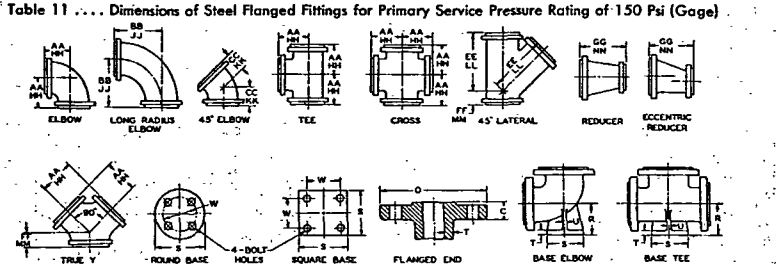
Table 11 Dimensions of Steel Flanged Fittings for Primary Service Pressure Rating of 150 Psi (Gage)



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
			1/16 In. Raised Face (Flange Edge)						Ring Joint									Base Drilling	
Nominal* Pipe Size	Outside Diameter of Flange	Thickness of Flange, Min	Center to Contact Surface of Raised Face, Elbow, Tee, Cross, and True Y	Center to Contact Surface of Raised Face, Long Radius Ell	Center to Contact Surface of Raised Face 45° Ell	Long Center to Contact Surface of Raised Face, Lateral	Short Center to Contact Surface of Raised Face, Lateral, and True Y	Contact Surface to Contact Surface of Raised Face, Reducer	Center to End, Elbow, Tee, Cross, and True Y	Center to End, Long Radius Ell	Center to End, 45-Deg Elbow	Long Center to End, Lateral	Short Center to End, Lateral, and True Y	Center to Base	Dia. of Round Base or Width of Square Base	Thickness of Base	Thickness of Ribs	Bolt Circle or Bolt Spacing	Dia. of Drilled Holes
	O	C	AA	BB	CC	EE	FF	GG	HH	JJ	KK	LL	MM	R	S	T	U	W	
1	4¼	7/16	3½	5	1¾	5¾	1¾	4½	3¾	5¼	2	6	2						
1¼	4⅝	½	3¾	5½	2	6¼	1¾	4½	4	5¾	2½	6½	2						
1½	5	9/16	4	6	2¼	7	2	4½	4¼	6¼	2½	7¼	2¼						
2	6	⅝	4½	6½	2½	8	2½	5	4¾	6¾	2¾	8¼	2¾	4½	4⅝	½	½	3¼	⅝
2½	7	11/16	5	7	3	9½	2½	5½	5¼	7¾	3¼	9¾	2¾	4½	4⅝	½	½	3½	⅝
3	7½	¾	5½	7¾	3	10	3	6	5¾	8	3¼	10¼	3¼	4⅞	5	9/16	½	3⅞	⅝
3½	8½	13/16	6	8¼	3½	11½	3	6½	6¼	8¾	3¾	11¾	3¼	5¼	5	9/16	½	3⅞	⅝
4	9	15/16	6½	9	4	12	3	7	6¾	9¼	4¼	12¼	3¼	5½	6	⅝	½	4¾	¾
5	10	15/16	7½	10¼	4½	13½	3½	8	7¾	10½	4¾	13¾	3¾	6¼	7	11/16	⅝	5½	¾
6	11	1	8	11¼	5	14½	3½	9	8¼	11¾	5¼	14¾	3¾	7	7	11/16	⅝	5½	¾
8	13½	1⅛	9	14	5½	17½	4½	11	9¼	14¼	5¾	17¾	4¾	8¾	9	15/16	⅞	7½	¾
10	16	1⅜	11	16½	6½	20½	5	12	11¼	16¾	6¾	20¾	5¼	9¾	9	15/16	⅞	7½	¾
12	19	1¼	12	19	7½	24½	5½	14	12¼	19¼	7¾	24¾	5¾	11¼	11	1	1	9½	⅞
14	21	1⅜	14	21½	7½	27	6	16	14¼	21¾	7¾	27½	6¼	12½	11	1	1	9½	⅞
16	23½	1 7/16	15	24	8	30	6½	18	15¼	24¼	8¼	30½	6¾	13¾	11	1	1	9½	⅞
18	25	1⅝	16½	26½	8½	32	7	19	16¾	26¾	8¾	32½	7¼	15	13½	1⅛	1⅛	11¾	⅞
20	27½	1 11/16	18	29	9½	35	8	20	18¼	29¼	9¾	35¼	8¼	16	13½	1⅛	1⅛	11¾	⅞
24	32	1¾	22	34	11	40½	9	24	22¼	34¼	11¼	40¾	9¼	18½	13½	1¼	1¼	11¾	⅞

From *American Standard for Steel Pipe Flanges and Flanged Fittings*, 150, 300, 400, 600, 900, 1500, and 2500 Lb. *ASA* B16.5-1961. All dimensions given in inches.
* Actual diameter is same for sizes 1 to 12 in. and is ¾ in. less than nominal for sizes 14 to 24 in.

The compression-type fitting is generally limited to small sizes of tube, while the flared and soldered types are used in both large and small sizes. An American Standard, ASA B16.26-1958, has been prepared to standardize dimensions of brass fittings for flared copper tube. Flared tube fittings are widely used in refrigeration work where SAE dimensions and a 45-deg flare render most fittings interchangeable, although for refrigeration use, thread fits and tolerances on thread gages must be maintained within close limits. Brass fittings with SAE dimensions are not interchangeable with the American Standard fittings for water tube.

Flared compression fittings are permitted by the Piping Code for refrigerant lines not over ⅞ in. outside diameter, using annealed copper tubing, provided such joints are exposed for visual inspection.

FLANGE FACINGS AND GASKETS

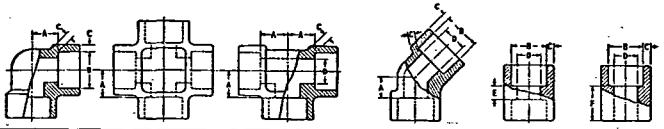
There are many types of flange facings. The simplest, and the one most commonly used, is the plain face. This type of face is used with fittings shown in Table 9. Other facings, with varying degrees of complexity, are used for higher pressures. They include: male and female face (an insert type face), tongue-and-groove (an adaption of the male and female type), lapped pipe to flange, lapped pipe to pipe, and ring and groove using neck flanges.

Because it is too expensive to machine flange faces sufficiently to provide watertight joints, a gasket is usually inserted between the contact faces of the flanges. The flange bolts then draw the faces up so tight that the gasket deforms into the face imperfections and thereby provides a tight joint.

Gaskets are made of numerous materials, such as: cork, paper, fiber, asbestos, metal (iron, steel, copper, etc.), plastics, neoprene, and combinations of metal and some soft material. The proper gasket material to use depends upon the service of the pipe. The material should not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

Table 12 Dimensions of Socket-Welding Fittings

A. Dimensions of Socket-Welding Elbows, Tees, and Crosses



Nominal Pipe Size	Depth of Socket, Min	Center to Bottom of Socket		Bore Diameter of Socket, Min	Socket Wall Thickness, Min			Bore Diameter of Fitting		
		Sched 40 and 80	Sched 160		Sched 40	Sched 80	Sched 160	Sched 40	Sched 80	Sched 160
		A		B	C			D		
⅛	⅜	7/16		0.420	0.125	0.125		0.269	0.215	
¼	⅜	7/16		0.555	0.125	0.149		0.364	0.302	
⅜	⅜	17/32		0.690	0.125	0.158		0.493	0.423	
½	⅜	⅝	¾	0.855	0.136	0.184	0.234	0.622	0.546	0.466
¾	½	¾	⅞	1.065	0.141	0.193	0.273	0.824	0.742	0.614
1	½	⅞	1 1/16	1.330	0.166	0.224	0.313	1.049	0.957	0.815
1¼	½	1 1/16	1¼	1.675	0.175	0.239	0.313	1.380	1.278	1.160
1½	½	1¼	1½	1.915	0.181	0.250	0.351	1.610	1.500	1.338
2	⅝	1½	1⅝	2.406	0.193	0.273	0.429	2.067	1.939	1.689
2½	⅝	1⅝	2⅛	2.906	0.254	0.345	0.469	2.469	2.323	2.125
3	⅝	2¼	2½	3.535	0.270	0.375	0.546	3.068	2.900	2.626

B. Dimensions of Socket-Welding 45 Deg Elbows, Couplings, and Half Couplings

Nominal Pipe Size	Depth of Socket, Min	Center to Bottom of Socket for 45 Deg Ells		Couplings Distance Between Bottoms of Sockets	Half Couplings, Bottom of Socket to Opposite Face	Bore Diameter of Socket, Min	Socket Wall Thickness, Min			Bore Diameter of Fitting		
		Sched 40 and 80	Sched 160				Sched 40	Sched 80	Sched 160	Sched 40	Sched 80	Sched 160
		A		E	F	B	C			D		
⅛	⅜	5/16		¼	⅝	0.420	0.125	0.125		0.269	0.215	
¼	⅜	5/16		¼	⅝	0.555	0.125	0.149		0.364	0.302	
⅜	⅜	5/16		¼	⅝	0.690	0.125	0.158		0.493	0.423	
½	⅜	5/16	½	⅜	⅞	0.855	0.136	0.184	0.234	0.622	0.546	0.466
¾	½	½	9/16	⅜	1 1/16	1.065	0.141	0.193	0.273	0.824	0.742	0.614
1	½	9/16	11/16	½	1⅜	1.330	0.166	0.224	0.313	1.049	0.957	0.815
1¼	½	11/16	13/16	½	1 5/16	1.675	0.175	0.239	0.313	1.380	1.278	1.160
1½	½	13/16	1	½	1¼	1.915	0.181	0.250	0.351	1.610	1.500	1.338
2	⅝	1	1⅛	¾	1⅝	2.406	0.193	0.273	0.429	2.076	1.939	1.689
2½	⅝	1⅛	1¼	¾	1 11/16	2.906	0.254	0.345	0.469	2.469	2.323	2.125
3	⅝	1¼	1⅜	¾	1¾	3.535	0.270	0.375	0.546	3.068	2.900	2.626

From *American Standard for Steel Socket-Welding Fittings, ASA* B16.11-1948. All dimensions are in inches.

VALVES

Valves are made with the same end connections as fittings. A brief description of each type follows.

1. *Flanged Ends:* Made in sizes from ¼ in. up. Used whenever line fittings are flanged, or if frequent removal is contemplated. Flanged valves facilitate installation when large sizes are used.

2. *Screwed Ends:* Most common-type end. Can be used for all pressures. Usually confined to smaller size because of difficulty in making large screwed joints.