only, or threads and couplings are required. The pipe is then cut to the length specified for plain end and threads only, but if cut lengths with threads and couplings are specified the practice is the same with the exception that the couplings are charged separately, whether they are shipped loose or screwed on the pipe.

On sizes 14-inch O.D. and larger, information must appear on the order as to whether plain ends, threads only, or threads and couplings are required, inasmuch as these large sizes are customarily held in stock in plain ends, subject to order as to the necessary requirements in regard to threads only or threads and couplings.

All data given on the following pages, numbers 575 to 582 inclusive, apply to Wrought Steel Tubular Products.

Pipe Carried in Stock

A distinguishing feature of Crane policy has always been to maintain widely distributed and adequate stocks of all staple lines for the convenience of customers. These include not only valves, fittings, flanges, and accessories but also large stocks of the various kinds of pipe.

Stocks of pipe are carried by each Crane Branch in sufficient sizes, kinds, and quantities to meet all normal local requirements. Prompt shipments can be made of random lengths or of cut pipe, plain end or threaded.

At the Crane Chicago Works, in addition to large

stocks of regular pipe, double random lengths are regularly carried in stock. Averaging 38 feet to 43 feet in length, depending on the size, they are stocked as follows:

Standard and Extra Strong Pipe

Butt-Welded..... $1\frac{1}{4}$ to 3-inch, inclusive
Lap-Welded..... $3\frac{1}{2}$ to 12-inch, inclusive
Seamless..... 2 to 12-inch, inclusive

Information on other sizes, on longer lengths, and on other kinds of pipe will be furnished on application.

Standard Pipe

Black and Galvanized

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness Inches	Weight per Foot		Number of Threads per Inch	Test Pressure Pounds per Square Inch		
		External Inches	Internal Inches		Plain Ends Pounds	Threads and Couplings Pounds		Butt- Weld	Lap- Weld	Seam- less
1/8	.05 1/2	.405	.269	.068	.24	.24	27	700		1000
1/4	.06	.540	.364	.088	.42	.42	18	700		1000
3/8	.06	.675	.493	.091	.56	.56	18	700		1000
1/2	.08 1/2	.840	.622	.109	.85	.85	14	700		1000
3/4	.11 1/2	1.050	.824	.113	1.13	1.13	14	700		1000
1	.17	1.315	1.049	.133	1.67	1.68	11 1/2	700		1000
1 1/4	.23	1.660	1.380	.140	2.27	2.28	11 1/2	700		2500
1 1/2	.27 1/2	1.900	1.610	.145	2.71	2.73	11 1/2	700		2300
2	.37	2.375	2.067	.154	3.65	3.67	11 1/2	700	1000	2000
2 1/2	.58 1/2	2.875	2.469	.203	5.79	5.81	8	800	1000	2100
3	.76 1/2	3.500	3.068	.216	7.57	7.61	8	800	1000	1900
3 1/2	.92	4.000	3.548	.226	9.10	9.20	8		1000	1700
4	1.09	4.500	4.026	.237	10.79	10.88	8		1000	1600
*4 1/2	1.27	5.000	4.506	.247	12.53	12.64	8		1000	1500
5	1.48	5.563	5.047	.258	14.61	14.81	8		1000	1500
6	1.92	6.625	6.065	.280	18.97	19.18	8		1000	1500
*7	2.38	7.625	7.023	.301	23.54	23.76	8		1000	1200
†8	2.50	8.625	8.071	.277	24.69	25.00	8		800	1000
	2.88		7.981	.322	28.55	28.80			1000	1200
*9	3.45	9.625	8.941	.342	33.90	34.18	8		900	1100
†10	3.20	10.750	10.192	.279	31.20	32.00	8		600	800
	3.50		10.136	.307	34.24	35.00			800	900
	4.12		10.020	.365	40.48	41.13			900	1000
*11	4.63	11.750	11.000	.375	45.55	46.24	8		800	950
†12	4.50	12.750	12.090	.330	43.77	45.00	8		600	800
	5.07		12.000	.375	49.56	50.70			800	900

*These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Standard Pipe is furnished with threads and couplings and in random lengths.

On sizes 3-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Threads: The taper of threads is 3/4-inch per foot, measured on the diameter for all sizes.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling.

†8, 10, and 12-inch sizes: On sizes made in more than one weight, weight desired must be specified.

Extra Strong Pipe

Black and Galvanized

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness Inches	Weight per Foot Plain Ends Pounds	Test Pressure Pounds per Square Inch		
		External Inches	Internal Inches			Butt- Weld	Lap- Weld	Seam- less
1/8	.12	.405	.215	.095	.31	700		1000
1/4	.07 1/2	.540	.302	.119	.53	700		1000
3/8	.07 1/2	.675	.423	.126	.73	700		1000
1/2	.11	.840	.546	.147	1.08	700		1000
3/4	.15	1.050	.742	.154	1.47	700		1000
1	.22	1.315	.957	.179	2.17	700		1000
1 1/4	.30	1.660	1.278	.191	2.99	1500		2500
1 1/2	.36 1/2	1.900	1.500	.200	3.63	1500		2500
2	.50 1/2	2.375	1.939	.218	5.02	1500	2500	2500
2 1/2	.77	2.875	2.323	.276	7.66	1500	2000	2500
3	1.03	3.500	2.900	.300	10.25	1500	2000	2500
3 1/2	1.25	4.000	3.364	.318	12.50		2000	2500
4	1.50	4.500	3.826	.337	14.98		2000	2200
* 4 1/2	1.80	5.000	4.290	.355	17.61		1800	2100
5	2.08	5.563	4.813	.375	20.77		1800	2000
6	2.86	6.625	5.761	.432	28.57		1800	2000
* 7	3.81	7.625	6.625	.500	38.04		1500	2000
8	4.34	8.625	7.625	.500	43.38		1500	1700
* 9	4.90	9.625	8.625	.500	48.72		1500	1600
10	5.48	10.750	9.750	.500	54.73		1200	1400
* 11	6.10	11.750	10.750	.500	60.07		1100	1300
12	6.55	12.750	11.750	.500	65.41		1100	1100

* These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Extra Strong Pipe is furnished with plain ends and in random lengths.

On sizes 3-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Random lengths: Random lengths of Extra Strong Pipe are considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths 6 feet to 12 feet.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads only or with threads and couplings, an extra charge will be made above plain ends.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

Double Extra Strong Pipe Black and Galvanized

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness Inches	Weight per Foot Plain Ends Pounds	Test Pressure Pounds per Square Inch		
		External Inches	Internal Inches			Butt-Weld	Lap-Weld	Seamless
1/2	.32	.840	.252	.294	1.71	700		1000
3/4	.35	1.050	.434	.308	2.44	700		1000
1	.37	1.315	.599	.358	3.65	700		1000
1 1/4	.52 1/2	1.660	.896	.382	5.21	2200		2500
1 1/2	.65	1.900	1.100	.400	6.40	2200		3000
2	.91	2.375	1.503	.436	9.02	2200	3000	3000
2 1/2	1.37	2.875	1.771	.552	13.69	2200	3000	3000
3	1.86	3.500	2.300	.600	18.58		3000	3000
3 1/2	2.30	4.000	2.728	.636	22.85		2500	2500
4	2.76	4.500	3.152	.674	27.45		2500	2500
*4 1/2	3.26	5.000	3.580	.710	32.53		2000	2500
5	3.86	5.563	4.063	.750	38.55		2000	2500
6	5.32	6.625	4.897	.864	53.16		2000	2500
*7	6.35	7.625	5.875	.875	63.07		2000	2500
8	7.25	8.625	6.875	.875	72.42		2000	2500

*These sizes are listed as standard but are not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Double Extra Strong Pipe is furnished with plain ends and in random lengths.

On sizes 2 1/2-inch and smaller, butt-weld pipe will be furnished unless otherwise specified.

Random lengths: Random lengths of Double Extra Strong Pipe are considered to be 12 feet to 22 feet, we to have the privilege, however, of supplying not exceeding 5 per cent of total order in lengths 6 feet to 12 feet.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads only or with threads and couplings, an extra charge will be made above plain ends.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

General notes... page 574

Standard Bundling Schedule... page 578

Hydraulic Pipe

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness		Weight per Foot Plain Ends Pounds	Test Pressure Pounds per Square Inch
		Ex- ternal Inches	In- ternal Inches	Fraction Inches	Decimal Inches		
9	6.01	9.625	8.375	5/8	.625	60.08	1600
	7.11		8.125	3/4	.750	71.09	1700
	8.18		7.875	7/8	.875	81.77	1800
	9.22		7.625	1	1.000	92.12	1800
10	6.76	10.750	9.500	5/8	.625	67.59	1400
	8.01		9.250	3/4	.750	80.10	1500
	9.23		9.000	7/8	.875	92.28	1600
	10.42		8.750	1	1.000	104.13	1800
11	7.43	11.750	10.500	5/8	.625	74.26	1300
	8.82		10.250	3/4	.750	88.11	1400
	10.17		10.000	7/8	.875	101.63	1500
	11.49		9.750	1	1.000	114.81	1600
12	8.10	12.750	11.500	5/8	.625	80.94	1200
	9.62		11.250	3/4	.750	96.12	1300
	11.10		11.000	7/8	.875	110.97	1400
	12.55		10.750	1	1.000	125.49	1500

Unless otherwise ordered: Unless otherwise ordered, Hydraulic Pipe is furnished with plain ends and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

Orders should specify internal diameter or weight desired.

General notes... page 574

Reamed and Drifted Pipe

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness Inches	Weight per Foot		Number of Threads per Inch	Test Pressure Pounds per Square Inch	
		External Inches	Internal Inches		Plain Ends Pounds	Threads and Couplings Pounds		Butt- Weld	Lap- Weld
1	.17	1.315	1.049	.133	1.67	1.70	11½	700	
1¼	.23	1.660	1.380	.140	2.27	2.30	11½	1000	
1½	.27½	1.900	1.610	.145	2.71	2.75	11½	1000	
2	.37 .40	2.375	2.067 2.041	.154 .167	3.65 3.93	3.75 4.00	11½	1000	1800 2200
2½	.58½	2.875	2.469	.203	5.79	5.90	8	1000	1500
3	.76½	3.500	3.068	.216	7.57	7.70	8	1000	1500
3½	.92	4.000	3.548	.226	9.10	9.25	8		1000
4	1.09	4.500	4.026	.237	10.79	11.00	8		1000
*4½	1.27	5.000	4.506	.247	12.53	12.80	8		1000
5	1.48	5.563	5.047	.258	14.61	15.00	8		1000
6	1.92	6.625	6.065	.280	18.97	19.45	8		1000

*This size is listed as standard but is not commonly used.

Unless otherwise ordered: Unless otherwise ordered, Reamed and Drifted Pipe is furnished with threads and couplings and in random lengths, 20 feet and shorter.

Threads: The taper of threads is ¾-inch per foot, measured on the diameter for all sizes.

Weights: The permissible variation in weight is

5 per cent above and 5 per cent below.

The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling, but shipping lengths of small sizes will usually average less than 20 feet.

2-inch size: On sizes made in more than one weight, weight desired must be specified.

General notes....page 574

Standard Bundling Schedule

Number of Pieces, Average Feet, and Average Weight of Pipe, per Bundle

Size Inches	Standard Pipe			Extra Strong Pipe			Double Extra Strong Pipe		
	Number of Pieces per Bundle	Average, per Bundle		Number of Pieces per Bundle	Average, per Bundle		Number of Pieces per Bundle	Average, per Bundle	
		Number of Feet	Weight Pounds		Number of Feet	Weight Pounds		Number of Feet	Weight Pounds
⅛	30	500	123	30	500	157			
¼	24	420	179	24	400	214			
⅜	18	340	193	18	330	244			
½	12	240	204	12	230	250	7	130	223
¾	7	140	159	7	140	206	5	95	232
1	5	100	168	5	100	217	3	60	220
1¼	3	60	137	3	60	180	3	60	313
1½	3	60	164	3	60	218	3	60	384

Order sizes ⅛ to 1½-inch by Bundle.

Order sizes 2-inch and larger by lengths, using 20 feet as average length.

Large O.D. Pipe

Plain Ends

All Dimensions and Weights Are Nominal

Size O.D.	Thick- ness	List Prices	Weight per Foot	Test Pressure Pounds per Square Inch			Size O.D.	Thick- ness	List Prices	Weight per Foot	Test Pressure Pounds per Square Inch		
				Welded	Seamless						Welded	Seamless	
					Low Carbon	Me- dium Carbon						Low Carbon	Me- dium Carbon
Inches	Inches	Per Foot	Pounds				Inches	Inches	Per Foot	Pounds			
14	1/4	3.67	36.71	550			18	5/16	5.90	59.03	500	500	600
	5/16	4.56	45.68	650	650	750		3/8	7.05	70.58	650	650	700
	3/8	5.45	54.56	800	800	900		7/16	8.20	82.06	750	750	850
	7/16	6.33	63.37	950	950	1100		1/2	9.34	93.45	850	850	950
	1/2	7.20	72.09	1100	1100	1200		9/16	10.47	104.75	950	950	1100
	9/16	8.07	80.72	1200	1200	1400		5/8	11.59	115.97	1000	1000	1200
	5/8	8.92	89.27	1300	1300	1500		11/16	12.71	127.11	1100	1100	1300
	11/16	9.77	97.74	1500	1500	1700		3/4	13.81	138.17	1300	1300	1400
	3/4	10.61	106.13	1600	1600	1800		7/8	16.00	160.03	1500		
15	7/8	12.26	122.65	1900			20	5/16	6.57	65.70	450	450	550
	1/4	3.93	39.38	500				3/8	7.85	78.59	550	550	650
	5/16	4.90	49.02	650				7/16	9.14	91.40	650	650	750
	3/8	5.85	58.57	750				1/2	10.41	104.13	750	750	850
	7/16	6.80	68.04	900				9/16	11.67	116.77	850	850	950
	1/2	7.74	77.43	1000				5/8	12.93	129.33	950	950	1100
	9/16	8.67	86.73	1100				11/16	14.18	141.80	1000	1000	1200
	5/8	9.59	95.95	1300				3/4	15.41	154.19	1100	1100	1300
	11/16	10.50	105.09	1400				7/8	17.87	178.72	1300		
16	3/4	11.41	114.14	1500			22	5/16	7.23	72.38	450	450	500
	7/8	13.20	132.00	1800				3/8	8.66	86.60	500	500	600
	1/4	4.20	42.05	450				7/16	10.07	100.75	600	600	700
	5/16	5.23	52.35	600	600	650		1/2	11.48	114.81	700	700	750
	3/8	6.25	62.57	700	700	800		9/16	12.87	128.78	750	750	850
	7/16	7.27	72.71	800	800	950		5/8	14.26	142.68	850	850	950
	1/2	8.27	82.77	950	950	1100		11/16	15.64	156.48	950	950	1100
	9/16	9.27	92.74	1100	1100	1200		3/4	17.02	170.21	1000	1000	1200
	5/8	10.26	102.62	1200	1200	1300		24	7/8	9.46	94.61	450	450	550
11/16	11.24	112.43	1300	1300	1500	7/16	11.00		110.09	550	550	600	
3/4	12.21	122.15	1400	1400	1600	1/2	12.54		125.49	650	650	700	
7/8	14.13	141.34	1600			9/16	14.08		140.80	700	700	800	
						5/8	15.60		156.03	800	800	900	
						11/16	17.11		171.17	850	850	950	
						3/4	18.62		186.23	950	950	1100	

Unless otherwise ordered: Unless otherwise ordered, Large O.D. Pipe is furnished with plain ends and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads, couplings: For pipe fitted with threads

only or with threads and couplings, an extra charge will be made above plain ends.

Weights: The permissible variation in weight is 10 per cent above and 10 per cent below.

Other sizes: Prices, dimensions, weights, and test pressures on 17 and 21-inch O.D. sizes and on sizes 26-inch O.D. and larger, are furnished on application.

A. P. I. Line Pipe

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thickness	Weight per Foot		Number of Threads per Inch	Test Pressure Pounds per Square Inch		
		External	Internal		Plain Ends	Threads and Couplings		Butt-Weld	*Lap-Weld and Grade "A" Seam-less	Grade "B" Seam-less
Inches	Per Foot	Inches	Inches	Inches	Pounds	Pounds				
1/8	.06	.405	.269	.068	.24	.25	27	700	1000	1000
1/4	.06 1/2	.540	.364	.088	.42	.43	18	700	1000	1000
3/8	.06 1/2	.675	.493	.091	.56	.57	18	700	1000	1000
1/2	.09	.840	.622	.109	.85	.86	14	700	1000	1000
3/4	.12	1.050	.824	.113	1.13	1.14	14	700	1000	1000
1	.17 1/2	1.315	1.049	.133	1.67	1.70	11 1/2	700	1000	1000
1 1/4	.23 1/2	1.660	1.380	.140	2.27	2.30	11 1/2	1200	2500	2500
1 1/2	.28	1.900	1.610	.145	2.71	2.75	11 1/2	1200	2300	2500
2	.37 1/2	2.375	2.067	.154	3.65	3.75	11 1/2	1200	2000	2200
2 1/2	.59	2.875	2.469	.203	5.79	5.90	8	1200	2100	2400
3	.77	3.500	3.068	.216	7.57	7.70	8	1200	1900	2100
3 1/2	.93	4.000	3.548	.226	9.10	9.25	8		1700	1900
4	1.10	4.500	4.026	.237	10.79	11.00	8		1600	1800
5	1.50	5.563	5.047	.258	14.61	15.00	8		1400	1600
6	1.94	6.625	6.065	.280	18.97	19.45	8		1300	1400
†8	2.54	8.625	8.071	.277	24.69	25.55	8		950	1100
	2.92		7.981	.322	28.55	29.35			1100	1300
†10	3.25	10.750	10.192	.279	31.20	32.75	8		800	900
	3.55		10.136	.307	34.24	35.75			850	950
	4.17		10.020	.365	40.48	41.85			1000	1200
†12	4.55	12.750	12.090	.330	43.77	45.45	8		800	900
	5.12		12.000	.375	49.56	51.15			900	1000
14 OD	5.68	14.000	13.250	.375	54.56	57.00	8		800	900
15 OD	6.18	15.000	14.250	.375	58.57	61.15	8		750	850
16 OD	6.60	16.000	15.250	.375	62.57	65.30	8		700	800
17 OD	7.30	17.000	16.214	.393	69.70	73.20	8		700	800
18 OD	8.10	18.000	17.182	.409	76.84	81.20	8		700	750
20 OD	9.00	20.000	19.182	.409	85.57	90.00	8		600	700

*Lap-Weld not furnished in sizes below 2 inches.

Unless otherwise ordered: Unless otherwise ordered, A. P. I. Line Pipe is furnished with threads and couplings and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated pipe: For galvanized or coated pipe, an extra charge will be made above Black.

Threads: The taper of threads is 3/4-inch per foot,

measured on the diameter for all sizes.

Weights: The permissible variation in weight for any length of pipe is 10 per cent above and 3 1/2 per cent below, but the carload weight shall not be more than 1 3/4 per cent under the nominal weight.

The weight per foot of pipe with threads and couplings is based on a length of 20 feet, including the coupling.

†8, 10, and 12-inch sizes: On sizes made in more than one weight, weight desired must be specified.

Merchant Casing

For Water Wells and Irrigation Purposes

All Dimensions and Weights Are Nominal

Size Inches	List Prices Per Foot	Diameters		Thickness Inches	Weight per Foot		Number of Threads per Inch	Test Pressure Pounds per Square Inch Lap-Weld and Seamless Grade "A"
		External Inches	Internal Inches		Plain Ends Pounds	Threads and Couplings Pounds		
2	.33	2.250	2.050	.100	2.29	2.34	14	500
2 1/4	.33	2.500	2.284	.108	2.75	2.82	14	500
*2 1/2	.33	2.750	2.524	.113	3.18	3.25	14	500
2 3/4	.40	3.000	2.768	.116	3.57	3.65	14	500
3	.41	3.250	3.010	.120	4.01	4.10	14	500
3 1/4	.46	3.500	3.250	.125	4.50	4.60	14	500
*3 1/2	.51	3.750	3.492	.129	4.98	5.10	14	500
3 3/4	.56 1/2	4.000	3.732	.134	5.53	5.65	14	500
4	.62	4.250	3.974	.138	6.06	6.20	14	500
4 1/4	.68 1/2	4.500	4.216	.142	6.60	6.75	14	500
4 1/2	.74	4.750	4.460	.145	7.13	7.25	14	500
4 3/4	.81	5.000	4.696	.152	7.87	8.00	14	500
5	.85	5.250	4.944	.153	8.32	8.50	14	500
5 3/16	.90	5.500	5.192	.154	8.79	9.00	14	500
5 5/8	1.05	6.000	5.672	.164	10.22	10.50	14	500
6 1/4	1.20	6.625	6.287	.169	11.65	12.00	14	500
6 5/8	1.35	7.000	6.652	.174	12.68	13.00	14	500
*7 1/4	1.48	7.625	7.263	.181	14.39	14.75	14	500
7 5/8	1.60	8.000	7.628	.186	15.52	16.00	11 1/2	500
8 1/4	1.75	8.625	8.249	.188	16.94	17.50	11 1/2	500
8 5/8	1.90	9.000	8.608	.196	18.42	19.00	11 1/2	500
9 5/8	2.28	10.000	9.582	.209	21.85	22.75	11 1/2	500
*10 5/8	2.68	11.000	10.552	.224	25.78	26.75	11 1/2	500
11 5/8	3.15	12.000	11.514	.243	30.51	31.50	11 1/2	500
12 1/2	3.65	13.000	12.482	.259	35.24	36.50	11 1/2	500
13 1/2	4.20	14.000	13.448	.276	40.45	42.00	11 1/2	500
14 1/2	4.75	15.000	14.418	.291	45.71	47.50	11 1/2	500
15 1/2	5.25	16.000	15.396	.302	50.63	52.50	11 1/2	500

*These sizes are listed as standard but are not commonly used; earlier delivery can generally be made of other sizes.

Unless otherwise ordered: Unless otherwise ordered, Merchant Casing is furnished with threads and couplings and in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Galvanized or coated casing: For galvanized or coated casing, an extra charge will be made above Black.

Threads: The taper of threads is 3/8-inch per foot,

measured on the diameter for all sizes.

The thickness of walls makes it impracticable to cut threads of coarser pitch than shown on the table.

Weights: The permissible variation in weight is 5 per cent above and 5 per cent below.

The weight per foot of casing with threads and couplings is based on a length of 20 feet, including the coupling.

Inserted Joint Casing

All Dimensions and Weights Are Nominal

Size	List Prices	Diameters		Thick-ness	Weight per Foot	Number of Threads per Inch	Joint		Test Pressure Pounds per Square Inch
		External	Internal				Length of Joint	Diameter of Joint	
Inches	Per Foot	Inches	Inches	Inches	Pounds		Inches	Inches	Lap-Weld and Seamless Grade "A"
2	.33	2.250	2.050	.100	2.29	14	.968	2.340	1300
2 1/4	.33	2.500	2.284	.108	2.75	14	.993	2.606	1300
*2 1/2	.33	2.750	2.524	.113	3.18	14	1.018	2.866	1200
2 3/4	.40	3.000	2.768	.116	3.57	14	1.043	3.122	1200
3	.41	3.250	3.010	.120	4.01	14	1.068	3.380	1100
3 1/4	.46	3.500	3.250	.125	4.50	14	1.093	3.640	1100
*3 1/2	.51	3.750	3.492	.129	4.98	14	1.118	3.898	1000
3 3/4	.56 1/2	4.000	3.732	.134	5.53	14	1.143	4.158	1000
4	.62	4.250	3.974	.138	6.06	14	1.168	4.416	950
4 1/4	.68 1/2	4.500	4.216	.142	6.60	14	1.193	4.674	950
4 1/2	.74	4.750	4.460	.145	7.13	14	1.218	4.930	900
4 3/4	.81	5.000	4.696	.152	7.87	14	1.243	5.194	900
5	.85	5.250	4.944	.153	8.32	14	1.268	5.446	850
5 3/16	.90	5.500	5.192	.154	8.79	14	1.293	5.698	850
5 5/8	1.05	6.000	5.672	.164	10.22	14	1.343	6.218	800
5 5/8	1.20	6.000	5.620	.190	11.78	11 1/2	1.374	6.246	950
6 1/4	1.20	6.625	6.287	.169	11.65	14	1.405	6.853	750
6 5/8	1.35	7.000	6.652	.174	12.68	14	1.443	7.238	750
*7 1/4	1.48	7.625	7.263	.181	14.39	14	1.505	7.877	700
7 5/8	1.60	8.000	7.628	.186	15.52	11 1/2	1.574	8.238	700
8 1/4	1.75	8.625	8.249	.188	16.94	11 1/2	1.636	8.867	650
8 5/8	1.90	9.000	8.608	.196	18.42	11 1/2	1.674	9.258	650
9 5/8	2.28	10.000	9.582	.209	21.85	11 1/2	1.774	10.284	650
*10 5/8	2.68	11.000	10.552	.224	25.78	11 1/2	1.874	11.314	600
11 5/8	3.15	12.000	11.514	.243	30.51	11 1/2	1.974	12.352	600
12 1/2	3.65	13.000	12.482	.259	35.24	11 1/2	2.074	13.384	600
13 1/2	4.20	14.000	13.448	.276	40.45	11 1/2	2.174	14.418	600
14 1/2	4.75	15.000	14.418	.291	45.71	11 1/2	2.274	15.448	600
15 1/2	5.25	16.000	15.396	.302	50.63	11 1/2	2.374	16.470	550

*These sizes are listed as standard but are not commonly used; earlier delivery can generally be made of other sizes.

Unless otherwise ordered: Unless otherwise ordered, Inserted Joint Casing is furnished in random lengths.

Cut lengths: For cut lengths, an extra charge will be made above random lengths.

Threads: The taper of threads is $\frac{3}{8}$ -inch per foot, measured on the diameter for all sizes.

The thickness of walls makes it impracticable to cut threads of coarser pitch than shown on the table.

Galvanized or coated casing: For galvanized or coated casing, an extra charge will be made above Black.

Weights: The permissible variation in weight is 10 per cent above and 5 per cent below.

Boiler Tubes

Boiler Tube Sizes
Dimensions and Weights — Prices on Application

Size O.D. Inches	Thickness Minimum		*Wt. Pounds per Foot	Size O.D. Inches	Thickness Minimum		*Wt. Pounds per Foot	Size O.D. Inches	Thickness Minimum		*Wt. Pounds per Foot	Size O.D. Inches	Thickness Minimum		*Wt. Pounds per Foot
	B.W.G.	Dec- imal of Inch			B.W.G.	Dec- imal of Inch			B.W.G.	Dec- imal of Inch			B.W.G.	Dec- imal of Inch	
1	13	.095	1.037	2	13	.095	2.201	3	12	.109	3.838	4½	10	.134	7.103
	12	.109	1.168		12	.109	2.503		11	.120	4.189		9	.148	7.817
	11	.120	1.263		11	.120	2.726		10	.134	4.652		8	.165	8.702
	10	.134	1.384		10	.134	3.018		9	.148	5.110		7	.180	9.447
1¼	13	.095	1.328	2¼	13	.095	2.492	3¼	11	.120	4.555	5	9	.148	8.720
	12	.109	1.502		12	.109	2.837		10	.134	5.061		8	.165	9.711
	11	.120	1.628		11	.120	3.092		9	.148	5.561		7	.180	10.550
	10	.134	1.793		10	.134	3.427		8	.165	6.179		6	.203	11.810
1½	13	.095	1.619	2½	12	.109	3.171	3½	11	.120	4.921	5½	9	.148	9.622
	12	.109	1.836		11	.120	3.457		10	.134	5.469		8	.165	10.720
	11	.120	1.994		10	.134	3.835		9	.148	6.012		7	.180	11.650
	10	.134	2.201		9	.148	4.207		8	.165	6.683		6	.203	13.050
1¾	13	.095	1.910	2¾	12	.109	3.504	4	10	.134	6.286	6	7	.180	12.750
	12	.109	2.169		11	.120	3.823		9	.148	6.915		6	.203	14.290
	11	.120	2.360		10	.134	4.244		8	.165	7.693		5	.220	15.410
	10	.134	2.610		9	.148	4.658		7	.180	8.347		4	.238	16.640

These are the Manufacturing Weights.

General notes . . . page 574

Under the permissible variations allowed in the A.S.T.M. Standard Specification A-83-40, and the A.S.M.E. Boiler Code, the tubing furnished on an order cannot be lighter in weight than that of the gauge thickness specified. Since manufacturing to exact specifications is impossible, the variations are

represented by heavier wall thickness and over-weight. Prices are based on actual weight.

Dimensions and weights for Boiler Tubes more than four gauges heavier than Standard and for sizes larger than 6-inch O.D. are furnished on application.

Brass and Copper Pipe

Standard Pipe Sizes
Dimensions and Weights—Prices on Application

Nominal Size (Iron Pipe Size) Inches	Regular				
	Diameters		Wall Thick- ness Inches	Weight, Pounds Per Linear Foot	
	Ex- ternal Inches	In- ternal Inches		Red Brass	Copper
⅛	.405	.281	.0620	.2533	.2590
¼	.540	.375	.0825	.4496	.4596
⅜	.675	.494	.0905	.6302	.6441
½	.840	.625	.1075	.9381	.9588
¾	1.050	.822	.1140	1.271	1.299
1	1.315	1.062	.1265	1.791	1.831
1¼	1.660	1.368	.1460	2.633	2.692
1½	1.900	1.600	.1500	3.127	3.196
2	2.375	2.062	.1565	4.136	4.228
2½	2.875	2.500	.1875	6.003	6.136
3	3.500	3.062	.2190	8.560	8.750
3½	4.000	3.500	.2500	11.17	11.42
4	4.500	4.000	.2500	12.66	12.94
5	5.563	5.063	.2505	15.85	16.20
6	6.625	6.125	.2500	18.99	19.41
8	8.625	8.000	.3125	30.95	31.63
10	10.750	10.019	.3655	45.22	46.22
12	12.750	12.000	.3750	55.28	56.51

Ordering: Unless otherwise ordered, Brass or Copper Pipe is furnished with plain ends.

When Brass Pipe is ordered, regular weight Red Brass Pipe will be furnished unless another type of brass is specified.

Lengths: Commercial lengths regularly available are 12 and 20 feet. Intermediate or shorter lengths are cut to order only.

Weights: Actual weights of Brass and Copper Pipe will vary slightly from the theoretical weights shown in the accompanying table.

Gauge tubing: Seamless brass or copper tubing in nominal or outside diameters, sizes ⅛ to 10-inch, can be supplied in any gauge. Prices, based upon direct shipment, are furnished on application.

Extra strong pipe: Brass and Copper pipe, made to the extra strong thicknesses and regular outside diameter up to 10-inch nominal pipe size can be furnished on special order, when so specified. Prices and complete information are furnished on application.

Types K, L, and O Copper Tubing
for Solder-Joint Valves and Fittings . . . page 512

Type B, Thin Wall Copper Tubing
for Crane-Seal Valves and Fittings . . . page 498

American Standard for Wrought-Iron and Wrought-Steel Pipe

The American Standards Association, during November, 1935, approved the American Tentative Standard for Wrought-Iron and Wrought-Steel Pipe, known as ASA B36.10-1935. In April, 1939, the American Standards Association approved an Addendum to this Standard, bringing it up-to-date and advancing it to the status of a full "American Standard" (ASA B36.10-1939).

In developing the American Tentative Standard, the Sectional Committee, composed of members from The American Society for Testing Materials and the American Society of Mechanical Engineers, with the co-operation of the industry, selected from the existing list of over-lapping sizes and thicknesses certain well-defined schedules of pipe wall thicknesses covering a wide range of pressure-stress ratios. In this way the diversified needs of the piping industry have been provided for with the smallest practicable number of pipe wall thicknesses in each size.

For the convenience of users, this American Standard (ASA B36.10-1939) is reprinted here; the Introductory Notes are shown below, and Tables 1 to 5 inclusive appear on the three pages which follow.

Introductory Notes

1 Scope: These standards shall be known as the "American Standard for Wrought-Iron and Wrought-Steel Pipe". The word "pipe" is used as distinguished from "tubing", restricting the term "pipe" and therefore the scope of these standards, to apply to tubular products of dimensions and materials commonly used for pipe lines and connections.

2 Size: The "size" of pipe for all schedules in Tables 2, 3, 4, and 5 is identified by the "nominal pipe size". For 14 inches and larger, "size" corresponds to the outside diameter of the pipe.

3 Materials: The dimensional standards for pipe described herein are based on products such as are covered by the A.S.T.M. and A.P.I. specifications outlined in Table 1.

It is recommended that material be ordered and made in accordance with these specifications or any subsequent revisions thereof.

4 Wall Thickness: The nominal wall thicknesses are given in Table 2 for steel pipe, and in Table 4 for wrought-iron pipe.

5 Weights: The nominal weights of steel pipe are listed in Table 3, and correspond to the respective wall thicknesses given in Table 2. The nominal weights of wrought-iron pipe are listed in Table 5 and correspond to the respective wall thicknesses given in Table 4.

A pipe size may be designated by giving the nominal pipe size and wall thickness, or the nominal pipe size and weight per foot.

6 Permissible Variations: Unless otherwise pro-

vided by the specification, the actual wall thickness at any point shall not be more than 12.5 per cent under the nominal wall thickness shown in the tables. Permissible variations for other dimensions are indicated in each specification.

7 Screw Threads: Unless otherwise specified, the screw threads of threaded pipe and couplings shall conform to American Standard for Pipe Threads (ASA B2) as approved by American Standards Association; or in the case of threaded line pipe as used in the petroleum and gas industries, the screw threads shall conform to the standard of the American Petroleum Institute for line pipe (A.P.I. 5-L).

8 Schedule Numbers: As stated under Tables 2, 3, 4, and 5 the schedule numbers indicate approximate values for the expression $1000 \times P/S$. This permits an approximation of the wall thickness if the service pressure and the value of allowable stress for the material and service conditions are known. Recommended values of "S", the allowable stress, may be obtained by reference to engineering codes such as the A.S.M.E. Boiler Code, the American Standard Code for Pressure Piping (ASA B31.1), etc.

It is contemplated that the user will compute the exact value of wall thickness suitable for the conditions for which the pipe is required, as described in detail in the A.S.M.E. Boiler Code, American Tentative Standard Code for Pressure Piping (ASA B31.1), etc. From the schedules of nominal thicknesses contained herein, a thickness may then be selected to suit the value computed to fulfill the conditions for which the pipe is desired.

Table 1 (Part 1) Specifications for Pipe, With the Tensile Strengths Called for and the Corresponding Uses for Which Each Material Is Intended

ASA Designation	Title Standard Specifications	Tensile Strength Lbs. per Sq. In.	Scope
B36.1	Welded and Seamless Steel Pipe. (A.S.T.M. A 53)	Welded, bessemer, 50,000 min. Welded, open-hearth, 45,000 min Seamless, low carbon, 48,000 min Seamless, medium, 62,000 min	Commercial steel pipe for general uses, also for coiling, bending, flanging, and similar forming operations when so specified.
B36.2	Welded Wrought-Iron Pipe (A.S.T.M. A 72)	40,000 min	Commercial wrought-iron pipe for general uses, also for coiling, bending, flanging, & other special purposes.
B36.3	Lap-Welded and Seamless Steel Pipe for High Temperature Service (A.S.T.M. A 106)	Welded, open-hearth, 45,000 min Seamless, Grade A, 48,000 min Seamless, Grade B, 62,000 min Seamless, Grade C, 75,000 min	Lap-welded and seamless steel pipe for high temperature service. Suitable for bending, flanging, and similar forming operations.
B36.4	Electric-Fusion-Welded Steel Pipe, Sizes 30" and Over (A.S.T.M. A 134)	Material as specified from a list of A.S.T.M. Standards included in A 134	Covers pipe 30 inch diameter and over in wall thicknesses up to $\frac{3}{4}$ inch, inclusive, fabricated from steel plates by electric fusion welding.
B36.5	Electric-Resistance-Welded Steel Pipe. (A.S.T.M. A 135)	Grade A, 48,000 min Grade B, 60,000 min	Pipe up to 30" incl., for liquids, gas, or vapor at temperatures below 450° F. Adapted for flanging, bending, and similar forming operations in Grade A class.
B36.6	Forged-Welded Steel Pipe (A.S.T.M. A 136)	Grade A, 45,000 min Grade B, 50,000 min	Covers sizes 14 to 96", wall thicknesses $\frac{1}{4}$ to $1\frac{1}{4}$ ", forged-welded from steel plates and intended for various uses.
B36.7	Lock-Bar Steel Pipe (A.S.T.M. A 137)	Plates, 55,000 to 65,000 Lock-bars, 40,000 to 50,000	Covers sizes 20 to 72", wall thicknesses $\frac{3}{8}$ to $\frac{1}{2}$ ", fabricated from plates, with H-shaped lock bars for the longitudinal seams. Suitable for conveying liquids or gases.
B36.8	Riveted Steel and Wrought-Iron Pipe (A.S.T.M. A 138)	Plates, steel, 55,000 to 65,000 Plates, wrought-iron, Class A, 48,000 min; B, 47,000 min Rivet bar stock, steel, 45,000 to 55,000; wrought-iron, 47,000 min	Shop-fabricated pipe suitable for conveying liquids or gases; made from steel or wrought-iron plates with riveted seams.
B36.9	Electric-Fusion-Welded Steel Pipe, 8" to but not including 30" (A.S.T.M. A 139)	Grade A, 48,000 min Grade B, 60,000 min or other suitable materials as specified from a list of A.S.T.M. Standards	Covers sizes 8 inch up to but not including 30 inch in wall thicknesses not over $\frac{3}{4}$ inch, fabricated from steel plates by electric fusion welding. Intended for conveying liquids, gas, or vapor at temperatures below 450° F. Adapted for flanging and bending.
B36.11	Electric-Fusion-Welded Steel Pipe for High-Temperature High-Pressure Service (A.S.T.M. A 155-36)	Grade A, 45,000 min Grade B, 50,000 min Grade C, 55,000 min	Covers pipe 18" OD and over for high-temperature and high-pressure service. Suitable for bending, flanging, corrugating, and similar forming operations. Welding in accordance with Part U-68 of the A.S.M.E. Code for Unfired Pressure Vessels.
G8.7	Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses (A.S.T.M. A 120)	(See Footnote)	Commercial steel pipe for ordinary uses such as low-pressure steam, liquid, or gas lines. Not intended for coiling or close bending, nor for high temperature service.

Table 1 (Part 2) A.P.I. and A.S.T.M. Specifications for Pipe, With Tensile Strengths Called for and the Corresponding Uses for Which Each Material Is Intended

(These three specifications do not constitute part of this American Standard but are included for information only.)

Title	Tensile Strength Lbs. per Sq. In.	Scope
Line Pipe Specifications (A.P.I. 5-L)	Furnace welded: Bessemer, 50,000 min Open-hearth, Class I, 45,000 min Open-hearth, Class II, 48,000 min Wrought iron, 42,000 min Seamless or electric welded: Open-hearth, Grade A, 48,000 min Open-hearth, Grade B, 60,000 min Open-hearth, Grade C, 75,000 min Seamless or furnace welded: Open-hearth iron, 42,000 min	Pipe for line pipe purposes, to convey gas, water, or oil. Sizes covered, $\frac{1}{8}$ inch nominal size to 24-inch outside diameter. Couplings for threaded line pipe are of special design. Threads on pipe and in couplings are subject to official gage limits. Due to the heavier weight of couplings the nominal weights of line pipe are somewhat greater than given in Tables 3 and 5.
Seamless Carbon-Molybdenum Alloy-Steel Pipe for Service at Temperatures from 750 to 1000 F. (A.S.T.M. A206-38T)	55,000 min	Seamless carbon— $\frac{1}{2}$ per cent molybdenum alloy steel pipe intended for service at metal temperatures from 750 to 1000 F. Suitable for bending, flanging, and similar forming operations, and for fusion welding.
Seamless Alloy-Steel Pipe for Service at Temperatures From 750 to 1100 F. (A.S.T.M. A158-38T)	Ferritic, 60,000 min Austenitic, 75,000 min	Seamless alloy-steel pipe intended for service at metal temperatures from 750 to 1100 F. Several classes of materials that have been rather extensively used are included. Choice from the respective steels should be made on the basis of requirements of design, service conditions, and the physical properties.

Footnote: No physical test requirements are called for in A.S.T.M. A 120 except the mill hydrostatic tests on each length, which are for the same pressures as called for in B36.1 for the respective types and sizes of pipe. As indicated in the title, the purpose of the Society in framing A.S.T.M. A 120 is to provide a medium for the purchase of pipe from warehouse stocks for use under conditions where the physical and chemical properties of the material are of lesser moment.

Table 2 Dimensions of Welded and Seamless Steel Pipe

Nominal Pipe Size	Out- side Diam.	Nominal Wall Thicknesses for Schedule Numbers									
		Schedule 10	Schedule 20	Schedule 30	Schedule 40	Schedule 60	Schedule 80	Schedule 100	Schedule 120	Schedule 140	Schedule 160
1/8	.405	....	....	....	.068	....	.095	....	....	....	....
1/4	.540	....	....	....	.088	....	.119	....	....	....	....
3/8	.675	....	....	....	.091	....	.126	....	....	....	....
1/2	.840	....	....	....	.109	....	.147	....	....	....	.187
3/4	1.050	....	....	....	.113	....	.154	....	....	....	.218
1	1.315	....	....	....	.133	....	.179	....	....	....	.250
1 1/4	1.660	....	....	....	.140	....	.191	....	....	....	.250
1 1/2	1.900	....	....	....	.145	....	.200	....	....	....	.281
2	2.375	....	....	....	.154	....	.218	....	....	....	.343
2 1/2	2.875	....	....	....	.203	....	.276	....	....	....	.375
3	3.500	....	....	....	.216	....	.300	....	....	....	.437
3 1/2	4.00	....	....	....	.226	....	.318	....	....	....	....
4	4.500	....	....	....	.237	....	.337	....	.437	....	.531
5	5.563	....	....	....	.258	....	.375	....	.500	....	.625
6	6.625	....	....	....	.280	....	.432	....	.562	....	.718
8	8.625	....	.250	.277	.322	.406	.500	.593	.718	.812	.906
10	10.75	....	.250	.307	.365	.500	.593	.718	.843	1.000	1.125
12	12.75	....	.250	.330	.406	.562	.687	.843	1.000	1.125	1.312
14 O.D.	14.00	.250	.312	.375	.437	.593	.750	.937	1.062	1.250	1.406
16 O.D.	16.00	.250	.312	.375	.500	.656	.843	1.031	1.218	1.437	1.562
18 O.D.	18.00	.250	.312	.437	.562	.718	.937	1.156	1.343	1.562	1.750
20 O.D.	20.00	.250	.375	.500	.593	.812	1.031	1.250	1.500	1.750	1.937
24 O.D.	24.00	.250	.375	.562	.687	.937	1.218	1.500	1.750	2.062	2.312
30 O.D.	30.00	.312	.500	.625	....	....	....	....	....	....	....

All dimensions are given in inches.

The decimal thicknesses listed for the respective pipe sizes represent their nominal or average wall dimensions. For tolerances on wall thicknesses, see appropriate material specification.

Thicknesses shown in bold face type in Schedules 30 and 40 are identical with thicknesses for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with thicknesses for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$. (See Introductory Notes, Section 8.) Owing to a necessary departure from the old "standard-weight" and "extra-strong" thicknesses in the 12 in. size in Schedules 40 and 60, the new thicknesses are not as yet stocked by all manufacturers and jobbers. Hence, where agreeable to the purchaser and suitable for the service conditions, the old "standard-weight" 0.375 in. wall pipe corresponding to a 1000 P/S value of 37.7 is still available and can be substituted for the 0.406 in. wall, and the old "extra-strong" 0.500 in. wall pipe corresponding to a 1000 P/S value of 55 can be substituted for the 0.562 in. wall.

Table 3 Nominal Weights of Welded and Seamless Steel Pipe¹

Nominal Pipe Size (Inches)	Sched 10 Plain Ends	Sched 20 Plain Ends	Schedule 30		Schedule 40		Sched 60 Plain Ends	Sched 80 Plain Ends	Sched 100 Plain Ends	Sched 120 Plain Ends	Sched 140 Plain Ends	Sched 160 Plain Ends
			Plain Ends	Threads ² and Couplings	Plain Ends	Threads ² and Couplings						
1/8	....	....	....	....	.25	.25	....	.32	....	....	....	....
1/4	....	....	....	....	.43	.43	....	.54	....	....	....	....
3/8	....	....	....	....	.57	.57	....	.74	....	....	....	....
1/2	....	....	....	....	.86	.86	....	1.09	....	....	....	1.31
3/4	....	....	....	....	1.14	1.14	....	1.48	....	....	....	1.94
1	....	....	....	....	1.68	1.69	....	2.18	....	....	....	2.85
1 1/4	....	....	....	....	2.28	2.29	....	3.00	....	....	....	3.77
1 1/2	....	....	....	....	2.72	2.74	....	3.64	....	....	....	4.86
2	....	....	....	....	3.66	3.68	....	5.03	....	....	....	7.45
2 1/2	....	....	....	....	5.80	5.82	....	7.67	....	....	....	10.0
3	....	....	....	....	7.58	7.62	....	10.3	....	....	....	14.3
3 1/2	....	....	....	....	9.11	9.21	....	12.5	....	....	....	....
4	....	....	....	....	10.8	10.9	....	15.0	....	19.0	....	22.6
5	....	....	....	....	14.7	14.9	....	20.8	....	27.1	....	33.0
6	....	....	....	....	19.0	19.2	....	28.6	....	36.4	....	45.3
8	....	22.4	24.7	25.0	28.6	28.8	35.7	43.4	50.9	60.7	67.8	74.7
10	....	28.1	34.3	35.0	40.5	41.2	54.8	64.4	77.0	89.2	105	116
12	....	33.4	43.8	45.0	53.6	55.0	73.2	88.6	103	126	140	161
14 O.D.	36.8	45.7	54.6	....	63.3	....	85.0	107	131	147	171	190
16 O.D.	42.1	52.3	62.6	....	82.8	....	108	137	165	193	224	241
18 O.D.	47.4	59.0	82.0	....	105	....	133	171	208	239	275	304
20 O.D.	52.8	78.6	105	....	123	....	167	209	251	297	342	374
24 O.D.	63.5	94.7	141	....	171	....	231	297	361	416	484	536
30 O.D.	99.0	158	197	....	....	....	....	....	....	....	....	....

¹Weights are given in pounds per linear foot and are for pipe with plain ends except for sizes which are commercially available with threads and couplings for which both weights are listed.

²Weights for line pipe with couplings are slightly greater than shown in Schedules 30 and 40 and may be found in A.P.I. Spec. 5-L. Weights shown in bold face type in Schedules 30 and 40 are identical with weights for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with weights for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$. (See Introductory Notes, Section 8.)

Table 4 Dimensions of Welded Wrought-Iron Pipe

Nominal Pipe Size	Outside Diameter	Nominal Wall Thicknesses for Schedule Numbers					
		Schedule 10	Schedule 20	Schedule 30	Schedule 40	Schedule 60	Schedule 80
$\frac{1}{8}$	.405	....	....	....	.070	....	.098
$\frac{1}{4}$	.540	....	....	....	.090	....	.122
$\frac{3}{8}$	.675	....	....	....	.093	....	.129
$\frac{1}{2}$	.840	....	....	....	.111	....	.151
$\frac{3}{4}$	1.050	....	....	....	.115	....	.157
1	1.315	....	....	....	.136	....	.183
$1\frac{1}{4}$	1.660	....	....	....	.143	....	.195
$1\frac{1}{2}$	1.900	....	....	....	.148	....	.204
2	2.375	....	....	....	.158	....	.223
$2\frac{1}{2}$	2.875	....	....	....	.208	....	.282
3	3.500	....	....	....	.221	....	.306
$3\frac{1}{2}$	4.000	....	....	....	.231	....	.325
4	4.500	....	....	....	.242	....	.344
5	5.563	....	....	....	.263	....	.383
6	6.625	....	....	....	.286	....	.441
8	8.625	....	....	.283	.329	....	.510
10	10.75	....	....	.313	.372	.510	.606
12	12.75	....	....	.336	.414	.574	.702
14 O.D.	14.00	.250	.312	.375	.437	.625	.750
16 O.D.	16.00	.250	.312	.375	.500	.687	....
18 O.D.	18.00	.250	.312	.437	.562	.750	....
20 O.D.	20.00	....	.375	.500	.562	....	....

All dimensions are given in inches.

The decimal thicknesses listed for the respective pipe sizes represent their nominal or average wall dimensions. For tolerances on wall thicknesses, see appropriate material specification.

Thicknesses shown in bold face type in Schedules 30 and 40 are identical with thicknesses for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with thicknesses for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$. (See Introductory Notes, Section 8.)

Owing to a necessary departure from the old "standard-weight" and "extra-strong" thicknesses in the 12 in. size in Schedules 40 and 60, the new thicknesses are not as yet stocked by all manufacturers and jobbers. Hence, where agreeable for the purchaser and suitable for the service conditions, the old "standard-weight" 0.382 in. wall pipe corresponding to a $1000 P/S$ value of 38.7 is still available and can be substituted for the 0.414 in. wall, and the old "extra-strong" 0.510 in. wall pipe corresponding to a $1000 P/S$ value of 56.3 can be substituted for the 0.574 in. wall.

Table 5 Nominal Weights of Welded Wrought-Iron Pipe¹

Nominal Pipe Size (Inches)	Schedule 10 Plain Ends	Schedule 20 Plain Ends	Schedule 30		Schedule 40		Schedule 60 Plain Ends	Schedule 80 Plain Ends
			Plain Ends	Threads and Couplings	Plain Ends	Threads and Couplings		
$\frac{1}{8}$					.25	.25	....	.32
$\frac{1}{4}$					.43	.43	....	.54
$\frac{3}{8}$					.57	.57	....	.74
$\frac{1}{2}$					.86	.86	....	1.09
$\frac{3}{4}$					1.14	1.14	....	1.48
1					1.68	1.69	....	2.18
$1\frac{1}{4}$					2.28	2.29	....	3.00
$1\frac{1}{2}$					2.72	2.74	....	3.64
2					3.66	3.68	....	5.03
$2\frac{1}{2}$					5.80	5.82	....	7.67
3					7.58	7.62	....	10.3
$3\frac{1}{2}$					9.11	9.21	....	12.5
4					10.8	10.9	....	15.0
5					14.7	14.9	....	20.8
6					19.0	19.2	....	28.6
8			24.7	25.0	28.6	28.8	....	43.4
10			34.3	35.0	40.5	41.2	54.8	64.4
12			43.8	45.0	53.6	55.0	73.2	88.6
14 O.D.	36.0	44.8	53.6	....	62.2	....	87.6	104
16 O.D.	41.3	51.4	61.4	....	81.2	....	111	....
18 O.D.	46.5	57.9	80.5	....	103	....	136	....
20 O.D.		77.0	103	....	115	....	....	....

¹ Weights are given in pounds per linear foot and are for pipe with plain ends except for sizes which are commercially available with threads and couplings for which both weights are listed.

Weights shown in bold face type in Schedules 30 and 40 are identical with weights for "standard weight" pipe in former lists; those in Schedules 60 and 80 are identical with weights for "extra strong" pipe in former lists.

The Schedule Numbers indicate approximate values of the expression $1000 \times P/S$. (See Introductory Notes, Section 8.)

Standard Wrought Steel Pipe Data

All Dimensions and Weights are Nominal

Size	Diameters		Thick- ness	Circumference		Transverse Areas			Length of Pipe Per Sq. Foot of		Length of Pipe Con- taining One Cubic Foot	Weight per Foot		Number of Threads per Inch of Screw	Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface		Plain Ends	Threaded and Coupled Ends			
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds	Pounds			Pounds
1/8	.405	.269	.068	1.272	.845	.129	.057	.072	9.431	14.199	2533.775	.244	.245	27	.00106	.025
1/4	.540	.364	.088	1.696	1.144	.229	.104	.125	7.073	10.493	1383.789	.424	.425	18	.00331	.045
3/8	.675	.493	.091	2.121	1.549	.358	.191	.167	5.658	7.747	754.360	.567	.568	18	.00729	.083
1/2	.840	.622	.109	2.639	1.954	.554	.304	.250	4.547	6.141	473.906	.850	.852	14	.01709	.132
3/4	1.050	.824	.113	3.299	2.589	.866	.533	.333	3.637	4.635	270.034	1.130	1.134	14	.03704	.231
1	1.315	1.049	.133	4.131	3.296	1.358	.864	.494	2.904	3.641	166.618	1.678	1.684	11 1/2	.08734	.375
1 1/4	1.660	1.380	.140	5.215	4.335	2.164	1.495	.669	2.301	2.767	96.275	2.272	2.281	11 1/2	.1947	.65
1 1/2	1.900	1.610	.145	5.969	5.058	2.835	2.036	.799	2.010	2.372	70.733	2.717	2.731	11 1/2	.3099	.88
2	2.375	2.067	.154	7.461	6.494	4.430	3.355	1.075	1.608	1.847	42.913	3.652	3.678	11 1/2	.6657	1.45
2 1/2	2.875	2.469	.203	9.032	7.757	6.492	4.788	1.704	1.328	1.547	30.077	5.793	5.819	8	1.530	2.07
3	3.500	3.068	.216	10.996	9.638	9.621	7.393	2.228	1.091	1.245	19.479	7.575	7.616	8	3.017	3.20
3 1/2	4.000	3.548	.226	12.566	11.146	12.566	9.886	2.680	.954	1.076	14.565	9.109	9.202	8	4.788	4.29
4	4.500	4.026	.237	14.137	12.648	15.904	12.730	3.174	.848	.948	11.312	10.790	10.889	8	7.233	5.50
4 1/2	5.000	4.506	.247	15.708	14.156	19.635	15.947	3.688	.763	.847	9.030	12.538	12.642	8	10.44	6.91
5	5.563	5.047	.258	17.477	15.856	24.306	20.006	4.300	.686	.756	7.198	14.617	14.810	8	15.16	8.67
6	6.625	6.065	.280	20.813	19.054	34.472	28.891	5.581	.576	.629	4.984	18.974	19.185	8	28.14	12.51
7	7.625	7.023	.301	23.955	22.063	45.664	38.738	6.926	.500	.543	3.717	23.544	23.769	8	46.52	16.80
8	8.625	8.071	.327	27.096	25.356	58.426	51.161	7.265	.442	.473	2.815	24.696	25.000	8	63.35	22.18
9	9.625	9.041	.342	30.238	28.089	72.760	62.786	9.974	.396	.427	2.294	33.907	34.188	8	107.6	27.20
10	10.750	10.192	.379	33.772	32.019	90.763	81.585	9.178	.355	.374	1.765	31.201	32.000	8	125.9	35.37
10	10.750	10.136	.307	33.772	31.843	90.763	80.691	10.072	.355	.376	1.785	34.240	35.000	8	137.4	34.95
10	10.750	10.020	.365	33.772	31.479	90.763	78.855	11.908	.355	.381	1.826	40.483	41.132	8	160.7	34.20
11	11.750	11.000	.375	36.914	34.558	108.434	95.033	13.401	.325	.347	1.515	45.557	46.247	8	217.0	41.20
12	12.750	12.090	.330	40.055	37.982	127.676	114.800	12.876	.299	.315	1.254	43.773	45.000	8	248.5	49.70
12	12.750	12.000	.375	40.055	37.699	127.676	113.097	14.579	.299	.318	1.273	49.562	50.706	8	279.3	49.00

Extra Strong Wrought Steel Pipe Data

All Dimensions and Weights are Nominal

Size	Diameters		Thick- ness	Circumference		Transverse Areas			Length of Pipe per Sq. Ft. of		Length of Pipe Con- taining One Cubic Foot	Weight per Foot		Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface		Plain Ends	Threaded and Coupled Ends		
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds	Pounds		Pounds
1/8	.405	.215	.095	1.272	.675	.129	.036	.093	9.431	17.766	3966.392	.314	.314	.00122	.016
1/4	.540	.302	.119	1.696	.949	.229	.072	.157	7.073	12.648	2010.290	.535	.535	.00377	.031
3/8	.675	.423	.126	2.121	1.329	.358	.141	.217	5.658	9.030	1024.689	.738	.738	.00862	.061
1/2	.840	.546	.147	2.639	1.715	.554	.234	.320	4.547	6.995	615.017	1.087	1.087	.02008	.102
3/4	1.050	.742	.154	3.299	2.331	.866	.433	.433	3.637	5.147	333.016	1.473	1.473	.04479	.188
1	1.315	.957	.179	4.131	3.007	1.358	.719	.639	2.904	3.991	200.193	2.171	2.171	.1056	.312
1 1/4	1.660	1.278	.191	5.215	4.015	2.164	1.283	.881	2.301	2.988	112.256	2.996	2.996	.2418	.56
1 1/2	1.900	1.500	.200	5.969	4.712	2.835	1.767	1.068	2.010	2.546	81.487	3.631	3.631	.3912	.77
2	2.375	1.939	.218	7.461	6.092	4.430	2.953	1.477	1.608	1.969	48.766	5.022	5.022	.8679	1.28
2 1/2	2.875	2.323	.276	9.032	7.298	6.492	4.238	2.254	1.328	1.644	33.976	7.661	7.661	1.924	1.87
3	3.500	2.900	.300	10.996	9.111	9.621	6.605	3.016	1.091	1.317	21.801	10.252	10.252	3.894	2.86
3 1/2	4.000	3.364	.318	12.566	10.568	12.566	8.888	3.678	.954	1.135	16.202	12.505	12.505	6.280	3.84
4	4.500	3.826	.337	14.137	12.020	15.904	11.497	4.407	.848	.998	12.525	14.983	14.983	9.610	4.98
4 1/2	5.000	4.290	.355	15.708	13.477	19.635	14.455	5.180	.763	.890	9.962	17.611	17.611	14.05	6.27
5	5.563	4.813	.375	17.477	15.120	24.306	18.194	6.112	.686	.793	7.915	20.778	20.778	20.67	7.88
6	6.625	5.761	.432	20.813	18.099	34.472	26.067	8.405	.576	.663	5.524	28.573	28.573	40.49	11.29
7	7.625	6.625	.500	23.955	20.813	45.664	34.472	11.192	.500	.576	4.177	38.048	38.048	71.37	14.95
8	8.625	7.625	.500	27.096	23.955	58.426	45.663	12.763	.442	.500	3.154	43.388	43.388	105.7	19.78
9	9.625	8.625	.500	30.238	27.096	72.760	58.426	14.334	.396	.442	2.464	48.728	48.728	149.6	25.30
10	10.750	9.750	.500	33.772	30.631	90.763	74.662	16.101	.355	.391	1.929	54.735	54.735	212.0	32.35
11	11.750	10.750	.500	36.914	33.772	108.434	90.763	17.671	.325	.355	1.587	60.075	60.075	280.1	39.40
12	12.750	11.750	.500	40.055	36.914	127.676	108.434	19.242	.299	.325	1.328	65.415	65.415	361.5	46.92

Double Extra Strong Wrought Steel Pipe Data

All Dimensions and Weights are Nominal

Size	Diameters		Thick- ness	Circumference		Transverse Areas			Length of Pipe per Sq. Ft. of		Length of Pipe Con- taining One Cubic Foot	Weight per Foot		Moment of Inertia	Wt. of Water Per Foot
	External	Internal		External	Internal	External	Internal	Metal	External Surface	Internal Surface		Plain Ends	Threaded and Coupled Ends		
Ins.	Inches	Inches	Inches	Inches	Inches	Sq. Ins.	Sq. Ins.	Sq. Ins.	Feet	Feet	Feet	Pounds	Pounds		Pounds
1/2	.840	.252	.294	2.639	.792	.554	.050	.504	4.547	15.157	2887.164	1.714	1.714	.0242	.022
3/4	1.050	.434	.308	3.299	1.363	.866	.148	.718	3.637	8.801	973.404	2.440	2.440	.0579	.064
1	1.315	.599	.358	4.131	1.882	1.358	.282	1.076	2.904	6.376	510.998	3.659	3.659	.1405	.122
1 1/4	1.660	.896	.382	5.215	2.815	2.164	.630	1.534	2.301	4.263	228.379	5.214	5.214	.3411	.273
1 1/2	1.900	1.100	.400	5.969	3.456	2.835	.950	1.885	2.010	3.472	151.526	6.408	6.408	.5678	.42
2	2.375	1.503	.436	7.461	4.722	4.430	1.774	2.656	1.608	2.541	81.162	9.029	9.029	1.311	.77
2 1/2	2.875	1.771	.552	9.032	5.564	6.492	2.464	4.028	1.328	2.156	58.457	13.695	13.695	2.871	1.07
3	3.500	2.300	.600	10.996	7.226	9.621	4.155	5.466	1.091	1.660	34.659	18.583	18.583	5.993	1.80
3 1/2	4.000	2.728	.636	12.566	8.570	12.566	5.845	6.721	.954	1.400	24.637	22.850	22.850	9.848	2.53
4	4.500	3.152	.674	14.137	9.902	15.904	7.803	8.101	.848	1.211	18.454	27.541	27.541	15.28	3.38
4 1/2	5.000	3.580	.710	15.708	11.247	19.635	10.066	9.569	.763	1.066	14.306	32.530	32.530	22.62	4.36
5	5.563	4.063	.750	17.477	12.764	24.306	12.966	11.340	.686	.940	11.107	38.552	38.552	33.63	5.61
6	6.625	4.897	.864	20.813	15.384	34.472	13.835	15.637	.576	.780	7.646	53.160	53.160	66.33	8.16
7	7.625	5.875	.875	23.955	18.457	45.664	27.109	18.555	.500	.650	5.312	63.079	63.079	107.5	11.75
8	8.625	6.875	.875	27.096	21.598	58.426	37.122	21.304	.442	.555	3.879	72.424	72.424	162.0	16.10

For list prices and tests, see pages 575, 576, and 577.

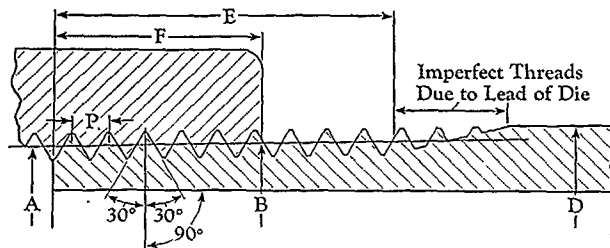
Internal Fluid Pressures for Pipe

D = Outside diameter in inches. t = Thickness of wall in inches. Based on Barlow's Formula $P = 2f \frac{t}{D}$ P = Pressure in pounds per square inch. f = Fiber stress in pounds per square inch.

Size	External diameter	Thickness	Ultimate bursting pressure		Pressures at various factors of safety									
			Butt-weld	Lap-weld	Factor of safety=5		Factor of safety=6		Factor of safety=8		Factor of safety=10			
			Fiber stress 40,000 lbs. per sq. in.	Fiber stress 50,000 lbs. per sq. in.	Butt-weld fiber stress= 8,000 lbs. per sq. in.	Lap-weld fiber stress= 10,000 lbs. per sq. in.	Butt-weld fiber stress= 6,667 lbs. per sq. in.	Lap-weld fiber stress= 8,333 lbs. per sq. in.	Butt-weld fiber stress= 5,000 lbs. per sq. in.	Lap-weld fiber stress= 6,250 lbs. per sq. in.	Butt-weld fiber stress= 4,000 lbs. per sq. in.	Lap-weld fiber stress= 5,000 lbs. per sq. in.		
Standard Pipe														
1/8	.405	.068	13432		2686		2239		1679		1343			
1/4	.540	.088	13037		2607		2173		1630		1304			
3/8	.675	.091	10785		2157		1798		1348		1079			
1/2	.840	.109	10381		2076		1730		1298		1038			
3/4	1.050	.113	8610		1722		1435		1076		861			
1	1.315	.133	8091		1618		1349		1011		809			
1 1/4	1.660	.140	6747	8434	1349	1687	1124	1406	843	1054	675	843		
1 1/2	1.900	.145	6105	7632	1221	1526	1018	1272	763	954	611	763		
2	2.375	.154	5187	6484	1037	1297	865	1081	648	811	519	648		
2 1/2	2.875	.203	5649	7061	1130	1412	941	1177	706	883	565	706		
3	3.500	.216	4937	6171	987	1234	823	1029	617	771	494	617		
3 1/2	4.000	.226		5650		1130		942		706		565		
4	4.500	.237		5267		1053		878		658		527		
4 1/2	5.000	.247		4940		988		823		618		494		
5	5.563	.258		4638		928		773		580		464		
6	6.625	.280		4226		845		704		528		423		
7	7.625	.301		3948		790		658		493		395		
8	8.625	.277		3212		642		535		401		321		
9	8.625	.322		3733		747		622		467		373		
10	9.625	.342		3553		711		592		444		355		
10	10.750	.279		2595		519		433		324		260		
10	10.750	.307		2856		571		476		357		286		
10	10.750	.365		3395		679		566		424		340		
11	11.750	.375		3191		638		532		399		319		
12	12.750	.330		2588		518		431		324		259		
12	12.750	.375		2941		588		490		368		294		
14 O.D.	14.000	.375		2679		536		446		335		268		
15 O.D.	15.000	.375		2500		500		417		313		250		
16 O.D.	16.000	.375		2344		469		391		293		234		
17 O.D.	17.000	.393		2312		462		385		289		231		
18 O.D.	18.000	.409		2272		454		379		284		227		
20 O.D.	20.000	.409		2045		409		341		256		205		
Extra Strong Pipe														
1/8	.405	.095	18765		3753		3128		2346		1877			
1/4	.540	.119	17630		3526		2938		2204		1763			
3/8	.675	.126	14933		2987		2489		1867		1493			
1/2	.840	.147	14000		2800		2333		1750		1400			
3/4	1.050	.154	11733		2347		1956		1467		1173			
1	1.315	.179	10890		2178		1815		1361		1089			
1 1/4	1.660	.191	9205	11506	1841	2301	1534	1918	1151	1438	920	1151		
1 1/2	1.900	.200	8421	10526	1684	2105	1404	1754	1053	1316	842	1053		
2	2.375	.218	7343	9179	1469	1836	1224	1530	918	1147	734	918		
2 1/2	2.875	.276	7680	9600	1536	1920	1280	1600	960	1200	768	960		
3	3.500	.300	6857	8571	1371	1714	1143	1429	857	1071	686	857		
3 1/2	4.000	.318		7950		1590		1325		994		795		
4	4.500	.337		7489		1498		1248		936		749		
4 1/2	5.000	.355		7100		1420		1183		888		710		
5	5.563	.375		6741		1348		1124		843		674		
6	6.625	.432		6521		1304		1087		815		652		
7	7.625	.500		6557		1311		1093		820		656		
8	8.625	.500		5797		1159		966		725		580		
9	9.625	.500		5195		1039		866		649		519		
10	10.750	.500		4651		930		775		581		465		
11	11.750	.500		4255		851		709		532		426		
12	12.750	.500		3922		784		654		490		392		
Double Extra Strong Pipe														
1/2	.840	.294	28000		5600		4667		3500		2800			
3/4	1.050	.308	23467		4693		3911		2933		2347			
1	1.315	.358	21779		4356		3630		2722		2178			
1 1/4	1.660	.382	18410		3682		3068		2301		1841			
1 1/2	1.900	.400	16842	21053	3368	4211	2807	3509	2105	2632	1684	2105		
2	2.375	.436	14686	18358	2937	3672	2448	3060	1836	2295	1469	1836		
2 1/2	2.875	.552	15360	19200	3072	3840	2560	3200	1920	2400	1536	1920		
3	3.500	.600		17143		3429		2857		2143		1714		
3 1/2	4.000	.636		15900		3180		2650		1988		1590		
4	4.500	.674		14978		2996		2496		1872		1498		
4 1/2	5.000	.710		14200		2840		2367		1775		1420		
5	5.563	.750		13482		2696		2247		1685		1348		
6	6.625	.864		13042		2608		2174		1630		1304		
7	7.625	.875		11475		2295		1913		1434		1148		
8	8.625	.875		10145		2029		1691		1268		1014		

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American Standard Taper Pipe Threads



$$A = D - (0.050D + 1.1)P$$

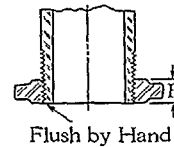
$$B = A + 0.0625P$$

$$E = (0.80D + 6.8)P$$

$$P = \text{Pitch}$$

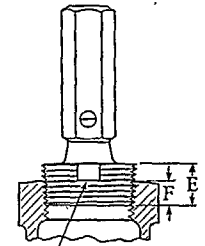
$$\text{Depth of thread} = 0.80P$$

$$\text{Total Taper } \frac{3}{4}\text{-inch per Foot}$$



Tolerance on Product:

One turn large or small from notch on plug gauge or face of ring gauge.



Notch flush with face of fitting. If chamfered, notch flush with bottom of chamfer.

Dimensions, in Inches

Nominal Pipe Size	A	B†	D	E§	F¶ Normal Engagement by Hand between Male and Female Thread	P	Depth of Thread	Number of Threads Per Inch
1/8	0.36351	0.37476	0.405	0.2638	0.180	0.03704	0.02963	27
1/4	0.47739	0.48989	0.540	0.4018	0.200	0.05556	0.04444	18
3/8	0.61201	0.62701	0.675	0.4078	0.240	0.05556	0.04444	18
1/2	0.75843	0.77843	0.840	0.5337	0.320	0.07143	0.05714	14
3/4	0.96768	0.98887	1.050	0.5457	0.339	0.07143	0.05714	14
1	1.21363	1.23863	1.315	0.6828	0.400	0.08696	0.06957	11 1/2
1 1/4	1.55713	1.58338	1.660	0.7068	0.420	0.08696	0.06957	11 1/2
1 1/2	1.79609	1.82234	1.900	0.7235	0.420	0.08696	0.06957	11 1/2
2	2.26902	2.29627	2.375	0.7565	0.436	0.08696	0.06957	11 1/2
2 1/2	2.71953	2.76216	2.875	1.1375	0.682	0.12500	0.10000	8
3	3.34063	3.38850	3.500	1.2000	0.766	0.12500	0.10000	8
3 1/2	3.83750	3.88881	4.000	1.2500	0.821	0.12500	0.10000	8
4	4.33438	4.38713	4.500	1.3000	0.844	0.12500	0.10000	8
5	5.39073	5.44929	5.563	1.4063	0.937	0.12500	0.10000	8
6	6.44609	6.50597	6.625	1.5125	0.958	0.12500	0.10000	8
8	8.43359	8.50003	8.625	1.7125	1.063	0.12500	0.10000	8
10	10.54531	10.62094	10.750	1.9250	1.210	0.12500	0.10000	8
12	12.53281	12.61781	12.750	2.1250	1.360	0.12500	0.10000	8
14 O.D.	13.77500	13.87263	14.000	2.2500	1.562	0.12500	0.10000	8
16 O.D.	15.76250	15.87575	16.000	2.4500	1.812	0.12500	0.10000	8
18 O.D.	17.75000	17.87500	18.000	2.6500	2.000	0.12500	0.10000	8
20 O.D.	19.73750	19.87031	20.000	2.8500	2.125	0.12500	0.10000	8
24 O.D.	23.71250	23.86094	24.000	3.2500	2.375	0.12500	0.10000	8

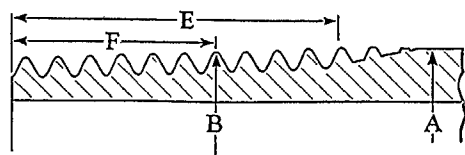
†Also pitch diameter at gauging notch.

§Also length of plug gauge.

¶Also length of ring gauge, and length from gauging notch to small end of plug gauge.

The above information taken from the American Standard for Pipe Threads, A. S. A.—B2.

British Standard Taper Pipe Threads



Whitworth 55° Form of Thread

Total Taper 3/4-inch per Foot

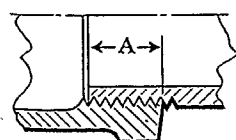
The above information taken from the British Engineering Standards Association Report No. 21

Dimensions, in Inches

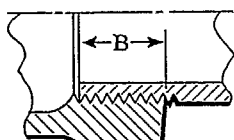
Nominal Bore of Pipe	A Approximate Outside Diameter of Pipe	B Gauge Diameter Top of Thread	Depth of Thread	Number of Threads Per Inch	E Length of Effective Thread	F Distance of Gauge Diameter from End
1/8	1 3/32	.383	.0230	28	3/8	5/32
1/4	1 7/32	.518	.0335	19	7/16	3/16
3/8	1 1/16	.656	.0335	19	1/2	1/4
1/2	1 27/32	.825	.0455	14	5/8	1/4
3/4	1 11/16	1.041	.0455	14	3/4	3/8
1	1 11/32	1.309	.0580	11	7/8	3/8
1 1/4	1 11/16	1.650	.0580	11	1	1/2
1 1/2	1 29/32	1.882	.0580	11	1	1/2
2	2 3/8	2.347	.0580	11	1 1/8	5/8
2 1/2	3	2.960	.0580	11	1 1/4	1 1/16
3	3 1/2	3.460	.0580	11	1 3/8	1 3/16
3 1/2	4	3.950	.0580	11	1 1/2	7/8
4	4 1/2	4.450	.0580	11	1 5/8	1
5	5 1/2	5.450	.0580	11	1 3/4	1 1/8
6	6 1/2	6.450	.0580	11	2	1 3/8
7	7 1/2	7.450	.0640	10	2 1/8	1 3/8
8	8 1/2	8.450	.0640	10	2 1/4	1 1/2
9	9 1/2	9.450	.0640	10	2 1/4	1 1/2
10	10 1/2	10.450	.0640	10	2 3/8	1 5/8
11	11 1/2	11.450	.0800	8	2 1/2	1 5/8
12	12 1/2	12.450	.0800	8	2 1/2	1 5/8

Normal Engagement

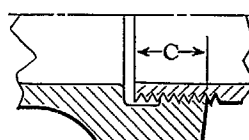
Between Male and Female Threads to Make Tight Joints



American Standard Pipe Threads



A.P.I. Line Pipe Threads



Shoulder Type Drainage Fitting Threads

For normal engagement on Crane Railing Pipe Threads, see page 266.

Size	1/8	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14
A	1/4	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	3/4	1 5/16	1	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16	1 5/8	1 3/4	
B*	1/4	3/8	3/8	1/2	9/16	1 1/16	1 1/16	1 1/16	1	1 5/16	1	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16	1 5/8	1 3/4	
C†					9/16	5/8	5/8	5/8	5/8	7/8	1 5/16	1	1 1/16	1 3/16	1 1/4	1 3/8	1 9/16	1 11/16	1 7/8

Dimensions given do not allow for variations in tapping or threading.

*The length of thread on A.P.I. Line Pipe is identical with that of American Standard Pipe Thread except on the 2-inch size where the A.P.I. Line Pipe Thread is longer. American Standard Pipe Threaded Fittings may be used providing there are no obstructions in the thread chambers to interfere with the

longer A.P.I. Male Thread on the 2-inch size.

†Using American Standard Taper Male Thread with Crane shoulder type Drainage Fittings. The male thread, however, should not be threaded small to gauge and not more than one turn large.

Information on threaded pipe joints ... page 592

Threaded Pipe Joints.

Threads

In screwed joints having strength, tightness, and durability, it is necessary to have clean-cut and uniform threads.

The threads should be tapered and smooth, cut with the correct taper, lead, thread angle, and diameters. Reasonable manufacturing tolerances are allowed on all of the thread elements to take care of variations in threading. The diameters should be such as to allow sufficient hand engagement and yet allow enough threads for wrench or power make-up.

The thread lengths should be long enough to compensate for pipe strains usually present in the various types of thread joint services. A short thread is satisfactory for joints where little or no pipe strains exist, but longer threads are required where extreme pipe strains are encountered, such as in Oil Field Casing Thread joints.

Standardized Threads

Several Standards have been established covering pipe threads for various purposes. The oldest and probably most commonly used is the American Standard for Pipe Threads, known as A.S.A. Standard B-2. There are also the American Petroleum Institute Standards No. 5A, SF, and 5L covering Oil Field Tubular Goods, such as Line Pipe and Casing Threads.

Thread Assembling

In making up screwed pipe joints it is very important that the threads in both parts be thoroughly cleaned. Any threads which may have become burred or bent should be straightened or removed and afterward a good grade of lubricant should be applied to the threads. The lubricant reduces the friction which allows the two parts to be pulled up further, resulting in a more effective pipe joint. Pipe joints should not be screwed together too rapidly and thereby avoid objectionably raising the temperature of the two parts. For Crane Thread Lubricants, see page 548.

Normal Engagements

The normal amount of engagement to make a tight joint for various types of screwed material is given in the table on page 591. These dimensions have been established from tests made under practical working conditions.

The normal engagement specified for American Standard Pipe Thread joints is based on both parts being threaded to the American Standard for Pipe Threads, and for A.P.I. Line Pipe Threads it has been based on using A.P.I. Line Pipe Thread for the male thread and American Standard Pipe Thread or A.P.I. Line Pipe Thread for the female thread. The shoulder type Drainage Fitting Thread engagement is based on using Crane Fittings and American Standard Pipe Thread dimensions on the male thread but holding the male thread to a special tolerance as covered in the foot note of the table.

In order to obtain the thread engagements listed in the table it is necessary to vary the torque or power

applied according to the size, metal and weight of material used. For example, it requires considerably less power to make up a screwed joint using a light brass valve than a high pressure steel valve.

Screwed Companion Flanges

The normal length of thread engagement listed in the table on page 591 does not apply to Screwed Companion Flanges. The length of thread engagement for Screwed Companion Flanges depends upon the weight of the flange, considering pressure, and the type of thread joint employed.

There are two types of threaded flange joints in general use; one where the pipe and the flange are refaced after assembly as distinguished from the other in which the pipe and the flange are not refaced. Pipe threaded for a refaced job should have a thread sufficiently long to extend slightly beyond the face of the flange when assembled, to allow for refacing. For the joint which is not to be refaced, the thread on the pipe should be slightly shorter so that the end of the threaded pipe will be about one thread from the face of the flange when assembled.

Leaky Joints

Leaky joints can usually be traced either to faulty threading or an improper lubricant. Frequently the trouble lies in the thread on the pipe which may have been cut with dull or improperly adjusted threading tools resulting in wavy, shaved, rough or chewed threads.

Wavy threads are noticeable both to the eye and touch, due to circumferential waves or longitudinal flats of slightly helical form rather than the desired true circular form. Shaved threads appear to have been threaded with two dies, one not matching the other, giving a double thread appearance at the start of the thread. Rough or chewed threads are noticeably rough and torn.

Should the threads have any of these defects it is possible that leaky joints might result.

Crane Screwed Materials

Crane threaded materials have smooth, accurately cut threads properly gauged and carefully inspected for taper, lead, thread angle, height, out-of-roundness, and alignment.

They are threaded in compliance with established Standards as the requirements may be, and the start of each thread is properly chamfered for ease in assembling.

Crane Co. has taken extraordinary precautions to insure satisfactory thread joints by maintaining constantly careful inspection of not only the product itself but the threading equipment as well, which is the best available.

A complete gauging system has also been established which includes Master Gauges approved by the National Bureau of Standards, Reference Gauges and Working Gauges. These gauges are checked periodically and frequently so as to keep them well within the allowable tolerances. In fact, Crane threading is held to much closer tolerances than actually required to make a tight joint.

Threading of Material For Use With Oil Country Tubular Goods

The American Petroleum Institute, in an effort to standardize Oil Country Tubular Goods nationally, has published A.P.I. Standards 5A, 5L, and 5F. These Standards contain dimensions of A.P.I. Line Pipe and Casing Threads.

Although the A.P.I. has set up these Standards which are being used throughout the country, there are other threads still being used in the oil industry for which there are no established Standards. The number of threads per inch, diameters of pipe, and taper of threads have been fairly well established by common use. The thread lengths vary considerably as conditions require.

In some instances material having short thread chambers is ordered tapped to suit pipe or casing with long threads. If this material is tapped to the same size as high pressure valves, the end of the casing would come in contact with the internal parts of the valve or the other openings in the fittings before making a joint in the threaded end along the taper. To overcome this condition, it is necessary to either shorten the thread on the casing or tap the valve or fitting to a thread size slightly smaller in diameter. It is our practice to tap all such material small to gauge so that the end of the regular casing does not come in contact with the internal parts of the valve or other openings of the fitting, yet allowing the casing to screw in the maximum amount. This results in exposed threads on the casing after the joint has been made up. The length of exposed thread depends on the fitting or valve and upon the casing thread.

Pages 594 and 595 give the best information available at the present time regarding threads being used in the oil industry.

How to designate threading: Owing to the various kinds of casings used in the oil fields today, it is necessary when ordering valves, fittings, nipples, etc., to be tapped or threaded with casing threads, to designate the threading information in the following manner:

Specifications for valves and fittings tapped with A.P.I. Threads should include the following:

Size, external diameter or external diameter of upset, threads per inch, type of thread and joint:

For example: 8 $\frac{5}{8}$ -inch — 8 $\frac{5}{8}$ -inch O.D. — 8 threads, A.P.I. Standard Round Thread Casing Threads.

8 $\frac{5}{8}$ -inch — 8 $\frac{5}{8}$ -inch O.D. — 8 threads, A.P.I. Long Thread Round Thread Casing Threads.

8 $\frac{5}{8}$ -inch — 8 $\frac{5}{8}$ -inch O.D. — 8 threads, A.P.I. Standard Sharp Thread Casing Threads.

8 $\frac{5}{8}$ -inch — 8 $\frac{5}{8}$ -inch O.D. — 8 threads, A.P.I. Long Thread Sharp Thread Casing Threads.

4 $\frac{3}{4}$ -inch — 5-inch U.D. — 10 threads, A.P.I. Standard Sharp Thread External Upset Casing Threads.

5 $\frac{1}{2}$ -inch — 5 $\frac{1}{2}$ -inch O.D. — 8 threads, A.P.I. Standard Drill Pipe Threads.

3-inch — 3 $\frac{1}{2}$ -inch O.D. — 10 threads, A.P.I. Standard Round Thread Non-Upset Tubing Threads.

3-inch — 3 $\frac{3}{4}$ -inch U.D. — 8 threads, A.P.I. Standard Round Thread External Upset Tubing Threads.

3-inch — 3 $\frac{1}{2}$ -inch O.D. — 11 $\frac{1}{2}$ threads, A.P.I. Standard Sharp Thread Non-Upset Tubing Threads.

3-inch — 3 $\frac{3}{4}$ -inch U.D. — 10 threads, A.P.I. Standard Sharp Thread External Upset Tubing Threads.

Specifications for valves and fittings tapped with casing threads other than A.P.I. Threads should include the following:

Size, external diameter or external diameter of upset, threads per inch, included taper per foot, and trade name of casing.

For example: 6 $\frac{5}{8}$ -inch — 7-inch O.D. — 11 $\frac{1}{2}$ threads, $\frac{3}{8}$ -inch included taper per foot, Boston Casing Threads.

6 $\frac{5}{8}$ -inch — 7-inch O.D. — 10 threads, $\frac{3}{8}$ -inch included taper per foot, California Diamond B. X. Casing Threads.

3-inch — 3 $\frac{3}{4}$ -inch U.D. of Upset — 10 threads, $\frac{3}{4}$ -inch included taper per foot, External Upset Tubing Threads.

For valves and fittings it is unnecessary to specify inside diameter or weight of casing per foot.

Specifications for casing, pipe or nipples should include the same information listed above for valves and fittings, also adding the weight per foot (threads and couplings).

For example: 8 $\frac{5}{8}$ -inch — 8 $\frac{5}{8}$ -inch O.D. — 38 pounds — 8 threads, A.P.I. Standard Round Thread Casing.

5 $\frac{1}{2}$ -inch — 5 $\frac{1}{2}$ -inch O.D. — 19 pounds — 8 threads, A.P.I. Standard Drill Pipe.

6 $\frac{5}{8}$ -inch — 7-inch O.D. — 17 pounds — 11 $\frac{1}{2}$ threads, $\frac{3}{8}$ -inch included taper per foot, Boston Casing.

6 $\frac{5}{8}$ -inch — 7-inch O.D. — 30 pounds — 10 threads, $\frac{3}{8}$ -inch included taper per foot, California Diamond B. X. Casing.

Thread Data for Casing

Dimensions, in Inches

Size	External Diameter of Casing O.D.	California D.B.X. Casing			California D.B. 8 Casing			South Penn Casing			Boston Casing			Sharp Thread A.P.I. Casing*			Round Thread A.P.I. Casing*	
		No. of Threds. per Inch	In-cluded Taper per Foot	Effective Thread Length	No. of Threds. per Inch	In-cluded Taper per Foot	Effective Thread Length	No. of Threds. per Inch	In-cluded Taper per Foot	Effective Thread Length	No. of Threds. per Inch	In-cluded Taper per Foot	Effective Thread Length	No. of Threds. per Inch	In-cluded Taper per Foot	External Diameter of Upset U.D.	No. of Threds. per Inch	In-cluded Taper per Foot
2	2.250										14	3/8	.9679					
2 1/4	2.500										14	3/8	.9929					
2 1/2	2.750										14	3/8	1.0179					
2 3/4	3.000										14	3/8	1.0429					
3	3.250										14	3/8	1.0679					
3 1/4	3.500										14	3/8	1.0929					
3 1/2	3.750										14	3/8	1.1179					
3 3/4	4.000										14	3/8	1.1429					
4	4.250										14	3/8	1.1679					
4 1/4	4.500										14	3/8	1.1929					
4 1/2	4.750	**10	3/8	2.1500	8	3/4	2.1875				14	3/8	1.2179					
4 3/4	4.750													10	3/8	†5.000	8	3/4
	5.000	10	3/8	2.1500	8	3/4	2.1875				14	3/8	1.2429					
		10	3/8	*2.4000	8	3/4	*2.4375											
5	5.250										14	3/8	1.2679					
											11 1/2	3/8	1.2989					
5 3/16	5.500	10	3/8	2.3500				11 1/2	3/8	1.6240	14	3/8	1.2929					
								11 1/2	3/8	*1.8740								
5 1/2	5.500													10	3/8		†8	†3/4
5 5/8	6.000	10	3/8	2.3500	8	3/4	2.3750				14	3/8	1.3429					
											11 1/2	3/8	1.3739					
5 3/4	5.750													10	3/8	†6.000		
														†10	†3/8			
6	6.000													10	3/8		†8	†3/4
6 1/4	6.625	**10	3/8	2.6000	8	3/4	2.6250	11 1/2	3/8	1.7370	14	3/8	1.4054					
								11 1/2	3/8	*1.9870								
6 5/8	6.625													10	3/8		8	3/4
	7.000	**10	3/8	2.6000	8	3/4	2.6250	10	3/8	1.8000	14	3/8	1.4429					
								10	3/8	*2.2000	11 1/2	3/8	1.4739					
7	7.000													10	3/8		8	3/4
7 1/4	7.625										14	3/8	1.5054					
														8	3/4		8	3/4
7 5/8	7.625																	
	8.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.5739					
8 1/8	8.125													10	3/8	†8.375		
														†10	†3/8			
8 1/4	8.625	10	3/8	2.8500	**8	3/4	2.8750	8	3/4	1.9630	11 1/2	3/8	1.6364					
														8	3/4		8	3/4
8 5/8	8.625																	
	9.000	10	3/8	2.8500	**8	3/4	2.8750				11 1/2	3/8	1.6739					
9	9.000													8	3/4		8	3/4
9 1/4	9.625				**8	3/4	2.8750							8	3/4		8	3/4
9 5/8	9.625													8	3/4		8	3/4
	10.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.7739					
10	10.750	10	3/8	2.8500	8	3/4	2.8750	8	3/4	2.1750								
10 5/8	11.000										11 1/2	3/8	1.8739					
10 3/4	10.750													8	3/4		8	3/4
11	11.750	10	3/8	2.8500	**8	3/4	2.8750											
11 5/8	12.000	10	3/8	2.8500	8	3/4	2.8750				11 1/2	3/8	1.9739					
11 3/4	11.750													8	3/4		8	3/4
12 1/2	13.000	10	3/8	2.8500	8	3/4	2.8750	8	3/4	2.6870	11 1/2	3/8	2.0739					
13 3/8	13.375													8	3/4		8	3/4
13 1/2	14.000	10	3/8	3.3500	8	3/4	3.3750				11 1/2	3/8	2.1739					
14 1/2	15.000										11 1/2	3/8	2.2739					
15 1/2	16.000	10	3/8	3.3500	8	3/4	3.3750				11 1/2	3/8	2.3739					
16	16.000													8	3/4			
18 5/8	18.625													8	3/4			
20 O.D.	20.000				8	3/4	3.8750											
21 1/2	21.500													8	3/4			
24 1/2	24.500													8	3/4			

*Material will be furnished with, or to suit, the shorter of the two effective thread lengths unless otherwise specified.

†Sharp Thread A.P.I. External Upset Casing.

**Same Threading as Sharp Thread A.P.I. Casing with corresponding O.D.

^A.P.I. Standard 5A includes Short and Long Thread Casing in most sizes, also two lengths each on the 5 1/2 and 6-inch sizes in the Round Thread Short Thread Series. Material is furnished with, or to suit, shortest thread length unless otherwise specified.

Thread Data for Drive, Rotary, and Drill Pipe, and Tubing

Dimensions, in Inches

Size	External Diameter of Pipe or Tubing O.D.	Drive Pipe		Internal Upset Rotary Pipe		A.P.I. Drill Pipe		Oil Well Tubing		Sharp Thread A.P.I. Tubing Non-Upset		Round Thread A.P.I. Tubing Non-Upset	
		Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot
3/4	1.050							14	3/4				
1	1.315							11 1/2	3/4				
1 1/4	1.660							11 1/2	3/4				
1 1/2	1.900							11 1/2	3/4	11 1/2	3/4	10	3/4
2	2.375	11 1/2	3/16 or 3/4					11 1/2	3/4	11 1/2	3/4	10	3/4
2 3/8	2.375					10	3/8						
						8	3/4						
2 1/2	2.875	8	3/16 or 3/4	8	3/4			8 or 11 1/2	3/4	11 1/2	3/4	10	3/4
2 7/8	2.875					8	3/4						
3	3.500	8	3/16 or 3/4	8	3/4			8 or 11 1/2	3/4	11 1/2	3/4	10	3/4
	3.500					8	3/4						
3 1/2	4.000	8	3/16 or 3/4					8, 10 or 11 1/2	3/4	10	3/4	8	3/4
4	4.500	8	3/16 or 3/4	8	3/4			8, 10 or 11 1/2	3/4	10	3/4	8	3/4
4 1/4	4.750	10	3/8 or 3/4										
	4.500					8	3/4						
4 1/2	5.000	10	3/8 or 3/4										
		8	3/16 or 3/4	8	3/4								
5	5.563	8	3/16 or 3/4	8	3/4								
5 9/16	5.563					8	3/4						
6	6.625	8	3/16	8	3/4								
6 5/8	6.625					8	3/4						
7	7.625	8	3/16										
7 3/8	7.625					8	3/4						
8	8.625	8	3/16										
8 5/8	8.625					8	3/4						
9	9.625	8	3/16										
10	10.750	8	3/16										
11	11.750	8	3/16										
12	12.750	8	3/16										
14 O.D.	14.000	8	3/16										
15 O.D.	15.000	8	3/16										
16 O.D.	16.000	8	3/16										
17 O.D.	17.000	8	3/16										
18 O.D.	18.000	8	3/16										
20 O.D.	20.000	8	3/16										

†D.B.X. Drive Pipe.

Dimensions, in Inches

Size	External Diameter of Pipe or Tubing O.D.	External Diameter of Upset U.D.	External Upset Tubing		Sharp Thread A.P.I. Tubing External Upset		Round Thread A.P.I. Tubing External Upset	
			Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot	Number of Threads per Inch	Included Taper per Foot
1 1/4	1.660	1.813	11 1/2	3/4	11 1/2	3/4	10	3/4
1 1/2	1.900	2.094	11 1/2	3/4	11 1/2	3/4	10	3/4
2	2.375	2.594			10	3/4	8	3/4
		2.603	11 1/2	3/4				
2 1/2	2.875	3.094	10 or 11 1/2	3/4	10	3/4	8	3/4
3	3.500	3.750	10 or 11 1/2	3/4	10	3/4	8	3/4
3 1/2	4.000	4.250			10	3/4	8	3/4
4	4.500	4.750	10	3/4	10	3/4	8	3/4

Malleable Iron and Cast Steel Fittings With Casing Threads

Standard Malleable Iron Refinery Oil Fittings, page 189; Heavy Malleable Iron Fittings, page 192; 1000-Pound Cast Steel Fittings, page 341; and 2000-Pound Cast Steel Fittings, page 341, can be tapped for the casing sizes shown in the table below.

Dimensions, in Inches

Fitting Size	**A. P. I. Casing Size (Actual O. D.)	California D. B. X. Casing Size (Nominal)	California D. B. 8 Casing Size (Nominal)	Boston Casing Size (Nominal)	South Penn Casing Size (Nominal)	Actual O. D. of Casing
2				2		2 $\frac{1}{4}$
				2 $\frac{1}{4}$		2 $\frac{1}{2}$
2 $\frac{1}{2}$				2 $\frac{1}{2}$		2 $\frac{3}{4}$
				2 $\frac{3}{4}$		3
3				3		3 $\frac{1}{4}$
				3 $\frac{1}{4}$		3 $\frac{1}{2}$
3 $\frac{1}{2}$				3 $\frac{1}{2}$		3 $\frac{3}{4}$
				3 $\frac{3}{4}$		4
4				4		4 $\frac{1}{4}$
				4 $\frac{1}{4}$		4 $\frac{1}{2}$
	4 $\frac{3}{4}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$	4 $\frac{1}{2}$		4 $\frac{3}{4}$
*5 $\frac{3}{16}$		4 $\frac{3}{4}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$		5
	5 $\frac{1}{2}$	5 $\frac{3}{16}$		5		5 $\frac{1}{4}$
	5 $\frac{3}{4}$			5 $\frac{3}{16}$	5 $\frac{3}{16}$	5 $\frac{1}{2}$
						5 $\frac{3}{4}$
6		5 $\frac{5}{8}$	5 $\frac{5}{8}$	5 $\frac{5}{8}$		6
	6 $\frac{5}{8}$	6 $\frac{1}{4}$	6 $\frac{1}{4}$	6 $\frac{1}{4}$	6 $\frac{1}{4}$	6 $\frac{5}{8}$
*6 $\frac{5}{8}$	7	6 $\frac{5}{8}$	6 $\frac{5}{8}$	6 $\frac{5}{8}$	6 $\frac{5}{8}$	7
	7 $\frac{5}{8}$			7 $\frac{1}{4}$		7 $\frac{5}{8}$
		7 $\frac{5}{8}$	7 $\frac{5}{8}$	7 $\frac{5}{8}$		8
8	8 $\frac{1}{8}$					8 $\frac{1}{8}$
	8 $\frac{5}{8}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{1}{4}$	8 $\frac{5}{8}$
	9	8 $\frac{5}{8}$	8 $\frac{5}{8}$	8 $\frac{5}{8}$		9
10	9 $\frac{5}{8}$		9 $\frac{1}{4}$			9 $\frac{5}{8}$
		9 $\frac{5}{8}$	9 $\frac{5}{8}$	9 $\frac{5}{8}$		10
	10 $\frac{3}{4}$	10	10		10	10 $\frac{3}{4}$
				10 $\frac{5}{8}$		11
12	11 $\frac{3}{4}$	11	11			11 $\frac{3}{4}$
		11 $\frac{5}{8}$	11 $\frac{5}{8}$	11 $\frac{5}{8}$		12

*These are casing sizes. Standard Malleable Iron Refinery Oil Fittings, Heavy Malleable Iron Fittings, and Cast Steel Fittings are listed in the 5 $\frac{3}{16}$ and 6 $\frac{5}{8}$ -inch sizes.

**A.P.I. Casing is known by its actual outside diameter; other Casings listed above are designated by their nominal size.

See page 593 when ordering Casing Thread Fittings.

Crane Fabricated Piping

Advantages of Crane Shop Fabrication	page 598
Scope of Crane Shop Facilities	page 599
Metallurgical and Engineering Control	page 599
Estimating and Ordering Services	page 599
Crane Shop Fabricating Facilities	pages 600 and 601
Crane Pipe Bends	pages 602 to 604
Cranelap Joints	pages 605 to 608
Crane Flanging Processes	pages 605 to 607
Available sizes and Types of Flanged Joints	page 610
Flange Facings and Finishes	pages 612 and 613
Crane Welded Piping	pages 614 and 615
Dimensions of Crane Welded Headers	pages 616 and 617
Pipe Coils	page 618
Crane Double Pipe Heat Exchangers	page 619
Testing of Fabricated Piping	page 619

The increasing use of higher pressures and temperatures has elevated the art of designing, erecting, and purchasing fabricated piping to its rightful position of importance. Discriminating buyers now realize that the purchase of piping requires the same careful thought and attention to details as does the selection of steam generators, prime movers, refinery cracking stills, valves, and other major items of modern plants.

Years ago, Crane Co. realized the desirability of having the production and development of its fabricated piping go hand in hand with the constant

improvement in its valves, fittings, and allied articles. In this manner, materials of uniform design, workmanship, and performance have been developed.

The nature of fabricated piping precludes any attempt to list completely the variety of materials and operations available in a modern shop. The special and peculiar requirements of industry and its processes daily present problems which must be solved. Your attention is invited to the following pages which tell a brief story about Crane Fabricated Piping; additional information furnished on request.

A complete line—not the fabricated piping only!

Exacting users of materials for piping installations will recognize the advantages of purchasing the fabricated piping from a manufacturer who also produces a complete line of valves, fittings, bolts, gaskets, and accessories.

One responsibility: When the task of furnishing all of the material rests with Crane Co., there is but one responsibility—one uniform standard of materials, workmanship, and service. Whether the joints used are threaded, flanged, or beveled for welding, the same standards and gauging systems are used uniformly on all of the products.

This assures the user that the component parts of the piping system will fit accurately, provide reliability and safety, and that the line will be erected

easily with a minimum of erection and maintenance costs.

Simplicity of ordering: An order for the complete piping job is handled as an integral unit; there is not the division of responsibility regarding the dimensions and related details of the various items, as may occur when the component parts of a piping system are ordered from several sources of supply.

Time saving: There is a saving in time and expense when orders and detailed drawings are prepared for only one source of supply. The delays caused by shipments from several sources are eliminated.

Ease of maintenance: When repairs or replacements are necessary because of the demands of service, they are effected easily when all of the original material was secured from one source of supply.

*Integrated piping systems from a single manufacturing source —
one responsibility for proper and complete fabrication*

Advantages of Crane Shop Fabrication

Accuracy: A piping system, when placed in service, should develop the predetermined results and fulfill all of the expectations of a proper design. This should be accomplished expeditiously and at a minimum of final erected cost consistent with the use of good materials and workmanship. Obviously, this purpose will be defeated unless each piece, large or small, of both simple and complex piping systems, receives the attention necessary to assure accuracy and a high quality of workmanship. Crane Shop Fabrication accomplishes this desirable end.

Proficiency: In the Crane Fabricating Shops the mechanics are employed solely on the production of fabricated piping. Such continuity of practice means that they do not lose their proficiency, particularly desirable for welding and other complex operations.

Safety: Safety is a prime requisite of every piping installation. Crane Shop Fabrication assures purchasers that every necessary precaution has been employed to eliminate hidden hazards of piping.

A weld may appear excellent on the exterior, yet under the surface it may contain gas pockets or have faulty penetration. A threaded flange joint gives no indication in its external appearance of improper threading. These are but two of the many hidden hazards of piping.

Shop appliances: Shop fabrication permits the use of special machinery, clamps, jigs, and other convenient appliances which are impractical for field service. This equipment permits the alignment and

squaring-up of all flanged faces or ends of piping, also accuracy of dimensions and angles—all within the closest practical limits. Such characteristics assure the final fitting of every piece into position without alteration or improper strain, resulting in increased safety and a saving of time and labor.

Stress relieving, annealing, or heat treating, when necessary, are readily performed in the shop. All of these advantages are almost impossible of accomplishment in the field.

Working conditions: Working conditions, almost invariably, are better in the shop than in the field. The shop has facilities for handling heavy or bulky pieces, therefore each mechanic is working at all times in a comfortable position and is not concerned about his safety.

Testing: Crane Shop Fabrication assures dependability because the product is tested and proved sound before shipment. Piping which is fabricated in the field usually must be installed in its final position before it can be tested, and, in the event of failure, the removal for replacement or repair proves expensive and causes delay.

Simplified assembly: The erecting force in the field should only be called upon to assemble a piping system. It should neither be expected to design and fabricate piping, nor to manufacture economically, under adverse field conditions, a product comparable with that of the modern fabricating shop.



A portion of the Crane Fabricated Piping Shop in Chicago.

Scope of Crane Shop Facilities

Crane Co. can supply advantageously any piping for any industry.

Shops at strategic points: Many shops are maintained for supplying the piping needs of industry. Most of the Crane Branch Houses are equipped for the simpler jobs—the larger Branch Houses for more elaborate jobs—and fabricating shops embracing the full line of pipe fabrication are located at strategic centers throughout the country.

All types of joints: Any type of joint can be furnished—screwed, flanged, welded, or special. The selection of any type of joint presents a basic engineering or mechanical problem. Crane Co. makes its recommendations accordingly—having an all-inclusive line, it can exercise a degree of impartiality conducive to best serving the interests of the purchaser.

Metallurgical and Engineering Control

Laboratories: In the year 1888, Crane Co. established a chemical laboratory with full control over the raw materials which went into Crane products. Constantly expanded, this service has grown into complete research, metallurgical, and testing laboratories. Long a dominant factor in the development of Crane products, all of the accumulated data held by these departments—the applied experience of Crane engineers and research men—are utilized in the production of Crane Fabricated Piping.

Engineering: All fabrication of piping in the Crane shops is under a system of constant procedure control. A thorough gauging system is employed in all operations. Trained engineers are responsible at all times for the design, superintendence during manufacture, and constant checking of the product.

The services outlined above eliminate guesswork in the production of Crane Fabricated Piping.

Estimating and Ordering

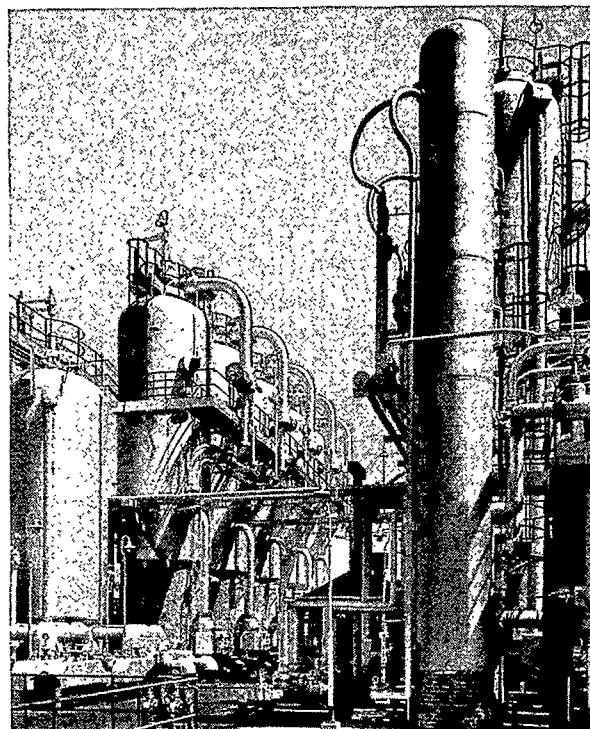
Estimates: A reliable estimate of the cost of any piping system will be furnished promptly upon receipt of an inquiry accompanied by blueprints and specifications. No matter how complex the layout or how involved the specification, a complete and accurate quotation is assured.

Orders: Crane Co. has specialized for many years in the handling of orders for fabricated piping. Men, well trained and experienced in this work, enter the shop orders direct from complete blueprints, detail sketches, or bills of material, constantly checking all dimensions and details. Accuracy is the watchword.

Submit your inquiries to the nearest Crane representative.

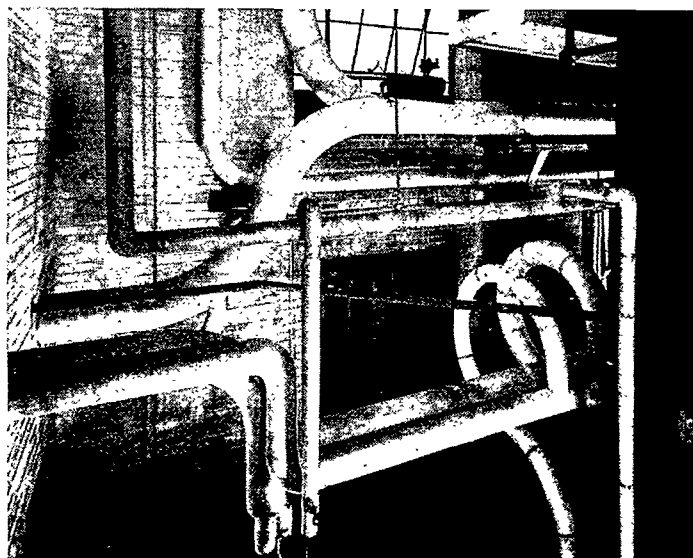
Large stocks: Large stocks of the various kinds of pipe, flanges, valves, fittings, and accessories are carried at all fabricating shops and branches.

Crane Co. is prepared for the job, whether it calls for a single piece of pipe cut to length, or the complete piping equipment of an industry.



Above
De-waxing unit of a lubricating oil plant — Crane equipped

Below
An interesting application of fabricated piping installed in the heating plant boiler room of a housing project

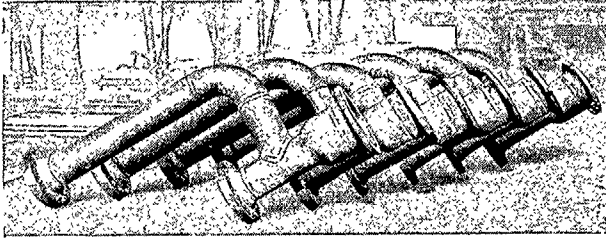


Crane Shop Fabricating Facilities

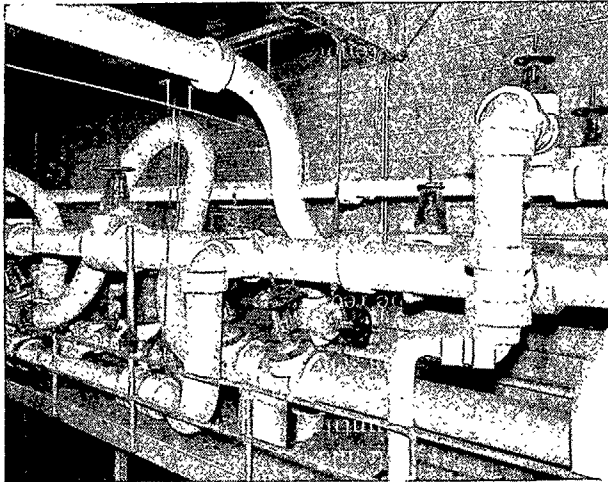
The Crane Shops are fully equipped with machinery and facilities for the various operations required in the production of a complete line of fabricated piping. Much of the shop equipment is special—designed and built to develop the manufacturing technique

necessary for the fabrication of piping of high, uniform accuracy and quality of workmanship.

Many forms of special jigs and appliances—a necessary adjunct—are employed constantly to supplement the effectiveness of the machines and other facilities.



The finished product of the welder—Welded Assemblies made of 12 and 8-inch Seamless Steel Tubing, Crane Welding Elbows, and Welding Neck Flanges.



A "close-up" of 300-Pound Main and Auxiliary Steam Headers with an 8-inch Expansion Bend in the Main Header.

Pipe Bending

In Crane shops, the art of bending pipe has been developed to a high degree—pipe bends of many sizes and shapes are in constant production.

Pipe bends have a wide range of usefulness. No two general piping installations are alike, hence pipe bends are especially adapted to solve the many problems of space requirements. The proper proportions of a pipe bend usually are essentially a matter of bending pipe to the dimensions necessary to fit into the available space.

To meet these needs of industry, Crane pipe bending facilities are available: shops are equipped to fabricate pipe bends from a large range of sizes, weights, and kinds of pipe. See pages 573 to 587.

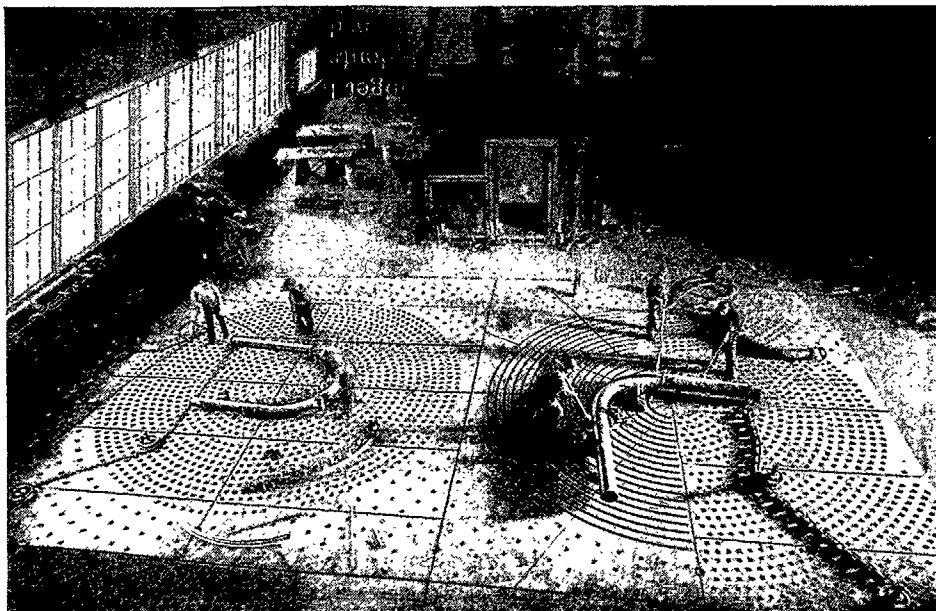
Welding

Crane Co. pioneered in the welding of fabricated piping. At Crane, welding equipment has been used for over thirty years in the production of headers and other products.

Untiring research and experiment in Crane Shops and Laboratories during this long period are responsible for the constant refinement in the technique of Crane welding.

Crane welders use both the electric arc and oxy-acetylene methods of welding with equal facility, and are subjected periodically to qualification tests.

Crane Fabricated Piping includes an almost infinite variety of shop-welded product. For detailed information on welding: see pages 614 to 617.



The illustration at the left shows a Pipe Bending Plate in a Crane Fabricated Piping Shop.

The pipe is packed with sand, heated to a proper temperature, and pulled to the required bend by the use of power winches. Extreme care is exercised to insure a uniform bend, free from wrinkles, and of maximum strength.

In the background is one of the furnaces used for heating pipe before bending. Crane shops have facilities for fabricating pipe in a wide range of sizes and weights.

Crane Shop Fabricating Facilities (Cont.)

Flanging

Crane shop facilities include equipment for producing the many types of flanged joints in current use. These can be furnished not only in their regular forms but also in the various modifications and special adaptations required.

Precision gauges govern every operation, assuring the utmost accuracy. For details, see pages 605 to 609.

Finishing

Special finishing machines enable Crane Shops to furnish fabricated piping with a variety of finishes — regular and special. See pages 612 and 613.

Cutting, beveling, threading, making on screwed flanges, facing all types of flanges, machining Cranelap Joints, and various other operations for finishing the ends of Crane Fabricated Piping are performed on these machines with precision and a close adherence to accurate gauging standards.

Swedging

Swedging facilities are available for all sizes of pipe. The facilities include furnaces for heating, powerful forging hammers, and dies to assure accurate fabrication.

Testing

Crane shop facilities include equipment for testing fabricated piping as specified in the various codes, or in accordance with the provisions of a specification. The usual hydrostatic tests are supplemented

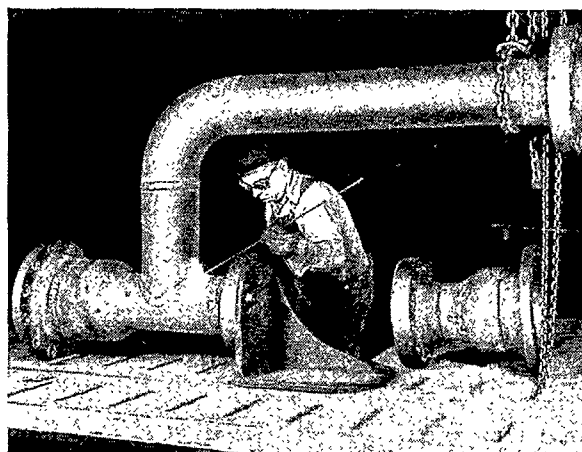
by air-under-water, kerosene, and other special tests if required.

For detailed information on testing, see page 619

Cutting and threading pipe

Crane Shops are equipped to cut and thread pipe for all commercial services; regular and special threads can be furnished.

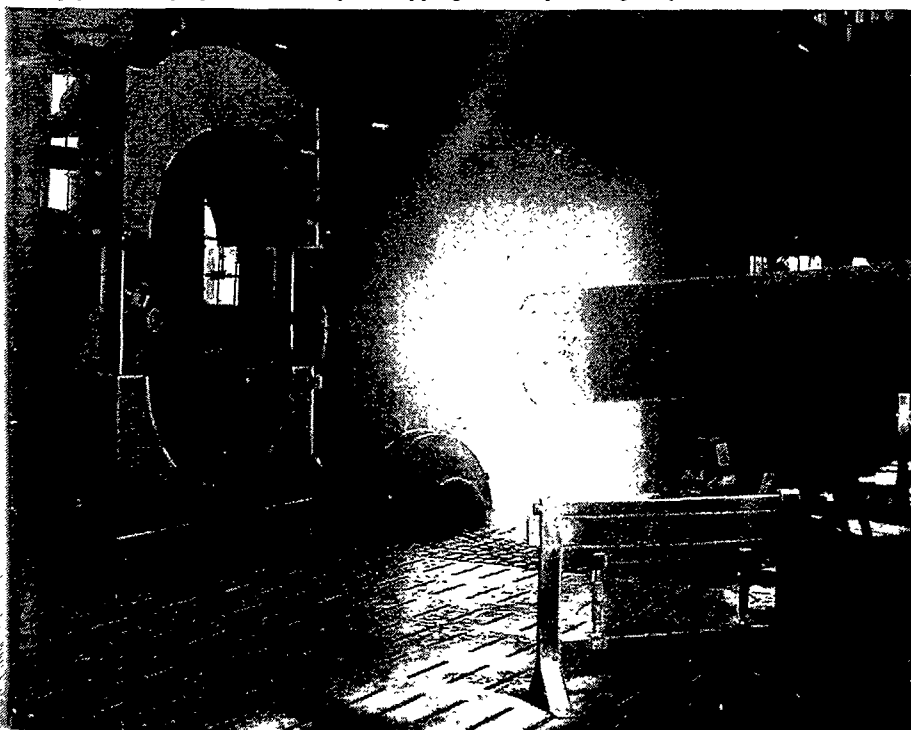
The accurate threading to gauge, so characteristic of Crane screwed products, is similarly found in pipe cut to length and threaded in Crane Shops.



A Crane Welder at work

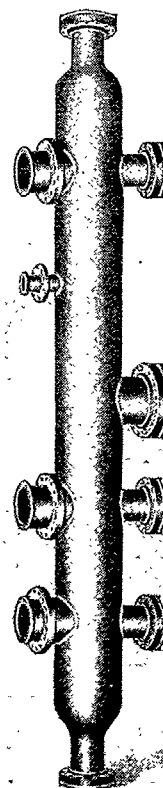
Below

One of the Cranelapping machines and furnaces in a Fabricated Piping Shop. A large pipe, at forging heat, is ready for lapping.



Right

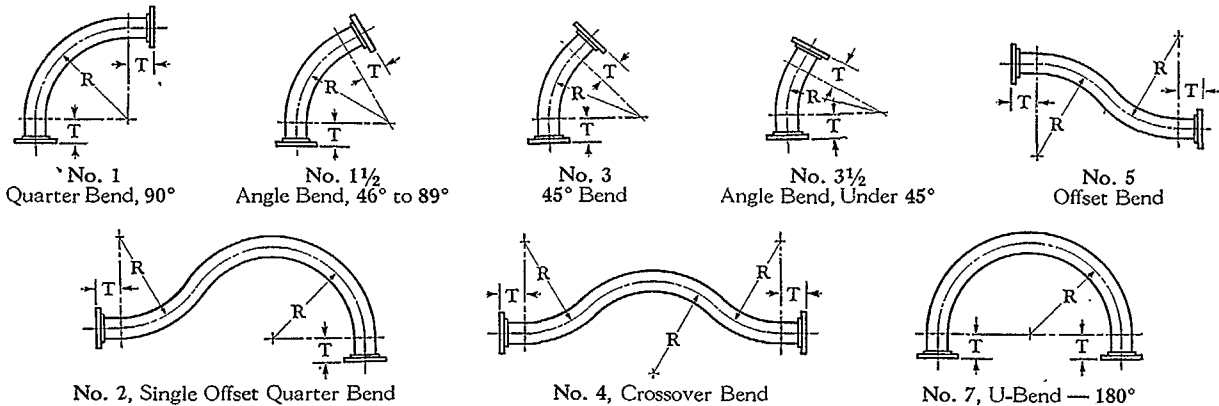
18-inch Welded Header with the ends swedged to 10-inch — Cranelap Flanged Joints on all ends.



Standard Types of Pipe Bends

Crane Pipe Bends are made from pipe which is filled with sand, heated carefully until the entire sand core produces a uniform temperature, then clamped on the bending floor to forms which have been accurately laid out. Power winches are applied to draw the pipe around the forms, and the point of power application is repeatedly shifted to prevent the formation of wrinkles on the inside wall. A new heat is made for each bend.

All bends are completed in the pipe before trimming, threading, or flanging. A system of repeated checking assures that every dimension and angle of the completed pipe bend will be accurate, and that the ends or flanges will be square with the axis of the pipe. Crane Pipe Bends are full area, free from wrinkles, buckles, and thin spots; they are cleaned of all scale, chips, and oil; and they are easy to erect, fitting into place exactly.



Radii and Tangents of Pipe Bends, in Inches

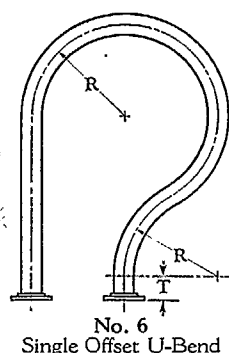
Size of Pipe	Column "A"	Column "B"								Column "C"	
	R Minimum Recommended Radius Steel or Genuine Wrought Iron Pipe Standard or Extra Strong Weight	R Shortest Radii to which pipe can be bent (See Cautionary Note on page 603)								T Minimum Length of Tangent (See Note, page 603) Steel or Genuine Wrought Iron Pipe Standard or Extra Strong Weight	
		Steel Pipe Only				Genuine Wrought Iron Pipe					
		Threaded Ends, Screwed, or Welded Flanges		Cranclap Joints		Threaded Ends, Screwed, or Welded Flanges		Cranclap Joints			
		Stand- ard Weight Pipe	Extra Strong Weight Pipe	Stand- ard Weight Pipe	Extra Strong Weight Pipe	Stand- ard Weight Pipe	Extra Strong Weight Pipe	Stand- ard Weight Pipe	Extra Strong Weight Pipe	Threaded Ends or Screwed Flanges	Cranclap Joints
1/4	1 1/4	1	5/8			1 1/4	1			1	
3/8	1 7/8	1 1/4	3/4			1 7/8	1 1/2			1 1/4	
1/2	2 1/2	1 1/2	1	2	2	2 1/2	2	2 1/2	2	1 1/2	2
3/4	3 3/4	1 3/4	1 1/4	3	3	3	2 1/2	3	3	1 3/4	2
1	5	2	1 1/2	4	4	4	3	4	4	2	2
1 1/4	6 1/4	2 1/4	1 3/4	4	4	5	4	5	4	2	2 1/2
1 1/2	7 1/2	2 1/2	2	5	5	6	5	6	5	2 1/2	3
2	10	3	2 1/2	6	6	8	5	8	6	3	4
2 1/2	12 1/2	5	4 1/4	10	10	10	8	10	10	4	5
3	15	8	6	12	12	12	10	12	12	4	6
3 1/2	17 1/2	10	8	12	12	14	12	14	12	5	6
4	20	12	10	14	14	16	12	16	14	5	6
5	25	18	14	18	14	20	15	20	15	6	7
6	30	22	15	22	15	26	18	26	18	7	7
8	40	30	23	30	23	30	28	30	28	9	8
10	50	36	30	36	30	36	32	36	32	12	10
12	60	46	36	46	36	46	42	46	42	14	10
*14 OD	70	60	48	60	48	60	54	60	54	16	14
*16 OD	96	80	60	80	60	80	70	80	70	18	16
*18 OD	108	90	66	90	66	90	80	90	80	18	18
*20 OD	120	100	72	100	72	100	90	100	90	18	18
*24 OD	144	144	108	144	108	144	122	144	122	18	20

*For sizes 14-inch O.D. and larger, the radii shown are based upon pipe with a wall thickness of 3/16-inch or lighter under the "Standard Weight Pipe" column, and a wall thickness of 1/2-inch or heavier under the "Extra Strong Weight Pipe" column.

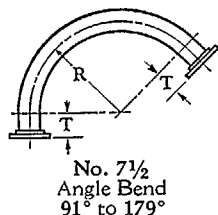
Continued on pages 603 and 604

Length of Pipe in Bends and Calculation of Pipe Bends . . . pages 638 to 640

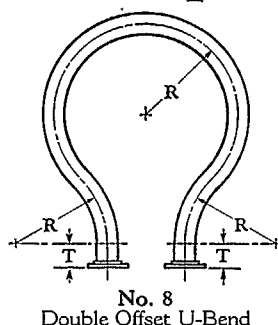
Standard Types of Pipe Bends



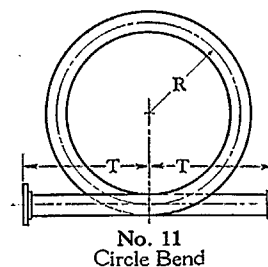
No. 6
Single Offset U-Bend



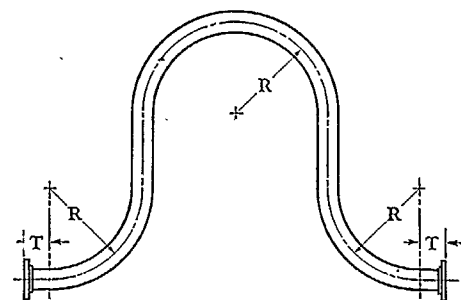
No. 7 1/2
Angle Bend
91° to 179°



No. 8
Double Offset U-Bend



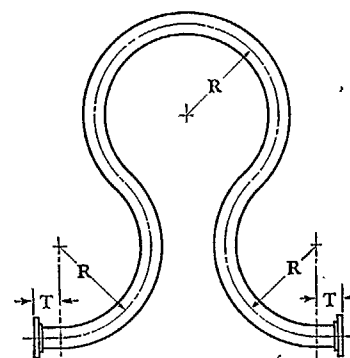
No. 11
Circle Bend



No. 9
Expansion U-Bend

For Table of Radii and
Tangents, see page 602.

For notes on pipe bends,
see below and page 604.



No. 10
Double Offset Expansion U-Bend

Notes on Pipe Bends

Minimum recommended radius: The figures shown in Column "A" represent a schedule of dimensions that is consistent with good practice for determining ordinary minimum radii of pipe bends.

Shortest radius: The dimensions shown in Column "B" are based upon actual manufacturing conditions and should not be lowered. Refer to the cautionary note below.

Minimum length of tangent: The dimensions shown in Column "C" are based upon actual manufacturing conditions for tangents with a threaded end, screwed flange, or Cranelap Joint. These dimensions must be maintained without deviation for minimum lengths. Refer to the cautionary note below.

Tangents for pipe bends with plain or beveled ends: Pipe bends with the ends plain or beveled for welding can be furnished without tangents. However, for convenience in erection, it is recommended that pipe bends with beveled ends have tangents at

least equal to the minimum lengths given in the table for threaded ends in Column "C". Such tangents will provide space for applying jigs or clamps to line up and fasten the piping before welding.

Tangents for pipe bends with Welding Flanges: Pipe bends fitted with Slip-On Welding Flanges can be furnished with a minimum length of tangent equal to the length through the hub of the Slip-On Welding Flange being used.

Pipe bends fitted with Welding Neck Flanges can be furnished without tangents, since these flanges may be butt-welded directly at the end of the arc of pipe bends with beveled ends.

This is only recommended when minimum dimensions must be maintained. When possible, the use of a tangent is desirable for the same reasons as outlined in the paragraph pertaining to pipe bends with beveled ends.

For dimensions of Flanges, see pages 366 and 367.

Cautionary note regarding the use of Minimum Radii and Tangents:

The table shown on page 602 and the preceding paragraphs outline the minimum radii and tangents which can be furnished for various conditions. *The use of such minimum dimensions is not desirable, nor is it recommended except when absolutely necessary.*

The radii of pipe bends preferably should equal or exceed the dimensions shown in Column "A", defining "Minimum Recommended Radius".

When possible, the tangents of pipe bends should be greater than the dimensions shown in Column "C", defining "Minimum Length of Tangent". The tangents can be of any dimensions up to the limits imposed by the length of pipe available or the shipping facilities. See paragraphs on "Long Lengths of Pipe", page 604.

Notes on Pipe Bends continued on next page
Calculating Working Pressure, Stress, or Wall Thickness of Pipe... pages 635 to 637

Notes on Pipe Bends (Cont.)

Compound and unusual bends: Compound and unusual pipe bends can be supplied in any practical shape. Our facilities are not limited only to the production of the common types shown on pages 602 and 603. Some of the photographs included in this fabricated piping section illustrate a few of the uncommon pipe bends made in Crane Shops. Compound pipe bends or bends in more than one plane do not require any tangent or straight portion between the arcs.

Long lengths of pipe: When designing or ordering pipe bends, consideration should be given to the maximum lengths of welded or seamless pipe available. Extra long or double random lengths of steel pipe are carried in stock for the fabrication of pipe bends requiring a long length of pipe, and when the elimination of an intermediate joint is practical and desirable; see page 574.

Genuine wrought iron pipe is only available in regular random mill lengths of approximately 19 feet average length.

When the necessary lengths are not available, two or more pieces of steel or genuine wrought iron pipe can be welded together or provided with intermediate flanged joints to produce a desired bend. The intermediate joint should be definitely located if its location is an important factor in erection.

Shipping facilities present the only practical limit to the shape or length of pipe bends. Care must be used, when ordering large or complicated pipe bends, to keep the over-all dimensions within the maximum shipping facilities and clearances between the factory and the destination.



Above: 18-inch O.D. Compound Pipe Bends

Ends of pipe bends: Pipe bends can be supplied with the ends plain, beveled for welding, threaded, or flanged, utilizing any of the types of flanged joints which are listed; see pages 605 to 610.

Special materials: Pipe bends can be made from special piping materials—a few are brass, aluminum, nickel, Monel, silicon bronze, rubber-lined or lead-lined pipe, as well as numerous alloy steels. Facilities for heat-treating alloy steels after fabrication are available when required.

Full information and prices quoted on application.

Commercial pipe bends: Pipe bends for downspouts, ash handling, railings, and other non-fluid and non-pressure mechanical purposes, when made to approximate dimensions only, can be furnished at prices lower than those of regular pipe bends.

Prices will be quoted upon receipt of inquiry giving full details as to quantities, size and kind of pipe, service, and dimension tolerances.

Copper tubing pipe bends: For pipe bends made of copper tubing, see pages 510.

Testing: Crane Pipe Bends are regularly tested before shipment. For schedule of tests, see page 610.

Protectors and Painting: Pipe bends are given an exterior coat of paint to serve as a protective coating against rust. Flanged ends are provided with flange protectors; threaded ends have thread protectors.

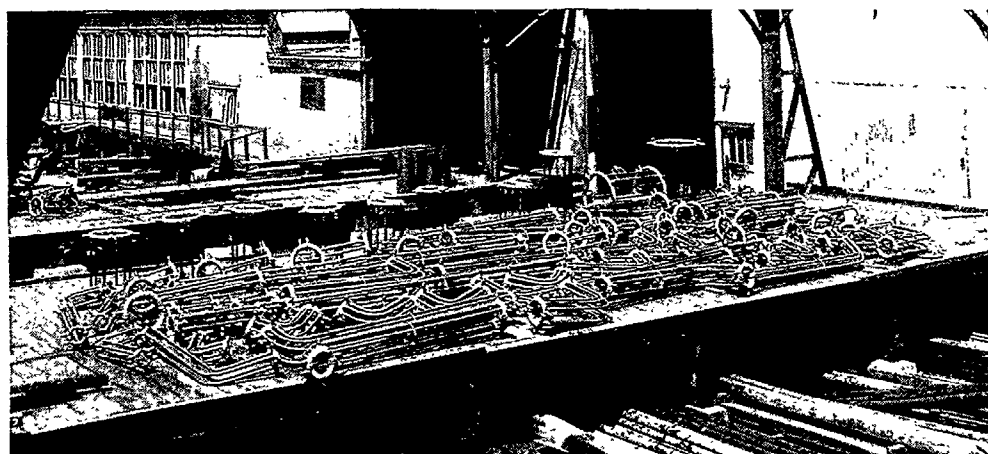
Pipe: For pipe, see pages 574 to 587.

Galvanized pipe bends: Pipe bends can be furnished galvanized on the inside and outside, or galvanized on the outside only. Information and prices will be furnished on application.

Engineering data: For the amount of pipe in the various types of pipe bends, see pages 640.

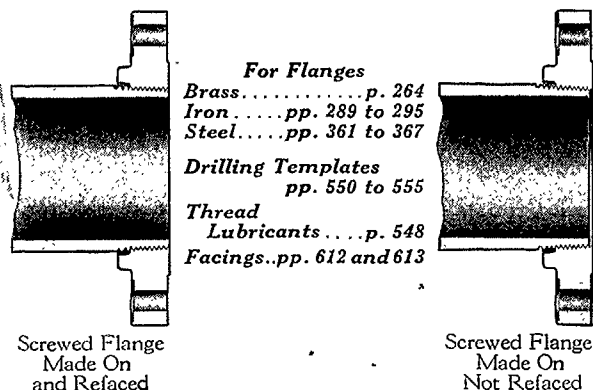
Complete data on designing pipe bends for taking care of the expansion and contraction of pipe lines, and determining deflection forces will be furnished on application.

Inquiries and orders: Inquiries or orders should specify the quantity; size, weight, and kind of pipe; dimensions; and also if the ends are to be plain, beveled, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified.



A group of unusual assemblies ready for shipment. Small size pipe bends welded to circular headers which are equipped with welded openings, tapped and plugged.

Flanging Processes—Screwed Flanged Joints



The Screwed Flanged Joint has proved its general utility and satisfactory performance, primarily for the low and moderate pressure and temperature services — especially when fabricated in the Crane Shops, using proper threading and pull-up machines.

Application: The Screwed Flanged Joint can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and to the flanged ends of welded assemblies. It can be applied to butt-welded and lapwelded steel, or genuine wrought iron pipe, and seamless steel pipe — all commercial weights and thicknesses.

Flanges: Any of the screwed flanges listed in this catalog can be used — Cast Iron, Malleable Iron, Forged Steel, and Brass — straight or reducing sizes

Special piping materials: The Screwed Flanged Joint can be furnished on special piping materials—a few are brass, copper, aluminum, nickel, and Monel. Flanges of the same material can be furnished. Full information on application.

Threading: The threading of both the pipe and the flange is to accurate gauge. The flange is secure on the pipe after the joint is made up.

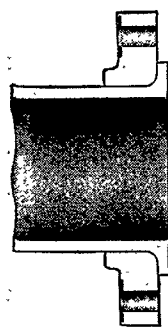
Alignment of bolt holes: Crane Shop Fabrication assures proper alignment of the bolt holes in all flanges. When specified, special alignment of the bolt holes can be furnished.

Screwed flange — made on and refaced: After the flange and the pipe have been properly threaded, the flange is made up tight by a powerful machine until the end of the pipe projects slightly beyond the face of the flange. A light refacing cut is then taken across both the flange face and the pipe end.

The refacing assures that the end of the pipe will be flush with the face of the flange, thus providing a proper gasket-bearing surface to the inside of the pipe. It also assures perfect alignment of the pipe.

Screwed flange — made on, not refaced: After the flange and the pipe have been properly threaded, the flange is made up tight by a powerful machine until the end of the pipe is within one-half to one thread from the face of the flange.

The Cranelap Joint



Regular Cranelap Joint with plain face, serrated finish.

CRANELAP JOINTS

Catalog Numbers

No. 561½,	150-Pound
No. 180 E,	300-Pound
No. 660 E,	400-Pound
No. 859 E,	600-Pound
No. 1268 E,	900-Pound
No. 1559 E,	1500-Pound

Additional description.....pages 606 and 607
Dimensions.....page 608
Facings.....pages 612 and 613

Regular Cranelap Joints are made on both steel and genuine wrought iron pipe. See note on page 606.

Prices on application

The Cranelap Joint approaches more closely than any other type the function of an all-purpose flanged pipe joint. It eliminates the individual, inherent disadvantages of the other types of joints.

(Continued on next page)

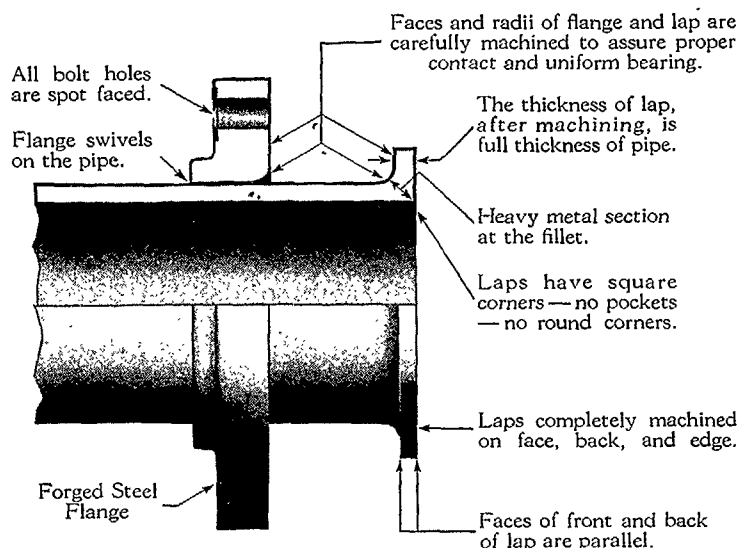
The Cranelap Joint is predominantly the most effective and practical joint. With either plain facing or the numerous modifications it has given such universal satisfaction over a long period of time that it is recommended for intermediate, high pressure, and high temperature steam and water lines, also for many other difficult services. The wide range of utility and service applications makes the Cranelap Joint a modern flanged joint with very few limitations.

Cranelap Joints are not only adapted to high pressure work but are well suited for low pressure service, particularly in those sizes where large flange diameters are employed.

In the Cranelap Joint the end of the pipe is lapped to produce a square corner at the junction of the inside periphery of the pipe and the face of the lap. When bolted up, the joint is made directly on the pipe itself — there is no thread in the flange to leak under distortion due to bolting load, pressure and temperature, or expansion and contraction strains.

These laps are made by a process which is a combination of upsetting and forging — this operation is performed while the metal is at a proper forging heat.

Flanging Processes—Cranelap Joint (Cont.)



Features and Advantages

Square corner laps: The Cranelap Joint has a square corner lap—it should not be confused or compared with a joint having a round corner lap.

The square corner lap assures a smooth joint on the inside of the pipe, without a pocket or depression. The formation of the square corner provides a metal thickness at the turn, or fillet, which is much heavier in section than the round corner lap, consequently much greater strength is developed.

Full thickness laps: The rough laps of all Plain Cranelap Joints are of sufficient thickness to produce, after machining both the front and the back, a finished thickness of lap equal to or greater than the wall thickness of the pipe on which the lap is made.

Male and Female, Tongue and Groove, Double Thickness, Ring Joint, and Radial Back Cranelap Joints have the laps of sufficient thickness to permit these facings to be machined without reducing the thickness of the lap at any point to less than that of the pipe wall.

Machining of the laps and flanges: All laps are completely machined on the front, back, and edge. The back of the lap is machined to provide a face which is parallel to the front or contact face. The face and the radius of the flange are carefully machined to match the corresponding face and radius of the lap on the pipe. The bolt holes of the flanges are spot faced.

The features of the machining outlined above are important. The spot facing of the bolt holes of the flange provides a uniform bearing surface for the nuts of the bolts or studs. In addition to this,

the facing of the flange and the parallel facing of the back and front of the lap assure an even bearing throughout the joint, and a uniform pressure on the gasket.

Swivel flanges of forged steel: The flanges on Cranelap Joints swivel on the pipe. This facilitates alignment of the piping and makes erection easier, because the swivel flange accommodates itself readily to any variations in the position of adjacent bolt holes or to the setting of piping at odd angles.

All flanges used on Cranelap Joints are of Forged Steel—unbreakable, and of high strength. This type of joint precludes the use of any flange material other than steel.

Marine service: Cranelap Joints comply with the regulations of the following bureaus: U. S. Dept. of Commerce, Bureau of Navigation and Steamboat Inspection—Lloyds Register of Shipping, Ships Registered in U.S.A.—American Bureau of Shipping, Special Inspection Required.

Notes on Cranelap Joints

Pipe: Cranelap Joints with plain face are regularly made from lapwelded steel or lapwelded genuine wrought iron pipe, using Standard, Extra Strong, or Double Extra Strong weights—or from seamless steel pipe in any of the regular thicknesses.

Cranelap Joints with Radial Back, Ring Joint, Double Thickness or 200% lap, Male and Female, or Tongue and Groove Facing require the use of lapwelded or seamless steel pipe only, and of a wall thickness equal to Extra Strong weight or heavier.

In sizes smaller than are obtainable in lapwelded steel pipe, all Cranelap Joints are only made on seamless steel pipe. For pipe, see pages 574 to 587.

Van Stone Joints: Whenever Van Stone Joints are specified, Cranelap Joints will be furnished.

Plain Face: Cranelap Joints with plain face, serrated finish, as illustrated on page 605, will always be furnished unless otherwise specified.

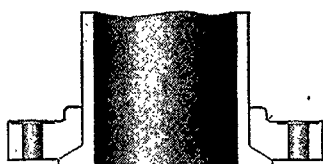
Application of Cranelap Joints: Cranelap Joints can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and the flanged ends of welded assemblies.

Cranelap Joints on special piping materials: Cranelap Joints can be fabricated on many special piping materials—a few are brass, aluminum, nickel, Monel, Toncan Iron, and copper-bearing steel, as well as numerous alloy steels. Facilities for heat-treating are available when required.

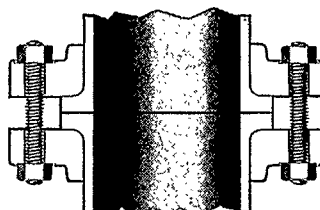
Information and prices furnished on application.

Flanging Processes—Cranelap Joint (Cont.)

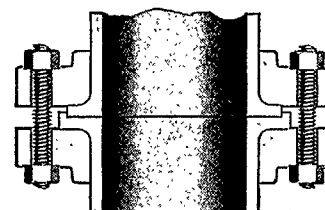
Modifications of the Cranelap Joint and Facings



Radial Back Cranelap Joint
No. 179 E, 300-Pound
No. 670 E, 400-Pound No. 1278 E, 900-Pound
No. 869 E, 600-Pound No. 1569 E, 1500-Pound



Double Thickness or
200% Lap, Cranelap Joint



Large Male and Female Cranelap
Joint (female in the lap)

In addition to the plain face Cranelap Joint shown on the preceding page, various modifications can be furnished, as shown on this page. Modified Cranelap Joints require the use of lapwelded or seamless steel pipe only, and of a wall thickness equal to or heavier than Extra Strong weight. They are applicable to primary service pressures of 300 pounds or higher.

Modified Cranelap Joints have the laps completely machined — on the face, back, and edge. All except the Radial Back have a straight face on the back.

Radial Back Cranelap Joints

Radial Back Cranelap Joints derive their name from the shape of the back — they have a radial back instead of the straight back as furnished on other Cranelap Joints. The regular Cranelap Forged Steel Flanges are used, except that the faces have a radius machined to fit the radius on the back of the lap on the pipe.

Dimensions of Radial Back Cranelap Joints are furnished on application.

Large Male and Female Cranelap Joints

Large Male and Female Cranelap Joints can be furnished in two types — one has the female in the lap, and the other has the female in the flange.

When large Male and Female Cranelap Joints are ordered, the "female in the lap" type will always be furnished unless otherwise specified.

In either the lapped end with male face or the lapped end used for "female in the flange", the thickness of the lap, after machining, will be the wall thickness of the pipe used, except that the minimum thickness of lap will be $\frac{1}{4}$ -inch when the wall thickness of the smaller sizes of Extra Strong weight pipe is less than $\frac{1}{4}$ -inch, i.e. 2-inch and smaller. In the lapped end used for "female in the lap", the thickness of the lap, after machining, will be the wall thickness of the pipe used, plus the depth of the female facing.

Large or Small Tongue and Groove Cranelap Joints

In either the Large Tongue and Groove or the Small Tongue and Groove Cranelap Joint the thickness of the lap, after machining, will be the wall thickness of the pipe used, plus the height of the tongue or the depth of the groove.

Ring Joint Cranelap Joints

The Ring Joint Cranelap Joint is furnished with a specially designed groove which employs a steel ring, this combination making a pressure-tight joint. The joint has a thickness of lap, after machining, equal to the wall thickness of the pipe used, plus the depth of the groove. For dimensions of Ring Joints, see pages 562 and 563.

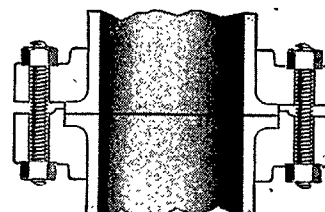
Double Thickness, or 200% Lap, Cranelap Joints

Double Thickness Cranelap Joints are exactly the same as the regular Cranelap Joint with plain face, except that the thickness of the lap, after machining, is twice the wall thickness of the pipe used.

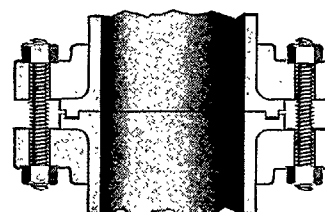
For dimensions of Double Thickness Cranelap Joints, use the dimensions of Plain Cranelap Flanges on page 608. A dimension of twice the wall thickness of the pipe should be used in establishing the thickness of the lap for obtaining dimension "L".

Prices on application

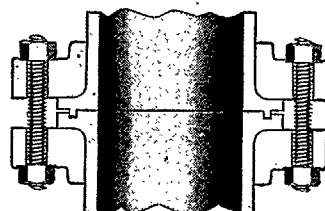
Dimensions . . . page 608



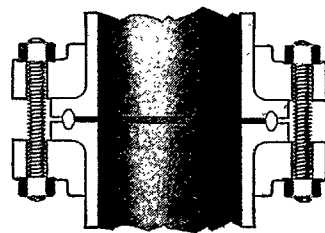
Large Male and Female Cranelap
Joint (female in the flange)



Large Tongue and Groove
Cranelap Joint

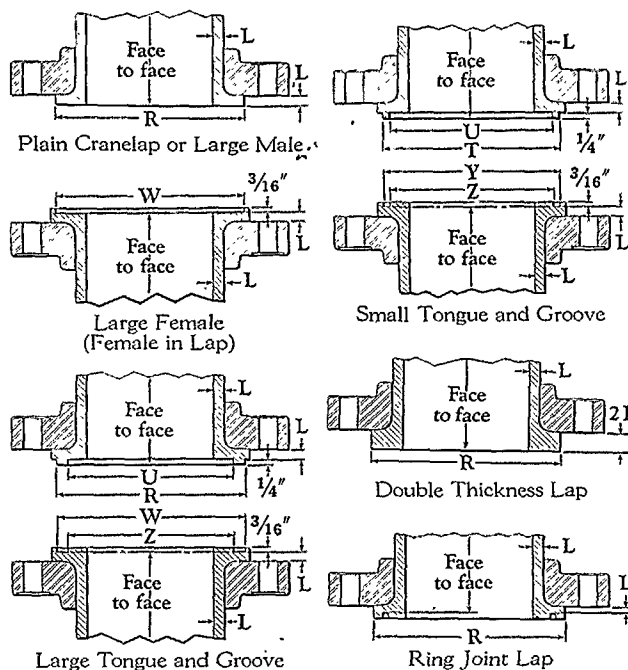


Small Tongue and Groove
Cranelap Joint



Ring Joint
Cranelap Joint

Flanging Processes—Cranelap Joint (Cont.)



Dimensions, in Inches

Size of Pipe	R	T	U	W	Y	Z
1/2	1 3/8	1 3/8	1	1 7/16	1 7/16	1 5/16
3/4	1 11/16	1 11/16	1 5/16	1 3/4	1 3/4	1 1/4
1	2	1 7/8	1 1/2	2 1/16	1 5/16	1 7/16
1 1/4	2 1/2	2 1/4	1 7/8	2 9/16	2 5/16	1 13/16
1 1/2	2 7/8	2 1/2	2 1/8	2 15/16	2 9/16	2 1/16
2	3 5/8	3 1/4	2 7/8	3 11/16	3 5/16	2 13/16
2 1/2	4 1/8	3 3/4	3 3/8	4 3/16	3 13/16	3 5/16
3	5	4 5/8	4 1/4	5 1/16	4 11/16	4 3/16
3 1/2	5 1/2	5 7/8	4 3/4	5 9/16	5 3/16	4 11/16
4	6 3/16	5 11/16	5 3/16	6 1/4	5 3/4	5 1/8
5	7 5/16	6 13/16	6 5/16	7 3/8	6 7/8	6 1/4
6	8 1/2	8	7 1/2	8 9/16	8 1/16	7 7/16
8	10 5/8	10	9 3/8	10 11/16	10 1/16	9 5/16
10	12 3/4	12	11 1/4	12 3/16	12 1/16	11 3/16
12	15	14 1/4	13 1/2	15 1/16	14 5/16	13 7/16
14 OD	16 1/4	15 1/2	14 3/4	16 5/16	15 9/16	14 11/16
16 OD	18 1/2	17 5/8	16 3/4	18 9/16	17 11/16	16 11/16
18 OD	21	20 1/8	19 1/4	21 7/16	20 3/16	19 3/16
20 OD	23	22	21	23 1/16	22 1/16	20 15/16
24 OD	27 1/4	26 1/4	25 1/4	27 5/16	26 5/16	25 3/16

This schedule of dimensions conforms to the American Steel Flange Standard (B16e-1939).

Plain Cranelaps are regularly made on lapwelded steel or genuine wrought iron pipe, using Standard, Extra Strong, or Double Extra Strong weights — or on seamless steel pipe, using any regular thickness. Plain Cranelaps are applicable to all pressure classes, i.e. 150-Pound and higher; the thickness of the lap is the same as the thickness of the pipe wall.

Male and Female, Tongue and Groove, Double Thickness or 200% lap, and Ring Joint Cranelaps

require the use of lapwelded or seamless steel pipe only, and of a wall thickness equal to or heavier than Extra Strong weight, except that the minimum lap thickness on the male for large male and female joints will be 1/4-inch where the pipe wall thickness is less than 1/4-inch (i.e. Extra Strong weight pipe sizes 2-inch and smaller). These Cranelaps, called "Modified Cranelaps", are applicable to the 300-Pound and higher pressure classes only.

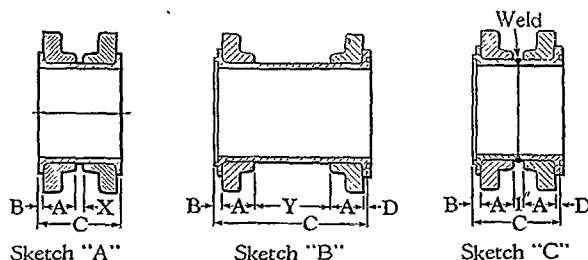
Dimensions of Radial Back Cranelaps and of Large Female Cranelaps with "female on the flange" are furnished on application.

Description . . . pages 605 to 607

Cranelap Flanges . . . pages 361 to 367

Ring Joints . . . pages 562 and 563

Minimum Face to Face of Piping with Cranelap Joints



Sketch "A"

Sketch "B"

Sketch "C"

The minimum face to face dimensions of straight pipe with Cranelap Joints are obtained as follows:

Sketch "A": Formula for straight pipe with Plain Face Cranelap Joints:

$$C = X + 2(A + B) \quad \text{Where } X = 16\frac{1}{2}'' \text{ on 1 to } 1\frac{1}{2}'' \text{ pipe}$$

$$X = 26'' \text{ on } 2'' \text{ pipe}$$

$$X = 1'' \text{ on } 2\frac{1}{2}'' \text{ and larger pipe}$$

Sketch "B": Formula for straight pipe with the Modified Cranelap Joints — Male and Female, Tongue and Groove, Ring Joint, Radial Back, and Double Thickness Lap:

$$C = Y + (2A) + B + D \quad \text{Where } Y = 16\frac{1}{2}'' \text{ on 1 to } 1\frac{1}{2}'' \text{ pipe}$$

$$Y = 26'' \text{ on 2 and } 2\frac{1}{2}'' \text{ pipe}$$

$$Y = 10'' \text{ on } 3'' \text{ and larger pipe}$$

Sketch "C": The minimum face to face outlined for Sketch "B" can be reduced if a butt weld is located between the flanges, as illustrated in "C".

If the procedure of Sketch "C" is followed, the minimum face to face of straight pipe with the Modified Cranelap Joints is in accordance with the formula:

$$C = 1'' + (2A) + B + D$$

Flanging Processes—Welded Flanged Joints

Welded Flanged Joints can be furnished in the three types illustrated here. The Welding Nipple with Cranelap Flange, also illustrated, affords an auxiliary flanged connection for welding.

Application: Any of the Welded Flanged Joints shown at the right can be applied to straight pipe, pipe bends, the ends and nozzles of welded headers, and the flanged ends of welded assemblies. Special shop equipment assures the perfect alignment of flange faces on all Crane Welded Flanged Joints.

Welding: The shop welding of these flanged joints is performed by Crane welders working under approved procedure control. All welds are tested and proved sound before shipment; see pages 614 and 615.

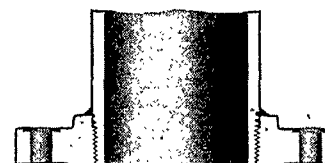
Special piping materials: These types of Welded Flanged Joints can be furnished on many special piping materials, including numerous alloy steels, with facilities for heat-treating after fabrication.

Information and prices furnished on application.

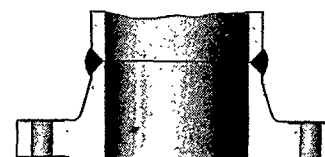
Forged Steel Screwed Flange, Seal Welded

A Crane Forged Steel Screwed Flange is used in this joint. The pipe and the flange are accurately threaded; the flange is made up tight on the pipe, seal welded, and then refaced. The joint is sealed by fillet welding the back of the flange to the pipe—this seal weld assures that no leakage will occur through the threads.

The refacing assures perfect alignment of the flange faces, and that the end of the pipe is flush with the face of the flange for a proper gasket-bearing surface to the inside of the pipe. The threads retain the function of holding the flange securely on the pipe, hence there is no shearing action.



Forged Steel
Screwed Flange
Seal Welded and Refaced



Welding Neck Flange
Butt Welded to Pipe

Forged Steel Welding Neck Flange

Crane Welding Neck Flanges are of Forged Steel. They are machined with a beveled end and bored to match the thickness of the pipe to which they are applied. A butt weld is used to attach the Welding Neck Flange to the pipe, which is also machine beveled.

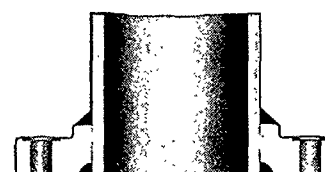
Forged Steel Slip-On Welding Flange

Crane Slip-On Welding Flanges are of Forged Steel. They are bored for a snug fit on the pipe, and are welded at the front and at the back. After the welding, the flanges are refaced. Slip-On Welding Flange Joints can be advantageously used when very short tangents are necessary on pipe bends.

Attention is called to the advantage of Crane Shop Fabrication. The method of welding this type of joint at the front and the subsequent refacing eliminates the pocket which is produced by the fillet weld necessary in field welding the front of the Slip-On Welding Flange.

Slip-On Welding Flange Joints in the 150 and 300-Pound pressure classes can be furnished in sizes larger than 24-inch O.D., which is beyond the scope of the other types of flanged joints. Prices on application.

Code limitation: The use of the Slip-On Welding Flange Joint is limited to a primary service pressure rating of 300 pounds per square inch, when piping must comply with either the Pressure Piping Code or the A.S.M.E. Unfired Pressure Vessel Code.

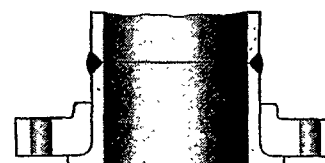


Slip-On Welding Flange
Welded Front and Back
and Refaced

Cranelap Welding Nipple and Flange

The Cranelap Welding Nipple with Cranelap Flange can be applied to fabricated piping. Both the welding nipple and the pipe are machine beveled. A butt weld is used to complete the joint.

This type of joint has all of the advantages of the regular Cranelap Joint, as described on pages 605 to 608. In most cases, piping can be fabricated with Cranelap Joints applied directly, which eliminates the weld necessary for the application of the Cranelap Welding Nipple with Cranelap Flange.



Cranelap Flange with
Welding Nipple
Butt Welded to Pipe

Summary of Sizes and Types of Available Flanged Joints

Pipe Size Inches	Brass Flanged Joints Screwed		Cast Iron Flanged Joints Screwed			
	150 Pound	300 Pound	25 Pound	125-Pound		250 Pound
				Cast Iron	Malleable Iron	
1/2						
3/4	x	x				
1	x	x		x		x
1 1/4	x	x		x		x
1 1/2	x	x		x		x
2	x	x		x	x	x
2 1/2	x	x		x	x	x
3	x	x		x	x	x
3 1/2	x	x		x	x	x
4	x	x		x	x	x
5	x	x	x	x	x	x
6	x	x	x	x	x	x
8	x	x	x	x	x	x
10			x	x	x	x
12			x	x	x	†
14 OD			†	†		†
16 OD			†	†		†
18 OD			†	†		†
20 OD			†	†		†
24 OD			†	†		†

These tables are designed to indicate all of the sizes and types of flanged joints that can be regularly furnished for piping installations.

The symbols found in these tables designate that a flanged joint is regularly furnished in the particular size, material, type, and pressure classification, as listed. The symbols (†), (‡), and (*) also serve to call attention to footnotes.

INDEX

Brass Flanges	Page
150-Pound, Screwed	264
300-Pound, Screwed	264
Iron Flanges	
25-Pound, Screwed	291
125-Pound, Screwed	292
250-Pound, Screwed	294
Forged Steel Flanges	
Description	363
List Prices, 150 and 300-Pound	364
List Prices, 400 to 1500-Pound	365
Dimensions, 150, 300, and 400-Pound	366
Dimensions, 600 to 2500-Pound	367

(†) Made of Ferrosteeel in these sizes.

Pipe Size Inches	Forged Steel Flanged Joints															
	150-Pound Joints				300-Pound Joints				400-Pound Joints				600-Pound Joints			
	Screwed	Crane-lap	Slip-On Welding	Welding Neck	Screwed	Crane-lap	Slip-On Welding	Welding Neck	Screwed	Crane-lap	Slip-On Welding	Welding Neck	Screwed	Crane-lap	Slip-On Welding	Welding Neck
1/2	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
3/4	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
1	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
1 1/4	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
1 1/2	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
2	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
2 1/2	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
3	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
3 1/2	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
4	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
5	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
6	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
8	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
10	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
12	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
14 OD	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
16 OD	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
18 OD	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
20 OD	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x
24 OD	x	x	x	x	x	x	x	x	*	*	*	*	x	x	x	x

*400-Pound Flanged Joints, sizes 1/2 to 3 1/2-inch inclusive, use 600-Pound American Standard Flanges, the pipe thickness to be suitable for the required pressure and temperature.

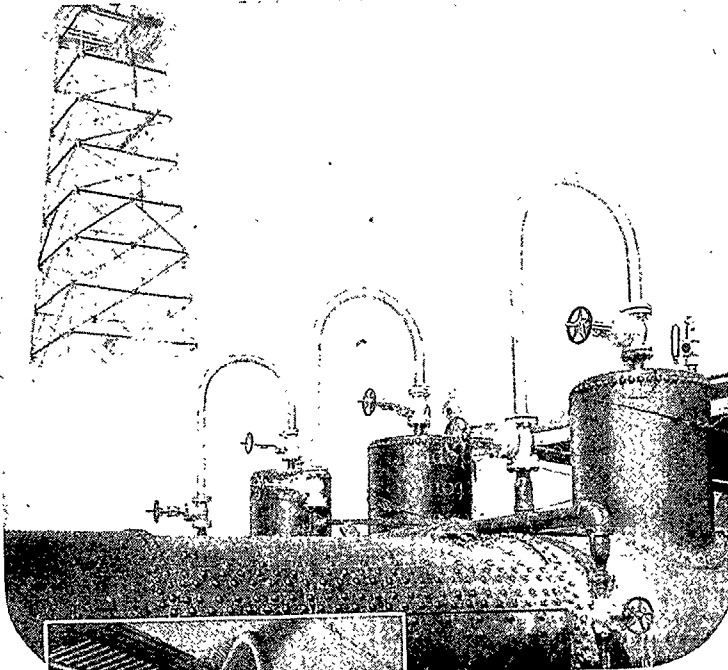
†900-Pound Flanged Joints, sizes 1/2 to 2 1/2-inch inclusive, use 1500-Pound American Standard Flanges, the pipe thickness to be suitable for the required pressure and temperature.

Forged Steel flanges for flanged joints are regularly made of carbon steel, but can be made of No. 4 Carbon-Molybdenum Steel or No. 5 Chrome-Molybdenum Steel when required for unusual service conditions.

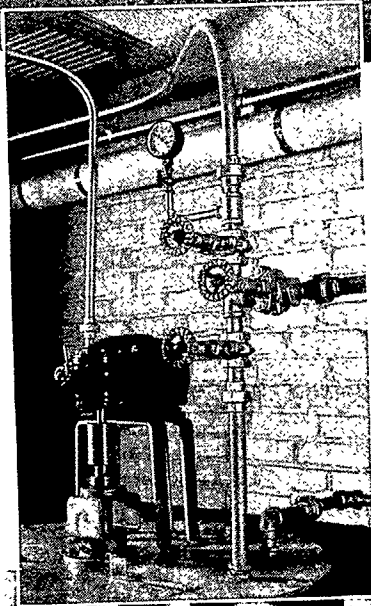
Forged Steel Slip-On Welding and Welding Neck Flanges are available for flanged joints in sizes larger than 24-inch. The flanges can be furnished in several different weights for pressures up to 300 pounds at 750° F.

Flanged joints can be furnished with any type of facing; see pages 612 and 613.

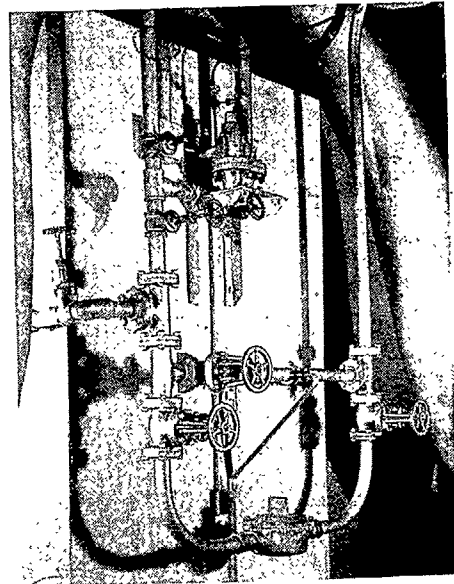
Crane
Fabricated Piping
Serves
Every Industry



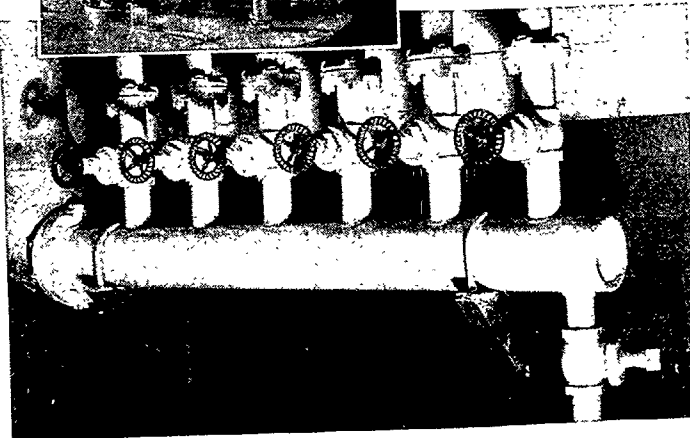
↑ on oil field boilers.



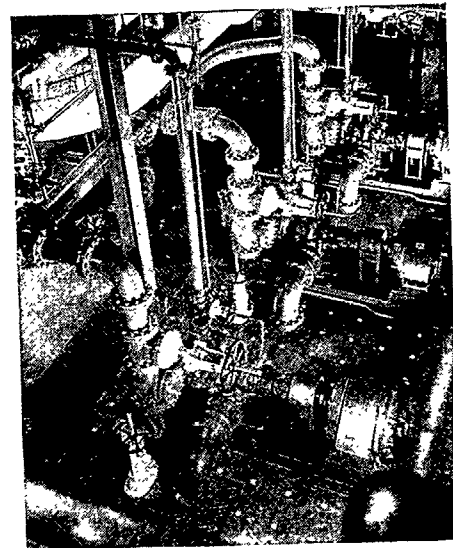
← for processing lines in metal working plants.



↑ in diversified plant piping systems.



↑ for headers and manifolds in distilleries.



↑ in central light and power plants.

Flange Facings and Finishes

Crane Fabricated Piping includes a variety of facings and finishes for flanged joints. The illustrations and descriptions outline the details of the facings and finishes which are regularly furnished for the various

types of flanged joints, also the alternative finishes which are available on special orders.

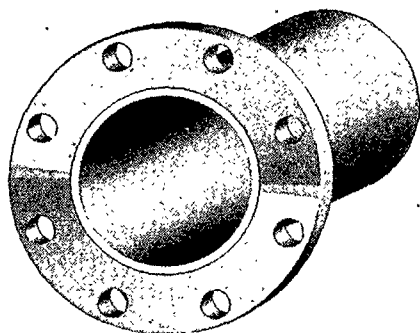
There are two finishes for facings in general use, i.e., "smooth finish" and "serrated finish".

Smooth: The machining of faces with this finish is smooth, designated "smooth finish".

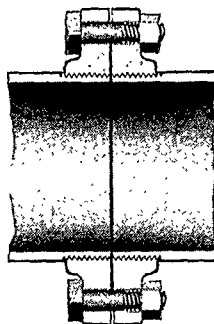
Serrated: The machining of faces with this finish is accomplished with a round nose or form tool which cuts concentric grooves, known as "serrated finish".

The serrations are approximately 16 per inch when used on Cast Iron and Ferrosteel Flange Facings, and approximately 32 per inch when used on Forged Steel Flange Facings.

Illustrations: The various facings and finishes are only illustrated with one type of flanged joint, but many of them are applicable to a variety of types, such as Screwed, Welding Neck, Slip-On Welding, and Cranelap.



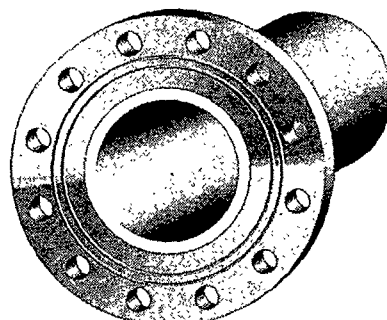
Plain Face — Smooth Finish



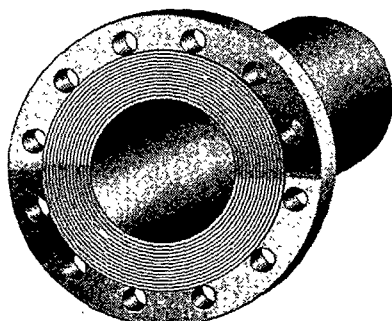
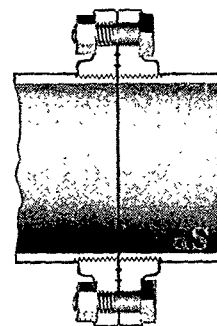
Flanged joints are regularly plain faced with smooth finish when used with 25 and 125-Pound Cast Iron, Ferrosteel, or Malleable Iron Screwed Flanges. Serrated and special finishes can be furnished; special prices will apply.

Brass flanged joints are regularly plain faced with smooth finish and "V" grooved.

Raised faces should be removed from iron or steel flanges before bolting against brass flanges. Full faced gaskets should always be used when assembling any brass flanged joint with plain face and "V" shaped grooves. Metallic gaskets are not recommended for use with brass flanged joints.



Plain Face — Smooth Finish — "V" Grooved

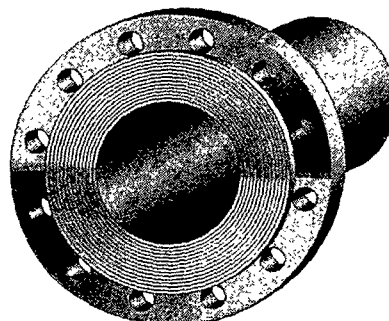


$\frac{1}{16}$ -inch Raised Face — Serrated Finish

Flanged joints are regularly furnished with a $\frac{1}{16}$ -inch high raised face when using 250-Pound Cast Iron and Ferrosteel Screwed Flanges; also 150 and 300-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Finish: The $\frac{1}{16}$ -inch raised faces are regularly furnished with a serrated finish.

Smooth finish and special finishes can be furnished when ordered; special prices will apply.



$\frac{1}{4}$ -inch Raised Face — Serrated Finish

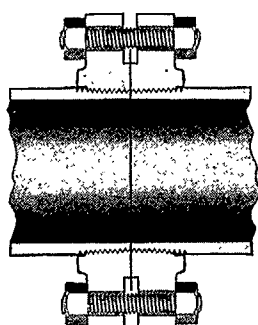
Flanged joints are regularly furnished with a $\frac{1}{4}$ -inch high (large male) face when using 400, 600, 900, 1500, and 2500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Finish: The $\frac{1}{4}$ -inch raised faces are regularly furnished with a serrated finish.

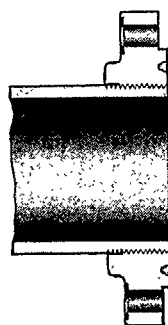
Smooth finish, special facings, and special finishes can be furnished when ordered; special prices will apply.

Flange Facings and Finishes (Cont.)

$\frac{1}{4}$ " High Double Male Face — Ring Joint Face — Large Male and Female
Small Male and Female — Large Tongue and Groove — Small Tongue and Groove



$\frac{1}{4}$ -inch High Double Male Face — Serrated Finish



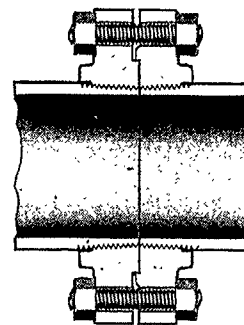
Ring Joint on Screwed Flange



Ring Joint on Welding Neck Flange



Ring Joint on Slip-On Welding Flange



Large Male and Female

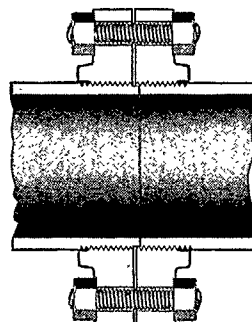
Flanged joints can be furnished with $\frac{1}{4}$ -inch high double male, large male and female, small male and female, large tongue and groove, and small tongue and groove facing when using 250-Pound Cast Iron or Ferrosteeel Screwed Flanges; or 300, 400, 600, 900, 1500 and 2500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

Flanged joints can be furnished with ring joint facing when using 150, 300, 400, 600, 900, 1500, and 2500-Pound Forged Steel Screwed, Welding Neck, or Slip-On Welding Flanges.

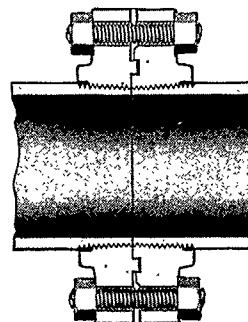
The ring joint face is also furnished on Cranelap Joints; see page 607.

The ring joint facing should not be used with or against iron or brass valves, flanges, or fittings.

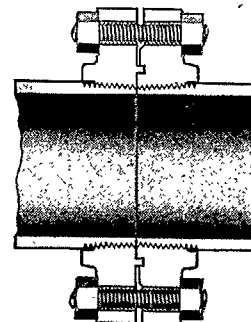
Finish: Male faces are regularly furnished with serrated finish. Female faces, tongue faces, and groove faces are regularly furnished with smooth finish.



Small Male and Female



Large Tongue and Groove



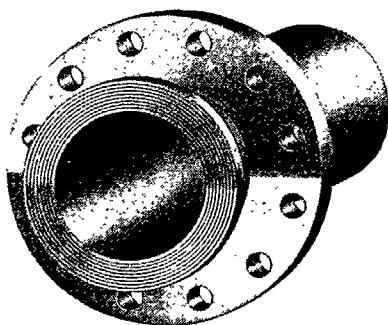
Small Tongue and Groove

Smooth finish can be furnished on the male faces when ordered; special prices will apply.

Caution: Care should be taken in the use of small male and female joints to insure that the pipe is thick enough to permit sufficient bearing surface to prevent crushing the gasket.

Gaskets: Corrugated metallic gaskets are recommended only when used with smooth finish flanged joints. For best results, they should be coated with Crane High Temperature Thread Lubricant when installed.

Cranelap Joint Facing Finishes



Cranelap Joint — Plain Face Serrated Finish

Regular Cranelap Joint: The regular Cranelap Joint with raised face is regularly furnished with a serrated finish, approximately 32 serrations per inch. Smooth finish can be furnished when specified.

Modified Cranelap Joints: The Modified Cranelap joints and facings are finished as follows:

Radial Back and Double Thickness Lap Cranelap Joints, with raised face are regularly furnished with a serrated finish, approximately 32 serrations per inch. Smooth finish can be furnished when specified.

Large Male and Female, Large Tongue and Groove, and Small Tongue and Groove Cranelap Joints are regularly furnished with a serrated finish (approximately 32 serrations per inch) on the male faces, and with smooth finish on the female, tongue, and groove faces. Smooth finish can be furnished on the male faces when specified.

Gaskets: Corrugated metallic gaskets are recommended only when used with smooth finish flanged joints. For best results they should be coated with Crane High Temperature Thread Lubricant when installed.

Dimensions of Cranelap Joints . . . p. 608

Thread Lubricants . . . p. 548

Crane Welded Piping

Crane Fabricated Piping includes a wide variety of shop welded product — headers, welded assemblies, receiver separators, vessels, etc. — for all current operating pressure and temperature services.

Welding processes: Both the electric arc and oxy-acetylene methods of fusion welding are employed in the fabrication of Crane Welded Piping.

When orders do not specify which process should be used, we employ the method which is best adapted to the character of the work and which will produce the best results.

Codes; qualification of welders: Crane Welded Piping can be fabricated to conform to the requirements of the various codes. Crane welders must pass tests in accordance with the A.S.M.E. Unfired Pressure Vessel Code and the A.S.A. Code for

Pressure Piping, under supervision of the Hartford Steam Boiler Inspection and Insurance Co. The qualification is for both electric arc and oxy-acetylene welding.

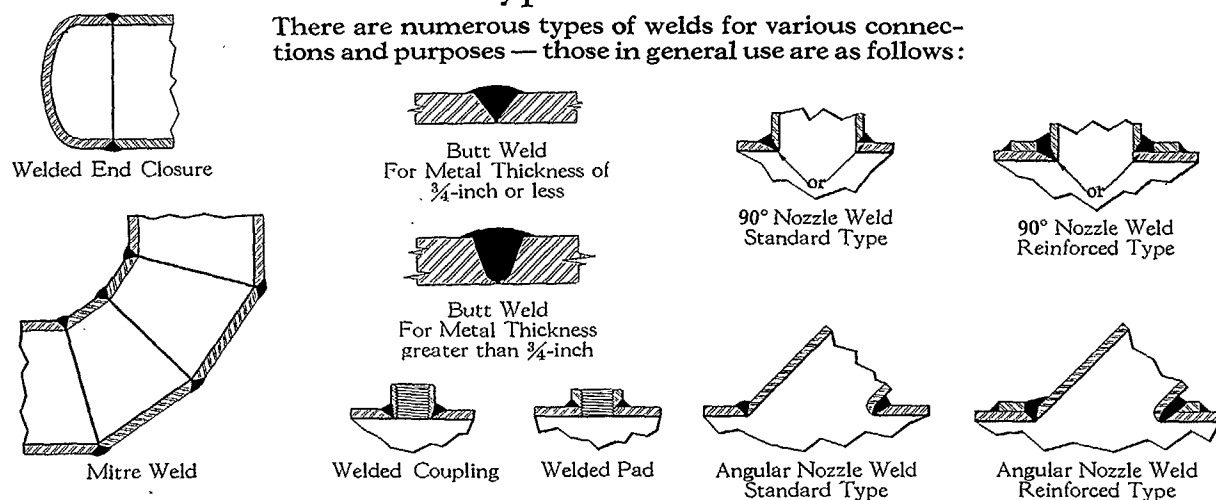
Crane welders also can be qualified by customers inspectors or by other recognized inspection bureaus, for both carbon and alloy steels, when so specified.

Stress relieving: Crane Welded Piping will be stress relieved in accordance with the A.S.A. Code for Pressure Piping. Welded nozzles, in both the unreinforced and reinforced types, and other welds are stress relieved when it is considered necessary, even though the Pressure Piping Code does not stipulate that stress relief is required.

The practice of stress relief as outlined above will be followed, unless orders or inquiries specify otherwise.

Types of Welds

There are numerous types of welds for various connections and purposes — those in general use are as follows:



Butt welds: Two types of butt welds are furnished as illustrated — one for light sections, and one for heavy sections; see page 647. All piping is beveled before butt welds are applied.

Mitre weld: The mitre weld, illustrated above, is used for fabricated piping, especially in the larger sizes, or for unusual conditions.

The use of pipe bends or welding elbows is recommended in preference to mitre welds. However, when the limitations of space, design, or the sizes of welding elbows available do not suffice, mitre welding can be used. They are made up of various combinations of segments, angles, etc., and must be designed for each condition encountered.

Welded end closure: The welded end closure regularly furnished is illustrated above. Crane Welding Caps (ellipsoidal shape) are used unless otherwise specified. For Welding Caps, see page 354. Other types, such as flat head, dished head, etc. can be furnished when ordered.

Welded couplings and welded pads: Smaller sizes of screwed connections are furnished in two types — welded couplings and welded pads. Both are illustrated above.

For welded couplings, the regular practice is to use a half coupling of the extra heavy seamless pattern; one end is beveled and the weld is made as illustrated. For welded pads, the regular practice is to use a section of steel bar stock or a forged steel pad; one end is beveled, the weld is made, and the threaded opening is drilled and tapped as the final operation. Orders and inquiries should specify type wanted.

Welded nozzles: Crane fabricated piping utilizes two types of welded 90° or angular nozzles — the "Standard Type" which is unreinforced, and the "Reinforced Type" which provides reinforcement of the nozzle weld. One of two types of welds is used; see illustrations above.

Reinforcing of welded nozzles will be done as required by the customer and in accordance with the A.S.M.E. Unfired Pressure Vessel Code or the A.S.A. Pressure Piping Code when these Codes must be complied with.

The ring type of reinforcement will be furnished in the absence of definite specifications on orders for fabricated piping with reinforced welded nozzles.

Other types of reinforcement can be furnished according to individual specifications, when so stipulated.

Crane Welded Piping

The welding of shop fabricated piping probably finds its greatest usefulness in the production of welded headers from pipe.

A few of the advantages of welded headers are: the elimination of joints; a saving in weight; a conservation of space when necessary; the location of branches or nozzles at any desired, practical intervals; continuity of insulation; and the freedom to apply any type of joint to the nozzles or connections.

Shop fabrication of welded headers is recommended. See page 598 for the "Advantages of Crane Shop Fabrication".

Crane welded headers are fabricated by competent welders working under approved procedure control. When necessary, welds are stress relieved.

For information on the dimensions and design of Crane Welded Headers, see pages 616 and 617.

Notes on Crane Welded Piping

Ends of welded piping: Welded headers and piping can be supplied with the ends plain, beveled for welding, threaded, or flanged, utilizing any of the types of flanged joints which are listed: see pages 612 and 613.

Long lengths of pipe: When designing or ordering welded headers and piping, consideration should be given to the maximum lengths of welded or seamless pipe available; see page 574.

When the necessary lengths are not available, two or more pieces of pipe can be welded together or provided with intermediate flanged joints to produce the desired header or welded assembly. Any intermediate joint should be definitely located if its location is an important factor in erection.

Shipping facilities present the only practical limit to the shape or length of welded headers and assemblies. Care must be used to keep the over-all dimensions within the maximum shipping facilities and clearances between factory and destination.

Special materials: Facilities are available for welding or brazing into various types of fabricated assemblies, piping materials such as brass, copper, aluminum, Monel, and others. The application of yellow brasses, however, is somewhat limited.

Numerous alloy steels also can be welded. Facilities for heat-treating alloy steels after fabrication are available when required. Crane Shops have welding rods and electrodes for welding alloy steels which give the deposited metals approximately the same characteristics as the parent metals.

Details on special materials on application.

Galvanizing: Welded headers and welded piping can be furnished galvanized on the inside and outside, or galvanized on the outside only. The galvanizing is done after fabrication. Information on application.

Testing, protectors, and painting: All Crane welded products are tested, painted, and provided with protectors on flanged or threaded ends.

Inquiries and Orders: Inquiries or orders for welded products should specify the quantity; the dimensions; size, weight, and kind of pipe; also if the ends are to be plain, beveled for welding, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified. It is advisable to have a sketch accompany all orders or inquiries.

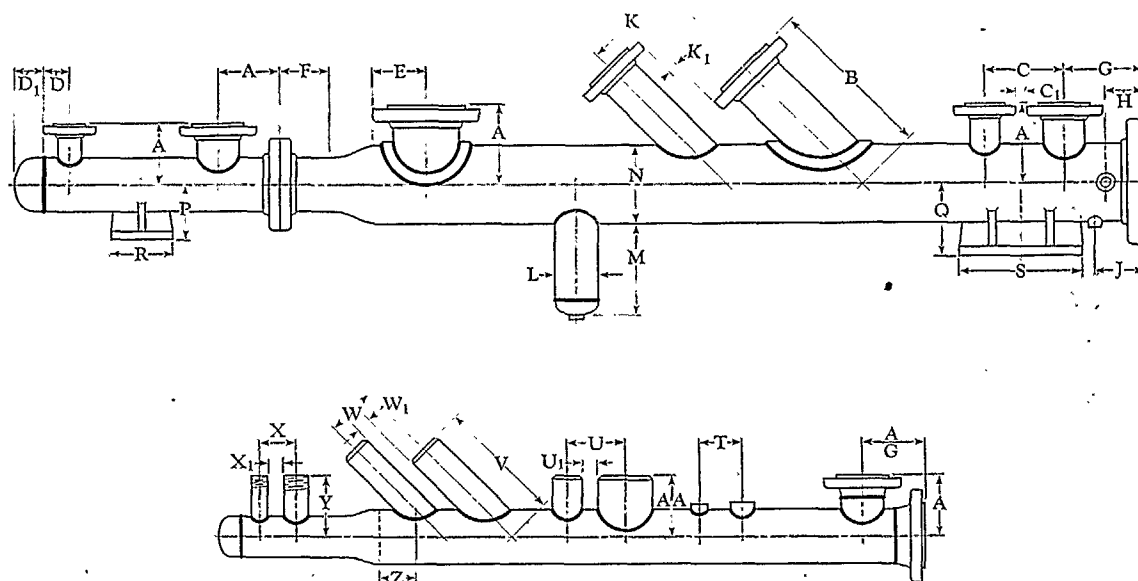


24 x 16-inch Welded Headers



Completing an unusual welded assembly

Dimensions of Crane Welded Headers



Design recommendations: It is impossible to outline in complete detail fixed recommendations for the dimensions of welded headers, because the specific requirements often necessitate the use of special or unusual dimensional design. However, for the major portion of ordinary requirements, it is possible to keep within the limitations of standard practice.

To this end, the composite header sketches shown above and the data following are presented as a guide for designing and for determining the dimensions of welded headers.

Caution: In the data following, reference is made, in many cases, to recommended minimum dimensions. The principles of good header design preclude the use of these minimum dimensions, and consequent close clearances, except when necessary.

As an example, refer to dimension "C" (center to center of adjacent flanged end nozzles) in the sketch above and in the data section following, and note that the recommended minimum should be used only when close nesting of the branch outlet piping is required, or when the space for the header length is limited. Obviously, the use of the minimum dimension "C" is not desirable when greater spacing of adjacent nozzles can be effected.

Recommended minima: While the recommended minimum dimensions appearing in the following data are accurate for general purposes, slight variations are possible. For specific problems of this nature, full information will be furnished upon receipt of inquiries, which preferably should be accompanied by a sketch.

Dimensions "A" and "B": The center to face dimension of flanged end welded nozzles should be the same as the corresponding dimensions of flanged fittings of similar pressure rating and of similar type.

Dimensions "C"-"C₁" and "K"-"K₁": The recommended minimum center to center dimension of adjacent flanged end welded nozzles should be one-half the diameter of one outlet flange, plus one-half the diameter of the other outlet flange, plus one inch (1"). This will provide sufficient clearance for welding the nozzles to the header and also for bolting up the adjacent flanged joints.

If the nozzle welds are reinforced, certain types of reinforcement may require more than one inch of clearance between adjacent flanges of nozzles. However, if ring reinforcement is used, this qualification does not apply, as the one inch clearance between adjacent flanges (Dimensions "C₁" and "K₁") provides sufficient clearance for the application of welded reinforcing rings.

Dimensions "D" and "E": The dimension "D" (center of welded nozzle to center of the butt weld of an end closure) and the dimension "E" (center of welded nozzle to the beginning of a swaged reduction in the diameter of the header) should not be less than one-half the diameter of the flange on the welded nozzle.

Dimension "D₁": For dimensions of the Welding Caps used for end closures, see page 357. See pages 358 and 359 for working pressures of Caps.

Dimensions of Welding Cap end closures for pressures greater than those shown on pages 358 and 359 will be furnished on application.

Dimension "F": The minimum lengths of tangents on swaged or reduced ends should be the same as the minimum tangents used on pipe bends. See Column "C" in the table on page 602 and the notes relating to tangents on page 603.

Dimensions of Crane Welded Headers

Dimension "G": When the diameter of the welded nozzle is smaller than the diameter of the header, it is possible, in some instances, to make the dimension from center of nozzle to face of header flange less than the normal dimension ("A"), which is the corresponding flanged fitting dimension.

Dimension "G" should not be less than one-half the diameter of the outlet flange, plus the length through the hub of the header flange (including welding neck type), plus any additional space, if necessary, for the insertion of bolts.

Dimension "H": The pipe connection for flow meter purposes should be located according to the requirement of the flow meter manufacturer. However, clearance for the hub of the flange is necessary.

Dimension "J": Welded coupling nozzles or welded pads for a drain or other purposes should be so located that dimension "J" provides ample clearance for the hub of the header flange, and also for the insertion or removal of the bolts for the header flange when piping is connected to the welded coupling nozzle or pad.

Dimensions "L" and "M": The diameter of welded drip pockets ("L") should be approximately one-half to two-thirds of the diameter of the header ("N"). The length of welded drip pockets ("M") should be, as a recommended minimum, approximately two to three times the diameter ("L"). It is recommended that the drain connection be not less than 1-inch, also that the size should be based on the service requirement.

For low pressure saturated steam lines, drip pockets should be larger than those used on high pressure superheated steam lines, because more condensate will be present in the low pressure saturated steam lines than in the high pressure superheated steam. Drip pockets should not be located immediately opposite and below a vertical branch outlet of a header, because the flow from the header through the vertical branch will produce a syphonic action and render the drip pocket partially or even entirely ineffective, especially when a high velocity of flow is employed.

Dimensions "P" and "Q": The fabrication of headers by welding readily permits variations in the location, design, and dimensions of supports and anchorage bases.

In the absence of any special requirement, it is recommended that the dimension "P" (center of header to face of base support) and the dimension "Q" (center of header to face of anchorage base) be the same as the corresponding dimensions of base fittings of similar pressure rating and of similar type.

These recommended dimensions provide clearance for the application of insulation.

Dimensions "R" and "S": The dimensions of the support bases ("R") should be the same as the corresponding dimensions of base fittings of similar pressure rating and type.

The dimensions of anchorage bases ("S") should be larger than those of support bases and should be developed to suit the conditions.

When bases are to be drilled for bolts, the size and the location of the holes should be specified. When an anchorage base is used, it should be bolted securely; however, the supporting base should then be free, in order not to interfere with the longitudinal movement of the header when expanding or contracting.

Dimension "T": The minimum center to center dimension of adjacent welded coupling nozzles or welded pads ("T") is governed by the pipe sizes of these connections. Adequate space should be provided for the installation of any valves, unions, etc., in the connected piping.

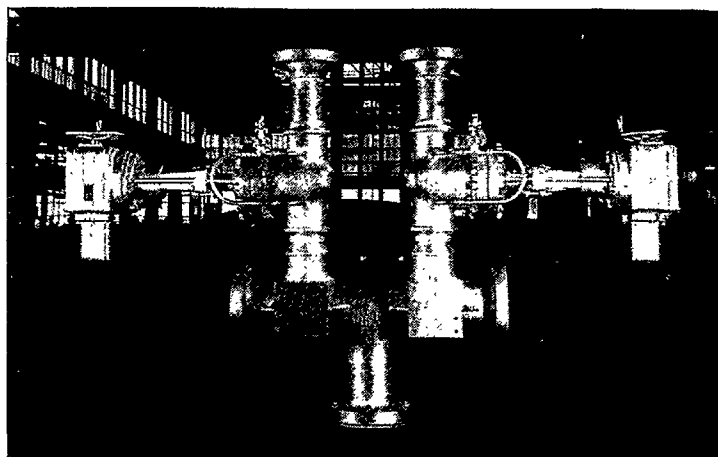
Dimensions "AA", "V", and "Y": It is recommended that the center to end dimension of beveled end welded nozzles ("AA" and "V") and threaded end welded nozzles ("Y") be the same as the center to face dimensions of corresponding flanged fittings of similar pressure rating and type.

When necessary, it is possible to reduce dimensions "AA", "V", and "Y" below the standard recommended above, but in such a case care should be used to have these dimensions of adequate length for proper butt welding or screwing-up of the branch piping to the ends of the nozzles in the header.

Dimensions "U", "U₁", "W", "W₁", and "X", "X₁": The minimum center to center dimension of adjacent beveled end or threaded end welded nozzles is governed by the pipe sizes of these nozzles. Adequate space should be provided for the installation of any valves, unions, flanges, etc. in the piping connected to the nozzles.

It is also necessary that the dimensions "U₁", "W₁", and "X₁" be of sufficient length to provide adequate space for the welding of the nozzles to the header.

Dimension "Z": The dimension "Z" can be determined by the same formula used for dimension "E", i. e., the same as one-half the flange diameter on a 90° welded nozzle.



A 900-Pound Header, complete with Valves

Pipe Coils

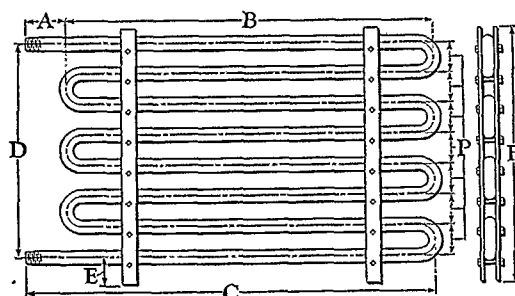
Pipe Coils can be furnished in many types. A few of those in general use are illustrated below. Pipe Coils are regularly made from any of the commercial sizes

and weights of steel and genuine wrought iron pipe. Information about coils made from other piping materials will be furnished on application.

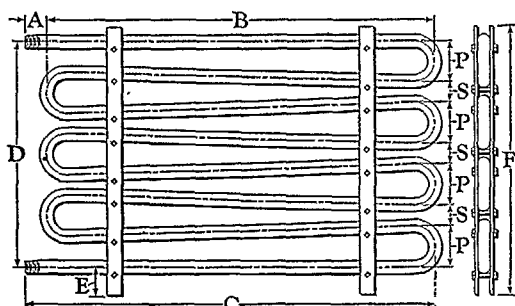
Center to Center Dimensions, in Inches

Size of Pipe	Recommended and Advisable Minimum		Shortest center to center dimensions		Size of Straps
	Standard	Extra Strong	Standard	Extra Strong	
$\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{4} \times \frac{1}{4}$
1	4	3	4	3	$1\frac{1}{4} \times \frac{1}{4}$
$1\frac{1}{4}$	5	4	$4\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{1}{2} \times \frac{1}{4}$
$1\frac{1}{2}$	6	5	5	4	$1\frac{1}{2} \times \frac{3}{8}$
2	8	6	6	5	$2 \times \frac{3}{8}$

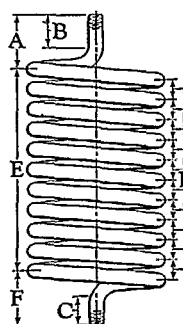
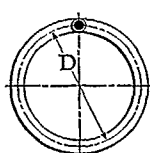
Information on smaller and larger sizes furnished on application.
Straps, if required, can be furnished in other sizes.



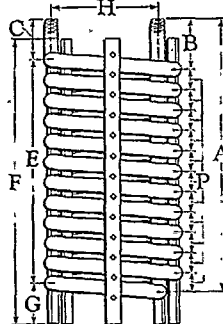
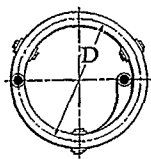
Flat Coil



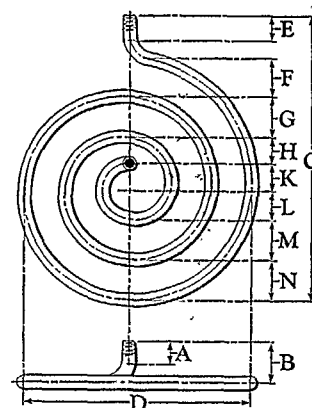
Flat Zig Zag Coil



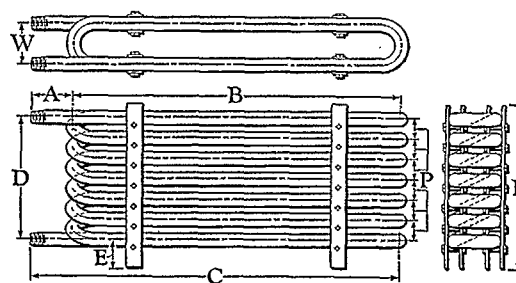
Cylindrical Coil



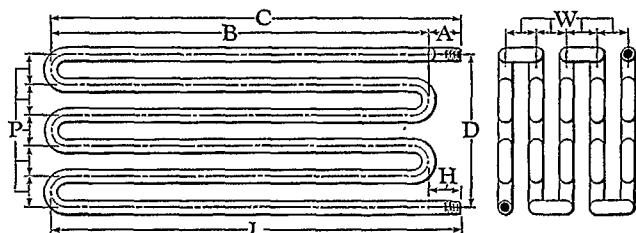
Cylindrical Coil
End Inside



Flat Spiral Coil



Oval Coil



Box Coil

Inquiries and orders: Inquiries and orders for Pipe Coils should specify the quantity; service; size, weight, and kind of pipe; also if the ends are to be plain, beveled, threaded, or flanged. If flanged, the kind of flange, facing, and type of joint should be specified.

The essential dimensions, as indicated by the letters in the drawings should be given, preferably in a sketch.

Threaded ends: If Pipe Coils are to have threaded ends, they can be furnished with regular threads, locknut threads, or straight threads. If the threads are other than regular, full details should be given.

Galvanizing: Pipe Coils can be furnished galvanized on the outside only. It is possible, in limited instances, to galvanize coils on the inside and outside. Full information will be furnished on receipt of specific inquiries.

Prices on application

Pipe...pages 574 to 587

Coils other than those illustrated above can be furnished.

Crane Double Pipe Heat Exchangers

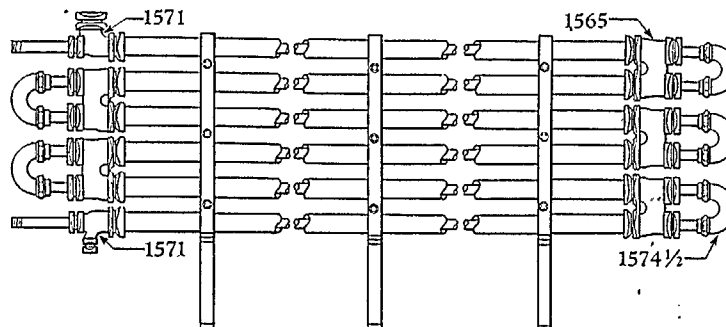
Crane Shops can fabricate heat exchangers of the type illustrated at the right. They are formed of two sets of piping, one placed inside of the other, and utilizing Crane double pipe return bends and fittings.

Application: Crane Double Pipe Heat Exchangers have a wide range of application, in various installations, to serve as the medium for heat transfer between fluids, gases, etc. The usual arrangement is to provide counter flows, or directions of travel, in the inside of the smaller, or inner piping, and the annular space between the inner piping and the outer piping.

Pipe sizes: Three sizes of heat exchangers are regularly made: 2 x 1¼-inch, 2½ x 1¼-inch, and 3 x 2-inch. A fourth size, 4 x 3-inch, can be made up on special orders. The sizes commonly used are 2 x 1¼-inch and 3 x 2-inch.

Length and height: Crane Double Pipe Heat Exchangers are regularly made in any length up to 20 feet long. Lengths over 20 feet can be made up on special orders. These heat exchangers can be any number of pipes in height; however, the usual practice limits the height to 12 pipes.

Construction: Heat exchangers are regularly constructed with No. 1565 Double Pipe Return Bends; No. 1571 Double Pipe Tees, for the inlet and outlet; and No. 1574½ Union End Return Bends or No. 1569 Flanged End Return Bends; see page 486. All flanged joints have tongue and groove facing.



Packing: Through the use of special packings and gaskets in the fittings, these heat exchangers are made suitable for use with various oils, gases, etc.

Headers for multiple stands: When two or more stands of double pipe heat exchangers are used in a battery, welded piping headers for connecting the inlets and outlets are recommended.

Testing and assembly: Crane Double Pipe Heat Exchangers are regularly subjected to a 300-pound air-under-water test, and are shipped in complete sections, ready for erection. When too large for shipment, they are assembled in partial sections, ready for final assembly in the field.

Inquiries and orders: Inquiries or orders should specify the quantity; size, weight, and kind of pipe; service, pressure, and temperature; over-all length and number of pipes; number of stands; center to center dimensions of stands, when headers are wanted; and whether or not valves and any additional connections are wanted on the inlets and outlets.

Prices on application. Information on welded heat exchangers and welded jacketed pipe on application.

Testing of Fabricated Piping

Crane fabricated piping, such as pipe bends, welded headers, welded assemblies, or any piping containing shop welds, is regularly tested to meet the requirements of the Code to which it has been fabricated.

Products such as the above which do not have to comply with any Code will be tested at the pressures shown in the table at the right.

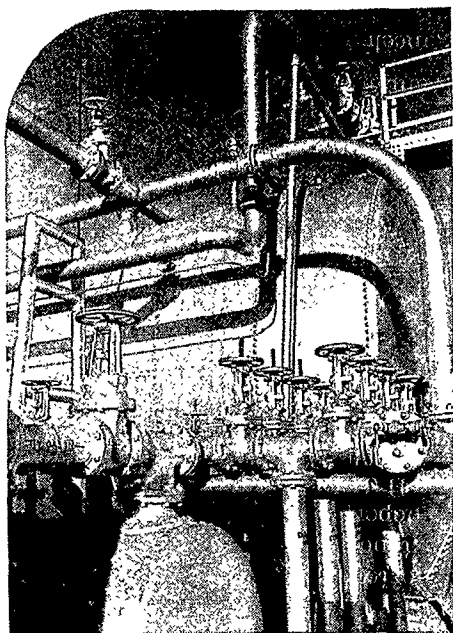
Special tests: Items other than those listed before as being regularly tested can be tested when specified, in which case an extra charge will be made.

Special tests, other than the usual hydrostatic, are available at a special price. Some of the special tests are steam, air-under-water, and kerosene. Full information will be furnished on application.

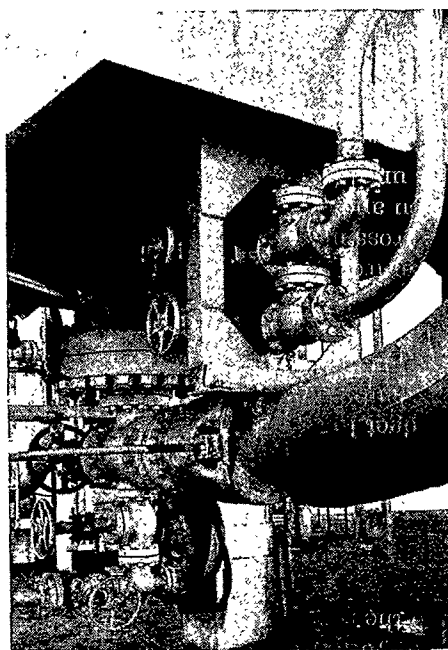
Hydrostatic Test Pressures

*Primary Service Pressure	Hydrostatic Tests
25 Pounds Steam	50 pounds
125 " "	250 "
150 " "	350 "
250 " "	500 "
300 " "	750 "
400 " "	1000 "
600 " "	1500 "
900 " "	2000 "
1500 " "	3500 "

*Primary Service Pressure is the pressure under which iron and steel valves, fittings, flanges, etc., are classified in the American Standards.



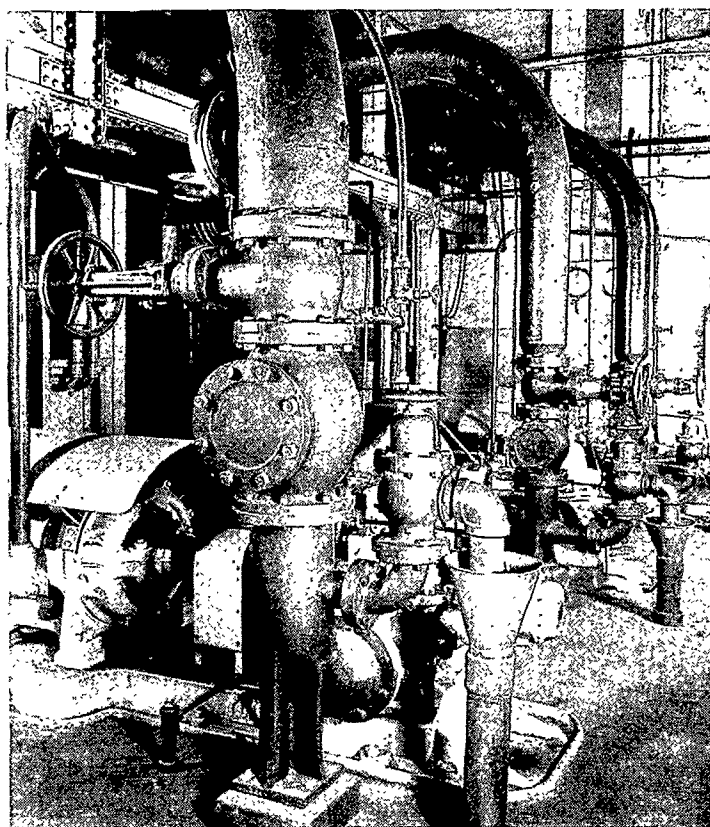
Natural gasoline processing system using Crane piping products.



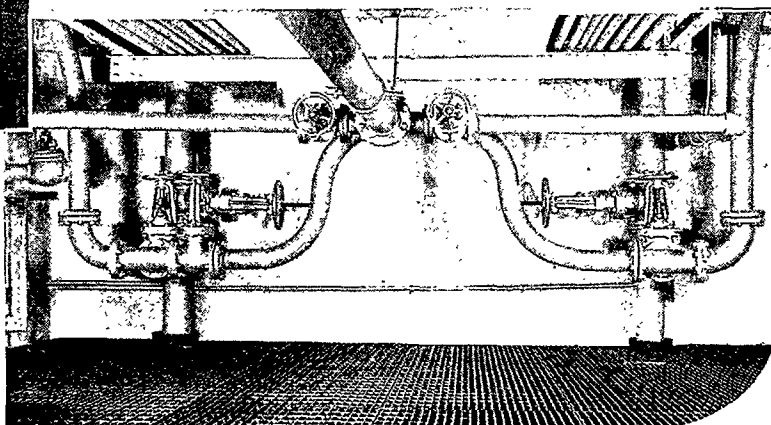
Crane high pressure-temperature steel valves, fittings, and pipe bends at bottom of still in oil refinery.



Crane pipe bends, iron gate valves, check valves, relief valves, and fittings in house service water lines in a large utilities plant. (Below)



Electric light and power plants find Crane shops a dependable source of accurately fabricated piping.



Engineering Data

Crane service to users of valves and fittings extends far beyond the manufacture of such products. Through years of research, experimenting, and testing, Crane Engineers have accumulated a wealth of engineering data to assist in solving the complicated problems sometimes associated with piping systems. A small portion of that data is shown in this section of the catalog. Users confronted with unusual piping problems are invited to avail themselves of Crane's complete service or to refer to the several Crane technical publications for additional information.

Assembly and Maintenance of Flanged Joints.....	page 624
Crane Bolting.....	pages 622 and 623
Welding Bevel Details.....	page 647
How to Read Reducing Fittings.....	page 644
Taps and Drains for Flanged Fittings.....	page 645
Taps, Drains, and Location of By-Passes for Valves.....	page 646
Resistance of Valves and Fittings to Flow of Fluids.....	pages 630 and 631
Discharge of Water Through Pipes, Orifices, and Valves.....	pages 625 to 627
Flow of Water Through Standard Wrought Iron or Steel Pipe.....	page 628
Pressure Drop in Elbows and Bends.....	page 629
Heating Water with Steam Coils.....	pages 632 and 633
Excerpts from the Code for Pressure Piping.....	page 634
Calculating Working Pressure, Stress, or Wall Thickness of Pipe.....	pages 635 to 637
Calculation of Pipe Bends.....	pages 638 and 639
Length of Pipe in Bends.....	page 640
Thermal Expansion and Modulus of Elasticity of Pipe.....	page 641
Spacing of Pipe Supports.....	page 642
Deflection of Horizontal Pipe Lines.....	page 643
Definition of Steam and General Data.....	pages 648 and 649
Properties of Saturated Steam.....	pages 650 to 653
Properties of Superheated Steam.....	pages 654 to 657
Conversion Table, General.....	page 658
Linear Conversion.....	pages 659 to 662
Pressure Conversion.....	page 664
Weight Conversion.....	page 664
Temperature Conversion.....	page 663
Circumferences and Areas of Circles.....	pages 665 to 667

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For greater convenience, certain data of an engineering nature have been included in other sections of this catalog with products to which they definitely pertain. Refer to the pages indicated below:

Formula for Determining Size of Stop-Check Valves.....	page 371
Formula for Determining Size of Steam or Oil Separators.....	page 420
Normal Engagement Between Male and Female Threads.....	page 591
American and British Standard Pipe Threads.....	pages 590 and 591
Threading Material for Oil Country Tubular Goods.....	pages 593 to 596
Railing Pipe Threads.....	page 266
Expansion of Wrought Iron, Steel, Brass, or Copper Pipe.....	page 426
Expansion of Copper Tubing.....	page 510
Standard, Extra Strong, and Double Extra Strong Pipe Data.....	page 588
Internal Fluid Pressures for Pipe.....	page 589

Crane Bolting

Definitions

1. **Bolt:** A bolt is threaded on one end only, the other end being upset into the form of a head.
2. **Stud:** A stud is threaded on both ends, one end being oversize in diameter to fit tightly (wrench fit) in a tapped hole, the other being to the standard diameter for a nut assembly.
3. **Bolt-Stud:** A bolt-stud is threaded either on both ends, or full length to the standard diameter for nut assembly on each end.

Materials

Crane Co. furnishes bolts, studs, and bolt-studs of the following materials:

Machine Bolts for use at temperatures up to 500° F. are made from steel complying with A.S.T.M. Specification A 107, open-hearth, free-cutting grade, having the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	60,000
Yield Point, lbs. per sq. in.	35,000
Elongation in 2", per cent.	25
Reduction of Area, per cent.	50

These bolts are furnished with "Regular" unfinished square heads in accordance with A.S.A. B18.2.

All machine bolts are threaded in accordance with A.S.A. B1.1 Coarse Thread Series, Class 2 fit.

Nuts regularly furnished with machine bolts are made of free-cutting or resulfurized nut stock conforming to A.S.T.M. Specification A 107.

Nuts are made to American Standard Unfinished "Heavy" Hexagon Dimensions, A.S.A. B18.2.

All nuts are tapped in accordance with A.S.A. B1.1 Coarse Thread Series, Class 2 fit.

Studs and Bolt-Studs for use at temperatures up to 500° F. are made from cold rolled steel complying with A.S.T.M. Spec. A 108, open-hearth free-cutting grade, having the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	70,000
Yield Point, lbs. per sq. in.	60,000
Elongation in 2", per cent.	18
Reduction of Area, per cent.	45

Cold roll steel studs and bolt-studs are threaded in accordance with A.S.A. B1.1 Coarse Thread Series, Class 2 fit (nut ends only).

Nuts regularly furnished are cold made of material in accordance with A.S.T.M. Spec. A 107.

Nuts are semi-finished in accordance with the American Standard "Heavy" Hexagon Dimensions, A.S.A. B18.2.

All nuts are tapped in accordance with A.S.A. B1.1 Coarse Thread Series, Class 2 fit.

Alloy Steel Studs and Bolt-Studs are made of Crane Triplex or Templex Steel. Crane Triplex Steel has been used with uniformly satisfactory results in thousands of steel valve and fitting installations, many of which—particularly in oil refineries—have

been operating under extreme pressures and temperatures. Templex Steel, a recent Crane development in bolting materials, is superior to Triplex Steel in creep resistance; on temperatures over 850° F., especially where joints are made up for permanent, long-time service, as in steam power plants, Crane Templex Steel will be found ideal.

Crane Triplex Steel complies with the requirements of A.S.T.M. Specification A 193, Grade B7.

Crane Templex Steel complies with the requirements of A.S.T.M. Specification A 193, Grade B14.

Both steels have the following physical properties:

	Minimum
Tensile Strength, lbs. per sq. in.	125,000
Yield Point, lbs. per sq. in.	105,000
Elongation in 2", per cent.	16
Reduction of Area, per cent.	50

Alloy steel bolt-studs, threaded throughout their entire pipe length, and nuts are threaded in accordance with the number of threads per inch specified in A.S.A. B1.1, Coarse Thread Series for sizes 1-inch and smaller. Sizes 1 1/8-inch and larger are furnished with threads per inch in accordance with A.S.A. B1.1, 8 Pitch Thread Series. This threading is in accordance with M.S.S. SP-29-1939.

M.S.S. SP-29-1939 specifies the A.S.A. B1.1 Class 3 tolerances and dimensions for bolt-studs and Class 2 tolerances and dimensions for nuts. This combination of dimensions and tolerances allows the maximum bolt-stud pitch diameter to be the same as the minimum nut pitch diameter.

Note: In addition to furnishing bolt-studs and nuts in accordance with the aforementioned tolerances and dimensions, Crane Co. maintains a smaller maximum bolt-stud pitch diameter and a larger minimum nut pitch diameter than allowed by M.S.S. SP-29-1939, thereby insuring a "clearance" under all conditions between bolt-stud and nut which tends to prevent "freezing" or seizing of the two parts.

Nuts regularly furnished with alloy steel bolt-studs are medium carbon, oil-quenched, semi-finished, made to the American Standard "Heavy" Hexagon Nut Dimensions, A.S.A. B18.2.

Nuts for alloy steel bolt-studs comply with the requirements of A.S.T.M. Specification A 96 for Class 1 and A.S.T.M. A 194 for Class 2 H.

Torque Required to Produce Bolt Stress

The torque or turning effort required to produce a certain stress in bolting is dependent upon a number of conditions, some of which are:

1. Diameter of bolt.
2. Type and number of threads on bolt.
3. Material of bolt.
4. Condition of nut bearing surfaces.
5. Lubrication of bolt threads and nut bearing surfaces.

Crane Co. has conducted many tests to determine the relation between torque and bolt stress from which the tables given below were prepared. The values given in these tables are based upon steel bolting

well lubricated with a heavy graphite and oil mixture. It was found that a non-lubricated bolt has an efficiency of about 50 per cent of a well lubricated bolt and also that different lubricants produce results varying between the limits of 50 and 100 per cent of the tabulated stress figures.

Crane High Temperature Thread Lubricant

The graphite and oil mixture will give satisfactory results; however, for high temperature service Crane High Temperature Thread Lubricant should be used so that bolt-studs can be more readily followed up or disassembled after being subjected to heat. See page 548 for description of Crane High Temperature Thread Lubricant.

Data for Use with Machine Bolts and Cold Rolled Steel Bolt-Studs

Load in Pounds on Bolts and Bolt-Studs when Torque Loads Are Applied

Nominal Diameter of Bolt	No. of Threads per Inch	Diameter at Root of Thread	Area at Root of Thread	Stress					
				7,500 Lbs. per Sq. In.		15,000 Lbs. per Sq. In.		30,000 Lbs. per Sq. In.	
				Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.
1/4"	20	.185	.027	1	203	2	405	4	810
5/16	18	.240	.045	2	388	4	675	8	1350
3/8	16	.294	.068	3	510	6	1020	12	2040
7/16	14	.345	.093	5	698	10	1395	20	2790
1/2	13	.400	.126	8	945	15	1890	30	3780
9/16	12	.454	.162	12	1215	23	2430	45	4860
5/8	11	.507	.202	15	1515	30	3030	60	6060
3/4	10	.620	.302	25	2265	50	4530	100	9060
7/8	9	.731	.419	40	3143	80	6285	160	12570
1	8	.838	.551	62	4133	123	8265	245	16530
1 1/8	7	.939	.693	98	5190	195	10380	390	20760
1 1/4	7	1.064	.890	137	6675	273	13350	545	26700
1 3/8	6	1.158	1.054	183	7905	365	15810	730	31620
1 1/2	6	1.283	1.294	219	9705	437	19410	875	38820
1 5/8	5 1/2	1.389	1.515	300	11363	600	22725	1200	45450
1 3/4	5	1.490	1.744	390	13080	775	26160	1550	52320
1 7/8	5	1.615	2.049	525	15368	1050	30735	2100	61470
2	4 1/2	1.711	2.300	563	17250	1125	34500	2250	69000

Data for Use with Alloy Steel Bolt-Studs

Load in Pounds on Bolt-Studs when Torque Loads Are Applied

Nominal Diameter of Stud	No. of Threads per Inch	Diameter at Root of Thread	Area at Root of Thread	Stress					
				30,000 Lbs. per Sq. In.		45,000 Lbs. per Sq. In.		60,000 Lbs. per Sq. In.	
				Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.	Torque Ft. Lbs.	Compression, Lbs.
1/4"	20	.185	.027	4	810	6	1215	8	1620
5/16	18	.240	.045	8	1350	12	2025	16	2700
3/8	16	.294	.068	12	2040	18	3060	24	4080
7/16	14	.345	.093	20	2790	30	4185	40	5580
1/2	13	.400	.126	30	3780	45	5670	60	7560
9/16	12	.454	.162	45	4860	68	7290	90	9720
5/8	11	.507	.202	60	6060	90	9090	120	12120
3/4	10	.620	.302	100	9060	150	13590	200	18120
7/8	9	.731	.419	160	12570	240	18855	320	25140
1	8	.838	.551	245	16530	368	24795	490	33060
1 1/8	8	.963	.728	355	21840	533	32760	710	43680
1 1/4	8	1.088	.929	500	27870	750	41805	1000	55740
1 3/8	8	1.213	1.155	680	34650	1020	51975	1360	69300
1 1/2	8	1.338	1.405	800	42150	1200	63225	1600	84300
1 5/8	8	1.463	1.680	1100	50400	1650	75600	2200	100800
1 3/4	8	1.588	1.980	1500	59400	2250	89100	3000	118800
1 7/8	8	1.713	2.304	2000	69120	3000	103680	4000	138240
2	8	1.838	2.652	2200	79560	3300	119340	4400	159120
2 1/4	8	2.088	3.423	3180	102690	4770	154035	6360	205380
2 1/2	8	2.338	4.292	4400	128760	6600	193140	8800	257520
2 3/4	8	2.588	5.259	5920	157770	8880	236655	11840	315540
3	8	2.838	6.324	7720	189720	11580	284580	15440	379440

Assembly and Maintenance of Flanged Joints

As the temperatures and pressures used in the piping industry have increased, the problem of maintaining tight flanged joints has progressively become more severe. Many types of joints have been used; various types of gaskets have been installed in these joints; and different kinds of bolting materials have been recommended — all with a varying amount of success, depending upon the operating conditions. Even with all of these variations in design, certain precautions must be taken to maintain tight flanged joints.

When a flanged joint is assembled, each of the component parts is subjected to tensile or compressive stresses of varying magnitude. Under service conditions, especially where high temperatures are involved, a change in the magnitude of these stresses occurs and a lowering of the bolt stress results.

In order to compensate for this reduction in bolt stress, the following recommendations are made with regard to the assembly and maintenance of flanged joints.

Assembly: Initial bolt stresses to be applied in the assembly of flanged joints should afford a reasonable factor of safety with reference to the yield point of the bolting material. On the other hand, the initial bolt stress must be high enough to insure a tight joint.

An extensive survey of field erected flanged joints has indicated that the following initial stresses are usually applied when alloy steel bolt-studs are pulled up manually. Experience has shown that these stresses are satisfactory for American Standard Steel Flanges and will comply with the requirements as set forth in the preceding paragraph.

Table I

Size of Alloy Steel Bolt-Stud (Note 1)	Average Stress Applied Manually Lbs. per Sq. Inch (Note 2)	Approximate Torque to Obtain Stress, Ft. Lbs. (Note 3)	Elongation in Inches, per Inch of Effective Length (Note 4)
$\frac{3}{4}$	52,000	175	.00173
$\frac{7}{8}$	48,000	255	.00160
1	45,000	370	.00150
$1\frac{1}{8}$	42,500	500	.00142
$1\frac{1}{4}$	40,000	665	.00133
$1\frac{3}{8}$	38,000	860	.00127
$1\frac{1}{2}$	36,500	975	.00122
$1\frac{5}{8}$	35,000	1285	.00117
$1\frac{3}{4}$	34,000	1700	.00113
$1\frac{7}{8}$	33,000	2200	.00110
2	32,000	2350	.00107

Notes: (1) Coarse thread series, 1" and smaller; 8 pitch thread series, $1\frac{1}{8}$ " and larger. (2) Average stress applied by maintenance men in assembly, using a lever and wrench or by sledging. (3) Based upon well-lubricated* threads. (4) Based on a modulus of elasticity of 30,000,000. The effective length of bolt-stud equals the distance from center of one nut to center of the other.

The values given in Table I have been graduated according to size — however, if it is possible to apply higher torques, it is recommended that the initial bolt stress be approximately 45,000 pounds per square inch.

The initial bolt stress can be applied by either of

two methods: (1) By pulling up the well-lubricated* bolt-studs with the proper torque, or (2) by pulling up the bolt-studs to produce the elongation necessary for the desired bolt stress. When the second method is used the total desired elongation of the bolt-stud should be ascertained by multiplying the value given in the table for elongation in inches per inch by the effective length (distance from center of one nut to center of the other). Figures 1 and 2, respectively, show the design of an instrument which can be used in measuring bolt-stud elongation and the preparation of the ends of a bolt-stud for accurate measurement.

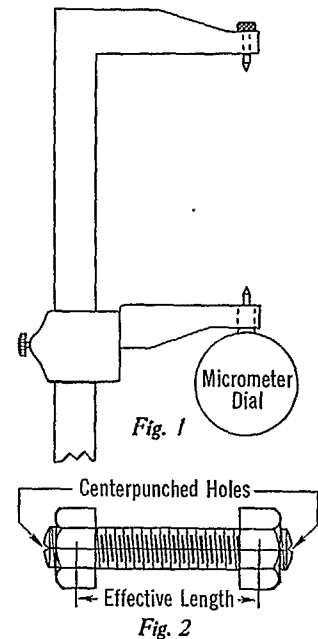
Maintenance: When should bolt-studs be pulled up after being in service? It is recommended that the bolting in all flanged joints installed on temperatures above 500° F. be pulled up after the first shutdown.

On high temperature service where creep may be expected to occur, it is recommended that the bolting be pulled up at least once during the first 200 hours of service, regardless of whether the line has been shut down or not. Bolt stress should be checked periodically during the life of the installation.

How should the bolt elongation be checked and the bolt-studs pulled up? As a general rule, it is only necessary to check the elongation in two or three diametrically opposite bolt-studs, using the average of the values obtained as the elongation for the remainder. If the bolt elongation is to be determined while the joint is in service, one bolt should be checked and pulled up before another is loosened. Measurements should be taken immediately after releasing the load before the bolt temperature decreases. The following procedure should be used in checking bolt elongation:

- Determine the length of the bolt in the assembled joint.
- Release the load on the bolt by loosening the nut and re-measure the length.
- Subtract second reading from first.
- Divide this value by the effective length of the bolt. (Effective length equals distance from center of one nut to center of the other.)

If the residual elongation is less than 70% of the values given in Table I, the bolts should be pulled up so that the final elongation approximates the figures shown.



*Crane High-Temperature Thread Lubricant or equal; see page 548

Discharge of Water Through Pipes, Orifices, and Valves

Table of Nomenclature

A	= Area of opening, square feet.
C	= Experimental coefficient.
D	= Inside diameter of pipe, feet.
f	= Coefficient of friction.
g	= 32.2 feet per second ²
h_1, h_2, h_3	= Individual head losses, feet of water.
H	= Effective head pressure, feet of water.
L	= Length of pipe line, feet.
Q	= Flow of water, gallons per minute.
V	= Velocity of water, feet per second.

Frequently it is necessary to determine the quantity of water which will be discharged through a valve or orifice, or through a certain length of pipe. This problem is one which occurs often in hydraulic work, particularly with reference to the flow of water through long pipe lines from a high level to a lower one.

The quantity of water which is discharged into the atmosphere through a pipe, orifice, or valve is dependent upon several variable factors which include flow pressure, size of pipe, type of valve or orifice, condition of pipe wall surface, length of pipe line, etc. The discharge of water into the atmosphere in terms of head loss follows the general formula:

$$H = C \frac{V^2}{2g} \quad \text{Formula No. 1.}$$

Where the value of "C" is usually determined by experiment.

Discharge of Water Through Pipes

In the case of water flowing through pipes, the quantity discharged is dependent upon three major resistance factors:

- A. Entrance loss
- B. Loss of head due to friction
- C. Loss of head due to velocity

The loss of head at entrance depends upon the condition of the pipe end. A well rounded connection will cause the entrance loss to be decreased appreciably, while a square non-projecting pipe will give a "C" value of approximately .5 in Formula No. 1. This latter condition is realized in the majority of installations and therefore, the formula for entrance effect is as follows:

$$h_1 = .5 \frac{V^2}{2g} \quad \text{Formula No. 2.}$$

The loss of head due to friction is mainly dependent upon the length and condition of the pipe line and may be expressed as

$$h_2 = \frac{f \times L}{D} \times \frac{V^2}{2g} \quad \text{Formula No. 3.}$$

In this equation, the friction factor, "f", must be determined from experimental results. For rough approximations, the value of "f" may be assumed as

.015 for brass tubes, .02 for steel pipe, and .04 for cast iron pipe.

The third factor, the loss of head due to velocity, may be expressed by the following formula:

$$h_3 = \frac{V^2}{2g} \quad \text{Formula No. 4.}$$

The total loss of head is the sum of the individual losses and may be expressed as follows:

$$H = h_1 + h_2 + h_3 = \left(1.5 + \frac{f \times L}{D}\right) \frac{V^2}{2g}$$

$$\text{As } Q = VA \times 450$$

$$\text{It follows that } Q = 450A \sqrt{\frac{2gH}{1.5 + \frac{f \times L}{D}}} \quad \text{Formula No. 5.}$$

Example: How much water will an 8" steel pipe line (7.981 inside diameter) 3000 feet long discharge per minute at a point which is 300 feet below the inlet?

$$\text{Given: } D = \frac{7.981}{12} = .665 \text{ feet}$$

$$A = .3474 \text{ square feet}$$

$$H = 300 \text{ feet}$$

$$2g = 64.4 \text{ feet per second}^2$$

$$f = .02 \text{ (assumed)}$$

$$L = 3000 \text{ feet}$$

$$\text{Then: } Q = 450 \times .3474 \sqrt{\frac{64.4 \times 300}{1.5 + \frac{.02 \times 3000}{.665}}}$$

$$Q = 2268 \text{ gallons per minute}$$

Discharge of Water Through Orifices

The coefficient "C" for orifices is dependent upon the condition of the orifice edges, i.e., an orifice having well rounded edges has a "C" value of approximately 1.23, while one having sharp edges gives a "C" value of approximately 2.69.

Discharge of Water Through Globe Valves

The discharge of water through globe valves under a given flow pressure depends primarily upon the type of valve considered. Crane Co. has conducted tests on various types of globe valves in sizes up to and including 2½" and has determined that the flow through a globe valve is, roughly, one-half of the flow through a short pipe of the same size.

For additional data, see pages 626 and 627.

Discharge of Water (Cont.)

Through Pipes, Orifices, and Valves

The chart on the opposite page gives the discharge of water through pipe sizes from $\frac{3}{8}$ " to 10", in lengths from 1 foot to 200 feet; through orifices in sizes up to 10"; and through valves in sizes up to $2\frac{1}{2}$ " based upon the formulas or tests described previously. For sizes, lengths, or pressures not given on the chart, the respective formulas or ratios may be used.

Note: In all cases, the pressure used to determine the flow through pipes, orifices, or valves, should be the effective head pressure under flow conditions, not the static pressure in the line before flow commences. This statement applies particularly to lines supplied by pumps, etc.

Application of Chart

Example No. 1

What quantity of water will be discharged through 75 feet of 5" standard pipe under a discharge gauge pressure of 50 pounds per square inch?

Enter the upper portion of the chart (page 627) at the intersection of the horizontal line for 75 feet of pipe and the line for the 5" pipe size. Proceed downward to the intersection with the diagonal for 50 pounds gauge pressure and then continue horizontally to the right where the quantity discharged is given as 2600 gallons per minute on the right hand ordinate.

Example No. 2

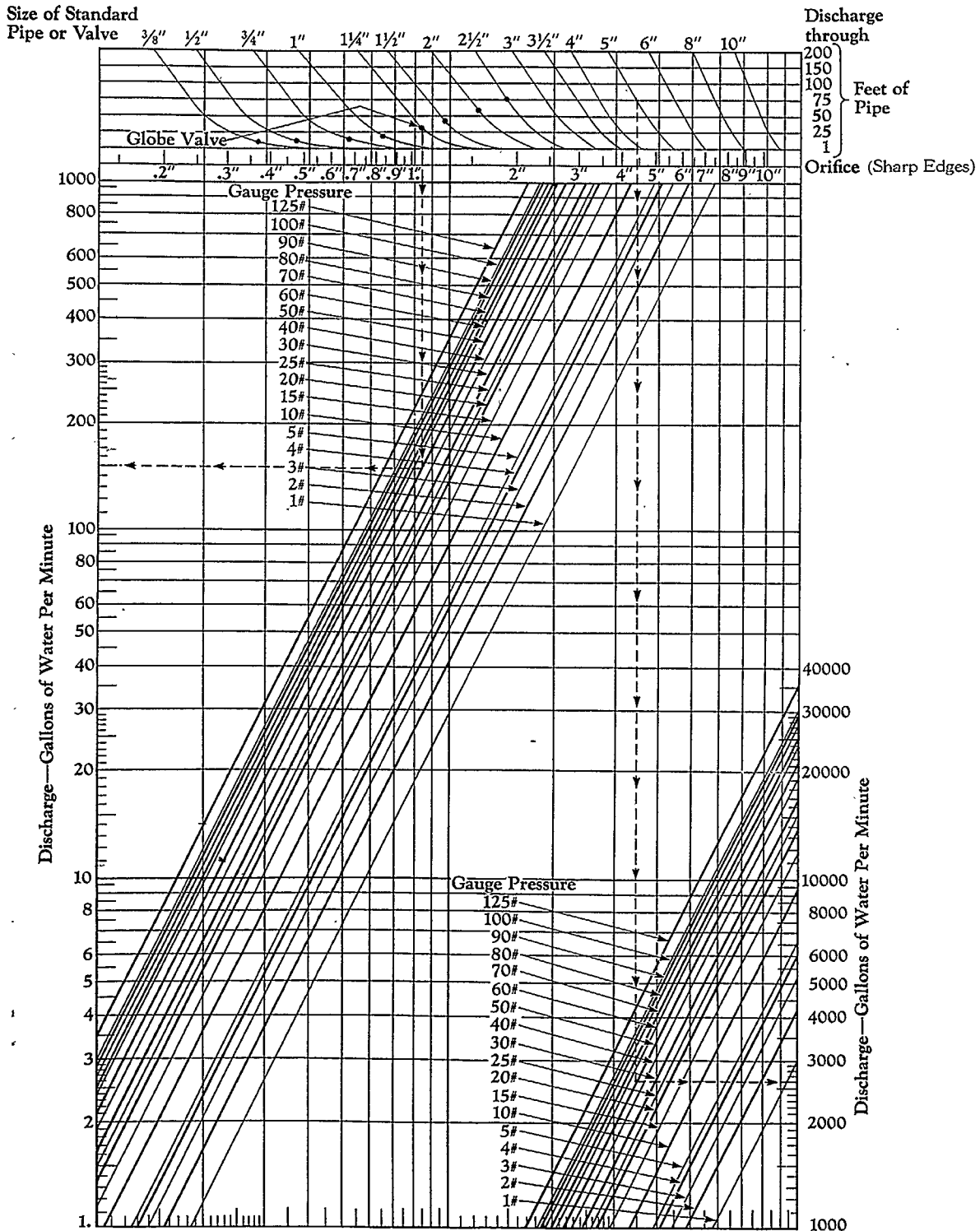
A $1\frac{1}{4}$ " globe valve is discharging water into the atmosphere under a discharge gauge pressure of 50 pounds per square inch. What quantity is discharged in gallons per minute?

Enter the upper portion of the chart (opposite page) at the black dot on the line for $1\frac{1}{4}$ " valve size. Proceed downward to the intersection with the diagonal for 50 pounds gauge pressure and then continue horizontally to the left where the quantity discharged is given as 150 gallons per minute on the left hand ordinate.

Discharge of Water (Cont.)

Through Smooth Pipes, Orifices, and Valves

40
10
30



Flow of Water Through Standard Wrought Iron or Steel Pipe

Based on Saph and Schoder Formula

Note: For old or rough pipes add 25% to the pressure drop given in the table.
Velocities given in light face type.
Pressure drops given in bold face type.

$$P = \frac{3.68 V^{1.86}}{d^{1.25}}$$

P = Pressure drop, lbs. per sq. in. per 1000 ft. of pipe
V = Velocity, feet per second
d = Inside diameter of pipe, inches

PRESSURE DROP, POUNDS PER SQ. IN. PER 1000 FT. OF PIPE
(1.0 Lb. per Sq. In. = 2.30 Ft. of Water)

Dis-charge Gals. per Min.	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop	Vel. Ft. per Sec.	Pres- sure Drop
1	.37	.55	1 1/4"	.50	1 1/2"	.50										
2	.74	2.0	0.43	1.08	0.47	.86	2"									
3	1.12	4.25	0.64	1.85	0.63											
4	1.49	7.3	0.86	1.85	0.63											
5	1.86	11.1	1.07	2.81	0.79	1.31										
6	2.24	15.4	1.28	3.94	0.95	1.82	.57	.52	2 1/2"							
8	2.98	25.3	1.72	6.70	1.26	3.11	.76	.88								
10	3.72	40.0	2.14	10.2	1.57	4.70	.96	1.34								
15	5.60	85.0	3.21	21.8	2.36	10.1	1.43	2.85	1.00	1.18	3"					
20	7.44	145	4.29	36.8	3.15	17.1	1.91	4.85	1.34	2.00	.87	.68				
25			5.36	56.0	3.94	26.0	2.39	7.32	1.68	3.04	1.08	1.02				
30			6.43	78.5	4.72	36.4	2.87	10.4	2.01	4.26	1.30	1.44				
35			7.51	100	5.51	48.3	3.35	13.7	2.35	5.14	1.52	1.92	.81	.49	4"	
40					6.30	62.5	3.82	17.6	2.68	7.29	1.74	2.45	1.14	.93		
45					7.08	78.0	4.30	22.1	3.00	9.12	1.95	3.08	1.46	1.49	1.13	.79
50					7.87	94.0	4.78	26.7	3.35	11.0	2.17	3.72	1.62	1.80	1.26	.96
60							5.74	37.5	4.02	15.5	2.60	5.20	1.95	2.54	1.51	1.24
70							6.69	51.8	4.69	21.4	3.04	7.25	2.27	3.48	1.76	1.86
80							7.65	63.8	5.37	26.4	3.48	8.90	2.59	4.33	2.01	2.30
90							8.60	79.1	6.04	32.8	3.91	11.1	2.92	5.31	2.26	2.86
100	1.11	.45					9.56	96.8	6.71	40.0	4.34	13.5	3.24	7.78	2.52	3.47
125	1.39	.68							8.38	60.6	5.42	20.5	4.05	9.90	3.15	5.28
150	1.67	.95							10.06	87.1	6.51	28.8	4.86	13.9	3.78	7.40
175	1.94	1.26	8"						11.73	115.9	7.59	39.0	5.67	18.4	4.41	9.80
200	2.22	1.62									8.68	49.0	6.48	23.6	5.04	12.6
225	2.50	2.00	1.44	.51							9.77	60.6	7.29	29.3	5.67	15.6
250	2.78	2.45	1.60	.63							10.85	74.1	8.10	35.8	6.30	19.0
275	3.06	2.93	1.76	.74							11.94	88.2	8.91	42.6	6.93	22.8
300	3.33	3.44	1.92	.87							13.02	104	9.72	50.2	7.56	26.8
325	3.61	3.98	2.08	1.02	10"								10.53	58.0	8.18	31.0
350	3.89	4.55	2.24	1.12									11.35	66.8	8.82	35.7
375	4.16	5.17	2.40	1.32									12.17	75.2	9.45	40.3
400	4.44	5.85	2.56	1.49	1.63	.48							12.97	85.3	10.08	45.5
425	4.72	6.53	2.72	1.67	1.73	.53							13.78	95.3	10.70	50.7
450	5.00	7.28	2.88	1.85	1.83	.59							14.59	108	11.33	56.8
475	5.27	8.07	3.04	2.05	1.93	.66							15.40	118	11.96	62.8
500	5.55	8.90	3.20	2.28	2.04	.73									12.59	69.3
550	6.11	10.6	3.53	2.71	2.24	.87									13.84	82.7
600	6.66	12.5	3.85	3.18	2.44	1.02	12"								15.10	97.0
650	7.21	14.4	4.17	3.67	2.65	1.18									16.36	112
700	7.77	16.6	4.49	4.23	2.85	1.36	1.84	.48								
750	8.32	19.0	4.81	4.80	3.05	1.54	1.99	.55								
800	8.88	21.3	5.13	5.41	3.26	1.73	2.13	.63								
850	9.44	23.7	5.45	6.05	3.46	1.94	2.27	.70								
900	10.00	26.4	5.77	6.72	3.66	2.16	2.41	.79	1.98	.48						
950	10.55	29.2	6.09	7.45	3.87	2.38	2.55	.87								
1,000	11.10	32.3	6.41	8.18	4.07	2.63	2.69	.96								
1,100	12.22	38.6	7.05	9.82	4.48	3.15	2.84	1.06								
1,200	13.32	45.1	7.69	11.6	4.88	3.64	3.12	1.27	2.10	.53						
1,300	14.43	52.5	8.33	13.4	5.29	4.30	2.21	.59	2.21	.59						
1,400	15.54	60.0	8.97	15.4	5.70	4.88	2.33	.65	2.33	.65						
1,500	16.65	68.8	9.62	17.5	6.10	5.59	2.46	.69	2.46	.69						
1,600	17.76	77.1	10.26	19.7	6.51	6.29	2.56	.77	2.56	.77						
1,800	19.98	96.1	11.54	24.5	7.32	7.85	2.81	.77	2.81	.77						
2,000	22.20	117	12.83	29.9	8.13	9.57	3.03	1.06	3.03	1.06						
2,500			16.03	45.1	10.18	14.5	3.26	1.22	3.26	1.22						
3,000			19.24	63.2	12.21	20.4	3.49	1.39	3.49	1.39						
3,500			22.43	84.0	14.25	27.2	3.73	1.56	3.73	1.56						
4,000			25.65	108	16.28	34.7	4.19	1.93	4.19	1.93	2.11	.45				
4,500					18.31	43.2	4.66	2.37	4.66	2.37						
5,000					20.35	52.3	5.12	2.75	5.12	2.75						
6,000					24.42	73.1	5.82	3.58	5.82	3.58						
7,000					28.50	98.0	6.48	4.50	6.48	4.50						
8,000					32.57	125	7.09	5.88	7.09	5.88						
9,000							8.51	8.23	8.51	8.23						
10,000							9.93	10.9	9.93	10.9						
12,000							11.35	14.1	11.35	14.1						
14,000							12.76	17.4	12.76	17.4						
15,000							14.18	21.3	14.18	21.3						
16,000							15.60	25.2	15.60	25.2						
18,000							17.02	29.8	17.02	29.8						
20,000							18.44	34.7	18.44	34.7						
22,000							19.85	39.6	19.85	39.6						
24,000							21.26	44.5	21.26	44.5						
25,000							22.67	49.4	22.67	49.4						
30,000							25.53	62.8	25.53	62.8						
35,000							28.37	77.0	28.37	77.0						
40,000							31.20	91.2	31.20	91.2						
45,000							34.00	108	34.00	108						
50,000																
55,000																
60,000																

Pressure Drop in Elbows and Bends

The general effect of elbows, bends, or obstructions on the flow of fluids in pipes is to lower the critical velocity, so that a fluid flowing streamline in a straight pipe may become turbulent upon traversing a bend, or any existing turbulence may be increased.

In bends or elbows, the degree of turbulence is altered by any change of velocity and also by any change in the ratio of the radius of curvature, R , to the pipe diameter, d . Tests have indicated that the increase in the degree of turbulence depends upon the properties of the fluid itself and is not constant for all fluids.

It is generally assumed that short radius elbows produce a greater pressure drop than long radius bends. This assumption is not borne out by tests, however, which show that if the mean radius of curvature of the elbow is equal to approximately $1\frac{1}{2}$ or 2 pipe diameters, the pressure drop is lower than that caused by a bend having a radius of curvature of 5 pipe diameters. This, however, does not take into consideration the straight length of pipe connected to the short radius elbow, to maintain the overall dimensions of the larger radius bend which, if included, would indicate a greater pressure drop for the short radius elbow construction.

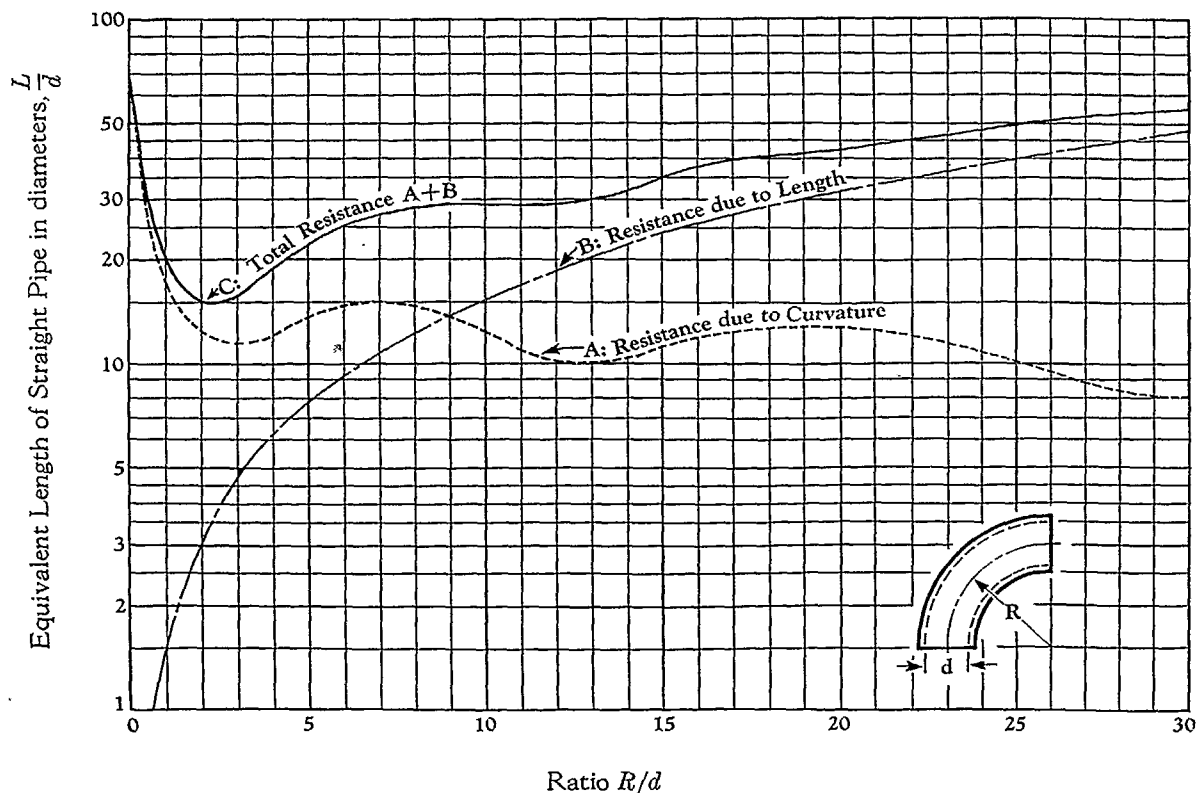
Professor Eustice* has shown, by the use of colored filaments, the motion of water in its flow through curved glass pipes and has prepared an average curve of frictional resistance ratios which is plotted as curve A in the chart shown below. Curve B shows the resistance due to the actual length of the bend; Curve C shows the total resistance of the pipe bend.

The curves indicate that the variation due to the properties of the various fluids is small and that for all practical purposes the curves given for water may be used for steam, gas, etc.

Example: What is the pressure drop in terms of equivalent pipe length caused by an expansion "U" bend made from 6" pipe having a radius of curvature of 30"?

Referring to the chart for an R/d ratio of $30/6 = 5$ and proceeding upward to Curve C , the equivalent pipe length for a quarter bend is equal to $22 \times 6 = 132$ ", or 11 feet of 6" pipe. As an expansion "U" bend is made up of four quarter bends, the approximate total resistance offered by this type of bend is $11 \times 4 = 44$ feet of 6" pipe.

*"Engineering" London — November 13, 1925



Resistance of Valves and Fittings to Flow of Fluids

When the flow of a fluid in a pipe line is altered by some obstruction such as a valve or fitting, the velocity is changed, turbulence is magnified, and a drop in pressure results. This pressure drop may be insignificant in long lines where it is very small in comparison to the total drop, but when the line is short, the pressure drop through valves and fittings becomes a major item in the total pressure drop value.

The most widely used data on the subject of the resistance of valves and fittings to the flow of water and steam is the information given in Dean Foster's paper on "Effect of Fittings on Flow of Fluids Through Pipe Lines" (published in Vol. 42, 1920, of the *Transactions of the American Society of Mechanical Engineers*). Later tests conducted by others have indicated that the values given by Foster are low for globe valves, angle valves, etc., and that data are needed to establish the correct information to use.

It has been the tendency, and probably is the most practical way, to present the friction values in terms of an equivalent length of the same size of pipe; i. e., the pressure drop caused by a 2-inch elbow is equivalent to approximately the pressure drop caused by five or six feet of 2-inch pipe under the same conditions of flow.

In this way, water and steam can be treated comparatively and a relation can be established between the relative friction values of water and steam. Foster has stated that the equivalent length of pipe for steam flow is about .8 of that established for the flow of water.

Realizing the need for definite data covering this subject, Crane Co. has conducted pressure drop tests on valves and fittings on both water and steam. These tests were made on 2-inch and 6-inch sizes and conducted under conditions which were thoroughly investigated previous to the tests.

Resistance in Terms of Equivalent pipe Length

From data given in the tests conducted by Crane Co. and also from information gathered from authentic sources, the chart shown on the opposite page has been prepared. The chart gives the equivalent length of pipe to produce the same pressure drop as a valve or fitting. This additional pipe length should be added to the length of the line in order to determine the total pressure drop.

It has been shown by previous investigators that the drop in pressure through valves, fittings, etc., is some constant multiplied by the velocity head,

$$\frac{V^2}{2g}$$

Therefore: $H_1 = k \frac{V^2}{2g}$ where

H_1 = Loss of head in feet

k = Coefficient (Values given in table below)

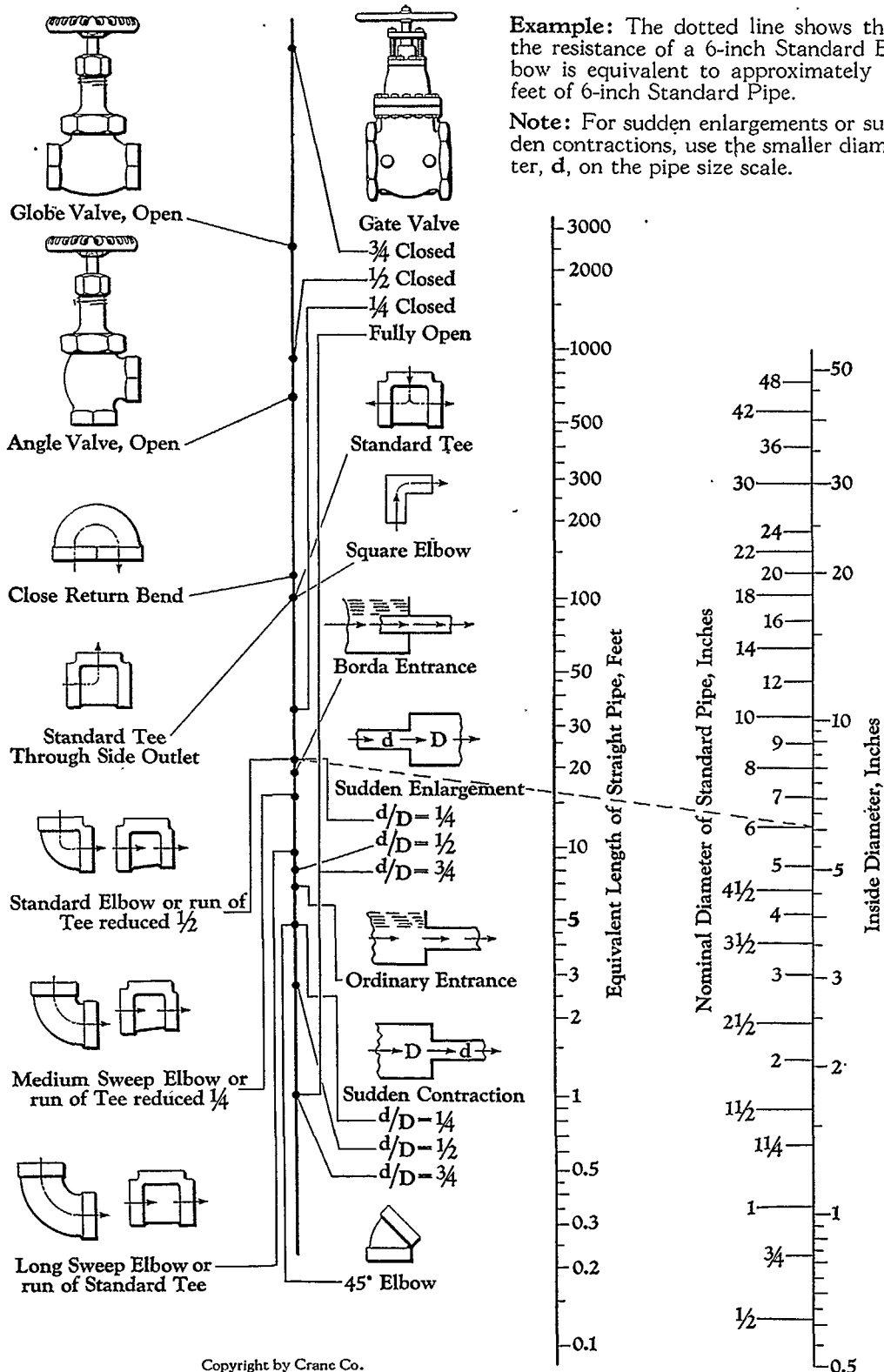
V = Velocity of water, feet per second

$2g$ = 64.4

Coefficient "k"

Type	"k"	Authority
Globe valve.....	10.0	Crane tests
Angle valve.....	5.0	Crane tests
Close return bend.....	2.2	
Standard tee.....	1.8	Giesecke & Badgett
Standard elbow.....	.9	{ Giesecke & Badgett Crane tests
Medium sweep elbow.....	.75	
Long sweep elbow.....	.60	Bulletin No. 2712 — University of Texas
45° elbow.....	.42	Bulletin No. 2712 — University of Texas
Gate valve (fully open).....	.19	Bulletin No. 252 — University of Wisconsin
1/4 closed.....	1.15	Bulletin No. 252 — University of Wisconsin
1/2 closed.....	5.6	Bulletin No. 252 — University of Wisconsin
3/4 closed.....	24.0	Bulletin No. 252 — University of Wisconsin
Borda entrance.....	.83	"Hydraulics" Daugherty
Sudden enlargement:		
d/D = 1/4.....	.92	"Hydraulics" Daugherty
d/D = 1/2.....	.56	"Hydraulics" Daugherty
d/D = 3/4.....	.19	"Hydraulics" Daugherty
Ordinary entrance.....	.5	"Hydraulics" Daugherty
Sudden contraction:		
d/D = 1/4.....	.42	"Hydraulics" Daugherty
d/D = 1/2.....	.33	"Hydraulics" Daugherty
d/D = 3/4.....	.19	"Hydraulics" Daugherty

Resistance of Valves and Fittings to Flow of Fluids



Heating Water With Steam Coils

When steam pipes or coils are submerged in water and the condensation is withdrawn as rapidly as it is formed, the rate of heat transfer may be determined by referring to the chart shown on the opposite page.

The values for brass and iron pipe given on this chart are based upon data prepared by the American Radiator Co., which were derived from tests. The figures given on the chart are one-half of the actual test results to allow for corrosion and fouling of the pipe.

Caution: It must be realized that when the size of a trap is to be recommended based on the values obtained from this chart, the pounds of steam condensed per square foot per hour, as given by the chart for the operating conditions, should be doubled.

The chart not only gives the B.t.u. loss per square foot per hour from copper, brass, and iron pipes, but also includes the pounds of steam condensed per square foot of pipe surface per hour for pressures ranging from 10 to 385 pounds per square inch gauge.

Example No. 1

A well insulated tank contains 10,000 gallons of water.

Given:

Quantity of water = 10,000 gallons = 10,000 x 8.33
= 83,300 pounds

Inlet temperature of water = 70° Fahr.

Final temperature of water = 140° Fahr.

Temperature of steam at 150 pounds per square inch gauge = 366° Fahr.

Size of pipe for coil = 1½"

Material of pipe for coil = steel

Problem:

How many feet of 1½" steel pipe will be required for a coil large enough to raise the temperature of the water from 70° Fahr. to 140° Fahr. in one hour if the steam pressure available is 150 pounds per square inch gauge?

Procedure:

1. Determine the mean temperature difference.

$$\frac{(366 - 70) + (366 - 140)}{2} = 261^\circ \text{ Fahr.}$$

2. Referring to the opposite page, enter the bottom

of the chart at a mean temperature difference of 261° Fahr.; proceed upward to the intersection with the line for steel pipe and then horizontally to the left to the ordinate where it is noted that the heat transfer rate is 70,000 B.t.u. square foot per hour.

3. Determine the B.t.u. necessary to raise the water from 70° to 140° Fahr.

$$83,300 \text{ pounds} \times (140 - 70) = 5,831,000 \text{ B.t.u. per hour.}$$

4. Divide this quantity by the rate of heat transfer to determine the square feet of pipe surface required.

$$\frac{5,831,000}{70,000} = 83.3 \text{ square feet}$$

5. The length of 1½" pipe which has one square foot of outer surface is equal to 2.301 feet.

6. Multiply the number of square feet required by the length per square foot to obtain the total length of 1½" pipe required.

$$83.3 \times 2.301 = 191.7 \text{ feet of } 1\frac{1}{2}" \text{ pipe.}$$

Example No. 2

Given:

Steam pressure = 10 pounds per square inch, gauge.

Pipe size = 2-inch standard.

Pipe material = brass.

Inlet water temperature = 40° Fahr.

Required outlet water temperature = 170° Fahr.

Required:

Total number of B.t.u. transferred per square foot of pipe surface per hour.

Pounds of steam condensed per square foot of pipe surface per hour.

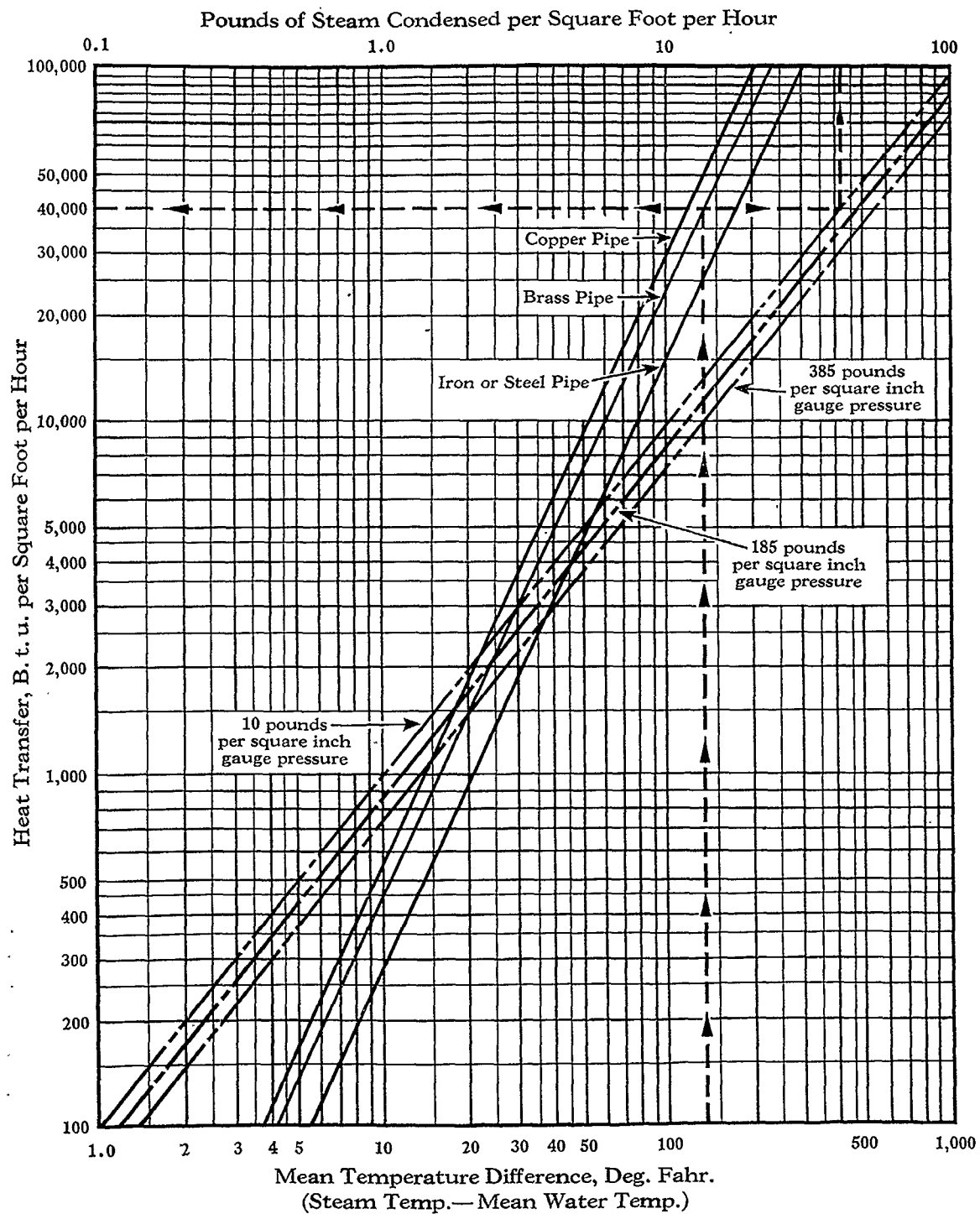
Procedure:

The temperature of saturated steam at 10 pounds per square inch gauge pressure is approximately 240° Fahr.

The mean water temperature is 105 deg. Fahr. which gives a mean temperature difference of 240 — 105 = 135° Fahr.

Entering the chart on the lower scale at a temperature difference of 135° Fahr. and proceeding upward to the intersection with the line for *Brass pipe* and thence left to the ordinate, it is found that the heat transfer is approximately 40,000 B.t.u. per square foot per hour. Proceeding horizontally to the right along the 40,000 B.t.u. line to the intersection with the dash line for 10 pounds per square inch gauge pressure and then upward to the top boundary line, it is determined that 42 pounds of steam are condensed by each square foot of outer pipe surface per hour.

Heating Water with Steam Coils (Cont.)



For typical problems involving the use of this chart, see the preceding page.

Excerpts from the Code for Pressure Piping

The following excerpts from the Code for Pressure Piping, American Tentative Standard B31.1-1935, cover the scope and classification of the four piping sections and set forth limitations of threaded end pipe.

Section 1, Power Piping Systems

"101 Scope. Section 1 of this Code covers the design, manufacture, test, and installation of power piping systems, as defined below, for steam generating plants, central heating plants, and industrial plants.

102 Classification. (a) Power piping systems shall be understood to comprise all steam, water, and oil piping (not including oil piping covered by Section 3 of this Code) within or forming a part of the above-mentioned plants and to exclude gas, air, and refrigerating piping, central and district heating steam or hot water distribution piping away from the plant, building heating piping when the pressure does not exceed 15 lb gage, roof and floor drains, plumbing, sprinkler systems, piping for hydraulic pressure tools or equipment, sewers, and industrial process piping for fluids not mentioned above.

(b) All valves, fittings, and piping for boilers as prescribed in the A.S.M.E. Power Boiler Code are to be considered as part of the boiler or boilers and are outside the scope of this Code.

(c) Economizers, heaters, tanks, and other pressure vessels are also outside the scope of this Code, but connecting piping shall conform to the requirements herein specified.

122 Thickness of Pipe. (e) Steel pipe lighter than Schedule 40 shall not be threaded.

(f) (1) While the thickness given by Formula 1 [pipe design formula] is theoretically ample to take care of both bursting pressure and material removed in threading, it is mandatory that where steel pipe is threaded and used for steam pressure of 250 lb per sq in. and over, or for piping under pressure in excess of 125 lb per sq in. with water temperature of 220 F and over, it shall be seamless of a quality at least equal to A.S.T.M. Specification A 106 and of a weight at least equal to Schedule 80 in order to furnish added mechanical strength.

Section 2, Gas and Air Piping Systems

"201 Scope. This section covers the design, manufacture, installation, and tests of piping systems intended for conveying only air, fuel gas, or illuminating gas.

202 Classification. (a) Section 2 of this Code includes city gas distribution systems, cross-country transportation systems, piping in gas manufacturing plants, in gas or air compressing stations, and in processing plants.

(b) This section does not contemplate gas or air temperatures above 450 F. The requirements of Section 3 of this Code for temperatures above 450 F shall apply to all gas or air piping systems where the temperature exceeds 450 F.

(c) This section does not apply to:

- (1) Air piping under pressures 30 lb per sq in. and below,
- (2) Equipment or apparatus, or pipe connections which are a part of apparatus,
- (3) Piping lined with firebrick or other refractory material used for conveying hot gases,
- (4) Piping used for conveying refinery process gas in oil refineries or gasoline recovery plants, and for sewer gas; or ducts for waste gases and ventilation,
- (5) Casing, tubing, and pipe used in gas or oil wells, and natural gas field gathering systems outside the boundaries of cities or villages. (The latter is defined as piping beginning at the wells and extending to a common point in the producing field where the transportation systems begin), or
- (6) Domestic gas piping systems.

220 Thickness of Pipe. Div. 1. (d) Steel pipe lighter than Schedule 40 shall not be threaded.

(f) In case piping is buried beneath streets, the value of P in

Formula 2 [pipe design formula] shall not be less than 185 lb for any condition except that pit-cast cast iron pipe shall

Section 3, Oil Piping Systems Including Oil Vapor, Refinery Gas, and Gasoline Recovery Plants

"301 Scope. Section 3 of this Code covers mandatory requirements and recommended practices for the design, manufacture, test, and installation of oil piping systems used in the production, transmission, and refining of petroleum. It is not intended to include casing, tubing, or pipe used in gas or oil wells.

302 Classification. (a) The requirements specified herein shall apply only to oil piping, refinery gas piping, and piping for gasoline recovery plants. These requirements do not apply to other piping used in connection with oil piping systems such as steam lines, refrigeration plant lines, other gas or air piping which are covered in detail in other sections of the Code. The requirements do not apply to heater coils, economizer or pipe exchangers except surface coolers or exchangers ordinarily known as condenser box coils.

(b) This section of this Code includes piping, valves, and fittings up to the connections to drums, pressure vessels, and apparatus but does not include the connections themselves which are ordinarily furnished with and as a part of the equipment. Nor does it include such piping or its parts integral with the equipment or apparatus.

(c) Oil lines are classified according to pressure and temperature. Oil vapor lines shall follow the same classifications and specifications as oil lines. [Refinery gas lines are dealt with specifically.]

325 Thickness of Pipe. (d) For pipes both inside and outside of refinery limits it is recommended that no pipe lighter than standard weight shall be threaded. (Where two or more standard weights of pipe are obtainable, the heavier or heaviest weight is referred to in this case.)

Section 4, District Heating Piping Systems

"401 Scope. (a) This section covers the design, manufacture, test, and installation of district heating and central heating piping systems (away from the plant) for the distribution of steam or hot water.

(b) Piping in the district heating and central heating generating plants is covered by Section 1 of this Code.

402 Classification. (a) District and central heating piping systems shall include all distributing piping for steam or hot water produced in district heating and central heating plants whether the piping is installed underground or elsewhere and distributed at pressures in excess of 15 lb per sq in. gage.

(b) This section shall not apply to equipment, apparatus, or pipe connections which are a part of apparatus, nor does it apply to low pressure heating piping within buildings, roof, and floor drains, or plumbing and sewers.

423 Thickness of Pipe. (e) Steel pipe lighter than Schedule 40 shall not be threaded.

(f) (1) While the thickness given by Formula 7 [pipe design formula] is theoretically ample to take care of both bursting pressure and material removed in threading, it is mandatory that, where steel pipe is threaded and used for steam pressures of 125 lb per sq in. and over, or for carrying water at a temperature of 220 F or over and/or at a pressure over 175 lb per sq in, it shall be seamless of a quality at least equal to A.S.T.M. Specification A 106 and of a weight at least equal to Schedule 80 in order to furnish added mechanical strength.

Welded and Seamless Steel Pipe

Calculating Working Pressure, Stress, or Wall Thickness

Based on the Code for Pressure Piping

It is the generally accepted practice among designers today, when computing the thickness of pipe for a given service condition, to use the formulas provided by the Code for Pressure Piping, the A.S.M.E. Boiler Construction Code, or such other codes as may apply.

Of these codes, the Code for Pressure Piping, American Tentative Standard B31.1-1935, serves the

widest general purpose. It presents minimum safety requirements for the design, manufacture, and erection of pressure piping systems, and is divided into four major sections, as follows:

- Section 1.....covering Power Piping
- Section 2.....covering Gas and Air Piping
- Section 3.....covering Oil Piping
- Section 4.....covering District Heating Piping

Pipe Design Formula

Each section of the Code for Pressure Piping includes the following formula for determining pipe wall thickness, with varying "c" values as shown in the table at the right:

$$t = \frac{PD}{2S} + c$$

Where: *t = minimum pipe wall thickness for inspection, in inches
 P = maximum internal working pressure, in lbs. per sq. in. (gauge)
 D = outside diameter of pipe, in inches
 S = allowable stress in material, in lbs. per sq. in.
 c = allowance for threading, mechanical strength, and for corrosion, in inches

*Since all pipe furnished by the mill is subject to a 12½% variation in wall thickness, the thickness

calculated by the above formula should be multiplied by 8/7 to obtain the nominal wall thickness. The value of P shall not be taken at less than 100 lbs. per sq. in. (gauge) for any condition or material.

Table 1
 "c" Values for Steel Pipe, Code for Pressure Piping

Nominal Pipe Size Inches	Plain End			**Threaded
	Sections 1 and 4	Section 2	Section 3	All Sections
1/8	0.05"	0.02"	0.05"	0.05"
1/4 and 3/8	0.05	0.02	0.05	0.05
1/2 and 3/4	0.05	0.02	0.05	0.0571
1	0.05	0.05	0.05	0.0696
1 1/4 to 2	0.065	0.05	0.05	0.0696
Larger than 2	0.065	0.05	0.05	0.1000

**Values are for American Standard Pipe Threads for nominal pipe sizes of 1/2-inch and larger.

Simplified Method for Calculating Working Pressure, Stress, or Wall Thickness

Although the formula given above enables the determination of pipe wall thicknesses, its extensive use for practical purposes involves many laborious calculations. By establishing the ratio of the working pressure to the allowable stress as a coefficient, Crane engineers have developed an exceedingly easy,

simple, and accurate method for figuring not only the pipe wall thickness but also the stress in the pipe or the working pressure of the pipe, based on the Code for Pressure Piping. Three typical problems and complete data for making calculations are shown on the following two pages.

Coefficients for calculating; P/S values: The coefficients for calculating, which are the values of the ratio of the working pressure to allowable stress (P/S) are shown in Table 3, page 637. This table covers various thicknesses and sizes of steel pipe, including not only all scheduled pipe shown in the American Standard for Wrought-Iron and Wrought-Steel Pipe (A.S.A. B36.10) but also other thicknesses which are at present commercially available.

The table has been based upon the design formula given in the Code for Pressure Piping, the formula being rearranged in the following manner in order to calculate these values:

$$P/S = \frac{2 (.875T - c)}{D}$$

Where: T = nominal wall thickness, in inches

The P/S values vary for the different sections of the Code due to the fact that the value of "c" is not the same in all sections. The use of any particular

value, therefore, depends upon the service for which the pipe is to be used.

Allowable stress for pipe: Each section of the Code for Pressure Piping tabulates the allowable stress, "S", for piping materials at various temperatures. Table 2, page 636, shows these allowable stresses for steel pipe made in accordance with A.S.T.M. Specifications A 53 and A 106.

Calculated pressure-temperature ratings: For the convenience of users, Crane engineers have also calculated the actual pressure-temperature ratings for Standard and Extra Strong Grade A Seamless Steel Pipe for the Power Piping and the Oil Piping (Within Refinery Limits) Sections of the Code for Pressure Piping. These are shown in the section of this catalog devoted to Steel Butt-Welding Fittings; see pages 358 and 359. As explained above, other ratings, stresses, or pipe wall thicknesses can be easily calculated from the data shown on the following two pages.

Working Pressure, Stress, or Thickness Calculated Quickly and Accurately

Determining Working Pressure

Multiply P/S value Determination of maximum allowable working pressure when material, thickness, and temperature are known.

What is the maximum allowable working pressure at 100° F. for 1" Schedule 40, Grade A seamless steel plain end pipe per A.S.T.M. Specification A 106 to comply with Section 1 of the Code for Pressure Piping?

Find and multiply the P/S value by the allowable stress to obtain the maximum working pressure, thus: The P/S value for 1" Schedule 40 pipe for Section 1 is .100; see Table 3. The allowable stress for Grade A pipe at 100° F. for Section 1 is 13,050 pounds; see Table 2.

$$\text{Working pressure} = .100 \times 13050 = 1305 \text{ lbs. per sq. in.}$$

Determining Stress

Divide working pressure Determination of stress in pipe when the material, the working pressure, and the thickness are known.

What is the stress in 4" Schedule 80, Grade A seamless steel plain end pipe per A.S.T.M. Spec. A 106 when the working pressure is 1000 pounds per square inch and the temperature is 550° F.? The stress should not exceed that allowed at 550° F. by Section 1 of the Code for Pressure Piping.

Find the P/S value and divide the working pressure by it to obtain the stress, thus: The P/S value for 4" Schedule 80 pipe for Section 1 is .102; see Table 3. The working pressure is already known — 1000 pounds.

$$\text{Stress} = \frac{1000}{.102} = 9804 \text{ lbs. per sq. in.}$$

The allowable stress for this Grade A seamless steel pipe at 550° F. per Section 1 is 10,800 pounds per square inch; see Table 2. Since the calculated stress is less than the allowable, the pipe is satisfactory for the service conditions.

Determining Pipe Wall Thickness

Divide working pressure Determination of pipe wall thickness when the material, working pressure, and temperature are known.

What thickness of 12" Grade B seamless steel plain end pipe per A.S.T.M. Specification A 106 can be used for 950 pounds per square inch oil working pressure and a temperature of 450° F.? This pipe is to comply with Section 3 (Within Refinery Limits) of the Code for Pressure Piping.

Find the allowable stress and divide the working pressure by it to obtain the P/S value, from which the thickness can then be determined, thus: The allowable stress for 12" Grade B pipe at 450° F. for Section 3 is 10,470 pounds; see Table 2. The working pressure is already known — 950 pounds.

$$\text{P/S value} = \frac{950}{19470} = .049$$

Compare this P/S value with those of the established thicknesses of 12" pipe to find its equivalent or the next heavier weight; see Table 3. In the column for Section 3, it will be found that 12" pipe with a .500" thickness has a P/S value of .060. Since the calculated value is .049 and the next lighter weight pipe (.406" thickness) has a lower P/S value (.047), pipe .500" thick should be used for these service conditions.

Table 2 — Allowable Stresses for Steel Pipe (psi) — Code for Pressure Piping

Temperature Degrees Fahr.	Section 1, Power Piping Section 4, District Heating				Section 2, Division 1 Gas and Air Piping					Section 3, Oil Piping				
	Seamless		Lap- Weld	Butt- Weld	Seamless		Lap-Weld		Butt- Weld	Seamless		Lap-Weld		Butt- Weld
	Grade A	Grade B			Grade A	Grade B				Grade A	Grade B			
	ASTM A 106	ASTM A 106	ASTM A 53 or A 106	ASTM A 53	ASTM A 106	ASTM A 106	ASTM A 53	ASTM A 106	ASTM A 53	ASTM A 106	ASTM A 106	ASTM A 53	ASTM A 106	ASTM A 53
										Outside of Refinery Limits				
100										24400	31500	18000	18000	15200
										Within Refinery Limits				
100	13050	16675	10150	8120	16000	20700	12000	12000	10000	17400	22480	13050	13050	10875
150	12800	16360	9960	7970	16000	20700	12000	12000	10000	17070	22050	12800	12800	10675
200	12550	16040	9770	7820	16000	20700	12000	12000	10000	16740	21620	12550	12550	10470
250	12300	15720	9580	7670	16000	20700	12000	12000	10000	16410	21190	12300	12300	10260
300	12050	15400	9390	7520	16000	20700	12000	12000	10000	16080	20760	12050	12050	10050
350	11800	15080	9200	7360	16000	20700	12000	12000	10000	15750	20330	11800	11800	9840
400	11550	14760	9000	7200	16000	20700	12000	12000	10000	15420	19900	11550	11550	9630
450	11300	14440	8800	7040	16000	20700	12000	12000	10000	15080	19470	11300	11300	9420
500	11050	14120	8600	6880	14740	19040	11050	11050	9210	14740	19040	11050	11050	9210
550	10800	13800	8400	6720	14400	18590	10800	10800	9000	14400	18590	10800	10800	9000
600	10530	13450	8190	6550	14040	18130	10530	10530	8775	14040	18130	10530	10530	8775
650	10170	13000	7910	6330	13560	17510	10170	10170	8475	13560	17510	10170	10170	8475
700	9600	12400	7600	6000	13020	16810	9770	9770	8100	13020	16810	9770	9770	8100
750	9000	11500	7000	5600	12000	15500	9000	9000	7500	12000	15500	9000	9000	7500
800	7020	9160			9840	12710		7380		9840	12710		7380	
850	5800	7520			7920	10230		5940		7920	10230		5940	
900	Not used		Not used		6000	7750	Not used		4500	6000	7750	Not used		4500
950	above		above		4440	5740	above		3330	4440	5740	above		3330
1000	850°		750°		3000	3880	750°		2250	3000	3880	750°		2250

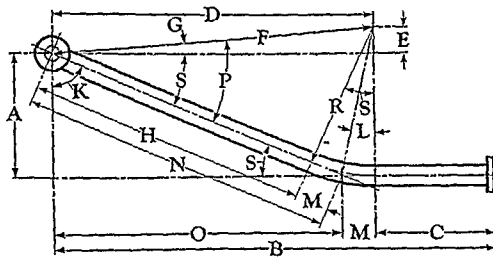
Table 3—P/S Values for Steel Pipe; Coefficients, Based on Code for Pressure Piping

Nominal Pipe Size	O.D. of Pipe Inches	Nominal Wall Thickness (1) Inches	Values for P/S				Nominal Pipe Size	O.D. of Pipe Inches	Nominal Wall Thickness (1) Inches	Values for P/S			
			Plain End Pipe			Thd'd. Pipe (2)				Plain End Pipe			Thd'd. Pipe (2)
			Sec. 1 & 4	Sec. 2 Div. 1	Sec. 3					Sec. 1 & 4	Sec. 2 Div. 1	Sec. 3	
1/8"	.405	.068 (40) s .095 (80) x	.046 .163	.195 .311	.046 .163	.046 .163	10"	10.75	.250 (20) .279 s .307 (30) s .365 (40) s .500 (60) x .593 (80) .718 (100) .843 (120) 1.000 (140) 1.125 (160)	.028 .033 .037 .047 .069 .084 .104 .125 .150 .171	.031 .036 .040 .050 .072 .087 .107 .127 .153 .173	.031 .036 .040 .050 .072 .087 .107 .127 .153 .173	.022 .026 .031 .040 .062 .077 .098 .118 .144 .164
1/4	.540	.088 (40) s .119 (80) x	.100 .200	.210 .311	.100 .200	.100 .200			.375 s .406 (40) s .500 x .562 (60) .687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.041 .045 .058 .066 .084 .105 .127 .144 .169	.043 .047 .060 .069 .086 .107 .129 .146 .172	.043 .047 .060 .069 .086 .107 .129 .146 .172	.035 .040 .052 .061 .078 .099 .121 .138 .164
3/8	.675	.091 (40) s .126 (80) x	.087 .178	.176 .267	.087 .178	.087 .178			.406 (40) x .500 x .562 (60) .687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.045 .058 .066 .084 .105 .127 .144 .169	.047 .060 .069 .086 .107 .129 .146 .172	.047 .060 .069 .086 .107 .129 .146 .172	.040 .052 .061 .078 .099 .121 .138 .164
1/2	.840	.109 (40) s .147 (80) x .187 (160) .294 xx	.108 .187 .270 .493	.179 .258 .341 .564	.108 .187 .270 .493	.091 .170 .253 .476			.562 (60) .687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.066 .084 .105 .127 .144 .169	.069 .086 .107 .129 .146 .172	.069 .086 .107 .129 .146 .172	.061 .078 .099 .121 .138 .164
3/4	1.050	.113 (40) s .154 (80) x .218 (160) .308 xx	.093 .161 .268 .418	.150 .218 .325 .475	.093 .161 .268 .418	.079 .147 .254 .404			.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164
1	1.315	.133 (40) s .179 (80) x .250 (160) .358 xx	.100 .162 .256 .400	.100 .162 .256 .400	.100 .162 .256 .400	.070 .131 .226 .370			.562 (60) .687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.066 .084 .105 .127 .144 .169	.069 .086 .107 .129 .146 .172	.069 .086 .107 .129 .146 .172	.061 .078 .099 .121 .138 .164
1 1/4	1.660	.140 (40) s .191 (80) x .250 (160) .382 xx	.069 .123 .185 .324	.087 .141 .203 .342	.087 .141 .203 .342	.063 .117 .179 .318			.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164
1 1/2	1.900	.145 (40) s .200 (80) x .281 (160) .400 xx	.065 .115 .190 .300	.080 .131 .206 .315	.080 .131 .206 .315	.060 .111 .185 .295			.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164
2	2.375	.154 (40) s .218 (80) x .343 (160) .436 xx	.058 .105 .197 .266	.071 .118 .210 .279	.071 .118 .210 .279	.054 .102 .194 .262			.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164
2 1/2	2.875	.203 (40) s .276 (80) x .375 (160) .552 xx	.078 .122 .183 .290	.088 .133 .193 .301	.088 .133 .193 .301	.053 .098 .158 .256			.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164
3	3.500	.216 (40) s .300 (80) x .437 (160) .600 xx	.070 .112 .161 .262	.079 .121 .189 .271	.079 .121 .189 .271	.050 .092 .161 .242	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
3 1/2	4.000	.226 (40) s .318 (80) x .636 xx	.066 .106 .245	.073 .114 .253	.073 .114 .253	.048 .089 .228	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
4	4.500	.237 (40) s .337 (80) x .437 (120) .531 (160) .674 xx	.063 .102 .141 .177 .233	.069 .108 .147 .184 .239	.069 .108 .147 .184 .239	.047 .086 .125 .162 .217	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
5	5.563	.258 (40) s .375 (80) x .500 (120) .625 (160) .750 xx	.057 .094 .133 .173 .212	.063 .099 .139 .178 .217	.063 .099 .139 .178 .217	.045 .082 .121 .160 .199	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
6	6.625	.280 (40) s .432 (80) x .562 (120) .718 (160) .864 xx	.054 .094 .128 .170 .208	.058 .099 .133 .174 .213	.058 .099 .133 .174 .213	.043 .083 .118 .159 .198	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
8	8.625	.250 (20) s .277 (30) s .322 (40) s .406 (60) x .500 (80) x .593 (100) .718 (120) .812 (140) .875 xx .906 (160)	.035 .041 .050 .067 .086 .105 .130 .149 .162 .168	.039 .044 .053 .070 .089 .108 .134 .153 .165 .172	.039 .044 .053 .070 .089 .108 .134 .153 .165 .172	.027 .033 .042 .059 .078 .097 .122 .141 .154 .160	.687 (80) .843 (100) 1.000 (120) 1.125 (140) 1.312 (160)	.084 .105 .127 .144 .169	.086 .107 .129 .146 .172	.086 .107 .129 .146 .172	.078 .099 .121 .138 .164		
(1) Figures in parentheses indicate A.S.A. B-36 Schedule Numbers. Letters "s", "x", and "xx" indicate Standard, Extra Strong, and Double Extra Strong Pipe.							24 OD	24.00	.250 (10) .375 (20) .500 (30) .593 (40) .812 (60) 1.031 (80) 1.250 (100) 1.500 (120) 1.750 (140) 1.937 (160)	.012 .021 .031 .035 .044 .062 .083 .103 .122 .144 .163	.014 .023 .032 .036 .045 .064 .084 .105 .123 .146 .164	.014 .023 .032 .036 .045 .064 .084 .105 .123 .146 .164	.009 .019 .028 .032 .041 .059 .080 .101 .119 .141 .160
(2) Values for threaded pipe apply to all four Sections. See page 634 for limitations of threaded ends.									.250 (10) .375 (20) .500 (30) .593 (40) .812 (60) 1.031 (80) 1.250 (100) 1.500 (120) 1.750 (140) 1.937 (160)	.012 .021 .031 .035 .044 .062 .083 .103 .122 .144 .163	.014 .023 .032 .036 .045 .064 .084 .105 .123 .146 .164	.014 .023 .032 .036 .045 .064 .084 .105 .123 .146 .164	.009 .019 .028 .032 .041 .059 .080 .101 .119 .141 .160

(1) Figures in parentheses indicate A.S.A. B-36 Schedule Numbers. Letters "s", "x", and "xx" indicate Standard, Extra Strong, and Double Extra Strong Pipe.

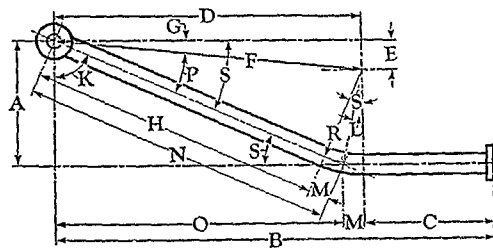
(2) Values for threaded pipe apply to all four Sections. See page 634 for limitations of threaded ends.

Calculation of Pipe Bends



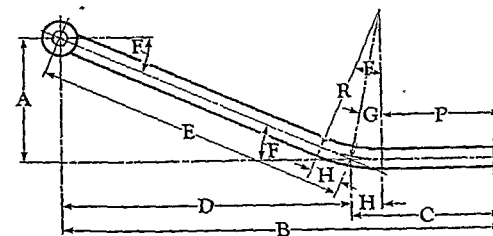
No. 1 - Given A, B, C, R

$$\begin{aligned} D &= B - C & \frac{R}{F} &= \sin \angle P \\ E &= R - A & \angle S &= \angle P - \angle G \\ F &= \sqrt{D^2 + E^2} & \angle K &= 90^\circ - \angle S \\ \frac{E}{F} &= \sin \angle G & \angle L &= \frac{1}{2} \angle S \\ H &= \sqrt{F^2 - R^2} & M &= \tan \angle L \times R \\ & & N &= H + M \\ & & O &= B - C - M \end{aligned}$$



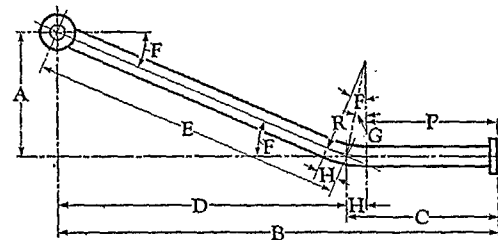
No. 2 - Given A, B, C, R

$$\begin{aligned} D &= B - C & \frac{R}{F} &= \sin \angle P \\ E &= A - R & \angle S &= \angle P + \angle G \\ F &= \sqrt{D^2 + E^2} & \angle K &= 90^\circ - \angle S \\ \frac{E}{F} &= \sin \angle G & \angle L &= \frac{1}{2} \angle S \\ H &= \sqrt{F^2 - R^2} & M &= \tan \angle L \times R \\ & & N &= H + M \\ & & O &= B - C - M \end{aligned}$$



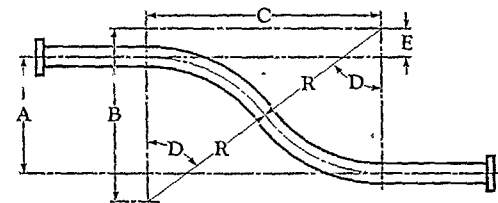
No. 3 - Given A, B, C, R

$$\begin{aligned} D &= B - C & \angle G &= \frac{1}{2} \angle F \\ E &= \sqrt{A^2 + D^2} & H &= \tan \angle G \times R \\ \frac{A}{E} &= \sin \angle F & P &= C - H \end{aligned}$$



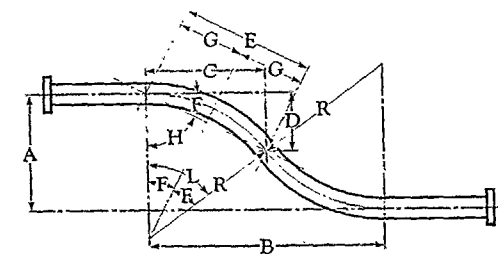
No. 4 - Given A, B, C, R

$$\begin{aligned} D &= B - C & \frac{A}{E} &= \sin \angle F & H &= \tan \angle G \times R \\ E &= \sqrt{A^2 + D^2} & \angle G &= \frac{1}{2} \angle F & P &= C - H \end{aligned}$$



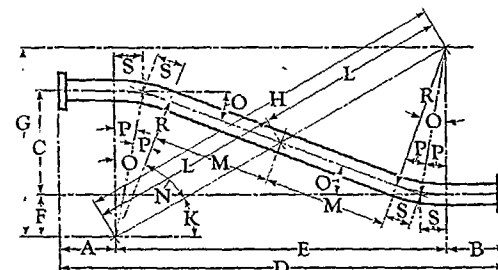
No. 5 - Given A, R

$$B = 2R - A \quad C = \sqrt{(2R^2 - B^2)} \quad \frac{C}{2R} = \sin \angle D$$



No. 6 - Given A, B

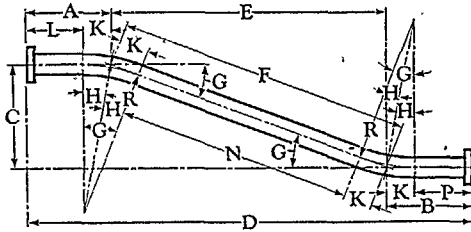
$$\begin{aligned} C &= \frac{1}{2} B & \frac{D}{E} &= \sin \angle F & \angle H &= 90^\circ - \angle F \\ D &= \frac{1}{2} A & & & R &= \frac{A^2 + B^2}{4A} \\ E &= \sqrt{C^2 + D^2} & G &= \frac{1}{2} E & L &= 2F \end{aligned}$$



No. 7 - Given A, B, C, D, R

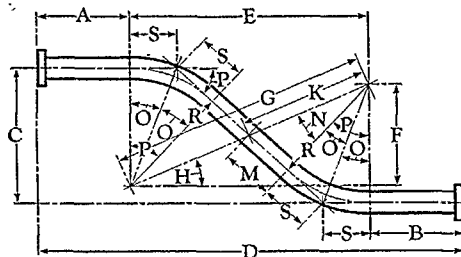
$$\begin{aligned} E &= D - A - B & G/H &= \sin \angle K & M/L &= \sin \angle N \\ F &= R - C & L &= \frac{1}{2} H & \angle O &= 90^\circ - \angle K - \angle N \\ G &= R + F & & & \angle P &= \frac{1}{2} \angle O \\ H &= \sqrt{E^2 + G^2} & M &= \sqrt{L^2 - R^2} & S &= \tan \angle P \times R \end{aligned}$$

Calculation of Pipe Bends



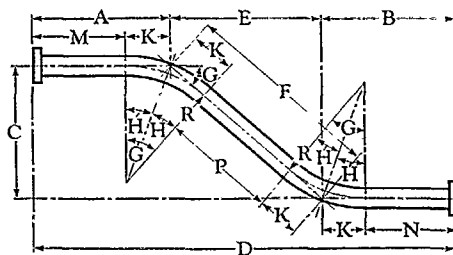
No. 8 - Given A, B, C, D, R

$$\begin{aligned} E &= D - A - B & \angle H &= \frac{1}{2} \angle G \\ F &= \sqrt{E^2 + C^2} & K &= \tan \angle H \times R \\ C &= \sin \angle G & L &= A - K \\ \bar{F} & & P &= B - K \\ N &= F - 2K \end{aligned}$$



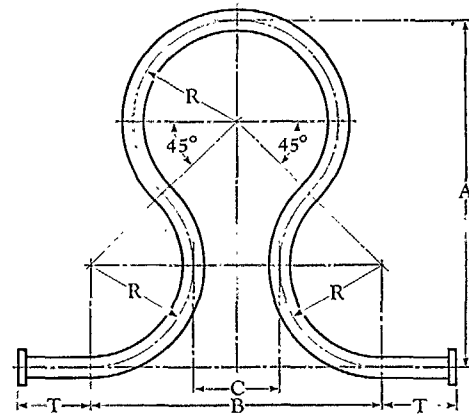
No. 9 - Given A, B, C, D, R

$$\begin{aligned} E &= D - A - B & M &= \sqrt{K^2 - R^2} \\ F &= 2R - C & \bar{K} &= \sin \angle N \\ G &= \sqrt{E^2 + F^2} & \angle P &= 90^\circ - \angle H - \angle N \\ \bar{F} &= \tan \angle H & \angle O &= \frac{1}{2} \angle P \\ K &= \frac{1}{2} G & S &= \tan \angle O \times R \end{aligned}$$



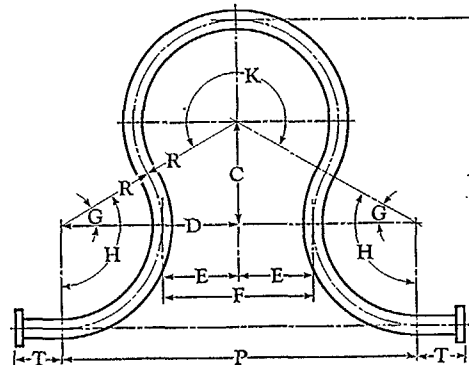
No. 10 - Given A, B, C, D, R

$$\begin{aligned} E &= D - A - B & \angle H &= \frac{1}{2} \angle G \\ F &= \sqrt{C^2 + E^2} & K &= \tan \angle H \times R \\ C &= \sin \angle G & M &= A - K \\ \bar{F} & & N &= B - K \\ P &= F - 2K \end{aligned}$$



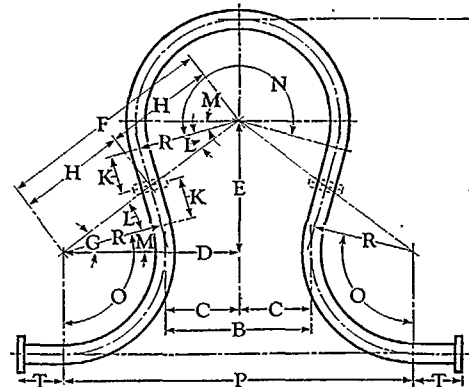
No. 11 - Given R and 45° Angles

$$\begin{aligned} A &= 3.414 \times R & T &= \text{Tangent} \\ B &= 2.828 \times R & \text{Length of Pipe in Bend} &= 9.425 \times R + 2T \\ C &= 0.828 \times R \end{aligned}$$



No. 12 - Given A, R

$$\begin{aligned} C &= A - 2R & P &= 2D & C/2R &= \sin \angle G \\ D &= \sqrt{(2R)^2 - C^2} & E &= D - R & \angle H &= 90^\circ + \angle G \\ & & F &= 2E & \angle K &= 180^\circ + 2 \angle G \end{aligned}$$

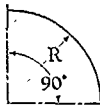
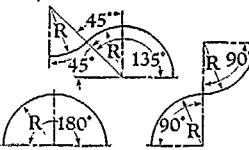
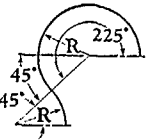
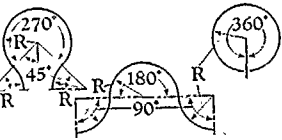
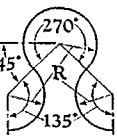


No. 13 - Given A, B, R

$$\begin{aligned} C &= \frac{1}{2} B & E/F &= \sin \angle G & \angle M &= \angle G - \angle L \\ D &= R + C & H &= \frac{1}{2} F & \angle N &= 180^\circ + 2 \angle M \\ E &= A - 2R & K &= \sqrt{H^2 - R^2} & \angle O &= 90^\circ + \angle M \\ F &= \sqrt{D^2 + E^2} & K/H &= \sin \angle L & P &= 2D \end{aligned}$$

Length of Pipe in Bends

Length of Pipe, in Inches

Radius of Bends		Length of Pipe, in Inches				
						
Inches	Feet	90° Bends	180° Bends	270° Bends	360° Bends	540° Bends
1		1½	3	4¾	6¼	9½
2		3	6¼	9½	12½	18¾
3	¼	4¾	9½	14¼	18¾	28¼
4		6¼	12½	18¾	25¼	37¾
5		7¾	15¾	23½	31½	47¼
6	½	9½	18¾	28¼	37¾	56½
7		11	22	33	44	66
8		12½	25¼	37¾	50¼	75½
9	¾	14¼	28¼	42½	56½	84¾
10		15¾	31½	47¼	62¾	94¼
11		17¼	34½	51¾	69	103¾
12	1	18¾	37¾	56½	75½	113
24	2	37¾	75½	113	150¾	226¼
36	3	56½	113	169½	226¼	339¼
48	4	75½	150¾	226¼	301½	452½
60	5	94¼	188½	282¾	377	565½
72	6	113	226¼	339¼	452½	678½
84	7	132	263¾	395¾	527¾	791½
96	8	150¾	301½	452½	603	904¾
108	9	169½	339¼	509	678½	1017¾
120	10	188½	377	565½	754	1131
132	11	207¼	414¾	622	829½	1244
144	12	226¼	452½	678½	904¾	1357¼
156	13	245	490	735¼	980¼	1470¼
168	14	263¾	527¾	791½	1055½	1583½
180	15	282¾	565½	848¼	1131	1696½
192	16	301½	603	904¾	1206¼	1809½
204	17	320½	640¾	961¼	1281¾	1922½
216	18	339¼	678½	1017¾	1357¼	2035¾
228	19	358	716¼	1074½	1432½	2148¾
240	20	377	754	1131	1508	2262

To determine the length of pipe in a bend having a radius not given in the table above, add together the length of pipe in bends whose combined radii equal the required radius.

Example

Determine the length of pipe in a 90° bend having a radius of 5' 9".

Length of pipe in 90° bend of 5' radius = 94¼"

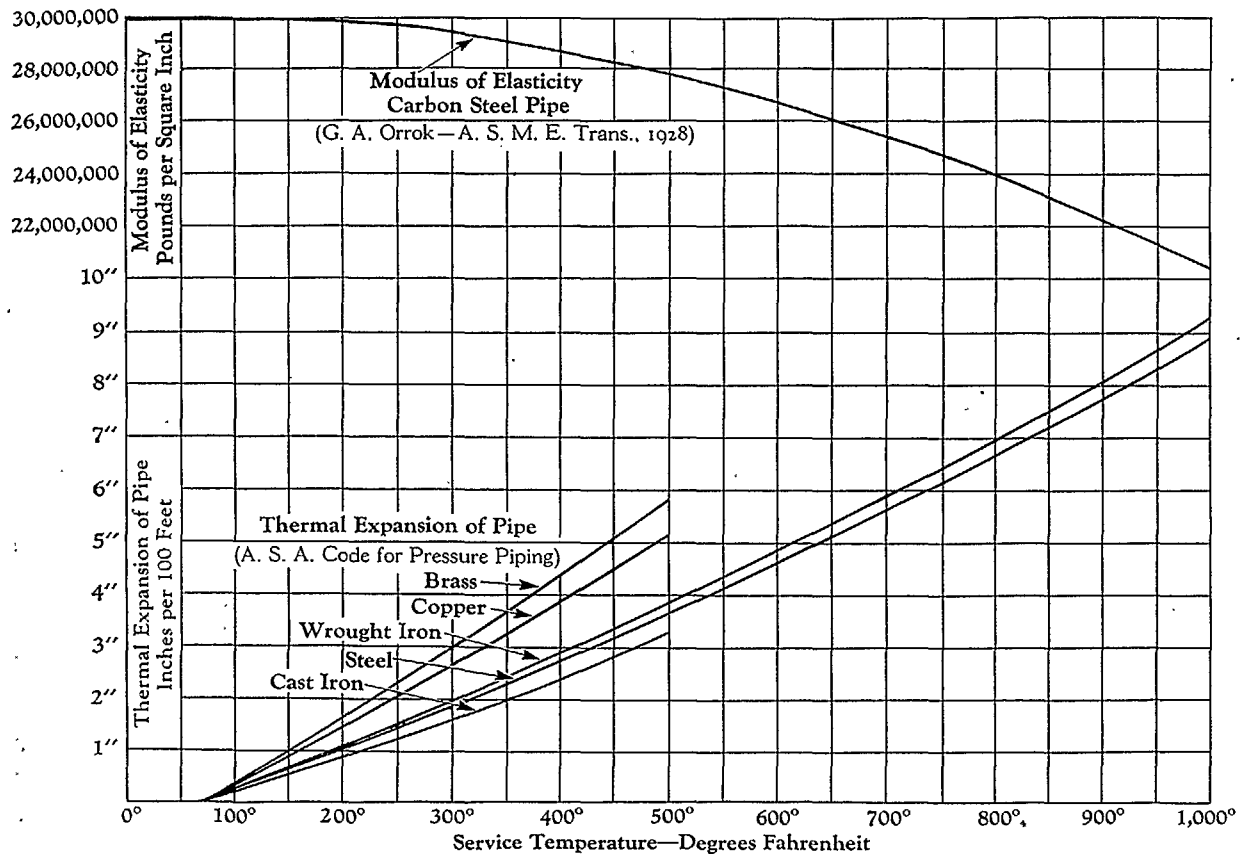
Length of pipe in 90° bend of 9" radius = 14¼"

108½"

Then 108½" equals the length of pipe in a bend having a radius of 5' 9".

Standard Types of Pipe Bends....pages 602 and 603
Minimum permissible radii of pipe bends....page 602

Thermal Expansion and Modulus of Elasticity of Pipe



References

Pipe.....pages 574 to 583
 American Standard for Pipe.....pages 584 to 587
 Wrought Steel Pipe Data.....page 588
 Internal Fluid Pressures for Pipe.....page 589

Calculating Working Pressures,
 Stress, or Wall Thickness of Pipe.....pages 635 to 637
 Calculations of Pipe Bends.....pages 638 and 639
 Length of Pipe in Bends.....page 640
 Linear Expansion of Pipe.....page 426

Spacing of Pipe Supports

When a horizontal pipe line is supported at intermediate points, sagging of the pipe occurs between these supports, the amount of sag being dependent upon the weight of the pipe, water, insulation, and valves or fittings which may be included in the line. If the pipe line is installed with no downward pitch, pockets will be formed in each span in which case condensation may collect if the line is transporting steam. In order to eliminate these pockets, the line must be pitched downward so that the outlet of each span is lower than the maximum sag.

Crane Co. has conducted tests to determine the deflection of horizontal standard pipe lines filled with water, in pipe sizes $\frac{3}{4}$ " to 4" inclusive, the results of which have indicated that for pipes larger than 2" and with supports having center to center dimensions greater than 10 feet, the resultant deflection is less than that determined by the use of the formula for a uniformly loaded pipe fixed at both ends. For pipe sizes 2" and smaller, the test deflection was in excess of that determined by the formula for pipe having fixed ends and approached, for the shorter spans, the deflection as determined by the use of the formula for pipe lines having unrestrained ends.

Page 643 gives the deflection of horizontal standard pipe lines filled with water, for varying spans, based upon the results obtained from tests for sizes 2" and smaller, and upon the formula for fixed ends for the

larger sizes of pipe. The deflection values given on the chart are twice those obtained from test or calculated, to compensate for any variables including weight of insulation, etc.

The formula given below indicates the vertical distance that the span must be pitched so that the outlet is lower than the maximum sag of the pipe.

$$h = \frac{144 S^2 y}{36 S^2 - y^2}$$

where:

h = Difference in elevation of span ends, inches
 S = Length of one span, feet
 y = Deflection of one span, inches

By eliminating the unsequential term " $-y^2$ " from the denominator, the formula reduces to:

$$h = 4 y$$

The pitch of pipe spans, called the Average Gradient, is a ratio between the drop in elevation and the length of the span. This is expressed as so many inches in a certain number of feet.

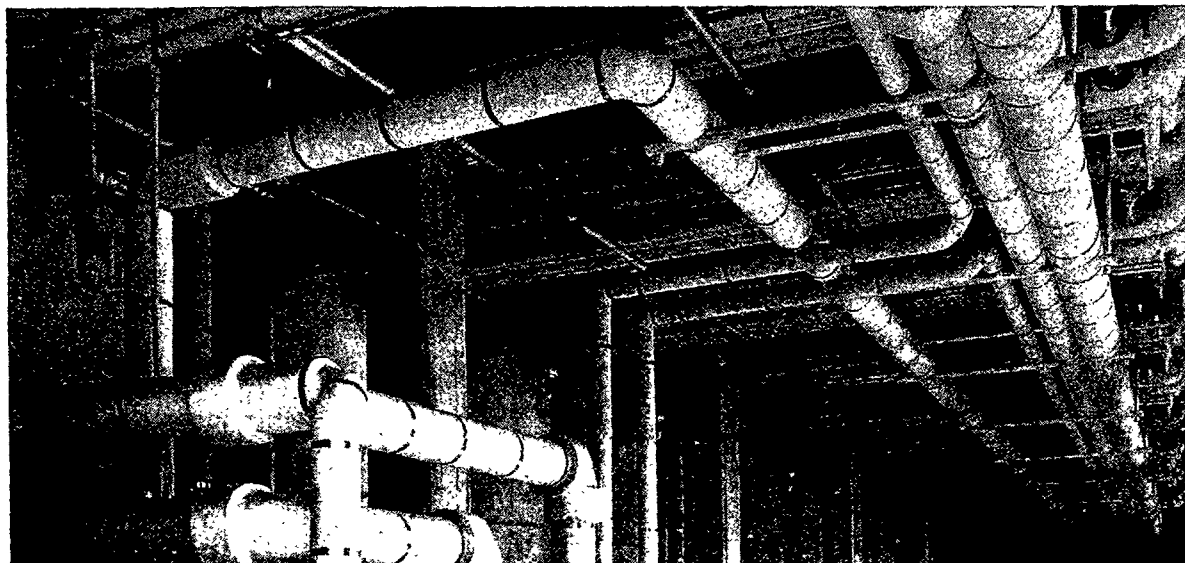
$$\text{Average Gradient} = \frac{4 y}{S}$$

The dotted lines as shown on the chart on the opposite page are plotted from the above formula and indicate average gradients of 1" in 10', 1" in 15', 1" in 20', 1" in 30', and 1" in 40'.

EXAMPLE

What is the maximum distance between supports for a 4" standard pipe line assuming a pitch or average gradient of 1" in 30 feet?

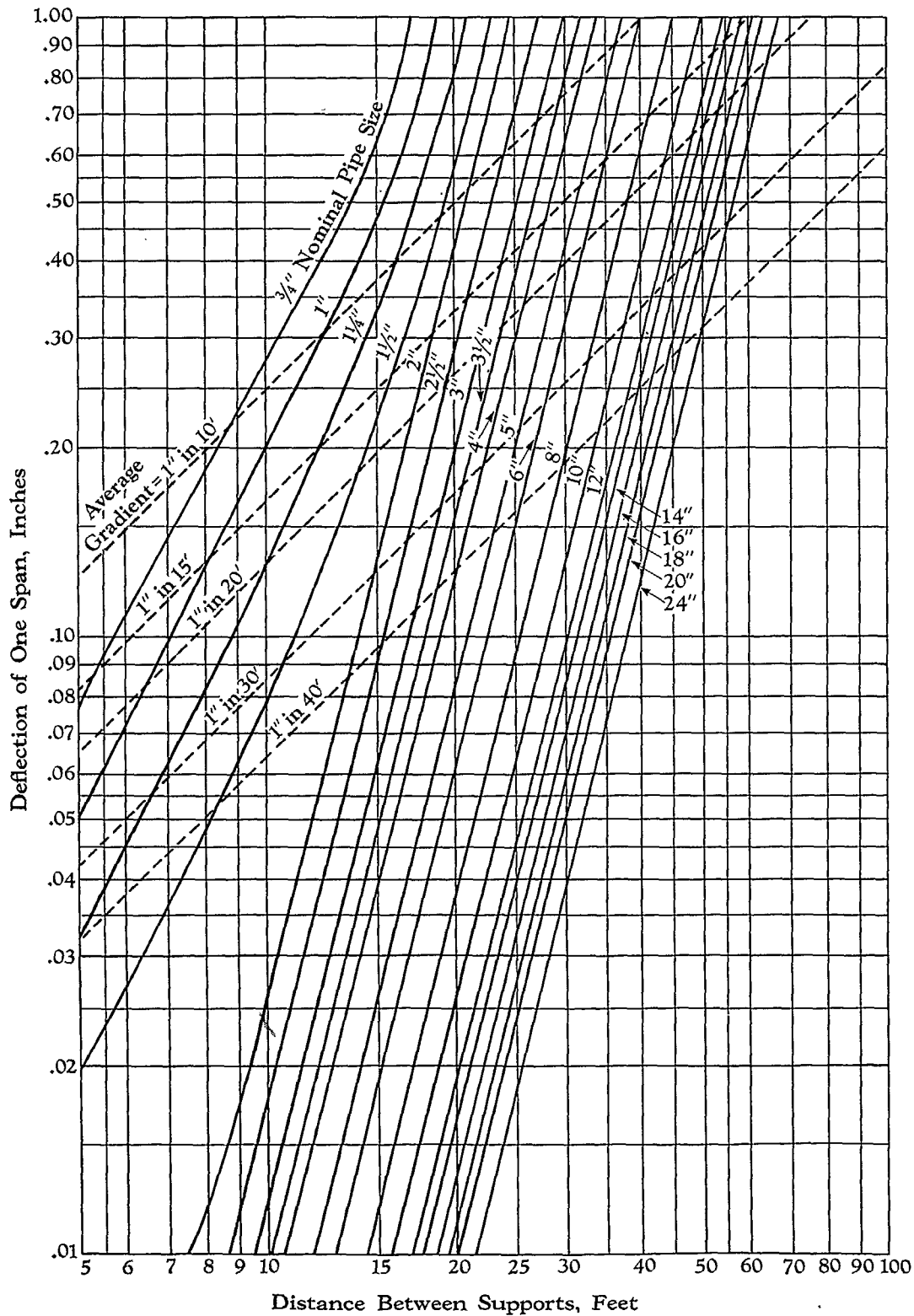
Proceed downward from the intersection of the diagonal dotted line for an average gradient of 1" in 30 feet and the diagonal solid line for 4" pipe to the bottom line where it is noted that the maximum span is approximately 22 feet.



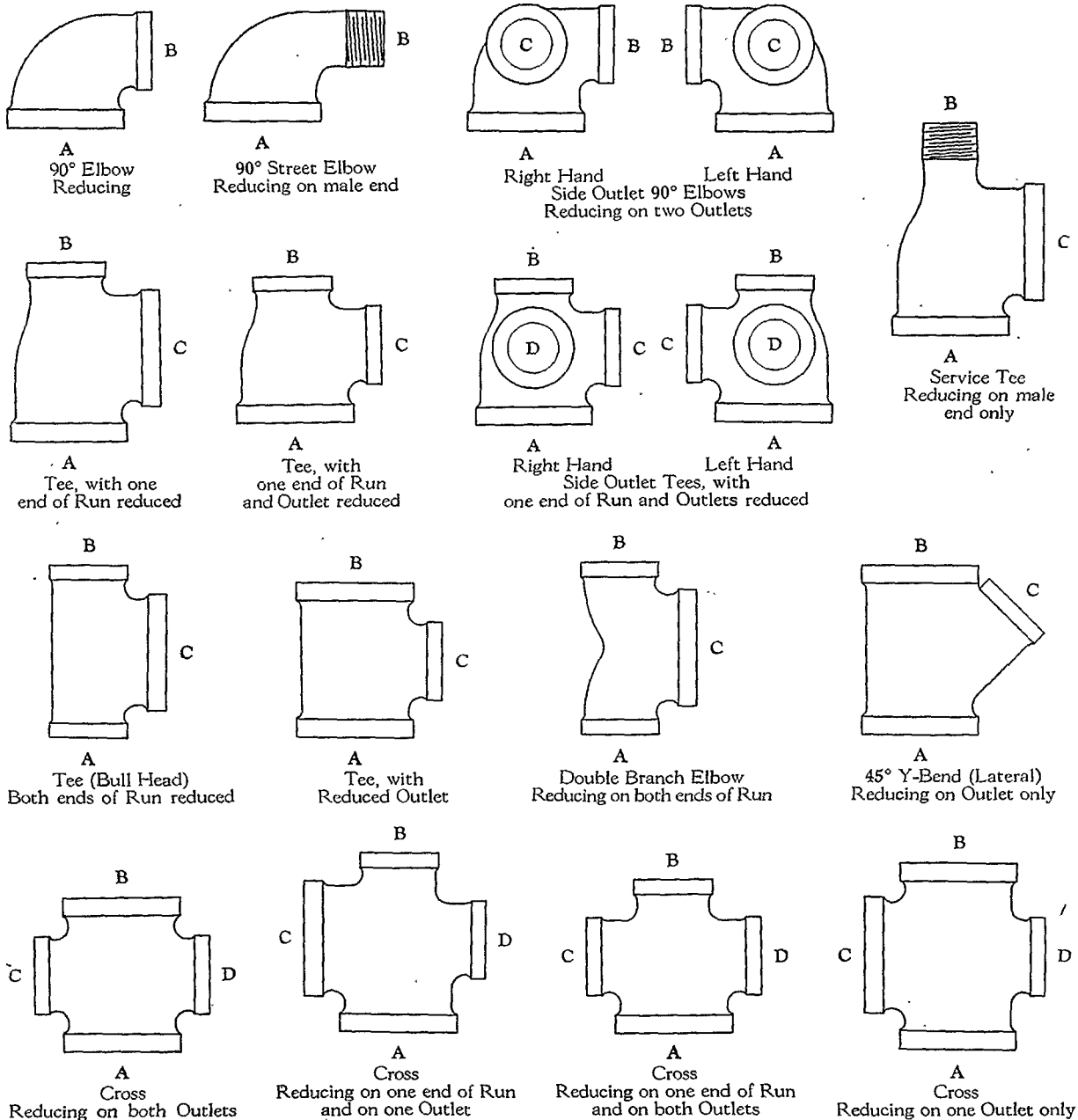
Pipe Hangers and Pipe Supports... pages 513 to 534

Deflection of Horizontal Pipe Lines

(Based on Standard Pipe Filled with Water)



How to Read Reducing Fittings



To assist the user in "Reading Reducing Fittings", there are illustrated on this page a variety of types most commonly required for piping systems. In these illustrations, each opening of the fitting is identified with a letter which indicates the sequence to be followed in reading the size of the fitting.

For example: A Cross having one end of run and one outlet reduced is designated as $2\frac{1}{2}(A) \times 1\frac{1}{4}(B) \times 2\frac{1}{2}(C) \times 1\frac{1}{2}(D)$, simply by naming the largest opening first and then naming the other openings in the order indicated.

Elbows and Crosses are always identified by designating first the size of the largest opening, following

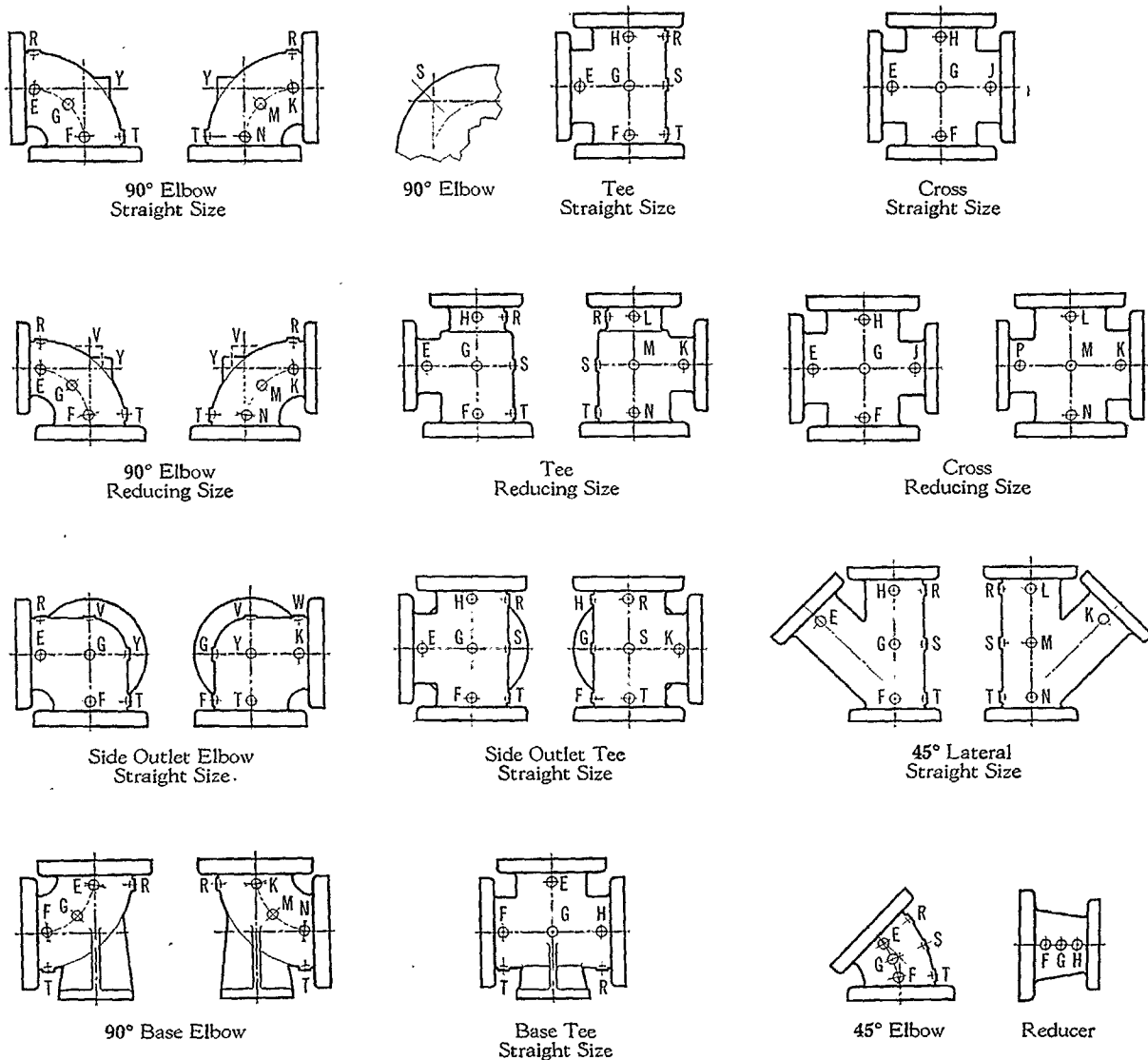
with the size of other opening or openings in proper order. Tees, 45° Y-Bends or Laterals, and Double Branch Elbows are identified by designating the size of the largest opening on the run first, the opposite opening of the run second, and the size of the outlet last. For example: a $3 \times 2 \times 1\frac{1}{2}$ size Tee is one that has openings $3(A) \times 2(B) \times 1\frac{1}{2}(C)$.

In designating the outlets of side outlet reducing fittings, the size of the side outlet is named last.

Flanged fittings: Although the illustrations appearing on this page are of screwed fittings, the same rules apply to the "Reading of Reducing Flanged Fittings".

Taps and Drains for Flanged Fittings

Designating Location of Tapped Holes



Maximum Size of Tapped Hole in Fitting Without Adding a Boss

Size of Fitting	Inches	2, 2½, 3	4, 5	6	8	10	12	14 to 24
Size of Tapping	Inches	⅜	½	¾	1	1¼	1½	2

Notes

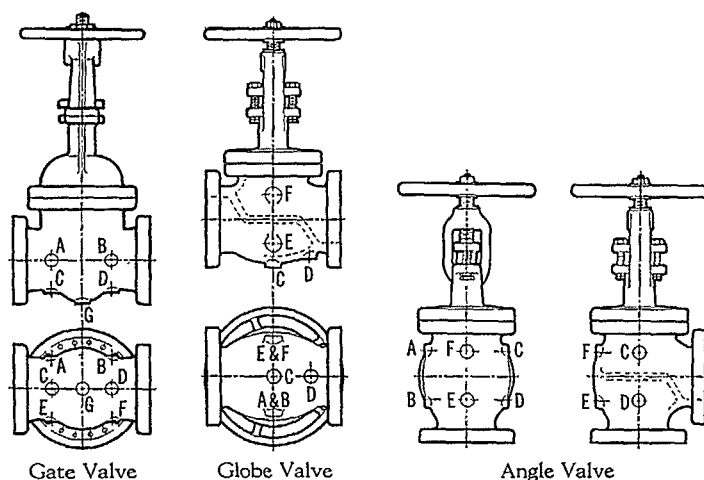
1. The illustrations above indicate the standard method used for designating the location of tapped holes on ferrous flanged fittings in all pressure classes. They are the same as those shown in the American Standard for Steel Pipe Flanges and Flanged Fittings (B16-1939) and in the American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125 (B16a-1939).
2. When a tapped connection is required at the heel

of an elbow without a boss (at location S), the tapping should be done at right angles to the point of tangency of the radius or sweep of the fitting. This shall be standard practice, and where the tapping is required parallel to the run (at locations V and Y), the fitting shall be furnished with a boss.

3. The table shown above indicates the maximum size of tapped hole which can be applied to any fitting without adding a boss.

Taps and Drains for Flanged Valves

Designating Location of Tapped Holes



Size of Valve Inches	Maximum Size of Tapped Hole In Valve With Boss (Inches)					
	Iron Valves	Steel Valves Pressure Class				
		150 Lb.	300 Lb.	400 Lb.	600 Lb.	900 Lb.
1	...	...	...	...	...	...
1 1/4	...	...	3/8	...	...	1/2
1 1/2	...	...	3/8	...	...	1/2
2	1/2	1/2	1/2	...	...	1/2
2 1/2	1/2	1/2	1/2	1/2	...	1/2
3	1/2	1/2	1/2	...	3/4	3/4
3 1/2	1/2	1/2	1/2	...	3/4	1
4	1/2	1/2	3/4	3/4	1	1
5	3/4	3/4	1	1	1	1
6	3/4	3/4	1	1	1 1/4	1 1/4
8	3/4	3/4	1	1	1 1/4	1 1/4
10	1	1	1	1 1/4	1 1/4	1 1/2
12	1	1	1	1 1/4	1 1/4	1 1/2
14	1 1/4	1 1/4	1 1/4	1 1/2	2	2
16	1 1/4	1 1/4	1 1/4	1 1/2	2	...
18	1 1/2	1 1/2	2	2	2 1/2	...
20	1 1/2	1 1/2	2	2	2	...
24	2	2	2 1/2	2 1/2	2 1/2	...

Notes

1. The illustrations above indicate the standard method used for designating the location of tapped holes on Cast Iron and Cast Steel Flanged Valves in all pressure classes.
2. Valve bodies can be tapped without a boss for a very small drain hole; the maximum size of hole, however, depends entirely upon the location of the

tapped hole and the pressure class of the valve.

3. The table above shows the maximum size of tapped hole which can be applied to any valve at a bossed location. Gate valves are regularly made with bosses (except at location "G"); globe and angle valves are not, but they can be furnished with bosses when so specified.

Location of By-Passes on Flanged Valves

Gate valves: When gate valves are ordered with by-pass attached, it shall be regular practice to attach said by-pass at the side of the main valve with the stems of both valves parallel, pointing vertically upward.

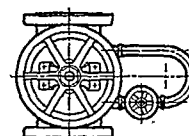
The more common of the "special" attached-locations is on the center of the flow line, at the bottom of the main valve, with the stem of the by-pass valve at right angles to the main valve stem. This is designated as the bottom "attachment", or defined as "by-pass at bottom". When any other "special" attached-location or other position of the by-pass valve stem is desired, a sketch should be submitted.

Globe valves: When globe valves are ordered with by-pass attached, it shall be regular practice to attach said by-pass at the right-hand side of the main valve, with the stems of both valves parallel, pointing vertically upward. When by-pass is "specially" required attached at the left-hand side, the designation shall be "left-hand attachment".

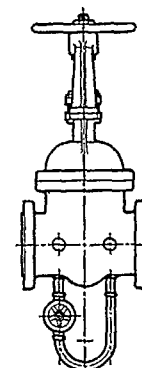
Right-hand side of a globe valve is the side at the right, when facing the flow-port which leads to the under side of the disc.

Angle valves: When angle valves are ordered with

by-pass attached, it shall be regular practice to attach said by-pass at the back of the main valve, with the stems of both valves parallel, pointing vertically upward. When by-pass is "specially" required attached at the right or left-hand side, the designations shall be "right-hand attachment" or "left-hand attachment". Right-hand side of an angle valve is at the right, when facing the back of the valve.



Gate Valve with
By-Pass on Side



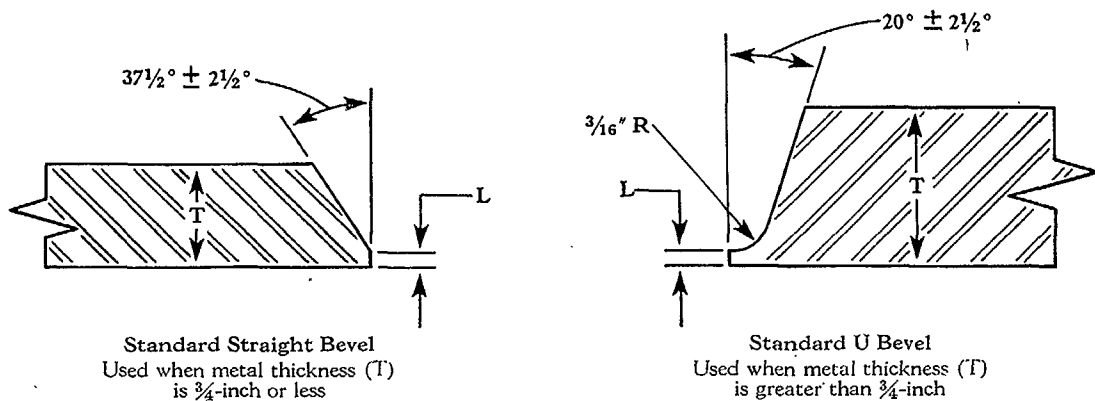
Gate Valve with
By-Pass at Bottom

These illustrations are representative of steel valves.

For prices of by-passes, see the following pages:

Iron Wedge Gate Valves.....page 114
Iron Double Disc Gate Valves.....page 138
Steel Wedge Gate Valves.....page 306

Welding Bevels Details



All Crane Steel Valves, Fittings, and Flanges furnished for butt-welding, and all Crane Steel Butt-Welding Fittings have the welding ends regularly machined in accordance with these details. The type of bevel is entirely dependant upon the thickness of the metal.

Standard Straight Bevels, used for butt-welding ends having a metal thickness of $\frac{3}{4}$ -inch or lighter, are machined to a $37\frac{1}{2}^\circ$ straight bevel. A tolerance of $2\frac{1}{2}^\circ$ plus or minus is allowed in the angle of the bevel.

Standard U Bevels, regularly machined on welding ends having metal thicknesses greater than $\frac{3}{4}$ -inch, are made to a $20\frac{1}{2}^\circ$ angle which terminates in a $\frac{3}{16}$ -inch radius to the land. The tolerance of $2\frac{1}{2}^\circ$ plus or minus is allowed for the angle of beveling.

The height of the "land" (indicated as dimension L

in the above illustrations) is regularly maintained at $\frac{1}{16}$ -inch, with a plus or minus manufacturing tolerance of $\frac{1}{32}$ -inch on all sizes and metal thicknesses, except as follows:

- A. On 2-inch Standard weight pipe, the height of the land is $\frac{1}{16}$ -inch maximum.
- B. On $1\frac{1}{2}$ -inch and smaller Standard weight pipe, the height of the land is $\frac{1}{32}$ -inch maximum.

American Standard: The dimensions of both of these bevels conform to the American Standard for Steel Pipe Flanges and Flanged Fittings (B16e-1939).

Other types of welding bevels: Other types of finish for welding ends can be furnished on special order. Inquiries and orders must be accompanied by a detailed description or by drawings showing the exact requirements.

Steam

There are three states of matter: solid, liquid, and gas. Under normal atmospheric conditions, substances exist in any one of these three states; and when the outside conditions are varied, they change from one state to another.

Water under average conditions exists in the form of a liquid. When a body of water is heated by means of some external medium, the temperature of the water rises, and soon small bubbles are noted on the surface which break and form continuously. This phenomenon is described as "boiling".

The amount of heat necessary to cause the temperature of the water to rise is expressed in British Thermal Units (B.t.u.), where one B.t.u. is the quantity of heat required to raise the temperature of 1 pound of water from 60 to 61° F. or, as is generally stated, 1/180 part of the heat necessary to raise the temperature of 1 pound of water from

32° F. (freezing point) to 212° F. (boiling point).

After the temperature of 212° F. is reached each pound of water contains 180 B.t.u. (above 32° F.). This quantity of heat is called "*heat of the liquid*" or "*sensible heat*". In order to change the liquid into a vapor at atmospheric pressure (14.7 pounds per square inch absolute), 970.2 B.t.u. must be added to each pound of water after the temperature of 212° F. is reached. During this transition period the temperature remains constant. The added quantity of heat is called the "*latent heat of evaporation*". Consequently, the "*total heat*" in the vapor, formed when water boils at atmospheric pressure, is the sum of the two quantities 180 B.t.u. and 970.2 B.t.u., or 1150.2 B.t.u. per pound.

If water is heated in a closed vessel not completely filled, the pressure will rise after steam begins to form accompanied by an increase in temperature

Saturated Steam: Saturated steam is steam in contact with the liquid water from which it was generated, at a temperature which is the boiling point of the water and the condensing point of the steam. It may be either "dry" or "wet", depending upon the generating conditions. "Dry" saturated steam is steam free from mechanically mixed water particles. "Wet" saturated steam, on the other hand, contains water particles in suspension. Saturated steam at any pressure has a definite temperature.

Superheated Steam: Superheated steam is steam at any given pressure which is heated to a temperature higher than the temperature of saturated steam at that pressure. Water cannot exist in the presence of superheated steam.

Steam Data page 649
Properties of Saturated Steam pages 650 to 653
Properties of Superheated Steam pages 654 to 657
Temperature Conversion table page 663

Steam Data

Boiler Horse Power

The accepted rule for figuring boiler horse power is as follows: 100° F. into steam at 70 pounds gauge pressure, or its equivalent; that is, 34½ pounds of water evaporated per hour from a temperature of 212° F. into steam at 212° F.

One Horse Power equals the evaporation of 30 pounds of water per hour from an initial temperature of

Horse Power of an Engine

P = Mean effective pressure per square inch of the steam on the piston. under when the valve cuts off at:

L = Length of stroke in feet.

A = Area of piston in square inches.

N = Number of strokes per minute.

Then Horse Power = $\frac{PLAN}{33000}$

The approximate mean effective pressure in the cyl-

¼ stroke equals steam pressure × .597

⅓ stroke equals steam pressure × .670

⅔ stroke equals steam pressure × .743

½ stroke equals steam pressure × .847

⅝ stroke equals steam pressure × .919

⅔ stroke equals steam pressure × .937

¾ stroke equals steam pressure × .966

⅞ stroke equals steam pressure × .992

Ranges in Steam Consumption by Prime Movers

(For Estimating Purposes)

Simple Non-Condensing Engines.....	29 —	45 pounds per hour
Simple Non-Condensing Automatic Engines.....	26 —	40 pounds per hour
Simple Non-Condensing Corliss Engines.....	26 —	35 pounds per hour
Compound Non-Condensing Engines.....	19 —	28 pounds per hour
Compound Condensing Engines.....	12 —	22 pounds per hour
Simple Duplex Steam Pumps.....	120 —	200 pounds per hour
Turbines, Non-Condensing.....	28 —	60 pounds per K.W. hour
Turbines, Condensing.....	12 —	42 pounds per K.W. hour

Flow of Steam in Pipes

To determine the velocity of steam in feet per minute through a pipe, the quantity, pressure and area being known.

V = Velocity in feet per minute.

A = Pounds of steam per hour.

B = Volume in cubic feet per lb. at given pressure.

(See steam tables, pages 650 to 657.)

C = Area of pipe in square inches.

1728 = Cubic inches in a cubic foot.

60 = Minutes in an hour.

12 = Inches in a foot.

$$\text{Then } V = \frac{A \times B \times 1728}{60 \times C \times 12} = \frac{A \times B \times 2.4}{C}$$

$$A = \frac{C \times V}{B \times 2.4}$$

$$B = \frac{C \times V}{A \times 2.4}$$

$$C = \frac{A \times B \times 2.4}{V}$$

Loss of Pressure

The above formula does not consider the probable drop, or loss of pressure which is dependent upon the velocity of flow, length of line, number of turns in fittings or valves, and the covering of the pipe. In every steam line there must be a difference in pressure between the inlet and outlet or there could be no flow, and this difference is increased by friction and radiation.

Reasonable Velocities for Flow of Steam in Pipes

The table below giving reasonable velocities, based on average practice, can be used to advantage in steam lines. It must be realized that the lower velocities should be used for smaller pipes and the higher velocities for pipes larger than 12 inches.

Condition of Steam	Pressure Pounds per Square Inch	Use	Reasonable Velocity Feet per Minute
Saturated	0 pounds — 15 pounds	Heating (Short lines)	4,000 to 6,000
Saturated	50 pounds and up	Miscellaneous	6,000 to 10,000
Superheated	200 pounds and up	High Pressure Steam Piping	7,000 to 20,000

Properties of Saturated Steam¹

Absolute Pressure		Vacuum Inches of Hg	Temperature Degrees F. <i>t</i>	Heat of the Liquid Btu/lb. <i>h_f</i>	Latent Heat of Evaporation Btu/lb. <i>h_{fg}</i>	Total Heat of Steam Btu/lb. <i>h_g</i>	Specific Volume Cu. ft. per lb. <i>v_g</i>	Entropy <i>s_g</i>
Lbs. per Sq. In.	Inches of Hg							
<i>P</i>								
0.20	0.41	29.51	53.14	21.21	1063.8	1085.0	1526.0	2.1163
0.25	0.51	29.41	59.30	27.36	1060.3	1087.7	1235.3	2.0970
0.30	0.61	29.31	64.47	32.52	1057.4	1090.0	1039.5	2.0812
0.35	0.71	29.21	68.93	36.97	1054.9	1091.9	898.5	2.0678
0.40	0.81	29.11	72.86	40.89	1052.7	1093.6	791.9	2.0563
0.45	0.92	29.00	76.38	44.41	1050.7	1095.1	708.5	2.0462
0.50	1.02	28.90	79.58	47.60	1048.8	1096.4	641.4	2.0372
0.60	1.22	28.70	85.21	53.21	1045.7	1098.9	540.0	2.0216
0.70	1.43	28.49	90.08	58.07	1042.9	1101.0	466.9	2.0085
0.80	1.63	28.29	94.38	62.36	1040.4	1102.8	411.7	1.9971
0.90	1.83	28.09	98.24	66.21	1038.3	1104.5	368.4	1.9871
1.0	2.04	27.88	101.74	69.70	1036.3	1106.0	333.6	1.9782
1.2	2.44	27.48	107.92	75.87	1032.7	1108.6	280.9	1.9628
1.4	2.85	27.07	113.26	81.20	1029.6	1110.8	243.0	1.9498
1.6	3.26	26.66	117.99	85.91	1026.9	1112.8	214.3	1.9386
1.8	3.66	26.26	122.23	90.14	1024.5	1114.6	191.8	1.9288
2.0	4.07	25.85	126.08	93.99	1022.2	1116.2	173.73	1.9200
2.2	4.48	25.44	129.62	97.52	1020.2	1117.7	158.85	1.9120
2.4	4.89	25.03	132.89	100.79	1018.3	1119.1	146.38	1.9047
2.6	5.29	24.63	135.94	103.83	1016.5	1120.3	135.78	1.8981
2.8	5.70	24.22	138.79	106.68	1014.8	1121.5	126.65	1.8920
3.0	6.11	23.81	141.48	109.37	1013.2	1122.6	118.71	1.8863
3.5	7.13	22.79	147.57	115.46	1009.6	1125.1	102.72	1.8735
4.0	8.14	21.78	152.97	120.86	1006.4	1127.3	90.63	1.8625
4.5	9.16	20.76	157.83	125.71	1003.6	1129.3	81.16	1.8528
5.0	10.18	19.74	162.24	130.13	1001.0	1131.1	73.52	1.8441
5.5	11.20	18.72	166.30	134.19	998.5	1132.7	67.24	1.8363
6.0	12.22	17.70	170.06	137.96	996.2	1134.2	61.98	1.8292
6.5	13.23	16.69	173.56	141.47	994.1	1135.6	57.50	1.8227
7.0	14.25	15.67	176.85	144.76	992.1	1136.9	53.64	1.8167
7.5	15.27	14.65	179.94	147.86	990.2	1138.1	50.29	1.8110
8.0	16.29	13.63	182.86	150.79	988.5	1139.3	47.34	1.8057
8.5	17.31	12.61	185.64	153.57	986.8	1140.4	44.73	1.8008
9.0	18.32	11.60	188.28	156.22	985.2	1141.4	42.40	1.7962
9.5	19.34	10.58	190.80	158.75	983.6	1142.3	40.31	1.7918
10.0	20.36	9.56	193.21	161.17	982.1	1143.3	38.42	1.7876
11.0	22.40	7.52	197.75	165.73	979.3	1145.0	35.14	1.7800
12.0	24.43	5.49	201.96	169.96	976.6	1146.6	32.40	1.7730
13.0	26.47	3.45	205.88	173.91	974.2	1148.1	30.06	1.7665
14.0	28.50	1.42	209.56	177.61	971.9	1149.5	28.04	1.7605

Pressure		Temperature Degrees F. <i>t</i>	Heat of the Liquid Btu/lb. <i>h_f</i>	Latent Heat of Evaporation Btu/lb. <i>h_{fg}</i>	Total Heat of Steam Btu/lb. <i>h_g</i>	Specific Volume Cu. ft. per lb. <i>v_g</i>	Entropy <i>s_g</i>
Lbs. per Sq. In.							
Absolute	Gage						
<i>P</i>	<i>p</i>						
14.696	0.0	212.00	180.07	970.3	1150.4	26.80	1.7566
15.0	0.3	213.03	181.11	969.7	1150.8	26.29	1.7549
16.0	1.3	216.32	184.42	967.6	1152.0	24.75	1.7497
17.0	2.3	219.44	187.56	965.5	1153.1	23.39	1.7449
18.0	3.3	222.41	190.56	963.6	1154.2	22.17	1.7403
19.0	4.3	225.24	193.42	961.9	1155.3	21.08	1.7360
20.0	5.3	227.96	196.16	960.1	1156.3	20.089	1.7319
21.0	6.3	230.57	198.79	958.4	1157.2	19.192	1.7280
22.0	7.3	233.07	201.33	956.8	1158.1	18.375	1.7242
23.0	8.3	235.49	203.78	955.2	1159.0	17.627	1.7206
24.0	9.3	237.82	206.14	953.7	1159.8	16.938	1.7172
25.0	10.3	240.07	208.42	952.1	1160.6	16.303	1.7139
26.0	11.3	242.25	210.62	950.7	1161.3	15.715	1.7108
27.0	12.3	244.36	212.75	949.3	1162.0	15.170	1.7078
28.0	13.3	246.41	214.83	947.9	1162.7	14.663	1.7048
29.0	14.3	248.40	216.86	946.5	1163.4	14.189	1.7020
30.0	15.3	250.33	218.82	945.3	1164.1	13.746	1.6993
31.0	16.3	252.22	220.73	944.0	1164.7	13.330	1.6967
32.0	17.3	254.05	222.59	942.8	1165.4	12.940	1.6941
33.0	18.3	255.84	224.41	941.6	1166.0	12.572	1.6917
34.0	19.3	257.58	226.18	940.3	1166.5	12.226	1.6893

¹ Abstracted from Thermodynamic Properties of Steam by J. H. Keenan and F. G. Keyes, 1936 Edition, by permission of the publishers, John Wiley & Sons, Inc.

Pressure Lbs. per Sq. In.		Temperature	Heat of the Liquid	Latent Heat of Evaporation	Total Heat of Steam	Specific Volume	Entropy
Absolute	Gage	Degrees F.	Btu/lb. h_f	Btu/lb. h_{fg}	Btu/lb. h_g	Cu. ft. per lb. v_g	s_g
35.0	20.3	259.28	227.91	939.2	1167.1	11.898	1.6870
36.0	21.3	260.95	229.60	938.0	1167.6	11.588	1.6848
37.0	22.3	262.57	231.26	936.9	1168.2	11.294	1.6826
38.0	23.3	264.16	232.89	935.8	1168.7	11.015	1.6805
39.0	24.3	265.72	234.48	934.7	1169.2	10.750	1.6784
40.0	25.3	267.25	236.03	933.7	1169.7	10.498	1.6763
41.0	26.3	268.74	237.55	932.6	1170.2	10.258	1.6743
42.0	27.3	270.21	239.04	931.6	1170.7	10.029	1.6724
43.0	28.3	271.64	240.51	930.6	1171.1	9.810	1.6706
44.0	29.3	273.05	241.95	929.6	1171.6	9.601	1.6687
45.0	30.3	274.44	243.36	928.6	1172.0	9.401	1.6669
46.0	31.3	275.80	244.75	927.7	1172.4	9.209	1.6652
47.0	32.3	277.13	246.12	926.7	1172.9	9.025	1.6634
48.0	33.3	278.45	247.47	925.8	1173.3	8.848	1.6617
49.0	34.3	279.74	248.79	924.9	1173.7	8.678	1.6601
50.0	35.3	281.01	250.09	924.0	1174.1	8.515	1.6585
51.0	36.3	282.26	251.37	923.0	1174.4	8.359	1.6569
52.0	37.3	283.49	252.63	922.2	1174.8	8.208	1.6553
53.0	38.3	284.70	253.87	921.3	1175.2	8.062	1.6538
54.0	39.3	285.90	255.09	920.5	1175.6	7.922	1.6523
55.0	40.3	287.07	256.30	919.6	1175.9	7.787	1.6509
56.0	41.3	288.23	257.50	918.8	1176.3	7.656	1.6494
57.0	42.3	289.37	258.67	917.9	1176.6	7.529	1.6480
58.0	43.3	290.50	259.82	917.1	1176.9	7.407	1.6466
59.0	44.3	291.61	260.96	916.3	1177.3	7.289	1.6452
60.0	45.3	292.71	262.09	915.5	1177.6	7.175	1.6438
61.0	46.3	293.79	263.20	914.7	1177.9	7.064	1.6425
62.0	47.3	294.85	264.30	913.9	1178.2	6.957	1.6412
63.0	48.3	295.90	265.38	913.1	1178.5	6.853	1.6399
64.0	49.3	296.94	266.45	912.3	1178.8	6.752	1.6387
65.0	50.3	297.97	267.50	911.6	1179.1	6.655	1.6374
66.0	51.3	298.99	268.55	910.8	1179.4	6.560	1.6362
67.0	52.3	299.99	269.58	910.1	1179.7	6.468	1.6350
68.0	53.3	300.98	270.60	909.4	1180.0	6.378	1.6338
69.0	54.3	301.96	271.61	908.7	1180.3	6.291	1.6326
70.0	55.3	302.92	272.61	907.9	1180.6	6.206	1.6315
71.0	56.3	303.88	273.60	907.2	1180.8	6.124	1.6303
72.0	57.3	304.83	274.57	906.5	1181.1	6.044	1.6292
73.0	58.3	305.76	275.54	905.8	1181.3	5.966	1.6281
74.0	59.3	306.68	276.49	905.1	1181.6	5.890	1.6270
75.0	60.3	307.60	277.43	904.5	1181.9	5.816	1.6259
76.0	61.3	308.50	278.37	903.7	1182.1	5.743	1.6248
77.0	62.3	309.40	279.30	903.1	1182.4	5.673	1.6238
78.0	63.3	310.29	280.21	902.4	1182.6	5.604	1.6228
79.0	64.3	311.16	281.12	901.7	1182.8	5.537	1.6217
80.0	65.3	312.03	282.02	901.1	1183.1	5.472	1.6207
81.0	66.3	312.89	282.91	900.4	1183.3	5.408	1.6197
82.0	67.3	313.74	283.79	899.7	1183.5	5.346	1.6187
83.0	68.3	314.59	284.66	899.1	1183.8	5.285	1.6177
84.0	69.3	315.42	285.53	898.5	1184.0	5.226	1.6168
85.0	70.3	316.25	286.39	897.8	1184.2	5.168	1.6158
86.0	71.3	317.07	287.24	897.2	1184.4	5.111	1.6149
87.0	72.3	317.88	288.08	896.5	1184.6	5.055	1.6139
88.0	73.3	318.68	288.91	895.9	1184.8	5.001	1.6130
89.0	74.3	319.48	289.74	895.3	1185.1	4.948	1.6121
90.0	75.3	320.27	290.56	894.7	1185.3	4.896	1.6112
91.0	76.3	321.06	291.38	894.1	1185.5	4.845	1.6103
92.0	77.3	321.83	292.18	893.5	1185.7	4.796	1.6094
93.0	78.3	322.60	292.98	892.9	1185.9	4.747	1.6085
94.0	79.3	323.36	293.78	892.3	1186.1	4.699	1.6076
95.0	80.3	324.12	294.56	891.7	1186.2	4.652	1.6068
96.0	81.3	324.87	295.34	891.1	1186.4	4.606	1.6060
97.0	82.3	325.61	296.12	890.5	1186.6	4.561	1.6051
98.0	83.3	326.35	296.89	889.9	1186.8	4.517	1.6043
99.0	84.3	327.08	297.65	889.4	1187.0	4.474	1.6035
100.0	85.3	327.81	298.40	888.8	1187.2	4.432	1.6026
101.0	86.3	328.53	299.15	888.2	1187.4	4.391	1.6018
102.0	87.3	329.25	299.90	887.6	1187.5	4.350	1.6010
103.0	88.3	329.96	300.64	887.1	1187.7	4.310	1.6002
104.0	89.3	330.66	301.37	886.5	1187.9	4.271	1.5994
105.0	90.3	331.36	302.10	886.0	1188.1	4.232	1.5986
106.0	91.3	332.05	302.82	885.4	1188.2	4.194	1.5978
107.0	92.3	332.74	303.54	884.9	1188.4	4.157	1.5971
108.0	93.3	333.42	304.26	884.3	1188.6	4.120	1.5963
109.0	94.3	334.10	304.97	883.7	1188.7	4.084	1.5956

Pressure Lbs. per Sq. In.		Temperature	Heat of the Liquid	Latent Heat of Evaporation	Total Heat of Steam	Specific Volume	Entropy
Absolute	Gage	Degrees F.	Btu/lb. h_f	Btu/lb. h_{fg}	Btu/lb. h_g	Cu. ft. per lb. v_g	s_g
110.0	95.3	334.77	305.66	883.2	1188.9	4.049	1.5948
111.0	96.3	335.44	306.37	882.6	1189.0	4.015	1.5941
112.0	97.3	336.11	307.06	882.1	1189.2	3.981	1.5934
113.0	98.3	336.77	307.75	881.6	1189.4	3.947	1.5927
114.0	99.3	337.42	308.43	881.1	1189.5	3.914	1.5919
115.0	100.3	338.07	309.11	880.6	1189.7	3.882	1.5912
116.0	101.3	338.72	309.79	880.0	1189.8	3.850	1.5905
117.0	102.3	339.36	310.46	879.5	1190.0	3.819	1.5898
118.0	103.3	339.99	311.12	879.0	1190.1	3.788	1.5891
119.0	104.3	340.62	311.78	878.4	1190.2	3.758	1.5885
120.0	105.3	341.25	312.44	877.9	1190.4	3.728	1.5878
121.0	106.3	341.88	313.10	877.4	1190.5	3.699	1.5871
122.0	107.3	342.50	313.75	876.9	1190.7	3.670	1.5865
123.0	108.3	343.11	314.40	876.4	1190.8	3.642	1.5858
124.0	109.3	343.72	315.04	875.9	1190.9	3.614	1.5851
125.0	110.3	344.33	315.68	875.4	1191.1	3.587	1.5844
126.0	111.3	344.94	316.31	874.9	1191.2	3.560	1.5838
127.0	112.3	345.54	316.94	874.4	1191.3	3.533	1.5831
128.0	113.3	346.13	317.57	873.9	1191.5	3.507	1.5825
129.0	114.3	346.73	318.19	873.4	1191.6	3.481	1.5819
130.0	115.3	347.32	318.81	872.9	1191.7	3.455	1.5812
131.0	116.3	347.90	319.43	872.5	1191.9	3.430	1.5806
132.0	117.3	348.48	320.04	872.0	1192.0	3.405	1.5800
133.0	118.3	349.06	320.65	871.5	1192.1	3.381	1.5793
134.0	119.3	349.64	321.25	871.0	1192.2	3.357	1.5787
135.0	120.3	350.21	321.85	870.6	1192.4	3.333	1.5781
136.0	121.3	350.78	322.45	870.1	1192.5	3.310	1.5775
137.0	122.3	351.35	323.05	869.6	1192.6	3.287	1.5769
138.0	123.3	351.91	323.64	869.1	1192.7	3.264	1.5763
139.0	124.3	352.47	324.23	868.7	1192.9	3.242	1.5757
140.0	125.3	353.02	324.82	868.2	1193.0	3.220	1.5751
141.0	126.3	353.57	325.40	867.7	1193.1	3.198	1.5745
142.0	127.3	354.12	325.98	867.2	1193.2	3.177	1.5740
143.0	128.3	354.67	326.56	866.7	1193.3	3.155	1.5734
144.0	129.3	355.21	327.13	866.3	1193.4	3.134	1.5728
145.0	130.3	355.76	327.70	865.8	1193.5	3.114	1.5722
146.0	131.3	356.29	328.27	865.3	1193.6	3.094	1.5716
147.0	132.3	356.83	328.83	864.9	1193.8	3.074	1.5710
148.0	133.3	357.36	329.39	864.5	1193.9	3.054	1.5705
149.0	134.3	357.89	329.95	864.0	1194.0	3.034	1.5699
150.0	135.3	358.42	330.51	863.6	1194.1	3.015	1.5694
152.0	137.3	359.46	331.61	862.7	1194.3	2.977	1.5683
154.0	139.3	360.49	332.70	861.8	1194.5	2.940	1.5672
156.0	141.3	361.52	333.79	860.9	1194.7	2.904	1.5661
158.0	143.3	362.53	334.86	860.0	1194.9	2.869	1.5650
160.0	145.3	363.53	335.93	859.2	1195.1	2.834	1.5640
162.0	147.3	364.53	336.98	858.3	1195.3	2.801	1.5630
164.0	149.3	365.51	338.02	857.5	1195.5	2.768	1.5620
166.0	151.3	366.48	339.05	856.6	1195.7	2.736	1.5610
168.0	153.3	367.45	340.07	855.7	1195.8	2.705	1.5600
170.0	155.3	368.41	341.09	854.9	1196.0	2.675	1.5590
172.0	157.3	369.35	342.10	854.1	1196.2	2.645	1.5580
174.0	159.3	370.29	343.10	853.3	1196.4	2.616	1.5570
176.0	161.3	371.22	344.09	852.4	1196.5	2.587	1.5561
178.0	163.3	372.14	345.06	851.6	1196.7	2.559	1.5551
180.0	165.3	373.06	346.03	850.8	1196.9	2.532	1.5542
182.0	167.3	373.96	347.00	850.0	1197.0	2.505	1.5532
184.0	169.3	374.86	347.96	849.2	1197.2	2.479	1.5523
186.0	171.3	375.75	348.92	848.4	1197.3	2.454	1.5514
188.0	173.3	376.64	349.86	847.6	1197.5	2.429	1.5506
190.0	175.3	377.51	350.79	846.8	1197.6	2.404	1.5497
192.0	177.3	378.38	351.72	846.1	1197.8	2.380	1.5488
194.0	179.3	379.24	352.64	845.3	1197.9	2.356	1.5479
196.0	181.3	380.10	353.55	844.5	1198.1	2.333	1.5470
198.0	183.3	380.95	354.46	843.7	1198.2	2.310	1.5462
200.0	185.3	381.79	355.36	843.0	1198.4	2.288	1.5453
205.0	190.3	383.86	357.58	841.1	1198.7	2.234	1.5432
210.0	195.3	385.90	359.77	839.2	1199.0	2.183	1.5412
215.0	200.3	387.89	361.91	837.4	1199.3	2.134	1.5392
220.0	205.3	389.86	364.02	835.6	1199.6	2.087	1.5372
225.0	210.3	391.79	366.09	833.8	1199.9	2.0422	1.5353
230.0	215.3	393.68	368.13	832.0	1200.1	1.9992	1.5334
235.0	220.3	395.54	370.14	830.3	1200.4	1.9579	1.5316
240.0	225.3	397.37	372.12	828.5	1200.6	1.9183	1.5298
245.0	230.3	399.18	374.08	826.8	1200.9	1.8803	1.5280

Pressure Lbs. per Sq. In.		Temperature	Heat of the Liquid	Latent Heat of Evaporation	Total Heat of Steam	Specific Volume	Entropy
Absolute	Gage	Degrees F.	Btu/lb.	Btu/lb.	Btu/lb.	Cu. ft. per lb.	
<i>P</i>	<i>p</i>	<i>t</i>	<i>h_f</i>	<i>h_{fg}</i>	<i>h_g</i>	<i>v_g</i>	<i>s_g</i>
250.0	235.3	400.95	376.00	825.1	1201.1	1.8438	1.5263
255.0	240.3	402.70	377.89	823.4	1201.3	1.8086	1.5246
260.0	245.3	404.42	379.76	821.8	1201.5	1.7748	1.5229
265.0	250.3	406.11	381.60	820.1	1201.7	1.7422	1.5212
270.0	255.3	407.78	383.42	818.5	1201.9	1.7107	1.5196
275.0	260.3	409.43	385.21	816.9	1202.1	1.6804	1.5180
280.0	265.3	411.05	386.98	815.3	1202.3	1.6511	1.5164
285.0	270.3	412.65	388.73	813.7	1202.4	1.6228	1.5149
290.0	275.3	414.23	390.46	812.1	1202.6	1.5954	1.5133
295.0	280.3	415.79	392.16	810.5	1202.7	1.5689	1.5118
300.0	285.3	417.33	393.84	809.0	1202.8	1.5433	1.5104
320.0	305.3	423.29	400.39	803.0	1203.4	1.4485	1.5046
340.0	325.3	428.97	406.66	797.1	1203.7	1.3645	1.4992
360.0	345.3	434.40	412.67	791.4	1204.1	1.2895	1.4941
380.0	365.3	439.60	418.45	785.8	1204.3	1.2222	1.4891
400.0	385.3	444.59	424.0	780.5	1204.5	1.1613	1.4844
420.0	405.3	449.39	429.4	775.2	1204.6	1.1061	1.4799
440.0	425.3	454.02	434.6	770.0	1204.6	1.0556	1.4755
460.0	445.3	458.50	439.7	764.9	1204.6	1.0094	1.4713
480.0	465.3	462.82	444.6	759.9	1204.5	0.9670	1.4673
500.0	485.3	467.01	449.4	755.0	1204.4	0.9278	1.4634
520.0	505.3	471.07	454.1	750.1	1204.2	0.8915	1.4596
540.0	525.3	475.01	458.6	745.4	1204.0	0.8578	1.4560
560.0	545.3	478.85	463.0	740.8	1203.8	0.8265	1.4524
580.0	565.3	482.58	467.4	736.1	1203.5	0.7973	1.4489
600.0	585.3	486.21	471.6	731.6	1203.2	0.7698	1.4454
620.0	605.3	489.75	475.7	727.2	1202.9	0.7440	1.4421
640.0	625.3	493.21	479.8	722.7	1202.5	0.7198	1.4389
660.0	645.3	496.58	483.8	718.3	1202.1	0.6971	1.4358
680.0	665.3	499.88	487.7	714.0	1201.7	0.6757	1.4327
700.0	685.3	503.10	491.5	709.7	1201.2	0.6554	1.4296
720.0	705.3	506.25	495.3	705.4	1200.7	0.6362	1.4266
740.0	725.3	509.34	499.0	701.2	1200.2	0.6180	1.4237
760.0	745.3	512.36	502.6	697.1	1199.7	0.6007	1.4209
780.0	765.3	515.33	506.2	692.9	1199.1	0.5843	1.4181
800.0	785.3	518.23	509.7	688.9	1198.6	0.5687	1.4153
820.0	805.3	521.08	513.2	684.8	1198.0	0.5538	1.4126
840.0	825.3	523.88	516.6	680.8	1197.4	0.5396	1.4099
860.0	845.3	526.63	520.0	676.8	1196.8	0.5260	1.4072
880.0	865.3	529.33	523.3	672.8	1196.1	0.5130	1.4046
900.0	885.3	531.98	526.6	668.8	1195.4	0.5006	1.4020
920.0	905.3	534.59	529.8	664.9	1194.7	0.4886	1.3995
940.0	925.3	537.16	533.0	661.0	1194.0	0.4772	1.3970
960.0	945.3	539.68	536.2	657.1	1193.3	0.4663	1.3945
980.0	965.3	542.17	539.3	653.3	1192.6	0.4557	1.3921
1000.0	985.3	544.61	542.4	649.4	1191.8	0.4456	1.3897
1050.0	1035.3	550.57	550.0	639.9	1189.9	0.4218	1.3838
1100.0	1085.3	556.31	557.4	630.4	1187.8	0.4001	1.3780
1150.0	1135.3	561.86	564.6	621.0	1185.6	0.3802	1.3723
1200.0	1185.3	567.22	571.7	611.7	1183.4	0.3619	1.3667
1250.0	1235.3	572.42	578.6	602.4	1181.0	0.3450	1.3612
1300.0	1285.3	577.46	585.4	593.2	1178.6	0.3293	1.3559
1350.0	1335.3	582.35	592.1	584.0	1176.1	0.3148	1.3506
1400.0	1385.3	587.10	598.7	574.7	1173.4	0.3012	1.3454
1450.0	1435.3	591.73	605.2	565.5	1170.7	0.2884	1.3402
1500.0	1485.3	596.23	611.6	556.3	1167.9	0.2765	1.3351
1600.0	1585.3	604.90	624.1	538.0	1162.1	0.2548	1.3249
1700.0	1685.3	613.15	636.3	519.6	1155.9	0.2354	1.3149
1800.0	1785.3	621.03	648.3	501.1	1149.4	0.2179	1.3049
1900.0	1885.3	628.58	660.1	482.4	1142.4	0.2021	1.2949
2000.0	1985.3	635.82	671.7	463.4	1135.1	0.1878	1.2849
2100.0	2085.3	642.77	683.3	444.1	1127.4	0.1746	1.2748
2200.0	2185.3	649.46	694.8	424.4	1119.2	0.1625	1.2646
2300.0	2285.3	655.91	706.5	403.9	1110.4	0.1513	1.2541
2400.0	2385.3	662.12	718.4	382.7	1101.1	0.1407	1.2434
2500.0	2485.3	668.13	730.6	360.5	1091.1	0.1307	1.2322
2600.0	2585.3	673.94	743.0	337.2	1080.2	0.1213	1.2205
2700.0	2685.3	679.55	756.2	312.1	1068.3	0.1123	1.2082
2800.0	2785.3	684.99	770.1	284.7	1054.8	0.1035	1.1946
2900.0	2885.3	690.26	785.4	253.6	1039.0	0.0947	1.1792
3000.0	2985.3	695.36	802.5	217.8	1020.3	0.0858	1.1615
3100.0	3085.3	700.31	825.0	168.1	993.1	0.0753	1.1368
3200.0	3185.3	705.11	872.4	62.0	934.4	0.0580	1.0852
3206.2	3191.5	705.40	902.7	0.0	902.7	0.0503	1.0580

Properties of Superheated Steam¹

v=specific volume, cubic feet per pound
h=total heat of steam, Btu per pound
s=entropy

Pressure Lbs. per Sq. In.		Sat. Temp. <i>t</i>		Total Temperature — Degrees Fahrenheit										
Abs. <i>P</i>	Gage <i>p</i>			360°	400°	440°	480°	500°	600°	700°	800°	900°	1000°	1200°
14.696	0.0	212.00	v	33.03	34.68	36.32	37.96	38.78	42.86	46.94	51.00	55.07	59.13	67.25
			h	1221.1	1239.9	1258.8	1277.6	1287.1	1334.8	1383.2	1432.3	1482.3	1533.1	1637.5
			s	1.8518	1.8743	1.8956	1.9162	1.9261	1.9734	2.0170	2.0576	2.0958	2.1319	2.1989
20.0	5.3	227.96	v	24.21	25.43	26.65	27.86	28.46	31.47	34.47	37.46	40.45	43.44	49.41
			h	1220.3	1239.2	1258.2	1277.1	1286.6	1334.4	1382.9	1432.1	1482.1	1533.0	1637.4
			s	1.8170	1.8396	1.8612	1.8818	1.8918	1.9392	1.9829	2.0235	2.0618	2.0978	2.1648
30.0	15.3	250.33	v	16.072	16.897	17.714	18.528	18.933	20.95	22.96	24.96	26.95	28.95	32.93
			h	1218.6	1237.9	1257.0	1276.2	1285.7	1333.8	1382.4	1431.7	1481.8	1532.7	1637.2
			s	1.7708	1.7937	1.8155	1.8363	1.8464	1.8940	1.9379	1.9786	2.0169	2.0530	2.1201
40.0	25.3	267.25	v	12.001	12.628	13.247	13.862	14.168	15.688	17.198	18.702	20.20	21.70	24.69
			h	1216.9	1236.5	1255.9	1275.2	1284.8	1333.1	1381.9	1431.3	1481.4	1532.4	1637.0
			s	1.7375	1.7608	1.7828	1.8038	1.8140	1.8619	1.9058	1.9467	1.9850	2.0212	2.0883
50.0	35.3	281.01	v	9.557	10.065	10.567	11.062	11.309	12.532	13.744	14.950	16.152	17.352	19.747
			h	1215.2	1235.1	1254.7	1274.2	1283.9	1332.5	1381.4	1430.9	1481.1	1532.1	1636.8
			s	1.7112	1.7349	1.7572	1.7784	1.7887	1.8368	1.8809	1.9219	1.9602	1.9964	2.0636
60.0	45.3	292.71	v	7.927	8.357	8.779	9.196	9.403	10.427	11.441	12.449	13.452	14.454	16.451
			h	1213.4	1233.6	1253.5	1273.2	1283.0	1331.8	1380.9	1430.5	1480.8	1531.9	1636.6
			s	1.6894	1.7135	1.7361	1.7575	1.7678	1.8162	1.8605	1.9015	1.9400	1.9762	2.0434
70.0	55.3	302.92	v	6.762	7.136	7.502	7.863	8.041	8.924	9.796	10.662	11.524	12.383	14.097
			h	1211.5	1232.1	1252.3	1272.2	1282.0	1331.1	1380.4	1430.1	1480.5	1531.6	1636.3
			s	1.6707	1.6952	1.7181	1.7397	1.7501	1.7988	1.8432	1.8843	1.9228	1.9591	2.0263
80.0	65.3	312.03	v	5.888	6.220	6.544	6.862	7.020	7.797	8.562	9.322	10.077	10.830	12.332
			h	1209.7	1230.7	1251.1	1271.1	1281.1	1330.5	1379.9	1429.7	1480.1	1531.3	1636.2
			s	1.6541	1.6791	1.7023	1.7242	1.7346	1.7836	1.8281	1.8694	1.9079	1.9442	2.0115
90.0	75.3	320.27	v	5.208	5.508	5.799	6.084	6.225	6.920	7.603	8.279	8.952	9.623	10.959
			h	1207.7	1229.1	1249.8	1270.1	1280.1	1329.8	1379.4	1429.3	1479.8	1531.0	1635.9
			s	1.6393	1.6648	1.6883	1.7103	1.7209	1.7702	1.8149	1.8562	1.8948	1.9311	1.9984
100.0	85.3	327.81	v	4.663	4.937	5.202	5.462	5.589	6.218	6.835	7.446	8.052	8.656	9.860
			h	1205.7	1227.6	1248.6	1269.0	1279.1	1329.1	1378.9	1428.9	1479.5	1530.8	1635.7
			s	1.6258	1.6518	1.6756	1.6979	1.7085	1.7581	1.8029	1.8443	1.8829	1.9193	1.9867
120.0	105.3	341.25	v	3.844	4.081	4.307	4.527	4.636	5.165	5.683	6.195	6.702	7.207	8.212
			h	1201.6	1224.4	1246.0	1266.9	1277.2	1327.7	1377.8	1428.1	1478.8	1530.2	1635.3
			s	1.6017	1.6287	1.6533	1.6760	1.6869	1.7370	1.7822	1.8237	1.8625	1.8990	1.9664
140.0	125.3	353.02	v	3.258	3.468	3.667	3.860	3.954	4.413	4.861	5.301	5.738	6.172	7.035
			h	1197.3	1221.1	1243.3	1264.7	1275.2	1326.4	1376.8	1427.3	1478.2	1529.7	1634.9
			s	1.5804	1.6087	1.6340	1.6573	1.6683	1.7190	1.7645	1.8063	1.8451	1.8817	1.9493
160.0	145.3	363.53	v		3.008	3.187	3.359	3.443	3.849	4.244	4.631	5.015	5.396	6.152
			h		1217.6	1240.6	1262.4	1273.1	1325.0	1375.7	1426.4	1477.5	1529.1	1634.5
			s		1.5908	1.6169	1.6407	1.6519	1.7033	1.7491	1.7911	1.8301	1.8667	1.9344
180.0	165.3	373.06	v		2.649	2.813	2.969	3.044	3.411	3.764	4.110	4.452	4.792	5.466
			h		1214.0	1237.8	1260.2	1271.0	1323.5	1374.7	1425.6	1476.8	1528.6	1634.1
			s		1.5745	1.6015	1.6258	1.6373	1.6894	1.7355	1.7776	1.8167	1.8534	1.9212
200.0	185.3	381.79	v		2.361	2.513	2.656	2.726	3.060	3.380	3.693	4.002	4.309	4.917
			h		1210.3	1234.9	1257.8	1268.9	1322.1	1373.6	1424.8	1476.2	1528.0	1633.7
			s		1.5594	1.5873	1.6123	1.6240	1.6767	1.7232	1.7655	1.8048	1.8415	1.9094
220.0	205.3	389.86	v		2.125	2.267	2.400	2.465	2.772	3.066	3.352	3.634	3.913	4.467
			h		1206.5	1231.9	1255.4	1266.7	1320.7	1372.6	1424.0	1475.5	1527.5	1633.3
			s		1.5453	1.5742	1.5998	1.6117	1.6652	1.7120	1.7545	1.7939	1.8308	1.8987
240.0	225.3	397.37	v		1.9276	2.062	2.187	2.247	2.533	2.804	3.068	3.327	3.584	4.093
			h		1202.5	1228.8	1253.0	1264.5	1319.2	1371.5	1423.2	1474.8	1526.9	1632.9
			s		1.5319	1.5619	1.5882	1.6003	1.6546	1.7017	1.7444	1.7839	1.8209	1.8889

¹Abstracted from Thermodynamic Properties of Steam by J. H. Keenan and F. G. Keyes, 1936 Edition, by permission of the publishers, John Wiley & Sons, Inc.

Pressure Lbs. per Sq. In.		Sat. Temp. <i>t</i>		Total Temperature — Degrees Fahrenheit											
Abs. <i>P</i>	Gage <i>p</i>			460°	500°	540°	580°	600°	660°	700°	800°	900°	1000°	1200°	
260.0	245.3	404.42	v h s	1.9483 1238.3 1.5642	2.063 1262.3 1.5897	2.172 1285.0 1.6129	2.278 1306.9 1.6344	2.330 1317.7 1.6447	2.482 1349.5 1.6739	2.582 1370.4 1.6922	2.827 1422.3 1.7352	3.067 1474.2 1.7748	3.305 1526.3 1.8118	3.776 1632.5 1.8799	
280.0	265.3	411.05	v h s	1.7960 1235.4 1.5536	1.9047 1260.0 1.5796	2.008 1283.1 1.6032	2.107 1305.3 1.6251	2.156 1316.2 1.6354	2.299 1348.3 1.6649	2.392 1369.4 1.6834	2.621 1421.5 1.7265	2.845 1473.5 1.7662	3.066 1525.8 1.8033	3.504 1632.1 1.8716	
300.0	285.3	417.33	v h s	1.6638 1232.5 1.5434	1.7675 1257.6 1.5701	1.8654 1281.1 1.5941	1.9594 1303.7 1.6163	2.005 1314.7 1.6268	2.140 1347.1 1.6565	2.227 1368.3 1.6751	2.442 1420.6 1.7184	2.652 1472.8 1.7582	2.859 1525.2 1.7954	3.269 1631.7 1.8638	
320.0	305.3	423.29	v h s	1.5479 1229.5 1.5337	1.6472 1255.2 1.5611	1.7406 1279.2 1.5855	1.8298 1302.0 1.6079	1.8734 1313.2 1.6186	2.001 1345.8 1.6485	2.083 1367.2 1.6673	2.285 1419.8 1.7108	2.483 1472.1 1.7508	2.678 1524.7 1.7880	3.063 1631.3 1.8565	
340.0	325.3	428.97	v h s	1.4454 1226.4 1.5243	1.5410 1252.8 1.5524	1.6303 1277.2 1.5773	1.7155 1300.4 1.6000	1.7569 1311.6 1.6108	1.8777 1344.6 1.6410	1.9562 1366.1 1.6599	2.147 1419.0 1.7036	2.334 1471.5 1.7437	2.518 1524.1 1.7811	2.881 1630.9 1.8496	
360.0	345.3	434.40	v h s	1.3539 1223.2 1.5152	1.4464 1250.3 1.5440	1.5322 1275.2 1.5694	1.6137 1298.7 1.5925	1.6533 1310.1 1.6033	1.7685 1343.3 1.6339	1.8431 1365.0 1.6529	2.025 1418.1 1.6968	2.202 1470.8 1.7371	2.376 1523.5 1.7745	2.719 1630.5 1.8431	
380.0	365.3	439.60	v h s	1.2719 1219.9 1.5063	1.3616 1247.7 1.5359	1.4444 1273.1 1.5618	1.5226 1297.0 1.5852	1.5605 1308.5 1.5962	1.6707 1342.0 1.6270	1.7419 1363.8 1.6462	1.9149 1417.3 1.6904	2.083 1470.1 1.7307	2.249 1523.0 1.7683	2.575 1630.0 1.8370	
400.0	385.3	444.59	v h s	1.1978 1216.5 1.4977	1.2851 1245.1 1.5281	1.3652 1271.0 1.5546	1.4406 1295.2 1.5783	1.4770 1306.9 1.5894	1.5827 1340.8 1.6205	1.6508 1362.7 1.6398	1.8161 1416.4 1.6842	1.9767 1469.4 1.7247	2.134 1522.4 1.7623	2.445 1629.6 1.8311	
420.0	405.3	449.39	v h s	1.1305 1213.1 1.4892	1.2158 1242.5 1.5205	1.2935 1268.9 1.5475	1.3663 1293.5 1.5716	1.4014 1305.3 1.5829	1.5030 1339.5 1.6143	1.5684 1361.6 1.6337	1.7267 1415.5 1.6783	1.8802 1468.7 1.7189	2.031 1521.9 1.7566	2.327 1629.2 1.8256	
440.0	425.3	454.02	v h s	1.0691 1209.5 1.4809	1.1526 1239.8 1.5132	1.2282 1266.7 1.5407	1.2988 1291.7 1.5652	1.3327 1303.6 1.5766	1.4306 1338.2 1.6083	1.4934 1360.4 1.6278	1.6454 1414.7 1.6727	1.7925 1468.1 1.7135	1.9368 1521.3 1.7512	2.220 1628.8 1.8203	
460.0	445.3	458.50	v h s	1.0128 1205.8 1.4728	1.0948 1237.0 1.5059	1.1685 1264.5 1.5340	1.2370 1289.9 1.5589	1.2698 1302.0 1.5705	1.3644 1336.9 1.6025	1.4250 1359.3 1.6222	1.5711 1413.8 1.6673	1.7124 1467.4 1.7082	1.8508 1520.7 1.7460	2.122 1628.4 1.8152	
480.0	465.3	462.82	v h s		1.0417 1234.2 1.4989	1.1138 1262.3 1.5276	1.1803 1288.0 1.5528	1.2122 1300.3 1.5645	1.3038 1335.6 1.5969	1.3622 1358.2 1.6167	1.5031 1412.9 1.6621	1.6390 1466.7 1.7031	1.7720 1520.2 1.7411	2.033 1628.0 1.8103	
500.0	485.3	467.01	v h s		0.9927 1231.3 1.4919	1.0633 1260.0 1.5213	1.1282 1286.2 1.5470	1.1591 1298.6 1.5588	1.2478 1334.2 1.5915	1.3044 1357.0 1.6115	1.4405 1412.1 1.6571	1.5715 1466.0 1.6982	1.6996 1519.6 1.7363	1.9504 1627.6 1.8056	
520.0	505.3	471.07	v h s		0.9473 1228.3 1.4851	1.0166 1257.7 1.5151	1.0799 1284.3 1.5412	1.1101 1296.9 1.5532	1.1962 1332.9 1.5863	1.2511 1355.8 1.6064	1.3826 1411.2 1.6522	1.5091 1465.3 1.6935	1.6326 1519.0 1.7317	1.8743 1627.2 1.8011	
540.0	525.3	475.01	v h s		0.9052 1225.3 1.4784	0.9733 1255.4 1.5091	1.0352 1282.4 1.5356	1.0646 1295.2 1.5478	1.1485 1331.5 1.5812	1.2017 1354.6 1.6015	1.3291 1410.3 1.6475	1.4514 1464.6 1.6890	1.5707 1518.5 1.7272	1.8039 1626.8 1.7968	
560.0	545.3	478.85	v h s		0.8659 1222.2 1.4717	0.9330 1253.0 1.5032	0.9937 1280.5 1.5302	1.0224 1293.4 1.5425	1.1041 1330.2 1.5762	1.1558 1353.5 1.5967	1.2794 1409.4 1.6430	1.3978 1463.9 1.6846	1.5132 1517.9 1.7229	1.7385 1626.4 1.7926	
580.0	565.3	482.58	v h s		0.8291 1219.0 1.4652	0.8954 1250.5 1.4974	0.9549 1278.5 1.5248	0.9830 1291.7 1.5373	1.0627 1328.8 1.5714	1.1131 1352.3 1.5920	1.2331 1408.6 1.6386	1.3479 1463.2 1.6804	1.4596 1517.3 1.7188	1.6776 1626.0 1.7885	

Pressure Lbs. per Sq. In.		Sat. Temp. <i>t</i>		Total Temperature — Degrees Fahrenheit										
Abs. <i>P</i>	Gage <i>p</i>			560°	600°	640°	680°	700°	760°	780°	800°	900°	1000°	1200°
600.0	585.3	486.21	v	0.8901	0.9463	0.9988	1.0489	1.0732	1.1440	1.1670	1.1899	1.3013	1.4096	1.6208
			h	1262.7	1289.9	1315.2	1339.3	1351.1	1385.3	1396.5	1407.7	1462.5	1516.7	1625.5
			s	1.5061	1.5323	1.5558	1.5773	1.5875	1.6163	1.6254	1.6343	1.6762	1.7147	1.7846
620.0	605.3	489.75	v	0.8567	0.9118	0.9633	1.0121	1.0358	1.1048	1.1272	1.1494	1.2577	1.3628	1.5676
			h	1260.4	1288.1	1313.7	1338.0	1349.9	1384.3	1395.6	1406.8	1461.8	1516.2	1625.1
			s	1.5007	1.5273	1.5511	1.5728	1.5831	1.6121	1.6213	1.6302	1.6722	1.7108	1.7808
640.0	625.3	493.21	v	0.8253	0.8795	0.9299	0.9777	1.0008	1.0680	1.0899	1.1115	1.2168	1.3190	1.5178
			h	1258.2	1286.2	1312.2	1336.7	1348.6	1383.3	1394.7	1405.9	1461.1	1515.6	1624.7
			s	1.4955	1.5225	1.5465	1.5684	1.5788	1.6080	1.6172	1.6262	1.6684	1.7070	1.7771
660.0	645.3	496.58	v	0.7958	0.8491	0.8985	0.9453	0.9679	1.0335	1.0548	1.0759	1.1784	1.2778	1.4709
			h	1255.9	1284.4	1310.6	1335.4	1347.4	1382.3	1393.7	1405.0	1460.4	1515.0	1624.3
			s	1.4903	1.5177	1.5420	1.5642	1.5746	1.6040	1.6132	1.6222	1.6646	1.7034	1.7735
680.0	665.3	499.88	v	0.7679	0.8205	0.8690	0.9148	0.9369	1.0010	1.0218	1.0424	1.1423	1.2390	1.4269
			h	1253.5	1282.5	1309.1	1334.1	1346.2	1381.3	1392.8	1404.1	1459.7	1514.5	1623.9
			s	1.4851	1.5130	1.5376	1.5600	1.5705	1.6001	1.6094	1.6184	1.6609	1.6998	1.7700
700.0	685.3	503.10	v	0.7416	0.7934	0.8411	0.8860	0.9077	0.9704	0.9907	1.0108	1.1082	1.2024	1.3853
			h	1251.1	1280.6	1307.5	1332.8	1345.0	1380.3	1391.8	1403.2	1459.0	1513.9	1623.5
			s	1.4800	1.5084	1.5333	1.5559	1.5665	1.5962	1.6056	1.6147	1.6573	1.6963	1.7666
750.0	735.3	510.86	v	0.6816	0.7319	0.7778	0.8208	0.8414	0.9008	0.9201	0.9391	1.0310	1.1196	1.2912
			h	1245.0	1275.7	1303.5	1329.4	1341.8	1377.7	1389.4	1400.9	1457.2	1512.4	1622.4
			s	1.4676	1.4972	1.5229	1.5460	1.5568	1.5870	1.5965	1.6057	1.6487	1.6879	1.7586
800.0	785.3	518.23	v	0.6288	0.6779	0.7223	0.7635	0.7833	0.8400	0.8583	0.8763	0.9633	1.0470	1.2088
			h	1238.6	1270.7	1299.4	1325.9	1338.6	1375.2	1387.0	1398.6	1455.4	1511.0	1621.4
			s	1.4553	1.4863	1.5129	1.5366	1.5476	1.5783	1.5879	1.5972	1.6407	1.6801	1.7510
850.0	835.3	525.26	v	0.5818	0.6301	0.6732	0.7130	0.7320	0.7863	0.8037	0.8209	0.9037	0.9830	1.1360
			h	1231.9	1265.5	1295.2	1322.4	1335.4	1372.5	1384.5	1396.3	1453.6	1509.5	1620.4
			s	1.4433	1.4756	1.5032	1.5275	1.5388	1.5700	1.5797	1.5892	1.6330	1.6727	1.7438
900.0	885.3	531.98	v	0.5396	0.5873	0.6294	0.6680	0.6863	0.7385	0.7552	0.7716	0.8506	0.9262	1.0714
			h	1224.9	1260.1	1290.9	1318.8	1332.1	1369.9	1382.0	1393.9	1451.8	1508.1	1619.3
			s	1.4313	1.4653	1.4938	1.5187	1.5303	1.5620	1.5719	1.5814	1.6257	1.6656	1.7371
950.0	935.3	538.42	v	0.5015	0.5489	0.5901	0.6276	0.6453	0.6957	0.7117	0.7275	0.8031	0.8753	1.0136
			h	1217.5	1254.6	1286.4	1315.2	1328.7	1367.2	1379.5	1391.6	1450.0	1506.6	1618.3
			s	1.4194	1.4551	1.4846	1.5103	1.5221	1.5544	1.5644	1.5741	1.6187	1.6589	1.7306
1000.0	985.3	544.61	v	0.4668	0.5140	0.5546	0.5912	0.6084	0.6571	0.6726	0.6878	0.7604	0.8294	0.9615
			h	1209.7	1248.8	1281.9	1311.4	1325.3	1364.4	1376.9	1389.2	1448.2	1505.1	1617.3
			s	1.4073	1.4450	1.4757	1.5021	1.5141	1.5470	1.5572	1.5670	1.6121	1.6525	1.7245
1100.0	1085.3	556.31	v	0.4053	0.4532	0.4929	0.5281	0.5445	0.5904	0.6049	0.6191	0.6866	0.7503	0.8716
			h	1192.6	1236.7	1272.4	1303.7	1318.3	1358.9	1371.7	1384.3	1444.5	1502.2	1615.2
			s	1.3827	1.4251	1.4583	1.4862	1.4989	1.5330	1.5435	1.5535	1.5995	1.6405	1.7130
1200.0	1185.3	567.22	v		0.4016	0.4410	0.4752	0.4909	0.5347	0.5484	0.5617	0.6250	0.6843	0.7967
			h		1223.5	1262.4	1295.7	1311.0	1353.2	1366.4	1379.3	1440.7	1499.2	1613.1
			s		1.4052	1.4413	1.4710	1.4843	1.5198	1.5306	1.5409	1.5879	1.6293	1.7025
1300.0	1285.3	577.46	v		0.3569	0.3966	0.4301	0.4454	0.4874	0.5004	0.5131	0.5728	0.6284	0.7333
			h		1209.0	1251.8	1287.3	1303.4	1347.3	1361.0	1374.3	1437.0	1496.2	1611.0
			s		1.3850	1.4246	1.4563	1.4703	1.5073	1.5184	1.5290	1.5769	1.6190	1.6927
1400.0	1385.3	587.10	v		0.3174	0.3580	0.3912	0.4062	0.4468	0.4593	0.4714	0.5281	0.5805	0.6789
			h		1193.0	1240.4	1278.5	1295.5	1341.3	1355.4	1369.1	1433.1	1493.2	1608.9
			s		1.3639	1.4079	1.4419	1.4567	1.4953	1.5068	1.5177	1.5666	1.6093	1.6836
1500.0	1485.3	596.23	v		0.2815	0.3240	0.3572	0.3719	0.4114	0.4235	0.4352	0.4893	0.5390	0.6318
			h		1174.5	1228.3	1269.3	1287.2	1335.2	1349.7	1363.8	1429.3	1490.1	1606.8
			s		1.3412	1.3912	1.4278	1.4434	1.4837	1.4956	1.5068	1.5569	1.6001	1.6750

Pressure Lbs. per Sq. In.		Sat. Temp. <i>t</i>		Total Temperature — Degrees Fahrenheit										
Abs. <i>P</i>	Gage <i>p</i>			660°	700°	740°	780°	800°	860°	900°	1000°	1050°	1100°	1200°
1600.0	1585.3	604.90	v h s	0.3112 1238.7 1.3952	0.3417 1278.7 1.4303	0.3682 1313.0 1.4595	0.3921 1343.9 1.4848	0.4034 1358.4 1.4964	0.4353 1399.5 1.5283	0.4553 1425.3 1.5476	0.5027 1487.0 1.5914	0.5253 1516.9 1.6115	0.5474 1546.4 1.6307	0.5906 1604.6 1.6669
1700.0	1685.3	613.15	v h s	0.2842 1226.8 1.3797	0.3148 1269.7 1.4173	0.3410 1305.8 1.4480	0.3643 1337.9 1.4743	0.3753 1352.9 1.4863	0.4061 1395.0 1.5190	0.4253 1421.4 1.5387	0.4706 1484.0 1.5831	0.4922 1514.1 1.6034	0.5132 1543.8 1.6228	0.5542 1602.5 1.6592
1800.0	1785.3	621.03	v h s	0.2597 1214.0 1.3638	0.2907 1260.3 1.4044	0.3166 1298.4 1.4367	0.3395 1331.8 1.4641	0.3502 1347.2 1.4765	0.3801 1390.4 1.5100	0.3986 1417.4 1.5301	0.4421 1480.8 1.5752	0.4627 1511.3 1.5957	0.4828 1541.3 1.6153	0.5218 1600.4 1.6520
1900.0	1885.3	628.58	v h s	0.2371 1200.2 1.3474	0.2688 1250.4 1.3915	0.2947 1290.6 1.4256	0.3173 1325.4 1.4541	0.3277 1341.5 1.4669	0.3568 1385.8 1.5014	0.3747 1413.3 1.5219	0.4165 1477.7 1.5676	0.4363 1508.5 1.5883	0.4556 1538.8 1.6081	0.4929 1598.2 1.6450
2000.0	1985.3	635.82	v h s	0.2161 1184.9 1.3300	0.2489 1240.0 1.3783	0.2748 1282.6 1.4145	0.2972 1319.0 1.4443	0.3074 1335.5 1.4576	0.3358 1381.2 1.4930	0.3532 1409.2 1.5139	0.3935 1474.5 1.5603	0.4126 1505.7 1.5813	0.4311 1536.2 1.6012	0.4668 1596.1 1.6384
2100.0	2085.3	642.77	v h s	0.1962 1167.7 1.3112	0.2306 1229.0 1.3651	0.2567 1274.3 1.4035	0.2789 1312.3 1.4346	0.2890 1329.5 1.4484	0.3167 1376.4 1.4848	0.3337 1405.0 1.5062	0.3727 1471.4 1.5533	0.3911 1502.9 1.5745	0.4089 1533.6 1.5945	0.4433 1593.9 1.6320
2200.0	2185.3	649.46	v h s	0.1768 1147.8 1.2903	0.2135 1217.4 1.3515	0.2400 1265.7 1.3925	0.2621 1305.4 1.4250	0.2721 1323.3 1.4393	0.2994 1371.5 1.4768	0.3159 1400.8 1.4986	0.3538 1468.2 1.5465	0.3715 1500.0 1.5679	0.3887 1531.1 1.5881	0.4218 1591.8 1.6259
2300.0	2285.3	655.91	v h s	0.1575 1123.8 1.2661	0.1978 1204.9 1.3375	0.2247 1256.7 1.3814	0.2468 1298.4 1.4156	0.2567 1316.9 1.4304	0.2835 1366.6 1.4690	0.2997 1396.5 1.4913	0.3365 1464.9 1.5399	0.3537 1497.1 1.5615	0.3703 1528.5 1.5820	0.4023 1589.6 1.6200
2400.0	2385.3	662.12	v h s		0.1828 1191.5 1.3228	0.2105 1247.3 1.3702	0.2327 1291.1 1.4061	0.2425 1310.3 1.4215	0.2689 1361.6 1.4613	0.2848 1392.2 1.4842	0.3207 1461.7 1.5335	0.3373 1494.2 1.5554	0.3534 1525.9 1.5760	0.3843 1587.4 1.6143
2500.0	2485.3	668.13	v h s		0.1686 1176.8 1.3073	0.1973 1237.6 1.3589	0.2196 1283.6 1.3967	0.2294 1303.6 1.4127	0.2555 1356.5 1.4538	0.2710 1387.8 1.4772	0.3061 1458.4 1.5273	0.3222 1491.3 1.5495	0.3379 1523.2 1.5702	0.3678 1585.3 1.6088
2600.0	2585.3	673.94	v h s		0.1549 1160.6 1.2908	0.1849 1227.3 1.3474	0.2074 1275.8 1.3873	0.2172 1296.8 1.4040	0.2431 1351.4 1.4464	0.2584 1383.4 1.4703	0.2926 1455.1 1.5212	0.3083 1488.4 1.5437	0.3236 1520.6 1.5646	0.3526 1583.1 1.6035
2700.0	2685.3	679.55	v h s		0.1415 1142.5 1.2728	0.1732 1216.5 1.3357	0.1960 1267.9 1.3778	0.2059 1289.7 1.3953	0.2315 1346.1 1.4391	0.2466 1378.9 1.4635	0.2801 1451.8 1.5154	0.2955 1485.5 1.5380	0.3103 1518.0 1.5592	0.3385 1580.9 1.5983
2800.0	2785.3	684.99	v h s		0.1281 1121.4 1.2524	0.1622 1205.1 1.3236	0.1854 1259.6 1.3683	0.1953 1282.4 1.3865	0.2208 1340.8 1.4318	0.2356 1374.3 1.4569	0.2685 1448.5 1.5096	0.2835 1482.5 1.5325	0.2979 1515.4 1.5539	0.3254 1578.7 1.5933
2900.0	2885.3	690.26	v h s		0.1143 1095.9 1.2286	0.1517 1193.0 1.3111	0.1754 1251.1 1.3587	0.1853 1274.9 1.3778	0.2108 1335.3 1.4247	0.2254 1369.7 1.4504	0.2577 1445.1 1.5040	0.2723 1479.6 1.5272	0.2864 1512.7 1.5487	0.3132 1576.5 1.5884
3000.0	2985.3	695.36	v h s		0.0984 1060.7 1.1966	0.1416 1180.1 1.2981	0.1660 1242.2 1.3490	0.1760 1267.2 1.3690	0.2014 1329.7 1.4176	0.2159 1365.0 1.4439	0.2476 1441.8 1.4984	0.2620 1476.6 1.5219	0.2757 1510.0 1.5437	0.3018 1574.3 1.5837
3100.0	3085.3	700.31	v h s			0.1320 1166.2 1.2844	0.1571 1233.0 1.3392	0.1672 1259.3 1.3602	0.1926 1324.1 1.4105	0.2070 1360.3 1.4376	0.2382 1438.4 1.4930	0.2523 1473.6 1.5168	0.2657 1507.4 1.5388	0.2911 1572.1 1.5790
3206.2	3191.5	705.40	v h s			0.1220 1150.2 1.2690	0.1480 1222.9 1.3287	0.1583 1250.5 1.3508	0.1838 1317.9 1.4031	0.1981 1355.2 1.4309	0.2288 1434.7 1.4874	0.2426 1470.4 1.5115	0.2557 1504.5 1.5337	0.2806 1569.8 1.5742

Conversion Table

Measure

1 in.	= 25.4 mm.
1 mm.	= .03937 in.
1 mm.	= .00328 ft.
1 ft.	= 304.8 mm.
1 ft.	= 30.48 cm.
1 sq. in.	= 6.4516 sq. cm.
1 sq. cm.	= 0.155 sq. in.
1 sq. cm.	= .00108 sq. ft.
1 sq. ft.	= 929.03 sq. cm.
1 cu. in.	= 16.39 cu. cm.
1 cu. ft.	= 1728 cu. in.
1 cu. ft.	= 28,316.83 cu. cm.
1 cu. ft.	= 7.4805 U. S. gals.
1 cu. ft.	= 6.23 imp. gals.
1 cu. ft.	= 28.375 liters
1 U. S. gal.	= 0.1337 cu. ft.
1 imp. gal.	= 277.27 cu. in.
1 imp. gal.	= 0.16 cu. ft.
1 imp. gal.	= 1.2 U. S. gals.
1 imp. gal.	= 4.537 liters
1 liter	= .61 cu. in.
1 liter	= .0353 cu. ft.
1 liter	= .22 imp. gal.

Weight

1 cu. in. of water	= .0361 lb. (15° C)
1 cu. ft. of water	= 62.4 lbs. (15° C)
1 U. S. gal. of water	= 8.33 lbs. (15° C)
1 imp. gal. of water	= 10 lbs. (15° C)
1 liter of water	= 2.2 lbs. (15° C)
1 kg.	= 2.2 lbs.
1 cu. in. of water	= .0735 cu. in. of mercury
1 cu. in. of mercury	= 13.6 cu. in. of water
1 cu. in. of mercury	= .491 lb.

Velocity

1 ft. per sec.	= .3048 m. per sec.
1 m. per sec.	= 3.2808 ft. per sec.

Density

1 lb. per cu. in.	= 27.68 gram. per cu. cm.
1 gr. per cu. cm.	= .03613 lb. per cu. in.
1 lb. per cu. ft.	= 16.0184 kg. per cu. m.
1 kg. per cu. m.	= .06243 lb. per cu. ft.

Pressure

1 in. of water	= .0361 lb. per sq. in.
1 in. of water	= .0735 in. of mercury
1 ft. of water	= .4332 lb. per sq. in.
1 ft. of water	= .8824 in. of mercury
1 in. of mercury	= .4912 lb. per sq. in.
1 in. of mercury	= 13.6 in. of water
1 in. of mercury	= 1.133 ft. of water
1 cm. of mercury	= .1934 lb. per sq. in.
1 atmosphere	= 14.696 lbs. per sq. in.
1 atmosphere	= 34 ft. of water
1 atmosphere	= 760 mm. of mercury
1 lb. per sq. in.	= 27.71 in. of water
1 lb. per sq. in.	= 2.312 ft. of water
1 lb. per sq. in.	= 2.04 in. of mercury
1 lb. per sq. in.	= .06804 atmosphere
1 lb. per sq. in.	= .0703 kg. per sq. cm.
1 lb. per sq. in.	= 703.08 kg. per sq. mm.
1 kg. per sq. cm.	= 14.223 lbs. per sq. in.
1 kg. per sq. m.	= .00142 lb. per sq. in.

Heat Transfer

1 B.t.u. per sq. ft.	= .2712 gram. calorie per sq. cm.
1 gram. cal. per sq. cm.	= 3.687 B.t.u. per sq. ft.
1 B.t.u. per hr. per sq. ft. per F°	= 4.88 kg. cal. per hr. per sq. m. per C°.
1 kg. cal. per hr. per sq. m. per C°	= .205 B.t.u. per hr. per sq. ft. per F°.
1 B.t.u. per hr. per sq. ft. per F°	= .0001355 gram. cal. per sec. per sq. cm. per C°.
1 gram. cal. per sec. per sq. cm. per C°	= 7380 B.t.u. per hr. per sq. ft. per F°.

Thermal Conductivity

1 B.t.u. per sq. ft. per in.	= .6892 gram. calories per sq. cm. per cm.
1 gram. cal. per sq. cm. per cm.	= 1.451 B.t.u. per sq. ft. per in.
1 B.t.u. per hr. per sq. ft. per F° per in.	= .0003445 gram. cal. per sec. per sq. cm. per C° per cm.
1 gram. cal. per sec. per sq. cm. per C° per cm.	= 2903 B.t.u. per hr. per sq. ft. per F° per in.
1 B.t.u. per hr. per sq. ft. per F° per ft.	= .00413 gram. cal. per sec. per sq. cm. per C° per cm.
1 gram. cal. per sec. per sq. cm. per C° per cm.	= 242.13 B.t.u. per hr. per sq. ft. per F° per ft.

Linear Conversion

Fractions of an Inch To Decimals of an Inch and to Millimeters

Fraction	Decimal	Millimeter	Fraction	Decimal	Millimeter
$\frac{1}{64}$	.015625	0.39688	$\frac{33}{64}$	.515625	13.09690
$\frac{1}{32}$	.03125	0.79375	$\frac{17}{32}$	.53125	13.49378
$\frac{3}{64}$	.046875	1.19063	$\frac{35}{64}$	.546875	13.89065
$\frac{1}{16}$	.0625	1.58750	$\frac{9}{16}$	.5625	14.28753
$\frac{5}{64}$	.078125	1.98438	$\frac{37}{64}$	.578125	14.68440
$\frac{3}{32}$	.09375	2.38125	$\frac{19}{32}$	.59375	15.08128
$\frac{7}{64}$	.109375	2.77813	$\frac{39}{64}$	.609375	15.47816
$\frac{1}{8}$	.125	3.17501	$\frac{5}{8}$	.625	15.87503
$\frac{9}{64}$	.140625	3.57188	$\frac{41}{64}$	.640625	16.27191
$\frac{5}{32}$	.15625	3.96876	$\frac{21}{32}$	.65625	16.66878
$\frac{11}{64}$	.171875	4.36563	$\frac{43}{64}$	.671875	17.06566
$\frac{3}{16}$	.1875	4.76251	$\frac{11}{16}$	.6875	17.46253
$\frac{13}{64}$	.203125	5.15939	$\frac{45}{64}$	.703125	17.85941
$\frac{7}{32}$	.21875	5.55626	$\frac{23}{32}$	.71875	18.25629
$\frac{15}{64}$	.234375	5.95314	$\frac{47}{64}$	.734375	18.65316
$\frac{1}{4}$	.25	6.35001	$\frac{3}{4}$	.75	19.05004
$\frac{17}{64}$	.265625	6.74689	$\frac{49}{64}$	.765625	19.44691
$\frac{9}{32}$	.28125	7.14376	$\frac{25}{32}$	.78125	19.84379
$\frac{19}{64}$	.296875	7.54064	$\frac{51}{64}$	.796875	20.24067
$\frac{5}{16}$	.3125	7.93752	$\frac{13}{16}$	.8125	20.63754
$\frac{21}{64}$	.328125	8.33439	$\frac{53}{64}$	.828125	21.03442
$\frac{11}{32}$	.34375	8.73127	$\frac{27}{32}$	.84375	21.43129
$\frac{23}{64}$	.359375	9.12814	$\frac{55}{64}$	.859375	21.82817
$\frac{3}{8}$	.375	9.52502	$\frac{7}{8}$	.875	22.22504
$\frac{25}{64}$	.390625	9.92189	$\frac{57}{64}$	.890625	22.62192
$\frac{13}{32}$	.40625	10.31877	$\frac{29}{32}$	.90625	23.01880
$\frac{27}{64}$	.421875	10.71565	$\frac{59}{64}$	.921875	23.41567
$\frac{7}{16}$	.4375	11.11252	$\frac{15}{16}$	.9375	23.81255
$\frac{29}{64}$	.453125	11.50940	$\frac{61}{64}$	.953125	24.20942
$\frac{15}{32}$	.46875	11.90627	$\frac{31}{32}$	.96875	24.60630
$\frac{31}{64}$	.484375	12.30315	$\frac{63}{64}$	.984375	25.00318
$\frac{1}{2}$	.5	12.70003	1	1.0	25.40005

Linear Conversion

Decimals of an Inch to Millimeters

(0.10 inch = 2.54 millimeters)

Inches	0.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	Inches
0.00	0.00	0.25	0.51	0.76	1.02	1.27	1.52	1.78	2.03	2.29	0.00
.10	2.54	2.79	3.05	3.30	3.56	3.81	4.06	4.32	4.57	4.83	.10
.20	5.08	5.33	5.59	5.84	6.10	6.35	6.60	6.86	7.11	7.37	.20
.30	7.62	7.87	8.13	8.38	8.64	8.89	9.14	9.40	9.65	9.91	.30
.40	10.16	10.41	10.67	10.92	11.18	11.43	11.68	11.94	12.19	12.45	.40
.50	12.70	12.95	13.21	13.46	13.72	13.97	14.22	14.48	14.73	14.99	.50
.60	15.24	15.49	15.75	16.00	16.26	16.51	16.76	17.02	17.27	17.53	.60
.70	17.78	18.03	18.29	18.54	18.80	19.05	19.30	19.56	19.81	20.07	.70
.80	20.32	20.57	20.83	21.08	21.34	21.59	21.84	22.10	22.35	22.61	.80
.90	22.86	23.11	23.37	23.62	23.88	24.13	24.38	24.64	24.89	25.15	.90

Millimeters to Inches

(1 millimeter = .03937 inch)

Millimeters	0	1	2	3	4	5	6	7	8	9	Millimeters
0	0.00	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354	0
10	0.39	0.43	0.47	0.51	0.55	0.59	0.63	0.67	0.71	0.75	10
20	0.79	0.83	0.87	0.91	0.94	0.98	1.02	1.06	1.10	1.14	20
30	1.18	1.22	1.26	1.30	1.34	1.38	1.42	1.46	1.50	1.54	30
40	1.57	1.61	1.65	1.69	1.73	1.77	1.81	1.85	1.89	1.93	40
50	1.97	2.01	2.05	2.09	2.13	2.17	2.20	2.24	2.28	2.32	50
60	2.36	2.40	2.44	2.48	2.52	2.56	2.60	2.64	2.68	2.72	60
70	2.76	2.80	2.83	2.87	2.91	2.95	2.99	3.03	3.07	3.11	70
80	3.15	3.19	3.23	3.27	3.31	3.35	3.39	3.43	3.46	3.50	80
90	3.54	3.58	3.62	3.66	3.70	3.74	3.78	3.82	3.86	3.90	90
100	3.94	3.98	4.02	4.06	4.09	4.13	4.17	4.21	4.25	4.29	100
110	4.33	4.37	4.41	4.45	4.49	4.53	4.57	4.61	4.65	4.69	110
120	4.72	4.76	4.80	4.84	4.88	4.92	4.96	5.00	5.04	5.08	120
130	5.12	5.16	5.20	5.24	5.28	5.31	5.35	5.39	5.43	5.47	130
140	5.51	5.55	5.59	5.63	5.67	5.71	5.75	5.79	5.83	5.87	140
150	5.91	5.94	5.98	6.02	6.06	6.10	6.14	6.18	6.22	6.26	150
160	6.30	6.34	6.38	6.42	6.46	6.50	6.54	6.57	6.61	6.65	160
170	6.69	6.73	6.77	6.81	6.85	6.89	6.93	6.97	7.01	7.05	170
180	7.09	7.13	7.17	7.20	7.24	7.28	7.32	7.36	7.40	7.44	180
190	7.48	7.52	7.56	7.60	7.64	7.68	7.72	7.76	7.80	7.83	190
200	7.87	7.91	7.95	7.99	8.03	8.07	8.11	8.15	8.19	8.23	200
210	8.27	8.31	8.35	8.39	8.43	8.46	8.50	8.54	8.58	8.62	210
220	8.66	8.70	8.74	8.78	8.82	8.86	8.90	8.94	8.98	9.02	220
230	9.06	9.09	9.13	9.17	9.21	9.25	9.29	9.33	9.37	9.41	230
240	9.45	9.49	9.53	9.57	9.61	9.65	9.69	9.72	9.76	9.80	240
250	9.84	9.88	9.92	9.96	10.00	10.04	10.08	10.12	10.16	10.20	250
260	10.24	10.28	10.31	10.35	10.39	10.43	10.47	10.51	10.55	10.59	260
270	10.63	10.67	10.71	10.75	10.79	10.83	10.87	10.91	10.94	10.98	270
280	11.02	11.06	11.10	11.14	11.18	11.22	11.26	11.30	11.34	11.38	280
290	11.42	11.46	11.50	11.54	11.57	11.61	11.65	11.69	11.73	11.77	290
300	11.81	11.85	11.89	11.93	11.97	12.01	12.05	12.09	12.13	12.17	300
310	12.20	12.24	12.28	12.32	12.36	12.40	12.44	12.48	12.52	12.56	310
320	12.60	12.64	12.68	12.72	12.76	12.80	12.83	12.87	12.91	12.95	320
330	12.99	13.03	13.07	13.11	13.15	13.19	13.23	13.27	13.31	13.35	330
340	13.39	13.43	13.46	13.50	13.54	13.58	13.62	13.66	13.70	13.74	340
350	13.78	13.82	13.86	13.90	13.94	13.98	14.02	14.06	14.09	14.13	350
360	14.17	14.21	14.25	14.29	14.33	14.37	14.41	14.45	14.49	14.53	360
370	14.57	14.61	14.65	14.69	14.72	14.76	14.80	14.84	14.88	14.92	370
380	14.96	15.00	15.04	15.08	15.12	15.16	15.20	15.24	15.28	15.31	380
390	15.35	15.39	15.43	15.47	15.51	15.55	15.59	15.63	15.67	15.71	390

(Continued on next page)

Millimeters to Inches (Cont.)

Millimeters	0	1	2	3	4	5	6	7	8	9	Millimeters
400	15.75	15.79	15.83	15.87	15.91	15.94	15.98	16.02	16.06	16.10	400
410	16.14	16.18	16.22	16.26	16.30	16.34	16.38	16.42	16.46	16.50	410
420	16.54	16.57	16.61	16.65	16.69	16.73	16.77	16.81	16.85	16.89	420
430	16.93	16.97	17.01	17.05	17.09	17.13	17.17	17.20	17.24	17.28	430
440	17.32	17.36	17.40	17.44	17.48	17.52	17.56	17.60	17.64	17.68	440
450	17.72	17.76	17.80	17.83	17.87	17.91	17.95	17.99	18.03	18.07	450
460	18.11	18.15	18.19	18.23	18.27	18.31	18.35	18.39	18.43	18.46	460
470	18.50	18.54	18.58	18.62	18.66	18.70	18.74	18.78	18.82	18.86	470
480	18.90	18.94	18.98	19.02	19.06	19.09	19.13	19.17	19.21	19.25	480
490	19.29	19.33	19.37	19.41	19.45	19.49	19.53	19.57	19.61	19.65	490
500	19.69	19.72	19.76	19.80	19.84	19.88	19.92	19.96	20.00	20.04	500
510	20.08	20.12	20.16	20.20	20.24	20.28	20.31	20.35	20.39	20.43	510
520	20.47	20.51	20.55	20.59	20.63	20.67	20.71	20.75	20.79	20.83	520
530	20.87	20.91	20.94	20.98	21.02	21.06	21.10	21.14	21.18	21.22	530
540	21.26	21.30	21.34	21.38	21.42	21.46	21.50	21.54	21.58	21.61	540
550	21.65	21.69	21.73	21.77	21.81	21.85	21.89	21.93	21.97	22.01	550
560	22.05	22.09	22.13	22.17	22.20	22.24	22.28	22.32	22.36	22.40	560
570	22.44	22.48	22.52	22.56	22.60	22.64	22.68	22.72	22.76	22.80	570
580	22.83	22.87	22.91	22.95	22.99	23.03	23.07	23.11	23.15	23.19	580
590	23.23	23.27	23.31	23.35	23.39	23.43	23.46	23.50	23.54	23.58	590
600	23.62	23.66	23.70	23.74	23.78	23.82	23.86	23.90	23.94	23.98	600
610	24.02	24.06	24.09	24.13	24.17	24.21	24.25	24.29	24.33	24.37	610
620	24.41	24.45	24.49	24.53	24.57	24.61	24.65	24.68	24.72	24.76	620
630	24.80	24.84	24.88	24.92	24.96	25.00	25.04	25.08	25.12	25.16	630
640	25.20	25.24	25.28	25.31	25.35	25.39	25.43	25.47	25.51	25.55	640
650	25.59	25.63	25.67	25.71	25.75	25.79	25.83	25.87	25.91	25.94	650
660	25.98	26.02	26.06	26.10	26.14	26.18	26.22	26.26	26.30	26.34	660
670	26.38	26.42	26.46	26.50	26.54	26.57	26.61	26.65	26.69	26.73	670
680	26.77	26.81	26.85	26.89	26.93	26.97	27.01	27.05	27.09	27.13	680
690	27.17	27.20	27.24	27.28	27.32	27.36	27.40	27.44	27.48	27.52	690
700	27.56	27.60	27.64	27.68	27.72	27.76	27.80	27.83	27.87	27.91	700
710	27.95	27.99	28.03	28.07	28.11	28.15	28.19	28.23	28.27	28.31	710
720	28.35	28.39	28.43	28.46	28.50	28.54	28.58	28.62	28.66	28.70	720
730	28.74	28.78	28.82	28.86	28.90	28.94	28.98	29.02	29.06	29.09	730
740	29.13	29.17	29.21	29.25	29.29	29.33	29.37	29.41	29.45	29.49	740
750	29.53	29.57	29.61	29.65	29.68	29.72	29.76	29.80	29.84	29.88	750
760	29.92	29.96	30.00	30.04	30.08	30.12	30.16	30.20	30.24	30.28	760
770	30.31	30.35	30.39	30.43	30.47	30.51	30.55	30.59	30.63	30.67	770
780	30.71	30.75	30.79	30.83	30.87	30.91	30.94	30.98	31.02	31.06	780
790	31.10	31.14	31.18	31.22	31.26	31.30	31.34	31.38	31.42	31.46	790
800	31.50	31.54	31.57	31.61	31.65	31.69	31.73	31.77	31.81	31.85	800
810	31.89	31.93	31.97	32.01	32.05	32.09	32.13	32.17	32.20	32.24	810
820	32.28	32.32	32.36	32.40	32.44	32.48	32.52	32.56	32.60	32.64	820
830	32.68	32.72	32.76	32.80	32.83	32.87	32.91	32.95	32.99	33.03	830
840	33.07	33.11	33.15	33.19	33.23	33.27	33.31	33.35	33.39	33.43	840
850	33.46	33.50	33.54	33.58	33.62	33.66	33.70	33.74	33.78	33.82	850
860	33.86	33.90	33.94	33.98	34.02	34.06	34.09	34.13	34.17	34.21	860
870	34.25	34.29	34.33	34.37	34.41	34.45	34.49	34.53	34.57	34.61	870
880	34.65	34.68	34.72	34.76	34.80	34.84	34.88	34.92	34.96	35.00	880
890	35.04	35.08	35.12	35.16	35.20	35.24	35.28	35.31	35.35	35.39	890
900	35.43	35.47	35.51	35.55	35.59	35.63	35.67	35.71	35.75	35.79	900
910	35.83	35.87	35.91	35.94	35.98	36.02	36.06	36.10	36.14	36.18	910
920	36.22	36.26	36.30	36.34	36.38	36.42	36.46	36.50	36.54	36.57	920
930	36.61	36.65	36.69	36.73	36.77	36.81	36.85	36.89	36.93	36.97	930
940	37.01	37.05	37.09	37.13	37.17	37.20	37.24	37.28	37.32	37.36	940
950	37.40	37.44	37.48	37.52	37.56	37.60	37.64	37.68	37.72	37.76	950
960	37.80	37.83	37.87	37.91	37.95	37.99	38.03	38.07	38.11	38.15	960
970	38.19	38.23	38.27	38.31	38.35	38.39	38.43	38.46	38.50	38.54	970
980	38.58	38.62	38.66	38.70	38.74	38.78	38.82	38.86	38.90	38.94	980
990	38.98	39.02	39.06	39.09	39.13	39.17	39.21	39.25	39.29	39.33	990
1000	39.37	39.41	39.45	39.49	39.53	39.57	39.61	39.65	39.68	39.72	1000

Linear Conversion

Inches to Millimeters

(1 inch = 25.4 millimeters)

In.	0	1/16	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16
0	0.0	1.6	3.2	4.8	6.4	7.9	9.5	11.1	12.7	14.3	15.9	17.5	19.1	20.6	22.2	23.8
1	25.4	27.0	28.6	30.2	31.8	33.3	34.9	36.5	38.1	39.7	41.3	42.9	44.5	46.0	47.6	49.2
2	50.8	52.4	54.0	55.6	57.2	58.7	60.3	61.9	63.5	65.1	66.7	68.3	69.9	71.4	73.0	74.6
3	76.2	77.8	79.4	81.0	82.6	84.1	85.7	87.3	88.9	90.5	92.1	93.7	95.3	96.8	98.4	100.0
4	101.6	103.2	104.8	106.4	108.0	109.5	111.1	112.7	114.3	115.9	117.5	119.1	120.7	122.2	123.8	125.4
5	127.0	128.6	130.2	131.8	133.4	134.9	136.5	138.1	139.7	141.3	142.9	144.5	146.1	147.6	149.2	150.8
6	152.4	154.0	155.6	157.2	158.8	160.3	161.9	163.5	165.1	166.7	168.3	169.9	171.5	173.0	174.6	176.2
7	177.8	179.4	181.0	182.6	184.2	185.7	187.3	188.9	190.5	192.1	193.7	195.3	196.9	198.4	200.0	201.6
8	203.2	204.8	206.4	208.0	209.6	211.1	212.7	214.3	215.9	217.5	219.1	220.7	222.3	223.8	225.4	227.0
9	228.6	230.2	231.8	233.4	235.0	236.5	238.1	239.7	241.3	242.9	244.5	246.1	247.7	249.2	250.8	252.4
10	254.0	255.6	257.2	258.8	260.4	261.9	263.5	265.1	266.7	268.3	269.9	271.5	273.1	274.6	276.2	277.8
11	279.4	281.0	282.6	284.2	285.8	287.3	288.9	290.5	292.1	293.7	295.3	296.9	298.5	300.0	301.6	303.2
12	304.8	306.4	308.0	309.6	311.2	312.7	314.3	315.9	317.5	319.1	320.7	322.3	323.9	325.4	327.0	328.6
13	330.2	331.8	333.4	335.0	336.6	338.1	339.7	341.3	342.9	344.5	346.1	347.7	349.3	350.8	352.4	354.0
14	355.6	357.2	358.8	360.4	362.0	363.5	365.1	366.7	368.3	369.9	371.5	373.1	374.7	376.2	377.8	379.4
15	381.0	382.6	384.2	385.8	387.4	388.9	390.5	392.1	393.7	395.3	396.9	398.5	400.1	401.6	403.2	404.8
16	406.4	408.0	409.6	411.2	412.8	414.3	415.9	417.5	419.1	420.7	422.3	423.9	425.5	427.0	428.6	430.2
17	431.8	433.4	435.0	436.6	438.2	439.7	441.3	442.9	444.5	446.1	447.7	449.3	450.9	452.4	454.0	455.6
18	457.2	458.8	460.4	462.0	463.6	465.1	466.7	468.3	469.9	471.5	473.1	474.7	476.3	477.8	479.4	481.0
19	482.6	484.2	485.8	487.4	489.0	490.5	492.1	493.7	495.3	496.9	498.5	500.1	501.7	503.2	504.8	506.4
20	508.0	509.6	511.2	512.8	514.4	515.9	517.5	519.1	520.7	522.3	523.9	525.5	527.1	528.6	530.2	531.8
21	533.4	535.0	536.6	538.2	539.8	541.3	542.9	544.5	546.1	547.7	549.3	550.9	552.5	554.0	555.6	557.2
22	558.8	560.4	562.0	563.6	565.2	566.7	568.3	569.9	571.5	573.1	574.7	576.3	577.9	579.4	581.0	582.6
23	584.2	585.8	587.4	589.0	590.6	592.1	593.7	595.3	596.9	598.5	600.1	601.7	603.3	604.8	606.4	608.0
24	609.6	611.2	612.8	614.4	616.0	617.5	619.1	620.7	622.3	623.9	625.5	627.1	628.7	630.2	631.8	633.4
25	635.0	636.6	638.2	639.8	641.4	642.9	644.5	646.1	647.7	649.3	650.9	652.5	654.1	655.6	657.2	658.8
26	660.4	662.0	663.6	665.2	666.8	668.3	669.9	671.5	673.1	674.7	676.3	677.9	679.5	681.0	682.6	684.2
27	685.8	687.4	689.0	690.6	692.2	693.7	695.3	696.9	698.5	700.1	701.7	703.3	704.9	706.4	708.0	709.6
28	711.2	712.8	714.4	716.0	717.6	719.1	720.7	722.3	723.9	725.5	727.1	728.7	730.3	731.8	733.4	735.0
29	736.6	738.2	739.8	741.4	743.0	744.5	746.1	747.7	749.3	750.9	752.5	754.1	755.7	757.2	758.8	760.4
30	762.0	763.6	765.2	766.8	768.4	769.9	771.5	773.1	774.7	776.3	777.9	779.5	781.1	782.6	784.2	785.8
31	787.4	789.0	790.6	792.2	793.8	795.3	796.9	798.5	800.1	801.7	803.3	804.9	806.5	808.0	809.6	811.2
32	812.8	814.4	816.0	817.6	819.2	820.7	822.3	823.9	825.5	827.1	828.7	830.3	831.9	833.4	835.0	836.6
33	838.2	839.8	841.4	843.0	844.6	846.1	847.7	849.3	850.9	852.5	854.1	855.7	857.3	858.8	860.4	862.0
34	863.6	865.2	866.8	868.4	870.0	871.5	873.1	874.7	876.3	877.9	879.5	881.1	882.7	884.2	885.8	887.4
35	889.0	890.6	892.2	893.8	895.4	896.9	898.5	900.1	901.7	903.3	904.9	906.5	908.1	909.6	911.2	912.8
36	914.4	916.0	917.6	919.2	920.8	922.3	923.9	925.5	927.1	928.7	930.3	931.9	933.5	935.0	936.6	938.2
37	939.8	941.4	943.0	944.6	946.2	947.7	949.3	950.9	952.5	954.1	955.7	957.3	958.9	960.4	962.0	963.6
38	965.2	966.8	968.4	970.0	971.6	973.1	974.7	976.3	977.9	979.5	981.1	982.7	984.3	985.8	987.4	989.0
39	990.6	992.2	993.8	995.4	997.0	998.5	1000.1	1001.7	1003.3	1004.9	1006.5	1008.1	1009.7	1011.2	1012.8	1014.4
40	1016.0	1017.6	1019.2	1020.8	1022.4	1023.9	1025.5	1027.1	1028.7	1030.3	1031.9	1033.5	1035.1	1036.6	1038.2	1039.8
41	1041.4	1043.0	1044.6	1046.2	1047.8	1049.3	1050.9	1052.5	1054.1	1055.7	1057.3	1058.9	1060.5	1062.0	1063.6	1065.2
42	1066.8	1068.4	1070.0	1071.6	1073.2	1074.7	1076.3	1077.9	1079.5	1081.1	1082.7	1084.3	1085.9	1087.4	1089.0	1090.6
43	1092.2	1093.8	1095.4	1097.0	1098.6	1100.1	1101.7	1103.3	1104.9	1106.5	1108.1	1109.7	1111.3	1112.8	1114.4	1116.0
44	1117.6	1119.2	1120.8	1122.4	1124.0	1125.5	1127.1	1128.7	1130.3	1131.9	1133.5	1135.1	1136.7	1138.2	1139.8	1141.4
45	1143.0	1144.6	1146.2	1147.8	1149.4	1150.9	1152.5	1154.1	1155.7	1157.3	1158.9	1160.5	1162.1	1163.6	1165.2	1166.8
46	1168.4	1170.0	1171.6	1173.2	1174.8	1176.3	1177.9	1179.5	1181.1	1182.7	1184.3	1185.9	1187.5	1189.0	1190.6	1192.2
47	1193.8	1195.4	1197.0	1198.6	1200.2	1201.7	1203.3	1204.9	1206.5	1208.1	1209.7	1211.3	1212.9	1214.4	1216.0	1217.6
48	1219.2	1220.8	1222.4	1224.0	1225.6	1227.1	1228.7	1230.3	1231.9	1233.5	1235.1	1236.7	1238.3	1239.8	1241.4	1243.0
49	1244.6	1246.2	1247.8	1249.4	1251.0	1252.5	1254.1	1255.7	1257.3	1258.9	1260.5	1262.1	1263.7	1265.2	1266.8	1268.4
50	1270.0	1271.6	1273.2	1274.8	1276.4	1277.9	1279.5	1281.1	1282.7	1284.3	1285.9	1287.5	1289.1	1290.6	1292.2	1293.8

Temperature Conversion

-459.4 to 0			1 to 60			61 to 290			300 to 890			900 to 3000		
C	C F	F	C	C F	F	C	C F	F	C	C F	F	C	C F	F
-273	-459.4		-17.2	1	33.8	16.1	61	141.8	149	300	572	482	900	1652
-268	-450		-16.7	2	35.6	16.7	62	143.6	154	310	590	488	910	1670
-262	-440		-16.1	3	37.4	17.2	63	145.4	160	320	608	493	920	1688
-257	-430		-15.6	4	39.2	17.8	64	147.2	166	330	626	499	930	1706
-251	-420		-15.0	5	41.0	18.3	65	149.0	171	340	644	504	940	1724
-246	-410		-14.4	6	42.8	18.9	66	150.8	177	350	662	510	950	1742
-240	-400		-13.9	7	44.6	19.4	67	152.6	182	360	680	516	960	1760
-234	-390		-13.3	8	46.4	20.0	68	154.4	188	370	698	521	970	1778
-229	-380		-12.8	9	48.2	20.6	69	156.2	193	380	716	527	980	1796
-223	-370		-12.2	10	50.0	21.1	70	158.0	199	390	734	532	990	1814
-218	-360		-11.7	11	51.8	21.7	71	159.8	204	400	752	538	1000	1832
-212	-350		-11.1	12	53.6	22.2	72	161.6	210	410	770	549	1020	1868
-207	-340		-10.6	13	55.4	22.8	73	163.4	216	420	788	560	1040	1904
-201	-330		-10.0	14	57.2	23.3	74	165.2	221	430	806	571	1060	1940
-196	-320		-9.4	15	59.0	23.9	75	167.0	227	440	824	582	1080	1976
-190	-310		-8.9	16	60.8	24.4	76	168.8	232	450	842	593	1100	2012
-184	-300		-8.3	17	62.6	25.0	77	170.6	238	460	860	604	1120	2048
-179	-290		-7.8	18	64.4	25.6	78	172.4	243	470	878	616	1140	2084
-173	-280		-7.2	19	66.2	26.1	79	174.2	249	480	896	627	1160	2120
-169	-273	-459.4	-6.7	20	68.0	26.7	80	176.0	254	490	914	638	1180	2156
-168	-270	-454	-6.1	21	69.8	27.2	81	177.8	260	500	932	649	1200	2192
-162	-260	-436	-5.6	22	71.6	27.8	82	179.6	266	510	950	660	1220	2228
-157	-250	-418	-5.0	23	73.4	28.3	83	181.4	271	520	968	671	1240	2264
-151	-240	-400	-4.4	24	75.2	28.9	84	183.2	277	530	986	682	1260	2300
-146	-230	-382	-3.9	25	77.0	29.4	85	185.0	282	540	1004	693	1280	2336
-140	-220	-364	-3.3	26	78.8	30.0	86	186.8	288	550	1022	704	1300	2372
-134	-210	-346	-2.8	27	80.6	30.6	87	188.6	293	560	1040	732	1350	2462
-129	-200	-328	-2.2	28	82.4	31.1	88	190.4	299	570	1058	760	1400	2552
-123	-190	-310	-1.7	29	84.2	31.7	89	192.2	304	580	1076	788	1450	2642
-118	-180	-292	-1.1	30	86.0	32.2	90	194.0	310	590	1094	816	1500	2732
-112	-170	-274	-.6	31	87.8	32.8	91	195.8	316	600	1112	843	1550	2822
-107	-160	-256	0	32	89.6	33.3	92	197.6	321	610	1130	871	1600	2912
-101	-150	-238	.6	33	91.4	33.9	93	199.4	327	620	1148	899	1650	3002
-96	-140	-220	1.1	34	93.2	34.4	94	201.2	332	630	1166	927	1700	3092
-90	-130	-202	1.7	35	95.0	35.0	95	203.0	338	640	1184	954	1750	3182
-84	-120	-184	2.2	36	96.8	35.6	96	204.8	343	650	1202	982	1800	3272
-79	-110	-166	2.8	37	98.6	36.1	97	206.6	349	660	1220	1010	1850	3362
-73	-100	-148	3.3	38	100.4	36.7	98	208.4	354	670	1238	1038	1900	3452
-68	-90	-130	3.9	39	102.2	37.2	99	210.2	360	680	1256	1066	1950	3542
-62	-80	-112	4.4	40	104.0	37.8	100	212.0	366	690	1274	1093	2000	3632
-57	-70	-94	5.0	41	105.8	43	110	230	371	700	1292	1121	2050	3722
-51	-60	-76	5.6	42	107.6	49	120	248	377	710	1310	1149	2100	3812
-46	-50	-58	6.1	43	109.4	54	130	266	382	720	1328	1177	2150	3902
-40	-40	-40	6.7	44	111.2	60	140	284	388	730	1346	1204	2200	3992
-34	-30	-22	7.2	45	113.0	66	150	302	393	740	1364	1232	2250	4082
-29	-20	-4	7.8	46	114.8	71	160	320	399	750	1382	1260	2300	4172
-23	-10	14	8.3	47	116.6	77	170	338	404	760	1400	1288	2350	4262
-17.8	0	32	8.9	48	118.4	82	180	356	410	770	1418	1316	2400	4352
			9.4	49	120.2	88	190	374	416	780	1436	1343	2450	4442
			10.0	50	122.0	93	200	392	421	790	1454	1371	2500	4532
			10.6	51	123.8	99	210	410	427	800	1472	1399	2550	4622
			11.1	52	125.6	100	212	413.6	432	810	1490	1427	2600	4712
			11.7	53	127.4	104	220	428	438	820	1508	1454	2650	4802
			12.2	54	129.2	110	230	446	443	830	1526	1482	2700	4892
			12.8	55	131.0	116	240	464	449	840	1544	1510	2750	4982
			13.3	56	132.8	121	250	482	454	850	1562	1538	2800	5072
			13.9	57	134.6	127	260	500	460	860	1580	1566	2850	5162
			14.4	58	136.4	132	270	518	466	870	1598	1593	2900	5252
			15.0	59	138.2	138	280	536	471	880	1616	1621	2950	5342
			15.6	60	140.0	143	290	554	477	890	1634	1649	3000	5432

Locate temperature in middle column. If in degrees Centigrade, read Fahrenheit equivalent in right hand column; if in degrees Fahrenheit, read Centigrade equivalent in left hand column.

Abstracted from "Bethlehem Alloy Steels". (Albert Sauveur type of table. Values revised.) Courtesy Bethlehem Steel Company.

Weight Conversion

Pounds to Kilograms

(1 pound = 0.4536 kilogram)

Pounds	0	1	2	3	4	5	6	7	8	9
0	0.00	0.45	0.91	1.36	1.81	2.27	2.72	3.18	3.63	4.08
10	4.54	4.99	5.44	5.90	6.35	6.80	7.26	7.71	8.16	8.62
20	9.07	9.53	9.98	10.43	10.89	11.34	11.79	12.25	12.70	13.15
30	13.61	14.06	14.52	14.97	15.42	15.88	16.33	16.78	17.24	17.69
40	18.14	18.60	19.05	19.50	19.96	20.41	20.87	21.32	21.77	22.23
50	22.68	23.13	23.59	24.04	24.49	24.95	25.40	25.86	26.31	26.76
60	27.22	27.67	28.12	28.58	29.03	29.48	29.94	30.39	30.84	31.30
70	31.75	32.21	32.66	33.11	33.57	34.02	34.47	34.93	35.38	35.83
80	36.29	36.74	37.20	37.65	38.10	38.56	39.01	39.46	39.92	40.37
90	40.82	41.28	41.73	42.18	42.64	43.09	43.55	44.00	44.45	44.91

Kilograms to Pounds

(1 kilogram = 2.2046 pounds)

Kilograms	0	1	2	3	4	5	6	7	8	9
0	0.00	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	52.91	55.12	57.32	59.52	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.77	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.43	114.64	116.84	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.09	143.30	145.50	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.75	171.96	174.16
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.00	196.21
90	198.41	200.62	202.82	205.03	207.23	209.44	211.64	213.85	216.05	218.26

Pressure Conversion

Pounds per Square Inch to Kilograms per Square Centimeter

(1 pound per square inch = .0703066 kilogram per square centimeter)

1 to 30		31 to 60		61 to 90		91 to 200		205 to 400		410 to 700		710 to 1000		1010 to 1500	
Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.	Lbs. per Sq. Inch	Kg. per Sq. Cm.
1	.07	31	2.18	61	4.29	91	6.40	205	14.41	410	28.83	710	49.92	1010	71.01
2	.14	32	2.25	62	4.36	92	6.47	210	14.76	420	29.53	720	50.62	1020	71.71
3	.21	33	2.32	63	4.43	93	6.54	215	15.12	430	30.23	730	51.32	1030	72.42
4	.28	34	2.39	64	4.50	94	6.61	220	15.47	440	30.93	740	52.03	1040	73.12
5	.35	35	2.46	65	4.57	95	6.68	225	15.82	450	31.64	750	52.73	1050	73.82
6	.42	36	2.53	66	4.64	96	6.75	230	16.17	460	32.34	760	53.43	1060	74.52
7	.49	37	2.60	67	4.71	97	6.82	235	16.52	470	33.04	770	54.14	1070	75.23
8	.56	38	2.67	68	4.78	98	6.89	240	16.87	480	33.75	780	54.84	1080	75.93
9	.63	39	2.74	69	4.85	99	6.96	245	17.23	490	34.45	790	55.54	1090	76.63
10	.70	40	2.81	70	4.92	100	7.03	250	17.58	500	35.15	800	56.25	1100	77.34
11	.77	41	2.88	71	4.99	105	7.38	255	17.93	510	35.86	810	56.95	1120	78.74
12	.84	42	2.95	72	5.06	110	7.73	260	18.28	520	36.56	820	57.65	1140	80.15
13	.91	43	3.02	73	5.13	115	8.09	265	18.63	530	37.26	830	58.35	1160	81.56
14	.98	44	3.09	74	5.20	120	8.44	270	18.98	540	37.97	840	59.06	1180	82.96
15	1.05	45	3.16	75	5.27	125	8.79	275	19.33	550	38.67	850	59.76	1200	84.37
16	1.12	46	3.23	76	5.34	130	9.14	280	19.69	560	39.37	860	60.46	1220	85.77
17	1.20	47	3.30	77	5.41	135	9.49	285	20.04	570	40.07	870	61.17	1240	87.18
18	1.27	48	3.37	78	5.48	140	9.84	290	20.39	580	40.78	880	61.87	1260	88.59
19	1.34	49	3.45	79	5.55	145	10.19	295	20.74	590	41.48	890	62.57	1280	89.99
20	1.41	50	3.52	80	5.62	150	10.55	300	21.09	600	42.18	900	63.28	1300	91.40
21	1.48	51	3.59	81	5.69	155	10.90	310	21.80	610	42.89	910	63.98	1320	92.80
22	1.55	52	3.66	82	5.77	160	11.25	320	22.50	620	43.59	920	64.68	1340	94.21
23	1.62	53	3.73	83	5.84	165	11.60	330	23.20	630	44.29	930	65.39	1360	95.62
24	1.69	54	3.80	84	5.91	170	11.95	340	23.90	640	45.00	940	66.09	1380	97.02
25	1.76	55	3.87	85	5.98	175	12.30	350	24.61	650	45.70	950	66.79	1400	98.43
26	1.83	56	3.94	86	6.05	180	12.66	360	25.31	660	46.40	960	67.49	1420	99.84
27	1.90	57	4.01	87	6.12	185	13.01	370	26.01	670	47.11	970	68.20	1440	101.24
28	1.97	58	4.08	88	6.19	190	13.36	380	26.72	680	47.81	980	68.90	1460	102.65
29	2.04	59	4.15	89	6.26	195	13.71	390	27.42	690	48.51	990	69.60	1480	104.05
30	2.11	60	4.22	90	6.33	200	14.06	400	28.12	700	49.21	1000	70.31	1500	105.46

Circumferences and Areas of Circles

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
1/64	.04909	.00019	2	6.2832	3.1416	6	18.850	28.274	14	43.982	153.94	22	69.115	380.13
1/32	.09818	.00077	1 1/16	6.4795	3.3410	1 1/8	19.242	29.465	1 1/8	44.375	156.70	1 1/8	69.508	384.46
3/64	.14726	.00173	1 1/8	6.6759	3.5466	1 1/4	19.635	30.680	1 1/4	44.768	159.48	1 1/4	69.900	388.82
1/16	.19635	.00307	3/16	6.8722	3.7583	3/8	20.028	31.919	3/8	45.160	162.30	3/8	70.293	393.20
3/32	.29452	.00690	1/4	7.0686	3.9761	1/2	20.420	33.183	1/2	45.553	165.13	1/2	70.686	397.61
1/8	.39270	.01227	5/16	7.2649	4.2000	5/8	20.812	34.472	5/8	45.946	167.99	5/8	71.079	402.04
5/32	.49087	.01917	3/8	7.4613	4.4301	3/4	21.206	35.785	3/4	46.338	170.87	3/4	71.471	406.49
3/16	.58905	.02761	7/16	7.6576	4.6664	7/8	21.598	37.122	7/8	46.731	173.78	7/8	71.864	410.97
7/32	.68722	.03758	1/2	7.8540	4.9087	7	21.991	38.485	15	47.124	176.71	23	72.257	415.48
1/4	.78540	.04909	9/16	8.0503	5.1572	1 1/8	22.384	39.871	1 1/8	47.517	179.67	1 1/8	72.649	420.00
9/32	.88357	.06213	5/8	8.2467	5.4119	1 1/4	22.776	41.282	1 1/4	47.909	182.65	1 1/4	73.042	424.56
5/16	.98175	.07670	11/16	8.4430	5.6727	3/8	23.169	42.718	3/8	48.302	185.66	3/8	73.435	429.13
11/32	1.0799	.09281	3/4	8.6394	5.9396	1/2	23.562	44.179	1/2	48.695	188.69	1/2	73.827	433.74
3/8	1.1781	.11045	13/16	8.8357	6.2126	5/8	23.955	45.664	5/8	49.087	191.75	5/8	74.220	438.36
13/32	1.2763	.12962	7/8	9.0321	6.4918	3/4	24.347	47.173	3/4	49.480	194.83	3/4	74.613	443.01
7/16	1.3744	.15033	15/16	9.2284	6.7771	7/8	24.740	48.707	7/8	49.873	197.93	7/8	75.006	447.69
15/32	1.4726	.17257	3	9.4248	7.0686	8	25.133	50.265	16	50.265	201.06	24	75.398	452.39
1/2	1.5708	.19635	1 1/16	9.6211	7.3662	1 1/8	25.525	51.849	1 1/8	50.658	204.22	1 1/8	75.791	457.11
17/32	1.6690	.22166	1 1/8	9.8175	7.6699	1 1/4	25.918	53.456	1 1/4	51.051	207.39	1 1/4	76.184	461.86
9/16	1.7671	.24850	3/16	10.014	7.9798	3/8	26.311	55.088	3/8	51.444	210.60	3/8	76.576	466.64
19/32	1.8653	.27688	1/4	10.210	8.2958	1/2	26.704	56.745	1/2	51.836	213.82	1/2	76.969	471.44
5/8	1.9635	.30680	5/16	10.407	8.6179	5/8	27.096	58.426	5/8	52.229	217.08	5/8	77.362	476.26
21/32	2.0617	.33824	3/8	10.603	8.9462	3/4	27.489	60.132	3/4	52.622	220.35	3/4	77.754	481.11
11/16	2.1598	.37122	7/16	10.799	9.2806	7/8	27.882	61.862	7/8	53.014	223.65	7/8	78.147	485.98
23/32	2.2580	.40574	1/2	10.996	9.6211	9	28.274	63.617	17	53.407	226.98	25	78.540	490.87
3/4	2.3562	.44179	9/16	11.192	9.9678	1 1/8	28.667	65.397	1 1/8	53.800	230.33	1 1/8	78.933	495.79
25/32	2.4544	.47937	5/8	11.388	10.321	1 1/4	29.060	67.201	1 1/4	54.192	233.71	1 1/4	79.325	500.74
13/16	2.5525	.51849	11/16	11.585	10.680	3/8	29.452	69.029	3/8	54.585	237.10	3/8	79.718	505.71
27/32	2.6507	.55914	3/4	11.781	11.045	1/2	29.845	70.882	1/2	54.978	240.53	1/2	80.111	510.71
7/8	2.7489	.60132	13/16	11.977	11.416	5/8	30.238	72.760	5/8	55.371	243.98	5/8	80.503	515.72
29/32	2.8471	.64504	7/8	12.174	11.793	3/4	30.631	74.662	3/4	55.763	247.45	3/4	80.896	520.77
15/16	2.9452	.69029	15/16	12.370	12.177	7/8	31.023	76.589	7/8	56.156	250.95	7/8	81.289	525.84
31/32	3.0434	.73708	4	12.566	12.566	10	31.416	78.540	18	56.549	254.47	26	81.681	530.93
1	3.1416	.7854	1 1/16	12.763	12.962	1 1/8	31.809	80.516	1 1/8	56.941	258.02	1 1/8	82.074	536.05
1 1/16	3.3379	.8866	1 1/8	12.959	13.364	1 1/4	32.201	82.516	1 1/4	57.334	261.59	1 1/4	82.467	541.19
1 1/8	3.5343	.9940	3/16	13.155	13.772	3/8	32.594	84.541	3/8	57.727	265.18	3/8	82.860	546.35
3/16	3.7306	1.1075	1/4	13.352	14.186	1/2	32.987	86.590	1/2	58.119	268.80	1/2	83.252	551.55
1/4	3.9270	1.2272	5/16	13.548	14.607	5/8	33.379	88.664	5/8	58.512	272.45	5/8	83.645	556.76
5/16	4.1233	1.3530	3/8	13.744	15.033	3/4	33.772	90.763	3/4	58.905	276.12	3/4	84.038	562.00
3/8	4.3197	1.4849	7/16	13.941	15.466	7/8	34.165	92.886	7/8	59.298	279.81	7/8	84.430	567.27
7/16	4.5160	1.6230	1/2	14.137	15.904	9	34.558	95.033	19	59.690	283.53	27	84.823	572.56
1 1/2	4.7124	1.7671	9/16	14.334	16.349	1 1/8	34.950	97.205	1 1/8	60.083	287.27	1 1/8	85.216	577.87
9/16	4.9087	1.9175	5/8	14.530	16.800	1 1/4	35.343	99.402	1 1/4	60.476	291.04	1 1/4	85.608	583.21
5/8	5.1051	2.0739	11/16	14.726	17.257	3/8	35.736	101.62	3/8	60.868	294.83	3/8	86.001	588.57
11/16	5.3014	2.2365	3/4	14.923	17.721	1/2	36.128	103.87	1/2	61.261	298.65	1/2	86.394	593.96
3/4	5.4978	2.4053	13/16	15.119	18.190	5/8	36.521	106.14	5/8	61.654	302.49	5/8	86.786	599.37
13/16	5.6941	2.5802	7/8	15.315	18.665	3/4	36.914	108.43	3/4	62.046	306.35	3/4	87.179	604.81
7/8	5.8905	2.7612	15/16	15.512	19.147	7/8	37.306	110.75	7/8	62.439	310.24	7/8	87.572	610.27
15/16	6.0868	2.9483	5	15.708	19.635	12	37.699	113.10	20	62.832	314.16	28	87.965	615.75
			1 1/16	15.904	20.129	1 1/8	38.092	115.47	1 1/8	63.225	318.10	1 1/8	88.357	621.26
			1 1/8	16.101	20.629	1 1/4	38.485	117.86	1 1/4	63.617	322.06	1 1/4	88.750	626.80
			3/16	16.297	21.135	3/8	38.877	120.28	3/8	64.010	326.05	3/8	89.143	632.36
			1/4	16.493	21.648	1/2	39.270	122.72	1/2	64.403	330.06	1/2	89.535	637.94
			5/16	16.690	22.166	5/8	39.663	125.19	5/8	64.795	334.10	5/8	89.928	643.55
			3/8	16.886	22.691	3/4	40.055	127.68	3/4	65.188	338.16	3/4	90.321	649.18
			7/16	17.082	23.221	7/8	40.448	130.19	7/8	65.581	342.25	7/8	90.713	654.84
			1/2	17.279	23.758	13	40.841	132.73	21	65.973	346.36	29	91.106	660.52
			9/16	17.475	24.301	1 1/8	41.233	135.30	1 1/8	66.366	350.50	1 1/8	91.499	666.23
			5/8	17.671	24.850	1 1/4	41.626	137.89	1 1/4	66.759	354.66	1 1/4	91.892	671.96
			11/16	17.868	25.406	3/8	42.019	140.50	3/8	67.152	358.84	3/8	92.284	677.71
			3/4	18.064	25.967	1/2	42.412	143.14	1/2	67.544	363.05	1/2	92.677	683.49
			13/16	18.261	26.535	5/8	42.804	145.80	5/8	67.937	367.28	5/8	93.070	689.30
			7/8	18.457	27.109	3/4	43.197	148.49	3/4	68.330	371.54	3/4	93.462	695.13
			15/16	18.653	27.688	7/8	43.590	151.20	7/8	68.722	375.83	7/8	93.855	700.98

Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area	Dia.	Circum.	Area
30	94.248	706.86	37	116.239	1075.2	44	138.230	1520.5	51	160.221	2042.8	58	182.212	2642.1
$\frac{1}{8}$	94.640	712.76	$\frac{1}{8}$	116.632	1082.5	$\frac{1}{8}$	138.623	1529.2	$\frac{1}{8}$	160.614	2052.8	$\frac{1}{8}$	182.605	2653.5
$\frac{1}{4}$	95.033	718.69	$\frac{1}{4}$	117.024	1089.8	$\frac{1}{4}$	139.015	1537.9	$\frac{1}{4}$	161.007	2062.9	$\frac{1}{4}$	182.998	2664.9
$\frac{3}{8}$	95.426	724.64	$\frac{3}{8}$	117.417	1097.1	$\frac{3}{8}$	139.408	1546.6	$\frac{3}{8}$	161.399	2073.0	$\frac{3}{8}$	183.390	2676.4
$\frac{1}{2}$	95.819	730.62	$\frac{1}{2}$	117.810	1104.5	$\frac{1}{2}$	139.801	1555.3	$\frac{1}{2}$	161.792	2083.1	$\frac{1}{2}$	183.783	2687.8
$\frac{5}{8}$	96.211	736.62	$\frac{5}{8}$	118.202	1111.8	$\frac{5}{8}$	140.194	1564.0	$\frac{5}{8}$	162.185	2093.2	$\frac{5}{8}$	184.176	2699.3
$\frac{3}{4}$	96.604	742.64	$\frac{3}{4}$	118.596	1119.2	$\frac{3}{4}$	140.586	1572.8	$\frac{3}{4}$	162.577	2103.3	$\frac{3}{4}$	184.569	2710.9
$\frac{7}{8}$	96.997	748.69	$\frac{7}{8}$	118.988	1126.7	$\frac{7}{8}$	140.979	1581.6	$\frac{7}{8}$	162.970	2113.5	$\frac{7}{8}$	184.961	2722.4
31	97.389	754.77	38	119.381	1134.1	45	141.372	1590.4	52	163.363	2123.7	59	185.354	2734.0
$\frac{1}{8}$	97.782	760.87	$\frac{1}{8}$	119.773	1141.6	$\frac{1}{8}$	141.764	1599.3	$\frac{1}{8}$	163.756	2133.9	$\frac{1}{8}$	185.747	2745.6
$\frac{1}{4}$	98.175	766.99	$\frac{1}{4}$	120.166	1149.1	$\frac{1}{4}$	142.157	1608.2	$\frac{1}{4}$	164.148	2144.2	$\frac{1}{4}$	186.139	2757.2
$\frac{3}{8}$	98.567	773.14	$\frac{3}{8}$	120.559	1156.6	$\frac{3}{8}$	142.550	1617.0	$\frac{3}{8}$	164.541	2154.5	$\frac{3}{8}$	186.532	2768.8
$\frac{1}{2}$	98.960	779.31	$\frac{1}{2}$	120.951	1164.2	$\frac{1}{2}$	142.942	1626.0	$\frac{1}{2}$	164.934	2164.8	$\frac{1}{2}$	186.925	2780.5
$\frac{5}{8}$	99.353	785.51	$\frac{5}{8}$	121.344	1171.7	$\frac{5}{8}$	143.335	1634.9	$\frac{5}{8}$	165.326	2175.1	$\frac{5}{8}$	187.317	2792.2
$\frac{3}{4}$	99.746	791.73	$\frac{3}{4}$	121.737	1179.3	$\frac{3}{4}$	143.728	1643.9	$\frac{3}{4}$	165.719	2185.4	$\frac{3}{4}$	187.710	2803.9
$\frac{7}{8}$	100.138	797.98	$\frac{7}{8}$	122.129	1186.9	$\frac{7}{8}$	144.121	1652.9	$\frac{7}{8}$	166.112	2195.8	$\frac{7}{8}$	188.103	2815.7
32	100.531	804.25	39	122.522	1194.6	46	144.513	1661.9	53	166.504	2206.2	60	188.496	2827.4
$\frac{1}{8}$	100.924	810.54	$\frac{1}{8}$	122.915	1202.3	$\frac{1}{8}$	144.906	1670.9	$\frac{1}{8}$	166.897	2216.6	$\frac{1}{8}$	188.888	2839.2
$\frac{1}{4}$	101.316	816.86	$\frac{1}{4}$	123.308	1210.0	$\frac{1}{4}$	145.299	1680.0	$\frac{1}{4}$	167.290	2227.0	$\frac{1}{4}$	189.281	2851.0
$\frac{3}{8}$	101.709	823.21	$\frac{3}{8}$	123.700	1217.7	$\frac{3}{8}$	145.691	1689.1	$\frac{3}{8}$	167.683	2237.5	$\frac{3}{8}$	189.674	2862.9
$\frac{1}{2}$	102.102	829.58	$\frac{1}{2}$	124.093	1225.4	$\frac{1}{2}$	146.084	1698.2	$\frac{1}{2}$	168.075	2248.0	$\frac{1}{2}$	190.066	2874.8
$\frac{5}{8}$	102.494	835.97	$\frac{5}{8}$	124.486	1233.2	$\frac{5}{8}$	146.477	1707.4	$\frac{5}{8}$	168.468	2258.5	$\frac{5}{8}$	190.459	2886.6
$\frac{3}{4}$	102.887	842.39	$\frac{3}{4}$	124.878	1241.0	$\frac{3}{4}$	146.869	1716.5	$\frac{3}{4}$	168.861	2269.1	$\frac{3}{4}$	190.852	2898.6
$\frac{7}{8}$	103.280	848.83	$\frac{7}{8}$	125.271	1248.8	$\frac{7}{8}$	147.262	1725.7	$\frac{7}{8}$	169.253	2279.6	$\frac{7}{8}$	191.244	2910.5
33	103.673	855.30	40	125.664	1256.6	47	147.655	1734.9	54	169.646	2290.2	61	191.637	2922.5
$\frac{1}{8}$	104.065	861.79	$\frac{1}{8}$	126.056	1264.5	$\frac{1}{8}$	148.048	1744.2	$\frac{1}{8}$	170.039	2300.8	$\frac{1}{8}$	192.030	2934.5
$\frac{1}{4}$	104.458	868.31	$\frac{1}{4}$	126.449	1272.4	$\frac{1}{4}$	148.440	1753.5	$\frac{1}{4}$	170.431	2311.5	$\frac{1}{4}$	192.423	2946.5
$\frac{3}{8}$	104.851	874.85	$\frac{3}{8}$	126.842	1280.3	$\frac{3}{8}$	148.833	1762.7	$\frac{3}{8}$	170.824	2322.1	$\frac{3}{8}$	192.815	2958.5
$\frac{1}{2}$	105.243	881.41	$\frac{1}{2}$	127.235	1288.2	$\frac{1}{2}$	149.226	1772.1	$\frac{1}{2}$	171.217	2332.8	$\frac{1}{2}$	193.208	2970.6
$\frac{5}{8}$	105.636	888.00	$\frac{5}{8}$	127.627	1296.2	$\frac{5}{8}$	149.618	1781.4	$\frac{5}{8}$	171.609	2343.5	$\frac{5}{8}$	193.601	2982.7
$\frac{3}{4}$	106.029	894.62	$\frac{3}{4}$	128.020	1304.2	$\frac{3}{4}$	150.011	1790.8	$\frac{3}{4}$	172.002	2354.3	$\frac{3}{4}$	193.993	2994.8
$\frac{7}{8}$	106.421	901.26	$\frac{7}{8}$	128.413	1312.2	$\frac{7}{8}$	150.404	1800.1	$\frac{7}{8}$	172.395	2365.0	$\frac{7}{8}$	194.386	3006.9
34	106.814	907.92	41	128.805	1320.3	48	150.796	1809.6	55	172.788	2375.8	62	194.779	3019.1
$\frac{1}{8}$	107.207	914.61	$\frac{1}{8}$	129.198	1328.3	$\frac{1}{8}$	151.189	1819.0	$\frac{1}{8}$	173.180	2386.6	$\frac{1}{8}$	195.171	3031.3
$\frac{1}{4}$	107.600	921.32	$\frac{1}{4}$	129.591	1336.4	$\frac{1}{4}$	151.582	1828.5	$\frac{1}{4}$	173.573	2397.5	$\frac{1}{4}$	195.564	3043.5
$\frac{3}{8}$	107.992	928.06	$\frac{3}{8}$	129.983	1344.5	$\frac{3}{8}$	151.975	1837.9	$\frac{3}{8}$	173.966	2408.3	$\frac{3}{8}$	195.957	3055.7
$\frac{1}{2}$	108.385	934.82	$\frac{1}{2}$	130.376	1352.7	$\frac{1}{2}$	152.367	1847.5	$\frac{1}{2}$	174.358	2419.2	$\frac{1}{2}$	196.350	3068.0
$\frac{5}{8}$	108.778	941.61	$\frac{5}{8}$	130.769	1360.8	$\frac{5}{8}$	152.760	1857.0	$\frac{5}{8}$	174.751	2430.1	$\frac{5}{8}$	196.742	3080.3
$\frac{3}{4}$	109.170	948.42	$\frac{3}{4}$	131.161	1369.0	$\frac{3}{4}$	153.153	1866.5	$\frac{3}{4}$	175.144	2441.1	$\frac{3}{4}$	197.135	3092.6
$\frac{7}{8}$	109.563	955.25	$\frac{7}{8}$	131.554	1377.2	$\frac{7}{8}$	153.545	1876.1	$\frac{7}{8}$	175.536	2452.0	$\frac{7}{8}$	197.528	3104.9
35	109.956	962.11	42	131.947	1385.4	49	153.938	1885.7	56	175.929	2463.0	63	197.920	3117.2
$\frac{1}{8}$	110.348	969.00	$\frac{1}{8}$	132.340	1393.7	$\frac{1}{8}$	154.331	1895.4	$\frac{1}{8}$	176.322	2474.0	$\frac{1}{8}$	198.313	3129.6
$\frac{1}{4}$	110.741	975.91	$\frac{1}{4}$	132.732	1402.0	$\frac{1}{4}$	154.723	1905.0	$\frac{1}{4}$	176.715	2485.0	$\frac{1}{4}$	198.706	3142.0
$\frac{3}{8}$	111.134	982.84	$\frac{3}{8}$	133.125	1410.3	$\frac{3}{8}$	155.116	1914.7	$\frac{3}{8}$	177.107	2496.1	$\frac{3}{8}$	199.098	3154.5
$\frac{1}{2}$	111.527	989.80	$\frac{1}{2}$	133.518	1418.6	$\frac{1}{2}$	155.509	1924.4	$\frac{1}{2}$	177.500	2507.2	$\frac{1}{2}$	199.491	3166.9
$\frac{5}{8}$	111.919	996.78	$\frac{5}{8}$	133.910	1427.0	$\frac{5}{8}$	155.902	1934.2	$\frac{5}{8}$	177.893	2518.3	$\frac{5}{8}$	199.884	3179.4
$\frac{3}{4}$	112.312	1003.8	$\frac{3}{4}$	134.303	1435.4	$\frac{3}{4}$	156.294	1943.9	$\frac{3}{4}$	178.285	2529.4	$\frac{3}{4}$	200.277	3191.9
$\frac{7}{8}$	112.705	1010.8	$\frac{7}{8}$	134.696	1443.8	$\frac{7}{8}$	156.687	1953.7	$\frac{7}{8}$	178.678	2540.6	$\frac{7}{8}$	200.669	3204.4
36	113.097	1017.9	43	135.088	1452.2	50	157.080	1963.5	57	179.071	2551.8	64	201.062	3217.0
$\frac{1}{8}$	113.490	1025.0	$\frac{1}{8}$	135.481	1460.7	$\frac{1}{8}$	157.472	1973.3	$\frac{1}{8}$	179.463	2563.0	$\frac{1}{8}$	201.455	3229.6
$\frac{1}{4}$	113.883	1032.1	$\frac{1}{4}$	135.874	1469.1	$\frac{1}{4}$	157.865	1983.2	$\frac{1}{4}$	179.856	2574.2	$\frac{1}{4}$	201.847	3242.2
$\frac{3}{8}$	114.275	1039.2	$\frac{3}{8}$	136.267	1477.6	$\frac{3}{8}$	158.258	1993.1	$\frac{3}{8}$	180.249	2585.4	$\frac{3}{8}$	202.240	3254.8
$\frac{1}{2}$	114.668	1046.3	$\frac{1}{2}$	136.659	1486.2	$\frac{1}{2}$	158.650	2003.0	$\frac{1}{2}$	180.642	2596.7	$\frac{1}{2}$	202.633	3267.5
$\frac{5}{8}$	115.061	1053.5	$\frac{5}{8}$	137.052	1494.7	$\frac{5}{8}$	159.043	2012.9	$\frac{5}{8}$	181.034	2608.0	$\frac{5}{8}$	203.025	3280.1
$\frac{3}{4}$	115.454	1060.7	$\frac{3}{4}$	137.445	1503.3	$\frac{3}{4}$	159.436	2022.8	$\frac{3}{4}$	181.427	2619.4	$\frac{3}{4}$	203.418	3292.8
$\frac{7}{8}$	115.846	1068.0	$\frac{7}{8}$	137.837	1511.9	$\frac{7}{8}$	159.829	2032.8	$\frac{7}{8}$	181.820	2630.7	$\frac{7}{8}$	203.811	3305.6

44

