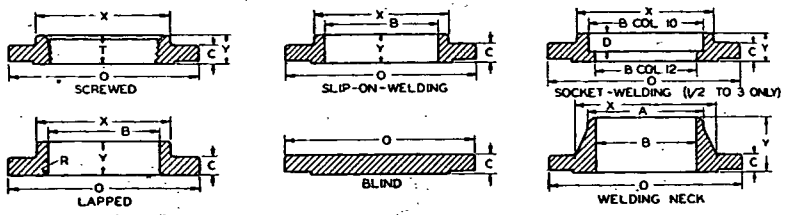
pressure work. Steel is the only valve material that can stand appreciable expansion stresses.

The characteristics of valves restrict their use. The five main uses for valves are listed below:

1. *Stopping flow:* The most general use for valves. *Gate* valves are generally used for this purpose. The gate valve operates by a disc moving at right angles to the

TABLE 12. DIMENSIONS OF STEEL FLANGES FOR PRIMARY SERVICE PRESSURE RATING OF 150 PSI (GAGE)



1	2	3	4	5	6	7	8	9	10	11	12	13	14
Nominal Pipe Size	Outside Diameter of Flange	Thickness of Flange, Min	Diameter of Hub	Hub Diameter Beginning of Chamfer Welding Neck	Length Through Hub Y			Thread Length Screwed	Bore B			Corner Radius of Bore of Lapped Flange and Pipe	Depth of Socket
					Screwed Slip-On Socket Welding	Lapped	Welding Neck		Slip-On Socket Welding, Min	Lapped, Min	Welding Neck Socket Welding		
	O	C	X	A				T				r	D
½	3½	7/16	1 3/16	0.84	5/8	5/8	1 7/8	5/8	0.88	0.90	0.62	1/8	3/8
¾	3 7/8	1/2	1 1/2	1.05	5/8	5/8	2 1/16	5/8	1.09	1.11	0.82	1/8	7/16
1	4¼	9/16	1 15/16	1.32	1 1/16	1 1/16	2 5/16	1 1/16	1.36	1.38	1.05	1/8	1/2
1¼	4 5/8	5/8	2 5/16	1.66	1 3/16	1 3/16	2 1/4	1 3/16	1.70	1.72	1.38	5/16	9/16
1½	5	1 1/16	2 9/16	1.90	7/8	7/8	2 7/16	7/8	1.95	1.97	1.61	1/4	5/8
2	6	¾	3 1/16	2.38	1	1	2½	1	2.44	2.46	2.07	5/16	1 1/16
2½	7	7/8	3 9/16	2.88	1 1/8	1 1/8	2¾	1 1/8	2.94	2.97	2.47	5/16	¾
3	7½	15/16	4¼	3.50	1 3/16	1 3/16	2¾	1 3/16	3.57	3.60	3.07	3/8	1 3/16
3½	8½	1 5/16	4 13/16	4.00	1¼	1¼	2 13/16	1¼	4.07	4.10	3.55	3/8	
4	9	1 5/16	5 5/16	4.50	1 5/16	1 5/16	3	1 5/16	4.57	4.60	4.03	7/16	
5	10	1 5/16	6 7/16	5.56	1 7/16	1 7/16	3½	1 7/16	5.66	5.69	5.05	7/16	
6	11	1	7 5/16	6.63	1 5/16	1 5/16	3½	1 5/16	6.72	6.75	6.07	½	
8	13½	1 1/8	9 1/16	8.63	1¾	1¾	4	1¾	8.72	8.75	7.98	½	
10	16	1 3/16	12	10.75	1 15/16	1 15/16	4	1 15/16	10.88	10.92	10.02	½	
12	19	1¼	14 3/16	12.75	2 5/16	2 5/16	4½	2 5/16	12.88	12.92	12.00	½	
14	21	1 3/8	15¾	14.00	2¼	3½	5	2¼	14.14	14.18		½	
16	23½	1 7/16	18	16.00	2½	3 7/16	5	2½	16.16	16.19		½	
18	25	1 9/16	19 7/8	18.00	2 11/16	3 13/16	5½	2 11/16	18.18	18.20		½	
20	27½	1 11/16	22	20.00	2 7/8	4 1/16	5 11/16	2 7/8	20.20	20.25		½	
24	32	1 7/8	26 1/16	24.00	3¼	4 5/8	6	3¼	24.25	24.25	To be specified by purchaser	½	

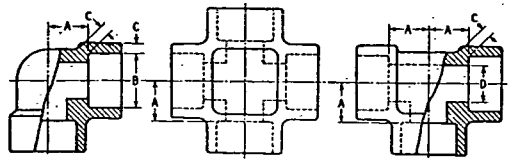
From American Standard for Steel Pipe Flanges and Flanged Fittings, *ASA* B16.5-1953.
All dimensions given in inches.

path of the fluid. The fluid flows straight through the valve, hence, a gate valve offers the minimum resistance when it is fully open. The gate is moved by a stem screw attached to the handle. Gate valves are poor regulators because at nearly closed position (where best regulation is obtained) the fluid velocity either causes vibration and noise, or else tends to erode the disc.

2. *Throttling flow:* This is best accomplished by *globe* or *angle* valves. These valves cause the fluid to change direction, and consequently, offer considerable fluid resistance even when in the open position. Both the globe and angle valves operate by closing a plug into a fitted seat. The angle valve is similar to the globe valve

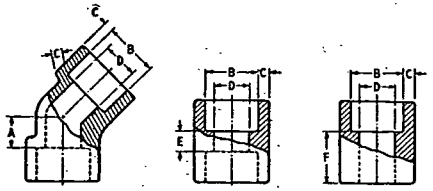
TABLE 13. DIMENSIONS OF SOCKET WELDING FITTINGS

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	3/8	7/16	....	0.420	0.125	0.125	....	0.269	0.215	....
¼	3/8	7/16	....	0.555	0.125	0.149	....	0.364	0.302	....
3/8	3/8	17/32	....	0.690	0.125	0.158	....	0.493	0.423	....
½	3/8	5/8	3/4	0.855	0.136	0.184	0.234	0.622	0.546	0.466
¾	½	¾	7/8	1.065	0.141	0.193	0.273	0.824	0.742	0.614
1	½	7/8	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	5/8	1½	1⅝	2.406	0.193	0.273	0.429	2.067	1.939	1.689
2½	5/8	1⅝	2¼	2.906	0.254	0.345	0.469	2.469	2.323	2.125
3	5/8	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	3/8	5/16	....	¼	5/8	0.420	0.125	0.125	....	0.269	0.215	....
¼	3/8	5/16	....	¼	5/8	0.555	0.125	0.149	....	0.364	0.302	....
3/8	3/8	5/16	....	¼	1 1/16	0.690	0.125	0.158	....	0.493	0.423	....
½	7/16	7/16	½	3/8	⅞	0.855	0.136	0.184	0.234	0.622	0.546	0.466
¾	½	½	9/16	3/8	1 5/16	1.065	0.141	0.193	0.273	0.824	0.742	0.614
1	½	9/16	1 1/16	½	1⅛	1.330	0.166	0.224	0.313	1.049	0.957	0.815
1¼	½	1 1/16	1 3/16	½	1 3/16	1.675	0.175	0.239	0.313	1.380	1.278	1.160
1½	½	1 3/16	1	½	1¼	1.915	0.181	0.250	0.351	1.610	1.500	1.338
2	5/8	1	1⅛	¾	1⅝	2.406	0.193	0.273	0.429	2.067	1.939	1.689
2½	5/8	1⅛	1¼	¾	1 1/16	2.906	0.254	0.345	0.469	2.469	2.323	2.125
3	5/8	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* B16.11-1946.
All dimensions are in inches.