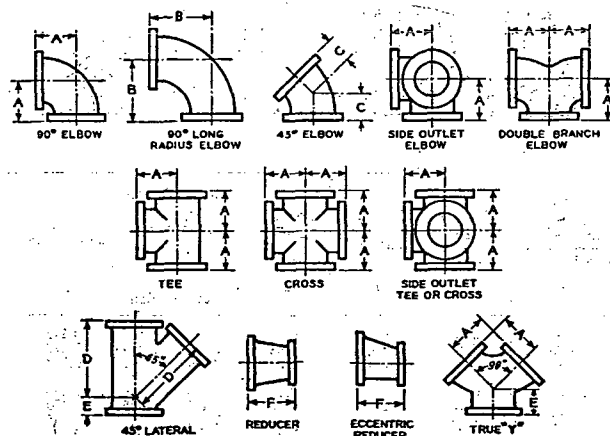


TABLE 9. DIMENSIONS OF FLANGED CAST-IRON ELBOWS, DOUBLE BRANCH ELBOWS, TEES, CROSSES, LATERALS, TRUE Y'S (STRAIGHT SIZES), AND REDUCERS (CLASS 125)



NOM- INAL PIPE SIZE	INSIDE DIAM OF FIT- TINGS	CENTER TO FACE 90 DEG ELBOW, TEES, CROSSES TRUE Y AND DOUBLE BRANCH ELBOW A	CENTER TO FACE 90 DEG LONG RADIUS ELBOW B	CENTER TO FACE 45 DEG ELBOW C	CENTER TO FACE LATER- AL D	SHORT CENTER TO FACE TRUE Y AND LATERAL E	FACE TO FACE RED- UCER F	DIAM OF FLANGE	THICK- NESS OF FLANGE (MIN)	WALL THICK- NESS
1	1	3 1/4	5	1 3/4	5 3/4	1 3/4	...	4 1/4	3/16	5/16
1 1/4	1 1/4	3 3/4	5 1/2	2	6 1/4	1 3/4	...	4 5/8	1/2	5/16
1 1/2	1 1/2	4	6	2 1/4	7	2	...	5	9/16	5/16
2	2	4 1/2	6 1/2	2 1/2	8	2 1/2	5	6	5/8	5/16
2 1/2	2 1/2	5	7	3	9 1/4	2 1/2	5 1/2	7	1 1/16	5/16
3	3	5 1/2	7 3/4	3	10	3	6	7 1/2	3/4	5/8
3 1/2	3 1/2	6	8 1/2	3 1/4	11 1/2	3	6 3/4	8 1/2	13/16	7/16
4	4	6 1/2	9	4	12	3	7	9	1 1/16	1/2
5	5	7 1/2	10 1/4	4 1/2	13 1/4	3 1/4	8	10	1 1/8	1/2
6	6	8	11 1/2	5	14 1/2	3 1/2	9	11	1 1/4	5/8
8	8	9	14	6 1/2	17 1/2	4 1/2	11	13 1/2	1 1/2	5/8
10	10	11	16 1/2	8 1/2	20 1/2	5	12	16	1 3/4	5/8
12	12	12	19	9 1/2	24 1/2	5 1/2	14	19	1 3/4	5/8
14 OD	14	14	21 1/2	10 1/2	27	6	16	21	1 3/4	5/8
16 OD	16	15	24	11 1/2	30	6 1/2	18	23 1/2	1 3/4	1
18 OD	18	16 1/2	26 1/2	12 1/2	32	7	19	25	1 3/4	1 1/8
20 OD	20	18	29	14 1/2	35	8	20	27 1/2	1 3/4	1 1/8
24 OD	24	22	34	17 1/2	40 1/2	9	24	32	1 3/4	1 1/8
30 OD	30	25	41 1/2	20 1/2	49	10	30	38 3/4	2 1/4	1 1/8
36 OD	36	28 1/2	48 1/2	23 1/2	56 1/2	11	36	46	2 3/4	1 1/8
42 OD	42	31 1/2	56 1/2	26 1/2	64	12	42	53	2 3/4	1 1/8
48 OD	48	34 1/2	64	29 1/2	72	13	48	60 1/2	2 3/4	2

From American Standard for Cast Iron Pipe Flanges and Flanged Fittings, Class 125, ASA B16.1-1948.
All dimensions given are in inches.

* Does not apply to true Y's or double-flanged elbows.

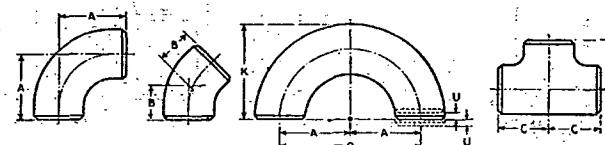
higher pressures. They include: male and female face (an insert type face), tongue-and-groove (an adaptation of the male and female type), lapped pipe to flange, lapped pipe to pipe, and ring and groove using neck flanges.

As it is too expensive to machine flange faces sufficiently to provide water-

tight 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.), 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 10. DIMENSIONS OF STEEL BUTT-WELDING FITTINGS



NOMINAL PIPE SIZE	LONG RADIUS ELBOWS			180-DEG RETURNS			STRAIGHT TEES		
	Outside Diameter at Bevel	Center-to-End		Outside Diameter at Bevel	Center- to-Center O	Back to Face K	Outside Diameter at Bevel	Center-to-End	
		90-Deg Elbows A	45-Deg Elbows B					Run C	Outlet M
1	1.315	1 1/4	3/8	1.315	3	2 3/4	1.315	1 1/4	1 1/4
1 1/4	1.660	1 3/4	1	1.660	3 3/4	2 3/4	1.660	1 3/4	1 3/4
1 1/2	1.900	2	1 1/8	1.900	4 1/2	3 1/4	1.900	2	2 1/4
2	2.375	2 1/2	1 1/4	2.375	6	4 3/4	2.375	2 1/2	2 1/2
2 1/2	2.875	3	1 3/4	2.875	7 1/4	5 1/4	2.875	3	3
3	3.500	3 1/2	2	3.500	9	6 1/4	3.500	3 1/2	3 1/2
3 1/2	4.000	4	2 1/4	4.000	10 1/4	7 1/4	4.000	3 3/4	3 3/4
4	4.500	4 1/2	2 1/2	4.500	12	8 1/4	4.500	4	4 1/4
5	5.563	5 1/2	2 3/4	5.563	15	10 1/4	5.563	4 1/2	4 1/2
6	6.625	6 1/2	3	6.625	18	12 1/4	6.625	5	5 1/2
8	8.625	8 1/2	3 3/4	8.625	24	16 1/4	8.625	7	7 1/2
10	10.750	10 1/2	4 1/4	10.750	30	20 1/4	10.750	8 1/2	8 1/2
12	12.750	12 1/2	5 1/4	12.750	36	24 1/4	12.750	10	10
14	14.000	14	6	14.000	42	28	14.000	11	11
16	16.000	16	6 1/2	16.000	48	32	16.000	12	12
18	18.000	18	7	18.000	54	36	18.000	13 1/2	13 1/2
20	20.000	20	7 1/2	20.000	60	40	20.000	15	15
24	24.000	24	9	24.000	72	48	24.000	17	17

From American Standard for Steel Butt-Welding Fittings, ASA B16.9-1951.

All dimensions are in inches.

Dimension A is equal to 1/2 of dimension O.

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 1/2 in. up. Used whenever line fittings are flanged and 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.

Welding Ends: Available in steel only. Generally employed for high temperature-high pressure work. Difficult to disassemble in a welded line. This type in-