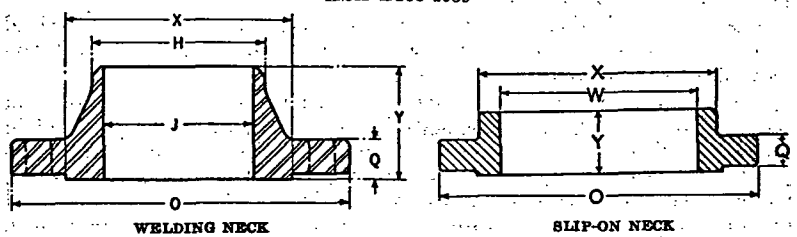
pipe are the governing factors, not the working pressure. There are a number of safety codes which govern the installation of welded piping in many cities and states. Some of the more prominent are listed at the end of this chapter.[4,5,6]

A complete line of manufactured steel welding fittings is now available,

TABLE 9. AMERICAN STANDARD DIMENSIONS OF STEEL WELDING NECK AND SLIP-ON WELDING FLANGES FOR STEAM SERVICE PRESSURE RATING OF 150 PSI (GAGE) AT A TEMPERATURE OF 500 F, AND 100 PSI (GAGE) AT 750 F, *ASA* B16e-1939



Nominal Pipe Size	Diameter of Flange	Thickness of Flg.[a] Min.	Diameter of Hub	Hub Diam. Beginning of Chamfer[b,c]	Length Thru Hub[a]	Inside Diam. of Pipe Schedule 40[c]	Bore of Slip-on Flanges Min.	Diam. of Bolt Circle	No. of Bolts	Size of Bolts
	O	*Q*	*X*	*H*	*Y*	*J*	*W*			
½	3½	7/16	1 3/16	0.84	1 1/8	0.62*	0.88	2 3/8	4	½
¾	3 7/8	½	1 ½	1.05	2 1/16	0.82*	1.09	2 ¾	4	½
1	4 ¼	9/16	1 15/16	1.32	2 1/16	1.05*	1.38	3 1/8	4	½
1¼	4 5/8	5/8	2 5/16	1.66	2 ¼	1.38*	1.72	3 ½	4	½
1½	5	11/16	2 13/16	1.90	2 7/16	1.61*	1.97	3 7/8	4	½
2	6	¾	3 5/16	2.38	2 ½	2.07*	2.44	4 ¾	4	⅝
2½	7	⅞	3 13/16	2.88	2 ¾	2.47*	2.94	5 ½	4	⅝
3	7½	15/16	4 ¼	3.50	2 ¾	3.07*	3.56	6	4	⅝
3½	8½	15/16	4 13/16	4.00	2 13/16	3.55*	4.06	7	8	⅝
4	9	15/16	5 5/16	4.50	3	4.03*	4.56	7½	8	⅝
5	10	15/16	6 7/16	5.56	3½	5.05*	5.66	8½	8	¾
6	11	1	7 9/16	6.63	3½	6.07*	6.72	9½	8	¾
8	13½	1⅛	9 11/16	8.63	4	7.98*	8.72	11¾	8	¾
10	16	1 5/16	12	10.75	4	10.02*	10.88	14¼	12	⅞
12	19	1¼	14 3/8	12.75	4½	———	12.88	17	12	⅞
14 O.D.	21	1 3/8	15¾	14.00	5	To Be	14.19	18¾	12	1
16 O.D.	23½	1 7/16	18	16.00	5	Specified	16.19	21¼	16	1
18 O.D.	25	1 9/16	19 7/8	18.00	5½	by	18.19	22¾	16	1⅛
20 O.D.	27½	1 11/16	22	20.00	5 11/16	Purchaser	20.19	25	20	1⅛
24 O.D.	32	1⅞	26⅛	24.00	6		24.19	29½	20	1¼

All dimensions given in inches.

[a] A raised face of 1/16 in. is included in *thickness of flange minimum* and in *length through hub*.

[b] The outside surface of the welding end of the hub shall be straight or tapered at not more than 6 deg.

[c] Dimensions *H* and *J* correspond to the outside and inside diameters of pipe as given in *ASA* B36.10-1939, Schedule 40.

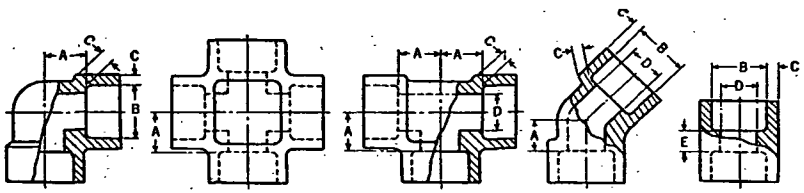
* These diameters are identical with the diameters of what was formerly designated as *Standard Weight Pipe* of the corresponding sizes.

and a dimensional standard[7] has been prepared under the procedure of the *American Standards Association* to unify heretofore divergent dimensions for the same type welding fittings as produced by different manufacturers. Standard dimensions for steel butt-welding elbows, tees, caps, and lapped-joint stub ends are given in Table 8. Dimensions for eccentric and concentric reducers, and 180-deg return bends are not shown in Table 8, but

are included in the American Standard. Larger sizes also are available in some types of fittings. The welding bevel which is a straight 37½-deg V for wall thickness ¾ in. and below, and a U-bevel for thicknesses heavier than ¾ in., conforms to the recommended practice of *ASA* Standard B16e-1939, American Standard for Steel Pipe Flanges and Flanged Fittings. The latter also contains dimensions for steel welding neck flanges for pressures up to 2500 psi, and slip-on welding flanges for 150 and 300 psi. Table 9 gives these dimensions for welding-neck and slip-on welding flanges suitable for 150 psi gage pressure.

Socket-welding fittings also are commercially available. These fittings have a machined recess for inserting the pipe which is attached by a

TABLE 10. AMERICAN STANDARD DIMENSIONS OF SOCKET-WELDING ELBOWS, TEES, CROSSES, 45-DEG ELBOWS, AND COUPLINGS



Nominal Pipe Size	Minimum Depth of Socket	Center to Bottom of Socket: 90-Deg Ells, Tees, Crosses Sched. 40 & 80	90-Deg Ells, Tees, Crosses Sched. 160	45-Deg Ells Sched. 40 & 80	45-Deg Ells Sched. 160	Couplings Distance Between Bottom Sockets	Bore Diameter of Socket, Minimum	Minimum Socket Wall Thickness Sched. 40	Sched. 80	Sched. 160	Bore Diameter of Fittings Sched. 40	Sched. 80	Sched. 160
		A		A		E	B	C[a]			D		
⅛	3/8	7/16	.....	5/16	.....	⅛	0.420	0.125	0.125	.....	0.269	0.215	.....
¼	3/8	7/16	.....	5/16	.....	¼	0.555	0.125	0.149	.....	0.364	0.302	.....
⅜	3/8	1 1/32	.....	5/16	.....	¼	0.690	0.125	0.158	.....	0.493	0.423	.....
½	3/8	5/8	¾	7/16	½	5/8	0.855	0.136	0.184	0.234	0.622	0.546	0.466
¾	½	¾	⅞	½	9/16	5/8	1.065	1.141	0.193	0.273	0.824	0.742	0.614
1	½	⅞	1 1/16	9/16	1 1/16	½	1.330	0.166	0.224	0.313	1.049	0.957	0.815
1¼	½	1 1/16	1¼	1 1/16	1 1/16	½	1.675	0.175	0.239	0.313	1.380	1.278	1.160
1½	½	1¼	1½	1 5/16	1	½	1.915	0.181	0.250	0.351	1.610	1.500	1.338
2	5/8	1½	1 5/8	1	1⅛	¾	2.406	0.193	0.273	0.429	2.067	1.939	1.689
2½	5/8	1 5/8	2¼	1⅛	1¼	¾	2.906	0.254	0.345	0.469	2.469	2.323	2.125
3	5/8	2¼	2½	1¼	1⅜	¾	3.535	0.270	0.375	0.546	3.068	2.900	2.626

All dimensions are given in inches.

[a] Dimension *C* is 1½ times the nominal pipe thickness, minimum, but not less than ⅛ in.

Reducing sizes have same center to bottom of socket dimension as the largest size of reducing fitting.

fillet weld between the pipe wall and socket end. Use of socket-welding fittings generally is restricted to nominal pipe sizes 3 in. and smaller in which range commercial fittings are available. This type of fitting has gained rapid acceptance owing to its ease of installation, low cost, and ability to make a pressure tight joint without weakening the pipe, as is the case with threading. Dimensions for socket-welding fittings, in accordance with *ASA* Standard B16.11-1946, are given in Table 10.[8]

VALVES

Valves are made with both threaded and flanged ends for screwed and bolted connections just as are pipe fittings.

The material used for valves of small size is generally brass or bronze for low pressures and forged steel for high pressures, while in the larger