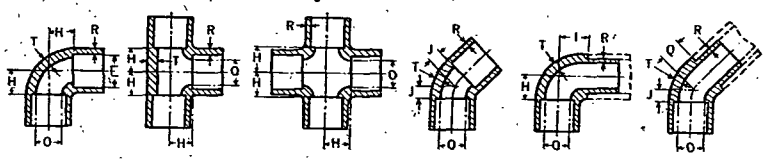
War standard ratings in effect for the duration of the emergency now permit higher ratings for certain sizes of the 125 lb cast-iron flanged fitting standard, and for 300 lb steel flanges and flanged fittings than are shown in the regular American Standards mentioned previously.

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[a] | 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 | T and R | E, Min. |
| ¼ | ¼ | ⅜ | 3/16 | ¼ | 0.31 | 0.08 | 0.048 | 0.030 | 0.378 |
| ⅜ | 5/16 | 7/16 | 3/16 | 5/16 | 0.43 | 0.08 | 0.048 | 0.035 | 0.503 |
| ½ | 7/16 | 9/16 | 3/16 | 5/16 | 0.54 | 0.09 | 0.054 | 0.040 | 0.628 |
| ¾ | 9/16 | 11/16 | ¼ | ⅜ | 0.78 | 0.10 | 0.060 | 0.045 | 0.878 |
| 1 | ¾ | ⅞ | 5/16 | 7/16 | 1.02 | 0.11 | 0.066 | 0.050 | 1.1285 |
| 1¼ | ⅞ | 1 | 7/16 | 9/16 | 1.26 | 0.12 | 0.072 | 0.055 | 1.3785 |
| 1½ | 1 | 1⅛ | ½ | ⅝ | 1.50 | 0.13 | 0.078 | 0.060 | 1.629 |
| 2 | 1¼ | 1⅜ | 9/16 | ¾ | 1.98 | 0.15 | 0.090 | 0.070 | 2.129 |
| 2½ | 1½ | 1⅝ | ⅝ | ⅞ | 2.46 | 0.17 | 0.102 | 0.080 | 2.629 |
| 3 | 1¾ | 1⅞ | ¾ | 1 | 2.94 | 0.19 | 0.114 | 0.090 | 3.129 |
| 3½ | 2 | 2⅛ | ⅞ | 1⅛ | 3.42 | 0.20 | 0.120 | 0.100 | 3.629 |
| 4 | 2¼ | 2⅜ | 15/16 | 1¼ | 3.90 | 0.22 | 0.132 | 0.110 | 4.129 |
| 5 | 3⅛ | ..... | 1 1/16 | ..... | 4.87 | 0.28 | 0.168 | 0.125 | 5.129 |
| 6 | 3⅜ | ..... | 1⅝ | ..... | 5.84 | 0.34 | 0.204 | 0.140 | 6.129 |

All dimensions given in inches.

[a]This size is the nominal bore of the tube.

[b]These dimensions may be used for wrought-metal fittings as well as for cast-brass fittings at manufacturer's option.

[c]This 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).

[d]Patterns 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.

[e]This dimension has the same thickness as Type L tubing.

[f]These 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.

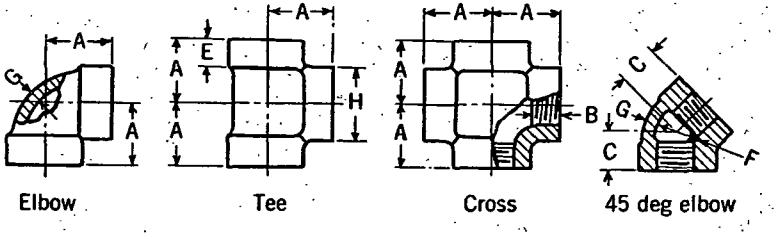
or open pattern, and may be cast with either a back or side outlet; tees; crosses; laterals or *Y* branches; and a variety of plugs, bushings, caps, lock-nuts, flanges and reducing fittings. Reducing fittings as well as bushings, both of which are used in changing from one pipe size to another, may have the smaller connection tapped eccentrically to permit free drain-



age of the water of condensation in steam lines or free escape of air in water lines.

Fittings for copper tubing are available in the soldered, flared, or compression types. Illustrations of each of these types are shown in Fig. 2. Fittings for copper pipe of *IPS* dimensions are available in screwed or soldered types of connection. Table 5 from *A.S.A.* Standard A40.3-1941

TABLE 6. AMERICAN STANDARD DIMENSIONS OF ELBOWS, 45-DEG ELBOWS, TEES, AND CROSSES (STRAIGHT SIZES) FOR CLASS 125 CAST-IRON SCREWED FITTINGS, *A.S.A.* B16a-1939




| Nominal Pipe Size | *A* Center to End, Elbows, Tees and Crosses | *C* Center to End, 45 Deg Elbows | *B* Length of Thread, Min. | *E* Width of Band, Min. | *F* Inside Diameter of Fitting, Min. | *F* Inside Diameter of Fitting, Max. | *G* Metal Thickness,[a] Min. | *H* Outside Diameter of Band, Min. |
|---|---|---|---|---|---|---|---|---|
| ¼ | 0.81 | 0.73 | 0.32 | 0.38 | 0.540 | 0.584 | 0.110 | 0.93 |
| ⅜ | 0.95 | 0.80 | 0.36 | 0.44 | 0.675 | 0.719 | 0.120 | 1.12 |
| ½ | 1.12 | 0.88 | 0.43 | 0.50 | 0.840 | 0.897 | 0.130 | 1.34 |
| ¾ | 1.31 | 0.98 | 0.50 | 0.56 | 1.050 | 1.107 | 0.155 | 1.63 |
| 1 | 1.50 | 1.12 | 0.58 | 0.62 | 1.315 | 1.385 | 0.170 | 1.95 |
| 1¼ | 1.75 | 1.29 | 0.67 | 0.69 | 1.660 | 1.730 | 0.185 | 2.39 |
| 1½ | 1.94 | 1.43 | 0.70 | 0.75 | 1.900 | 1.970 | 0.200 | 2.68 |
| 2 | 2.25 | 1.68 | 0.75 | 0.84 | 2.375 | 2.445 | 0.220 | 3.28 |
| 2½ | 2.70 | 1.95 | 0.92 | 0.94 | 2.875 | 2.975 | 0.240 | 3.86 |
| 3 | 3.08 | 2.17 | 0.98 | 1.00 | 3.500 | 3.600 | 0.260 | 4.62 |
| 3½ | 3.42 | 2.39 | 1.03 | 1.06 | 4.000 | 4.100 | 0.280 | 5.20 |
| 4 | 3.79 | 2.61 | 1.08 | 1.12 | 4.500 | 4.600 | 0.310 | 5.79 |
| 5 | 4.50 | 3.05 | 1.18 | 1.18 | 5.563 | 5.663 | 0.380 | 7.05 |
| 6 | 5.13 | 3.46 | 1.28 | 1.28 | 6.625 | 6.725 | 0.430 | 8.28 |
| 8 | 6.56 | 4.28 | 1.47 | 1.47 | 8.625 | 8.725 | 0.550 | 10.63 |
| 10 | 8.08[b] | 5.16 | 1.68 | 1.68 | 10.750 | 10.850 | 0.690 | 13.12 |
| 12 | 9.50[b] | 5.97 | 1.88 | 1.88 | 12.750 | 12.850 | 0.800 | 15.47 |

All dimensions given in inches.

[a]Patterns shall be designed to produce castings of metal thickness given in the table. Metal thickness at no point shall be less than 90 per cent of the thickness given in the table.

[b]Applies to elbows and tees only.

contains dimensions for soldered joint elbows, tees, crosses, and 45 deg elbows.

The compression type fitting is generally limited to smaller size tubing while the flared and soldered types are used in both large and small sizes. An American Standard, *A.S.A.* A40.2-1936 has been prepared to standardize dimensions for brass fittings for flared copper water tubes. Flared tube fittings are widely used in refrigerating work where *S.A.E.* dimensions and a 45-deg flare render most fittings interchangeable, although