

otherwise ordered. To facilitate drainage, some elbows have the thread tapped at an angle to provide a pitch of the connecting pipe of $\frac{1}{4}$ in. to the foot. These elbows are known to the trade as pitch elbows and are commercially available. All threaded pipe joints should be made up with a thread paste suitable for the service for which the pipe is to be used.

TYPES OF 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 $3\frac{1}{2}$ in., and the latter for the larger sizes, 4 in. and above. Screwed fittings of

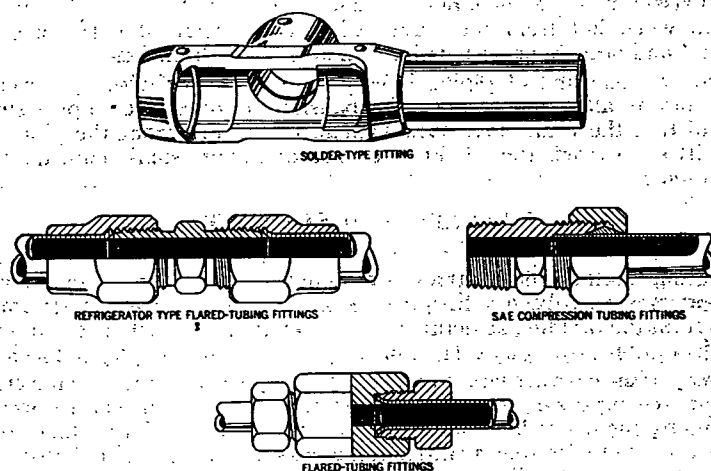


FIG. 2. COPPER OR BRASS TUBING FITTINGS

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. Malleable iron fittings, like brass fittings, are cast with a round instead of a flat band or bead, or with no bead at all. Fittings are designated as male or female, depending on whether the threads are on the outside or inside, respectively. Screwed galvanized fittings are made according to the 150 lb American Standard.

As in the case of pipe, several weights of fittings are manufactured. Recognized American Standards for the various weights are as follows:

Cast-iron pipe flanges and flanged fittings for 25 lb (sizes 4 in. and larger), 125 lb, and 250 lb maximum saturated steam pressure, A.S.A. B16b2, B16a, and B16b, respectively.

Malleable-iron screwed fittings for 150 lb maximum saturated steam pressure, A.S.A. B16c.

Cast-iron screwed fittings for 125 and 250 lb maximum saturated steam pressure, A.S.A. B16d.

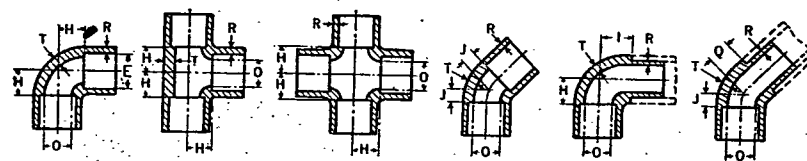
Steel flanged fittings for 150 and 300 lb maximum steam service pressure, A.S.A. B16e.

The allowable cold water working pressures for these standards vary from 43 lb for the 25 lb standard to 500 lb for the 300 lb steel standard.

War standard ratings in effect for the duration of the emergency permitted higher ratings for certain sizes of the 125 lb cast-iron flanged fitting standard, and for 300 lb steel flanges and flanged fittings than those shown in the regular American Standards mentioned previously.

Screwed fittings include: nipples or short pieces of pipe of varying lengths; couplings of steel or wrought-iron; elbows for turning angles of either 45 deg or 90 deg; return bends, which may be of either the close

TABLE 5. AMERICAN STANDARD DIMENSIONS OF ELBOWS, TEES, CROSSES, AND 45 DEG ELBOWS, SOLDERED-JOINT FITTINGS, A.S.A. A40.3-1941



NOMINAL SIZE	CAST BRASS ^b						WROUGHT METAL	BORE OF FITTINGS
	Laying Length, Tee, Ell, and Cross ^b	Laying Length, Ell With External Shoulder	Laying Length, 45 Deg Ell	Laying Length, 45 Deg Ell External Shoulder	Inside Diameter of Fittings, ^c Min.	Metal Thickness ^d	Metal Thickness ^e Min. ^f	
	H	I	J	Q	O	T	R	
$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{4}$	0.31	0.08	0.048	0.0378
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	0.43	0.08	0.048	0.503
$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	0.54	0.09	0.054	0.628
$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{3}{4}$	0.78	0.10	0.060	0.878
1	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1.02	0.11	0.066	1.1285
$1\frac{1}{4}$	$\frac{1}{2}$	1	$\frac{1}{2}$	$\frac{1}{2}$	1.26	0.12	0.072	1.3785
$1\frac{1}{2}$	1	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	1.50	0.13	0.078	1.629
2	$1\frac{1}{4}$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	1.98	0.15	0.090	2.129
$2\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	2.46	0.17	0.102	2.629
3	$1\frac{3}{4}$	$1\frac{1}{8}$	$\frac{1}{2}$	1	2.94	0.19	0.114	3.129
$3\frac{1}{2}$	2	$2\frac{1}{8}$	$\frac{1}{2}$	$1\frac{1}{2}$	3.42	0.20	0.120	3.629
4	$2\frac{1}{4}$	$2\frac{3}{8}$	$\frac{15}{16}$	$1\frac{1}{4}$	3.90	0.22	0.132	4.129
5	$3\frac{1}{8}$	-----	$1\frac{1}{16}$	-----	4.87	0.28	0.168	5.129
6	$3\frac{3}{8}$	-----	$1\frac{1}{8}$	-----	5.84	0.34	0.204	6.129

All dimensions given in inches.

^aThis size is the nominal bore of the tube.

^bThese dimensions may be used for wrought-metal fittings as well as for cast-brass fittings at manufacturer's option.

^cThis dimension is the same as the inside diameter Class L tubing (American Standard Specifications for Copper Water Tube, A.S.A. H23.1-1939 (A.S.T.M. B88)).

^dPatterns shall be designed to produce body thicknesses given in the table. Metal thickness at no point shall be less than 90 per cent of the thicknesses given in the table.

^eThis dimension has the same thickness as Type L tubing.

^fThese dimensions are minimum, but in every case the thickness of wrought fittings should be at least as heavy as the tubing with which it is to be used.

NOTE 1:—Wrought fittings, as well as cast fittings, must be provided with a shoulder or stop at the bottom end of socket.

NOTE 2:—Street fittings with male ends are for use in connection with other fittings illustrated.

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 drain-