

It is especially necessary with light-weight radiators so to anchor and so to give freedom for expansion of the piping that no strain therefrom shall be allowed to distort the radiators. When expansion strains from the pipes are permitted to reach these light metal heaters they usually emit sounds of distress which are exceedingly troublesome.

FITTINGS

Fittings for joining the separate lengths of pipe together are made in a variety of forms, and are either screwed or flanged; the former being generally used for the smaller sizes of pipe up to and including 3½ in., and the latter for the larger sizes, 4 in. and above. Screwed fittings of large size as well as flanged fittings of small size are also made and are used for certain classes of work at the proper pressure.

The material used for fittings is generally cast iron, but in addition to this malleable iron, steel and steel alloys are also used, as well as various grades of brass or bronze. The material to be used depends on the character of the service and the pressure.

As in the case of pipe, there are several weights of fittings manufactured, designed to be used with pipe of corresponding grade. These variations in weights are known as (1) low-pressure fittings for steam working pressures of 25 lb (cast-iron flanged only, sizes 4 in. and larger), (2) standard fittings for saturated steam working pressures of 125 lb, and extra heavy fittings for saturated steam working pressures of 250 lb. The latter fittings are suitable for cold water working pressures of 350 lb and are usually tested to twice the steam working pressure, or 500 lb cold hydrostatic.

Screwed Fittings

Screwed fittings include nipples or short pieces of pipe of varying lengths; couplings, usually of wrought iron only; elbows for turning angles of either 45 deg or 90 deg; return bends, which may be of either the close or open pattern, and may be cast with either a back or side outlet; tees; crosses; laterals or Y branches; and a variety of plugs, bushings, caps, lock-nuts, flanges and reducing fittings. Reducing fittings as well as bushings, both of which are used in changing from one pipe size to another, may have the smaller connection tapped eccentrically to permit free drainage of the water of condensation in steam lines or free escape of air in water lines.

Flanged Fittings

Flanged fittings are generally used in the best practice for connecting all piping above 6 in. in diameter. While screwed fittings may be used for the larger sizes and are satisfactory under the proper working conditions, it will be found difficult either to make or to break the joints in these large sizes.

The dimensions of elbows, tees and crosses for 125 lb cast-iron screwed fittings are given in Table 3, whereas the dimensions for 125 lb cast-iron flanged fittings are given in Tables 4 and 5.

A special type of joint known as the *Sarlun* joint consists of a lip which is provided for welding to make the joint fluid tight, while mechanical

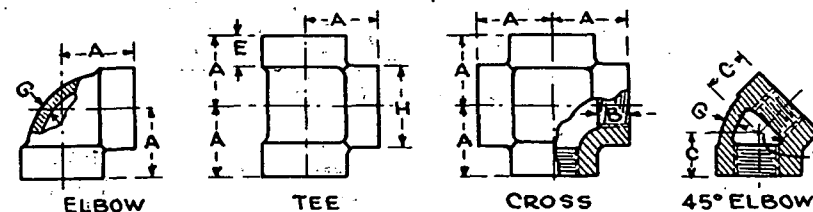
strength is provided by bolted flanges. Another type of pipe joint, the *lap flange*, is made by using loose flanges on lengths of pipe whose ends are lapped to give a bearing surface for a gasket or metal joint.

VALVES

Valves, like fittings, are usually either made with screwed or threaded ends or else are flanged for bolted connection to corresponding flanges on the pipe or fitting, in which case the flange and bolting arrangement should conform with the *American Standard* for flanged fittings of corresponding ratings.

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 sizes

TABLE 3. DIMENSIONS OF ELBOWS, 45 DEG ELBOWS, TEES, AND CROSSES (STRAIGHT SIZES) FOR 125 LB CAST IRON SCREWED FITTINGS



NOMINAL PIPE SIZE	A	C	B	E	F INSIDE DIAMETER OF FITTING		G	H
	CENTER TO END, ELBOWS, TEES AND CROSSES	CENTER TO END, 45 DEG ELBOWS	LENGTH OF THREAD MIN.	WIDTH OF BAND, MIN.	Min.	Max.	METAL THICKNESS, MIN.	OUTSIDE DIAMETER OF BAND, MIN.
¼	0.81	0.73	0.32	0.38	0.540	0.584	0.110	0.93
¾	0.95	0.80	0.36	0.44	0.675	0.719	0.120	1.12
1½	1.12	0.88	0.43	0.50	0.840	0.897	0.130	1.34
2	1.31	0.98	0.50	0.56	1.050	1.107	0.155	1.63
3	1.50	1.12	0.58	0.62	1.315	1.385	0.170	1.95
4	1.75	1.29	0.67	0.69	1.660	1.730	0.185	2.39
6	1.94	1.43	0.70	0.75	1.900	1.970	0.200	2.68
8	2.25	1.68	0.75	0.84	2.375	2.445	0.220	3.28
10	2.70	1.95	0.92	0.94	2.875	2.975	0.240	3.86
12	3.08	2.17	0.98	1.00	3.500	3.600	0.260	4.62
14	3.42	2.39	1.03	1.06	4.000	4.100	0.280	5.20
16	3.79	2.61	1.08	1.12	4.500	4.600	0.310	5.79
18	4.50	3.05	1.18	1.18	5.563	5.663	0.380	7.05
20	5.13	3.46	1.28	1.28	6.625	6.725	0.430	8.28
24	6.56	4.28	1.47	1.47	8.625	8.725	0.550	10.63
30	8.08	5.16	1.68	1.68	10.750	10.850	0.690	13.12
36	9.50	5.97	1.88	1.88	12.750	12.850	0.800	15.47
42 O.D.	10.40		2.00	2.00	14.000	14.100	0.880	16.94
48 O.D.	11.82		2.20	2.20	16.000	16.100	1.000	19.30

All dimensions given in inches.