ASME B16.18-2001
[Revision of ANSI B16.18-1984 (R1994)]

CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS

AN AMERICAN NATIONAL STANDARD



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FOREWORD

This American National Standard for solder joint fittings was originally developed by a subcommittee of American Standards Association (ASA) Sectional Committee A40 on Minimum Requirements for Plumbing and Standardization of Plumbing Equipment, organized in August 1928, under the procedures of the ASA. Subcommittee No. 11 on Solder-Joint Fittings for Tubing was appointed in October 1936.

At its first meeting, the subcommittee was informed of the investigation of solder joints being carried out by the National Bureau of Standards (now the National Institute of Standards and Technology). It was decided that the committee's scope should cover only solder fittings for use in plumbing. A subgroup was appointed to study the tolerances of commercial fittings, including depth of bore, laying lengths, and diameters of copper tube.

A draft standard was sent to the subcommittee in February 1939; a revision was distributed in August to selected organizations and individuals for review. A new subcommittee draft dated April 1940 was approved by Sectional Committee A40, the sponsor, and following ASA approval, was published in January 1941 as ASA A40.3-1941.

In 1949, the sponsors agreed to transfer responsibility for solder joint fittings to Sectional Committee B16 of ASA, because the fittings were being used in many applications other than plumbing. Subcommittee 9, Standardization of Solder Joint Fittings was established and charged with developing a revised standard. An April 1949 draft was distributed for industry review, resulting in recommended changes. A new draft was approved by Sectional Committee B16, sponsor organizations, and ASA and published as ASA B16.18-1950.

Work began in 1958 on a revision, including improvements in language. It was approved by B16, sponsor organizations, and ASA and published as ASA B16.18-1963. Starting in 1969, a comprehensive review resulted in revisions to clarify the text and to permit additional material. Final approval was granted by the American National Standards Institute (formally ASA) on March 2, 1972, for publication as ANSI B16.18-1972.

The subcommittee, now Subcommittee I, began a new revision on 1974, resulting in the addition of supply and return tees, baseboard tees, and flush bushings, as well as metrication, and change of "bronze" to "copper alloy." The draft finally approved was published as ANSI B16.18-1978.

In 1982, American National Standards Committee B16 became the ASME B16 Standards Committee, operating with the same scope under ASME procedures accredited by ANSI. Subsequently, Subcommittee I merged with Subcommittee J, which had a related scope. A general review was then started, resulting in a number of editorial changes and a few pictorial corrections. Table 2 (now Table 3) was updated to three place decimals from four, bringing the table more in line with practical gaging methods. Table B2 (now Table B3) was correspondingly corrected. Following approval by Subcommittee J, the B16 Standards Committee, and ASME, the American National Standards Institute granted approval on January 13, for publication as ANSI B16.18-1984. The standard was reaffirmed in 1994 with no change.

This 2001 edition of B16.18 contains a defined bursting strength, defined standard gaging method of threaded ends, and other clarifications and updates to text. Following approval by the Standards Committee and ASME, approval as an American National Standard was given on October 17, 2001 with the designation ASME B16.18-2001.

Requests for interpretations and suggestions for revision should be sent to the Secretary, B16 Committee, The American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

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Standardization of Valves, Flanges, Fittings, and Gaskets

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The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

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Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings, which are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

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CAST COPPER ALLOY SOLDER JOINT PRESSURE FITTINGS

1 SCOPE

1.1 General

This Standard for cast copper alloy solder joint pressure fittings designed for use with copper water tube, establishes requirements for:

(a) pressure-temperature ratings;

(b) abbreviations for end connections;

(c) sizes and method of designating openings of fittings;

(d) marking;

(e) material;

(f) dimensions and tolerances; and

(g) tests.

1.2 Units of Measurement

The values stated in either U.S. Customary (inch-lb.) or SI (metric) units of measure shall be regarded separately as standard. Within the main text, U.S. Customary units are given. For convenience, the SI units are shown in parentheses and in Nonmandatory Annex B. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other.

NOTE: Combining values from the two systems may result in nonconformance with the Standard.

1.3 Convention

For the purpose of determining conformance with this Standard, the convention for fixing significant digits where units, maximum or minimum values, are specified shall be "rounding off" as defined in ASTM Practice E 29. This requires that an observed or calculated value shall be rounded off to the nearest unit in the last right-hand digit used for expressing the limit.

1.4 References

Standards and specifications adopted by reference in this Standard are shown in Nonmandatory Annex D, which is part of this Standard. It is not considered practical to identify the specific edition of each standard and specification in the individual references. Instead, the specific edition reference is identified in Nonmandatory Annex D.

1.5 Quality System

Requirements relating to the product manufacturer's Quality System Programs are described in Nonmandatory Annex E.

2 PRESSURE-TEMPERATURE RATINGS

2.1 Rating of Fitting and of Joint

The internal working-pressure-temperature rating for a solder joint fitting is dependent not only on fitting and tube strength, but also on the composition of the solder used for the joint and selection of valves and appurtenances.

The internal working-pressure ratings of the system shall be the lowest of the values shown in Table 1 and Nonmandatory Annex A, and those of the tube, valves, or appurtenances.

Pressure-temperature ratings for solder joints to the dimensions of Table 3, made with typical commercial solders, are given in Nonmandatory Annex A.

2.2 Bursting Strength

When tested at 73°F±5°F (23°C±2°C) fittings manufactured to this standard shall have an ambient-temperature bursting strength of at least four times the 100°F (38°C) internal working-pressure rating as shown in Table 1.

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3 ABBREVIATIONS

The following symbols are used to designate the type of fitting end:

C = solder-joint fitting end made to receive copper tube diameter (female)
FTG = solder-joint fitting end made to copper tube diameter (male)
F = internal ANSI standard taper pipe thread (female) NPT
M = external ANSI standard taper pipe thread (male) NPT

4 SIZE

The size of the fittings shown in Table 3 and Table A1 corresponds to standard water tube size as shown in ASTM B 88, Specification for Seamless Copper Water Tube. The size of the threaded ends corresponds to nominal pipe size as shown in ASME B1.20.1.

Fittings are designated by the size of the openings in the sequence illustrated in Fig. 1.

5 MARKING

Each fitting shall be permanently marked with the manufacturer's name or trademark and other applicable markings as required by MSS-SP-25. Marking of fittings less than Standard Water Tube Size $\frac{1}{2}$, or on any fitting where it damages soldering surfaces is not required.

6 MATERIAL

Castings shall be copper alloy produced to meet:

(a) the requirement of ASTM B 62 Alloy C83600;

(b) the chemical and tensile requirements of ASTM B 584 Alloy C83800 or C84400 and in all other respects comply with the requirements of ASTM B 62.

7 METAL THICKNESS

Dimensional variations occur in the casting process. Pattern equipment shall be designed to produce the metal thickness given for fittings in Table 3 or Table B3. The minimum wall-thickness shall not be less than 90% of the body and joint wall-thickness as shown in Table 3 or Table B3.

8 INSPECTION TOLERANCE

8.1 Linear Dimensions

An inspection tolerance as shown in Table 2 shall be allowed on center-to-shoulder, center-to-center, center-to-threaded end, and shoulder-to-threaded end dimensions on all fittings having female solder (solder cup) ends, and on center-to-solder end and solder-to-threaded end dimensions on all fittings having male solder (fitting) ends.

Coupling inspection limits for shoulder-to-shoulder and shoulder-to-end dimensions shall be double those shown in Table 2, except that the minus tolerance applied to dimensions *M*, *N*, and *W*, and Tables 7 and B7 shall not result in a dimension less than 0.06 in. (1.5 mm) for sizes $\frac{1}{4}$ through 1 in., inclusive, or a dimension less than 0.09 in. (2.3 mm) for the larger sizes.

The largest opening in the fitting governs the tolerance to be applied to all openings.

Tables 3 through 19 offer dimensions for pressure fittings covered by this standard.

8.2 Ovality

Maximum ovality shall not exceed 1% of the maximum diameters shown in Table 3 or Table B3. The average of the maximum and minimum diameters must be within the dimensions shown in the table.

8.3 Gaging of Solder Joint Ends

8.3.1 Standard Gaging Method. The standard method of gaging the diameter tolerances for male and female ends shall be by the use of plain plug and ring gages designed to hold the product within the limits established in Table 3 or B3.

8.3.2 Optional Gaging Method. For gaging the diameter tolerance of male and female ends, the manufacturer may use direct reading instruments instead of ring and plug gages as specified in para. 8.3.1. When gaging the diameters of male and female ends using direct reading instruments, refer to para. 8.2.

8.4 Standard Gaging Method of Threaded Ends

The standard method of gaging the external and internal threaded ends shall be in accordance with the requirements of ASME B1.20.1.

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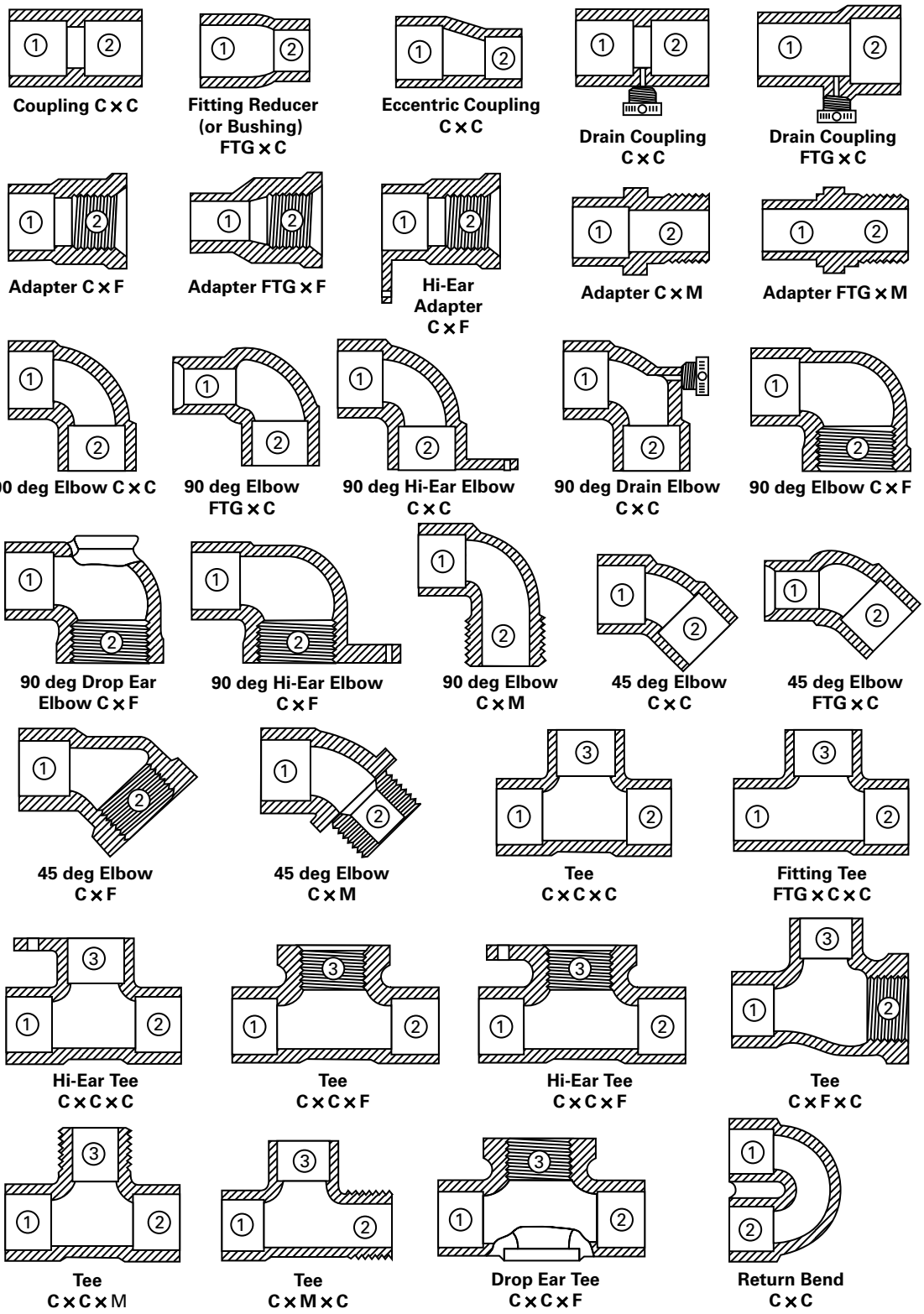

GENERAL NOTE: Fittings are designated by size in the order shown — i.e., 1 x 2 x 3.

FIG.1 METHOD OF DESIGNATING OPENINGS OF FITTINGS

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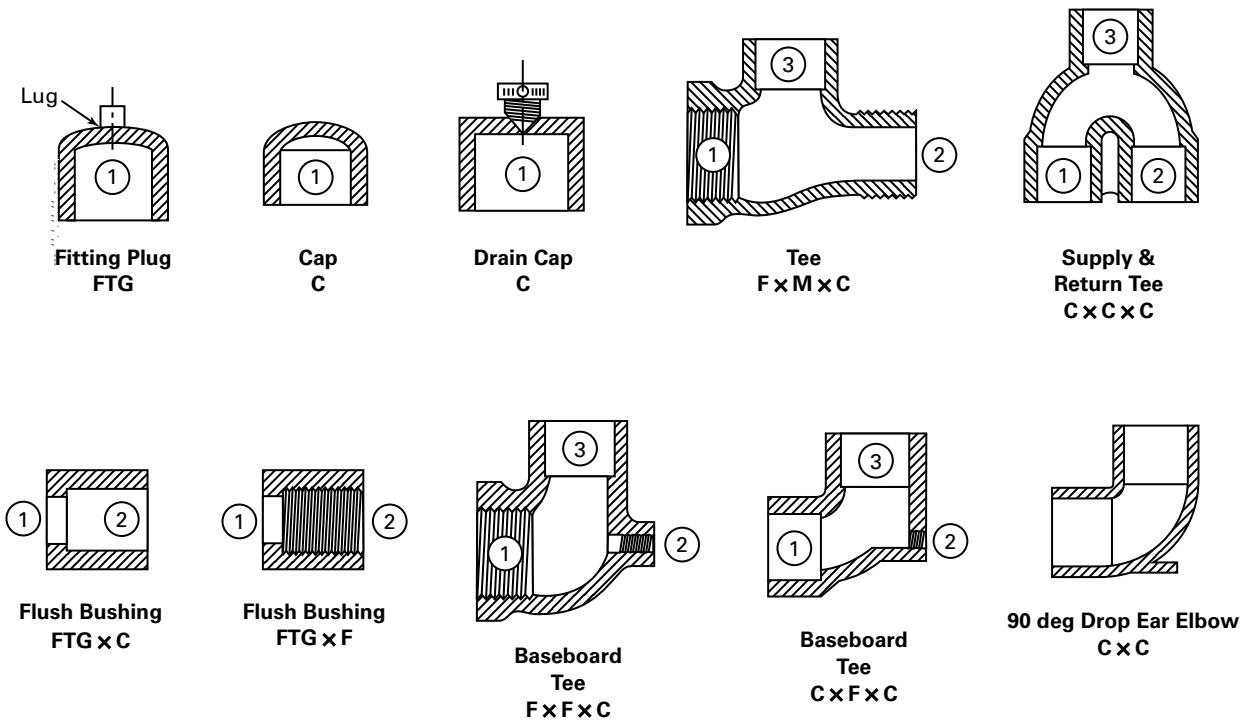

GENERAL NOTE: Fittings are designated by size in the order shown — i.e., 1 x 2 x 3.

FIG.1 METHOD OF DESIGNATING OPENINGS OF FITTINGS (CONT'D)

8.5 Alignment

The maximum-allowable deviation in the angular alignment of any opening shall be 0.06 in./ft (5mm/1 m) (0.5%).

9 THREADED ENDS

9.1 Thread Type

Fitting threads shall be right hand, conforming to ASME B1.20.1, Pipe Threads, General Purpose (Inch). They shall be taper threads (NPT).

9.2 Countersink or Chamfer

All internal threads shall be countersunk a distance not less than one-half the pitch of the thread at an angle approximately 45 deg with the axis of the thread, and all external threads shall be chamfered at an angle of 30 to 45 deg from the axis, for the purpose of easier entrance in making a joint and protection of the thread. Countersinking and chamfering shall be concentric with the threads.

9.3 Threading Tolerances

Tapered pipe threads (NPT) shall be checked by use of working plug or ring gages in either standard or limit types. Gages shall be threaded on/in hand tight. The reference point for gaging internal product threads depends upon the chamfer diameter. When the internal chamfer diameter exceeds the major diameter of the internal thread, the reference point is the last thread scratch on the chamfer cone. Otherwise, when the internal chamfer diameter does not exceed the major diameter of the internal thread, the reference point is the end of the fitting.

Tolerance for an internal threaded end having an internal shoulder shall be from the gage reference point (notch) to one turn small. Tolerance for an internal

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threaded end without shoulder and for an external threaded end shall be from one turn small to one turn large.

9.4 Thread Length

The length of threads specified in all tables shall be measured to include the countersink or chamfer.

10 CONFIGURATION OF THREADED ENDS

At the manufacturer's option, female ends of fittings may be furnished with a polygon or bead with or without ribs, and male ends of fittings may be furnished with a polygon, ribs, or flats.

11 TEST

These fittings shall be tested at a minimum air pressure of 60 psi (410 kPa) while under water or to a hydrostatic gage pressure of 250 psi (1 720 kPa) for sufficient length of time to assure tightness.

TABLE 1 INTERNAL WORKING-PRESSURE RATING FOR CAST COPPER ALLOY FITTINGS, psi (kPa)

Standard Water Tube Size	–20°F to 100°F (–29°C to 38°C)	150°F (66°C)	200°F (93°C)	250°F (121°C)	300°F (149°C)	350°F (177°C)	400°F (204°C)
1/4	910 (6280)	770 (5340)	725 (5020)	725 (5020)	710 (4920)	605 (4190)	455 (3140)
3/8	775 (5360)	660 (4560)	620 (4290)	620 (4290)	610 (4200)	515 (3570)	385 (2680)
1/2	720 (4970)	610 (4220)	575 (3980)	575 (3980)	565 (3890)	480 (3310)	360 (2480)
5/8	630 (4350)	535 (3700)	505 (3480)	505 (3480)	490 (3410)	420 (2900)	315 (2170)
3/4	580 (4010)	490 (3410)	465 (3210)	465 (3210)	455 (3140)	385 (2670)	290 (2000)
1	490 (3400)	420 (2890)	395 (2720)	395 (2720)	385 (2660)	325 (2270)	245 (1700)
1 1/4	435 (3020)	370 (2570)	350 (2420)	350 (2420)	340 (2370)	290 (2010)	315 (1510)
1 1/2	405 (2810)	345 (2390)	325 (2250)	325 (2250)	315 (2200)	270 (1870)	200 (1400)
2	360 (2500)	305 (2130)	290 (2000)	290 (2000)	280 (1960)	240 (1670)	180 (1250)
2 1/2	335 (2310)	285 (1960)	265 (1850)	265 (1850)	260 (1810)	220 (1540)	165 (1150)
3	315 (2180)	265 (1850)	250 (1740)	250 (1740)	245 (1710)	210 (1450)	155 (1090)
3 1/2	300 (2090)	255 (1770)	240 (1670)	240 (1670)	235 (1630)	200 (1390)	150 (1040)
4	290 (2020)	245 (1710)	230 (1610)	230 (1610)	225 (1580)	195 (1340)	145 (1010)
5	265 (1850)	225 (1570)	215 (1480)	215 (1480)	210 (1450)	175 (1230)	130 (920)
6	250 (1720)	210 (1460)	200 (1380)	200 (1380)	195 (1350)	165 (1150)	125 (860)
8	270 (1860)	225 (1580)	215 (1490)	215 (1490)	210 (1460)	180 (1240)	135 (930)
10	270 (1860)	230 (1580)	215 (1490)	215 (1490)	210 (1460)	180 (1240)	135 (930)
12	250 (1740)	215 (1480)	200 (1390)	200 (1390)	195 (1360)	165 (1160)	125 (870)

GENERAL NOTES:
(a) For size designation of fittings see Section 4.
(b) The internal pressure rating applies to the largest opening of the fitting.
(c) The internal pressure rating is calculated, as shown in Nonmandatory Annex C, then rounded down to the nearest unit of 5 for psi and 10 for kPa.

TABLE 2 INSPECTION TOLERANCES

Standard Water Tube and Pipe Thread Size	Plus or Minus	
	in.	mm
1/4, 3/8	0.05	1.3
1/2, 3/4	0.06	1.5
1 to 2 incl.	0.08	2.0
2 1/2 to 3 1/2 incl.	0.11	2.8
4, 5	0.12	3.2
6, 8	0.16	4.0
10, 12	0.20	5.2

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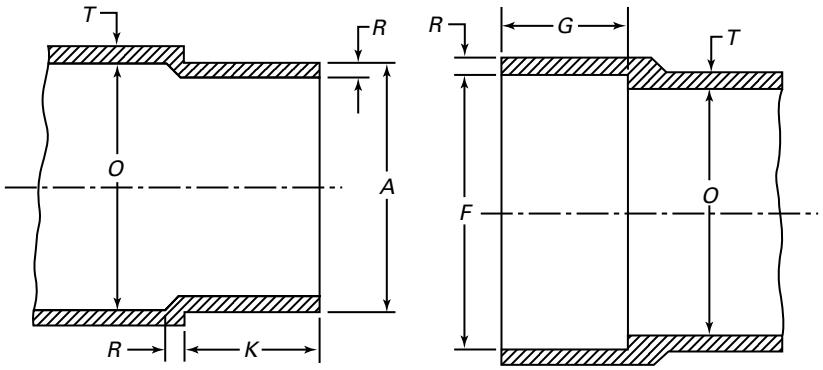

TABLE 3 DIMENSIONS OF SOLDER JOINT ENDS

Standard Water Tube Size [Note (1)]	Male End			Female End			Metal Thickness [Note (3)]		Inside Diameter of Fitting, *O*
	Outside Diameter [Note (2)], *A*		Length, *K*	Inside Diameter, *F*		Depth, *G*	Body, *T*	Joint, *R*	
	Min.	Max.	Min.	Min.	Max.	Min.			Min.
1/4	0.373	0.376	0.38	0.377	0.381	0.31	0.08	0.05	0.31
3/8	0.497	0.501	0.44	0.502	0.506	0.38	0.09	0.05	0.43
1/2	0.622	0.626	0.56	0.627	0.631	0.50	0.09	0.05	0.54
3/4	0.872	0.876	0.81	0.877	0.881	0.75	0.10	0.06	0.78
1	1.122	1.127	0.97	1.128	1.132	0.91	0.11	0.07	1.02
1 1/4	1.372	1.377	1.03	1.378	1.382	0.97	0.12	0.07	1.26
1 1/2	1.621	1.627	1.16	1.628	1.633	1.09	0.13	0.08	1.50
2	2.121	2.127	1.41	2.128	2.133	1.34	0.15	0.09	1.98
2 1/2	2.621	2.627	1.53	2.628	2.633	1.47	0.17	0.10	2.46
3	3.121	3.127	1.72	3.128	3.133	1.66	0.19	0.11	2.94
3 1/2	3.621	3.627	1.97	3.628	3.633	1.91	0.20	0.12	3.42
4	4.121	4.127	2.22	4.128	4.133	2.16	0.22	0.13	3.90
5	5.121	5.127	2.72	5.128	5.133	2.66	0.28	0.17	4.87
6	6.121	6.127	3.22	6.128	6.133	3.09	0.34	0.20	5.84
8	8.119	8.127	4.09	8.128	8.133	3.97	0.38	0.31	7.72
10	10.119	10.127	4.12	10.128	10.133	4.00	0.48	0.48	9.62
12	12.119	12.127	4.62	12.128	12.133	4.50	0.56	0.56	11.56

GENERAL NOTES:
(a) Dimensions are in inches.
(b) The sketches and designs of fittings are illustrative only. Dimensions herein shall govern in all cases.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For ovality and gaging tolerences, see Section 8.
(3) For metal thickness, see Section 7.

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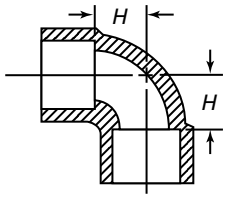
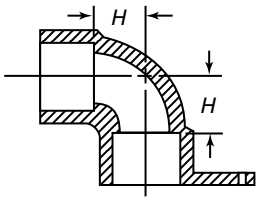
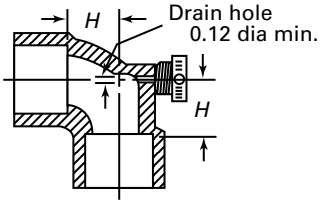


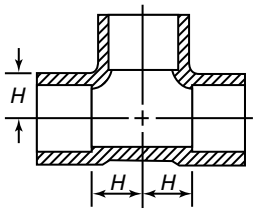
90 deg Elbow
C × C



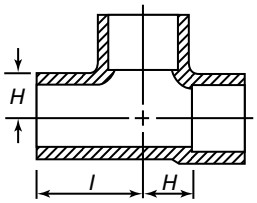
90 deg Hi-Ear Elbow
C × C
[Note (3)]



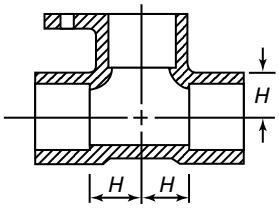
90 deg Drain Elbow
C × C



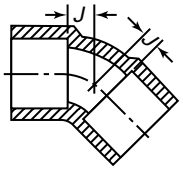
Tee
C × C × C



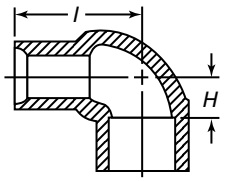
Fitting Tee
FTG × C × C



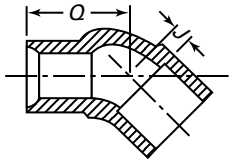
Hi-Ear Tee
C × C × C
[Note (3)]



45 deg Elbow
C × C



90 deg Elbow
FTG × C



45 deg Elbow
FTG × C

TABLE 4 DIMENSIONS OF ELBOW, TEES, AND 45 deg ELBOWS

Standard Water Tube Size [Note (1)]	Laying Length Tee and 90 deg Elbow [Note (2)], *H*	Center-to-End 90 deg Elbow and Tee, [Note (2)], *I*	Laying Length 45 deg Elbow [Note (2)], *J*	Center-to-End 45 deg Elbow [Note (2)], *Q*
1/4	0.25	0.75	. . .	. . .
3/8	0.31	0.88	0.19	0.75
1/2	0.44	1.12	0.19	0.88
3/4	0.56	1.50	0.25	1.19
1	0.75	1.84	0.31	1.31
1 1/4	0.88	2.03	0.44	1.56
1 1/2	1.00	2.28	0.50	1.75
2	1.25	2.78	0.56	2.12
2 1/2	1.50	3.16	0.62	. . .
3	1.75	3.59	0.75	. . .
3 1/2	2.00	. . .	0.88	. . .
4	2.25	4.59	0.94	. . .
5	3.12	. . .	1.44	. . .
6	3.62	. . .	1.62	. . .
8	4.88	. . .	2.12	. . .

(continued)

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TABLE 4 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.
(3) Hi-ear fittings are designed for use with $^{9}/_{16}$ in. maximum width strap.

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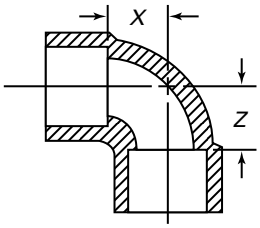

90 deg Elbow
C × C

TABLE 5 DIMENSIONS OF REDUCING 90 deg ELBOWS

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]	
	X	*Z*
3/8 × 1/4	0.25	0.31
1/2 × 3/8	0.38	0.44
3/4 × 1/2	0.44	0.56
1 × 3/4	0.62	0.75
1 × 1/2	0.50	0.75
1 1/4 × 1	0.75	0.88
1 1/4 × 3/4	0.62	0.88
1 1/4 × 1/2	0.50	0.88
1 1/2 × 1 1/4	0.88	1.00
1 1/2 × 1	0.75	1.00
1 1/2 × 3/4	0.62	1.00
2 × 1 1/2	1.00	1.25
2 × 1 1/4	0.88	1.25
2 × 1	0.75	1.25
2 × 3/4	0.62	1.25
2 1/2 × 2	1.25	1.50
2 1/2 × 1 1/2	1.00	1.50
2 1/2 × 1 1/4	0.88	1.50
2 1/2 × 1	0.75	1.50
3 × 2 1/2	1.50	1.75
3 × 2	1.25	1.75
3 × 1 1/2	1.00	1.75
3 × 1 1/4	0.88	1.75
4 × 3	1.75	2.25
4 × 2 1/2	1.50	2.25
4 × 2	1.25	2.25
6 × 4	2.62	3.62
6 × 3	2.00	3.62
8 × 6	3.88	4.88

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this Table, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.

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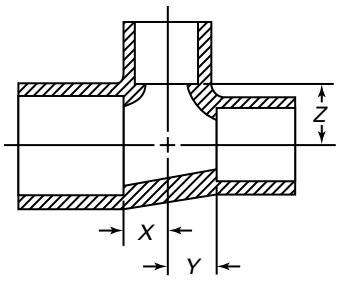

Tee
C × C × C

TABLE 6 DIMENSIONS OF REDUCING TEES

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]			Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]		
	X	*Y*	*Z*		*X*	*Y*	*Z*
3/8 × 3/8 × 1/2	0.44	0.44	0.38	1 1/4 × 3/4 × 3/4	0.62	0.62	0.88
3/8 × 3/8 × 1/4	0.25	0.25	0.31	1 1/4 × 1/2 × 1 1/4	0.88	0.88	0.88
1/2 × 1/2 × 3/4	0.56	0.56	0.44	1 1/4 × 1/2 × 1	0.75	0.75	0.88
1/2 × 1/2 × 3/8	0.38	0.38	0.44	1 1/2 × 1 1/2 × 2 1/2	1.50	1.50	1.00
1/2 × 1/2 × 1/4	0.31	0.31	0.44	1 1/2 × 1 1/2 × 2	1.25	1.25	1.00
1/2 × 3/8 × 1/2	0.44	0.44	0.44	1 1/2 × 1 1/2 × 1 1/4	0.88	0.88	1.00
1/2 × 3/8 × 3/8	0.38	0.38	0.44	1 1/2 × 1 1/2 × 1	0.75	0.75	1.00
3/4 × 3/4 × 1	0.75	0.75	0.62	1 1/2 × 1 1/2 × 3/4	0.62	0.62	1.00
3/4 × 3/4 × 1/2	0.44	0.44	0.56	1 1/2 × 1 1/2 × 1/2	0.50	0.50	1.00
3/4 × 3/4 × 3/8	0.38	0.38	0.56	1 1/2 × 1 1/4 × 1 1/2	1.00	1.00	1.00
3/4 × 1/2 × 3/4	0.56	0.56	0.56	1 1/2 × 1 1/4 × 1 1/4	0.88	0.88	1.00
3/4 × 1/2 × 1/2	0.44	0.44	0.56	1 1/2 × 1 1/4 × 1	0.75	0.75	1.00
3/4 × 1/2 × 3/8	0.38	0.38	0.56	1 1/2 × 1 1/4 × 3/4	0.62	0.62	1.00
1 × 1 × 1 1/2	1.00	1.00	0.75	1 1/2 × 1 1/4 × 1/2	0.50	0.50	1.00
1 × 1 × 1 1/4	0.88	0.88	0.75	1 1/2 × 1 × 1 1/2	1.00	1.00	1.00
1 × 1 × 3/4	0.62	0.62	0.75	1 1/2 × 1 × 1 1/4	0.88	0.88	1.00
1 × 1 × 1/2	0.50	0.50	0.75	1 1/2 × 1 × 1	0.75	0.75	1.00
1 × 1 × 3/8	0.44	0.44	0.75	1 1/2 × 3/4 × 1 1/2	1.00	1.00	1.00
1 × 3/4 × 1	0.75	0.75	0.75	1 1/2 × 1/2 × 1 1/2	1.00	1.00	1.00
1 × 3/4 × 3/4	0.62	0.62	0.75	2 × 2 × 4	2.25	2.25	1.25
1 × 3/4 × 1/2	0.50	0.50	0.75	2 × 2 × 3	1.75	1.75	1.25
1 × 1/2 × 1	0.75	0.75	0.75	2 × 2 × 2 1/2	1.50	1.50	1.25
1 × 1/2 × 3/4	0.62	0.62	0.75	2 × 2 × 1 1/2	1.00	1.00	1.25
1 × 1/2 × 1/2	0.50	0.50	0.75	2 × 2 × 1 1/4	0.88	0.88	1.25
1 1/4 × 1 1/4 × 2	1.25	1.25	0.88	2 × 2 × 1	0.75	0.75	1.25
1 1/4 × 1 1/4 × 1 1/2	1.00	1.00	0.88	2 × 2 × 3/4	0.62	0.62	1.25
1 1/4 × 1 1/4 × 1	0.75	0.75	0.88	2 × 2 × 1/2	0.50	0.50	1.25
1 1/4 × 1 1/4 × 3/4	0.62	0.62	0.88	2 × 1 1/2 × 2	1.25	1.25	1.25
1 1/4 × 1 1/4 × 1/2	0.50	0.50	0.88	2 × 1 1/2 × 1 1/2	1.00	1.00	1.25
1 1/4 × 1 × 1 1/4	0.88	0.88	0.88	2 × 1 1/2 × 1 1/4	0.88	0.88	1.25
1 1/4 × 1 × 1	0.75	0.75	0.88	2 × 1 1/2 × 1	0.75	0.75	1.25
1 1/4 × 1 × 3/4	0.62	0.62	0.88	2 × 1 1/2 × 3/4	0.62	0.62	1.25
1 1/4 × 1 × 1/2	0.50	0.50	0.88	2 × 1 1/2 × 1/2	0.50	0.50	1.25
1 1/4 × 3/4 × 1 1/4	0.88	0.88	0.88	2 × 1 1/4 × 2	1.25	1.25	1.25
1 1/4 × 3/4 × 1	0.75	0.75	0.88	2 × 1 1/4 × 1 1/2	1.00	1.00	1.25

(continued)

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TABLE 6 DIMENSIONS OF REDUCING TEES (CONT'D)

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]			Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]		
	X	*Y*	*Z*		*X*	*Y*	*Z*
2 × 1¼ × 1¼	0.88	0.88	1.25	3 × 2 × 1½	1.00	1.00	1.75
2 × 1 × 2	1.25	1.25	1.25	3 ×1½ × 3	1.75	1.75	1.75
2 × ¾ × 2	1.25	1.25	1.25	3 × 1¼ × 3	1.75	1.75	1.75
2 × ½ × 2	1.25	1.25	1.25	3 × 1 × 3	1.75	1.75	1.75
2½ × 2½ × 4	2.25	2.25	1.50	3½ × 3½ × 3	1.75	1.75	2.00
2½ × 2½ × 3	1.75	1.75	1.50	3½ × 3 ×3½	2.00	2.00	2.00
2½ × 2½ × 2	1.25	1.25	1.50	4 × 4 × 6	3.62	3.62	2.62
2½ × 2½ × 1½	1.00	1.00	1.50	4 × 4 × 3	1.75	1.75	2.25
2½ × 2½ × 1¼	0.88	0.88	1.50	4 × 4 × 2½	1.50	1.50	2.25
2½ × 2½ × 1	0.75	0.75	1.50	4 × 4 × 2	1.25	1.25	2.25
2½ × 2½ × ¾	0.62	0.62	1.50	4 × 4 × 1½	1.00	1.00	2.25
2½ × 2½ × ½	0.50	0.50	1.50	4 × 4 × 1¼	0.88	0.88	2.25
2½ × 2 × 2½	1.50	1.50	1.50	4 × 4 × 1	0.75	0.75	2.25
2½ × 2 × 2	1.25	1.25	1.50	4 × 4 × ¾	0.62	0.62	2.25
2½ × 2× 1½	1.00	1.00	1.50	4 × 3 × 4	2.25	2.25	2.25
2½ × 2× 1¼	0.88	0.88	1.50	4 × 3 × 3	1.75	1.75	2.25
2½ × 2× 1	0.75	0.75	1.50	4 × 3 × 2½	1.50	1.50	2.25
2½ × 2× ¾	0.62	0.62	1.50	4 × 3 × 2	1.25	1.25	2.25
2½ × 2× ½	0.50	0.50	1.50	4 × 2½ × 4	2.25	2.25	2.25
2½ × 1½ × 2½	1.50	1.50	1.50	4 × 2 × 4	2.25	2.25	2.25
2½ × 1½ × 2	1.25	1.25	1.50	4 × 2 × 3	1.75	1.75	2.25
2½ × 1½ × 1½	1.00	1.00	1.50	4 × 2 × 2	1.25	1.25	2.25
2½ × 1¼ × 2½	1.50	1.50	1.50	4 × 1½ × 4	2.25	2.25	2.25
2½ × 1 × 2½	1.50	1.50	1.50	4 × 1¼ × 4	2.25	2.25	2.25
2½ × ¾ × 2½	1.50	1.50	1.50	4 × 1 × 4	2.25	2.25	2.25
2½ × ½ × 2½	1.50	1.50	1.50	5 × 5 × 4	2.62	2.62	3.12
3 × 3 × 4	2.25	2.25	1.75	5 × 4 × 5	3.12	3.12	3.12
3 × 3 × 2½	1.50	1.50	1.75	6 × 6 × 8	4.88	4.88	3.88
3 × 3 × 2	1.25	1.25	1.75	6 × 6 × 4	2.62	2.62	3.62
3 × 3 × 1½	1.00	1.00	1.75	6 × 6 × 3	2.00	2.00	3.62
3 × 3 × 1¼	0.88	0.88	1.75	6 × 6 × 2½	1.88	1.88	3.62
3 × 3 × 1	0.75	0.75	1.75	6 × 6 × 2	1.62	1.62	3.62
3 × 3 × ¾	0.62	0.62	1.75	6 × 6 × 1½	1.38	1.38	3.62
3 × 3 × ½	0.50	0.50	1.75	6 × 6 × 1¼	1.25	1.25	3.62
3 × 2½ × 3	1.75	1.75	1.75	6 × 6 × 1	1.12	1.12	3.62
3 × 2½ × 2½	1.50	1.50	1.75	6 × 4 × 6	3.62	3.62	3.62
3 × 2½ × 2	1.25	1.25	1.75	6 × 4 × 4	2.62	2.62	3.62
3 × 2½ × 1½	1.00	1.00	1.75	6 × 3 × 6	3.62	3.62	3.62
3 × 2½ × 1¼	0.88	0.88	1.75	6 × 2½ × 6	3.62	3.62	3.62
3 × 2½ × 1	0.75	0.75	1.75	6 × 2 × 6	3.62	3.62	3.62
3 × 2 × 3	1.75	1.75	1.75	8 × 8 × 6	3.88	3.88	4.88
3 × 2 × 2½	1.50	1.50	1.75	8 × 8 × 4	2.88	2.88	4.88
3 × 2 × 2	1.25	1.25	1.75	...	...	...	...

(continued)

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TABLE 6 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.

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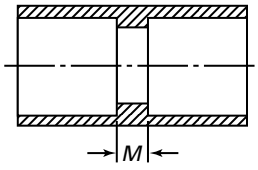
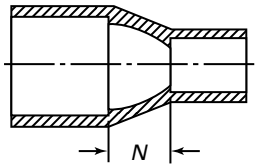
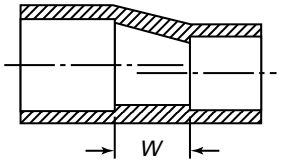


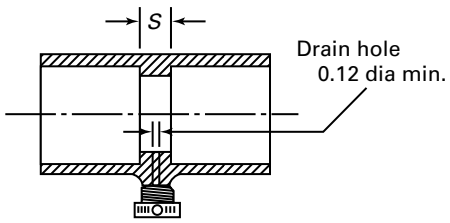
Coupling
C × C



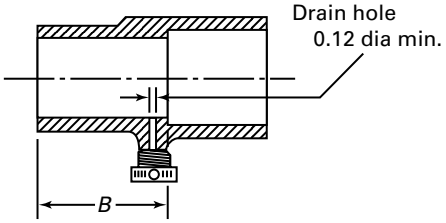
Reducing Coupling
C × C



Eccentric Coupling
C × C



Drain Coupling
C × C



Fitting Drain Coupling
FTG × C

TABLE 7 DIMENSIONS OF COUPLINGS

Straight		Reducing		Eccentric		Drain	
Standard Water Tube Size [Note (1)]	Laying Length, [Note (2)] *M*	Standard Water Tube Size [Note (1)]	Laying Length, [Note (2)] *N*	Standard Water Tube Size [Note (1)]	Laying Length [Note (2)], *W*	Laying Length [Note(2)], *S*	Laying Length [Note(2)], *B*
1/4	0.06	3/4 × 1/2	0.31	3/4 × 1/2	0.62	0.25	...
3/8	0.06	1 × 3/4	0.38	1 × 3/4	0.69	0.25	...
1/2	0.12	1 1/4 × 1	0.38	1 1/4 × 1	0.75	0.25	1.00
3/4	0.12	1 1/4 × 3/4	0.38	1 1/4 × 3/4	0.75	0.25	1.28
1	0.12	1 1/2 × 1 1/4	0.38	1 1/2 × 1 1/4	0.69	0.25	...
1 1/4	0.12	1 1/2 × 1	0.38	1 1/2 × 1	0.69	0.25	...
1 1/2	0.12	1 1/2 × 3/4	0.44	2 × 1 1/2	1.12	0.25	...
2	0.19	2 × 1 1/2	0.50	2 × 1 1/4	0.94	0.25	...
2 1/2	0.19	2 × 1 1/4	0.50	2 1/2 × 2	1.19	...	...
3	0.19	2 × 1	0.50	3 × 2 1/2	1.25	...	...
3 1/2	0.25	2 × 3/4	0.50	3 × 2	1.31	...	...
4	0.25	2 1/2 × 2	0.56	4 × 3	2.00	...	...
5	0.25	2 1/2 × 1 1/2	0.56	...	...	...	...
6	0.25	2 1/2 × 1 1/4	0.62	...	...	...	...
8	0.62	2 1/2 × 1	0.62	...	...	...	...
...	...	3 × 2 1/2	0.62	...	...	...	...
...	...	3 × 2	0.62	...	...	...	...
...	...	4 × 3	0.69	...	...	...	...
...	...	4 × 2 1/2	1.12	...	...	...	...
...	...	4 × 2	1.19	...	...	...	...
...	...	6 × 4	1.31	...	...	...	...
...	...	8 × 6	1.38	...	...	...	...

continued

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TABLE 7 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.

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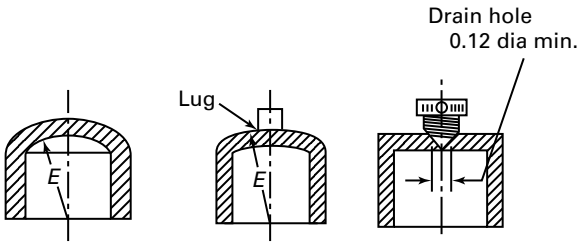

Cap C **Plug FTG** **Drain Cap C**

TABLE 8 DIMENSIONS OF CAPS AND PLUGS

Standard Water Tube Size [Note (1)]	Caps and Plugs Radius [Note (2)], *E*
1/4	0.38
3/8	0.50
1/2	0.62
3/4	0.88
1	1.12
1 1/4	1.38
1 1/2	1.62
2	2.12
2 1/2	2.62
3	3.12
3 1/2	3.62
4	4.12
5	5.12
6	6.12

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For other dimensions not given in this table, see Table 3.
(c) Casting of lug or square on plugs shall be optional.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) Caps shall have either flat or rounded top.

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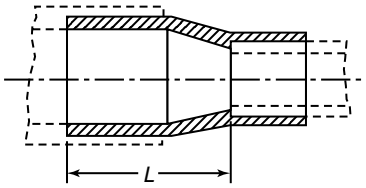

Fitting reducer
(or Bushing)
FTG × C

TABLE 9 DIMENSIONS OF FITTING REDUCERS

Standard Water Tube Size [Note (1)]	Length, *L*
3/8 × 1/4	0.69
1/2 × 3/8	0.94
1/2 × 1/4	0.94
3/4 × 1/2	1.19
3/4 × 3/8	1.25
1 × 3/4	1.50
1 × 1/2	1.50
1 1/4 × 1	1.62
1 1/4 × 3/4	1.62
1 1/4 × 1 1/2	1.62
1 1/2 × 1 1/4	1.81
1 1/2 × 1	1.81
1 1/2 × 3/4	1.81
2 × 1 1/2	2.12
2 × 1 1/4	2.12
2 × 1	2.12
2 1/2 × 2	2.38
2 1/2 × 1 1/2	2.38
2 1/2 × 1 1/4	2.38
3 × 2 1/2	2.62
3 × 2	2.62
3 × 1 1/2	2.62
4 × 3	3.44
4 × 2 1/2	3.44
4 × 2	3.44

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For other dimensions not given in this table, see Table 3.

NOTE:
(1) For size designation of fitting, see Section 4.

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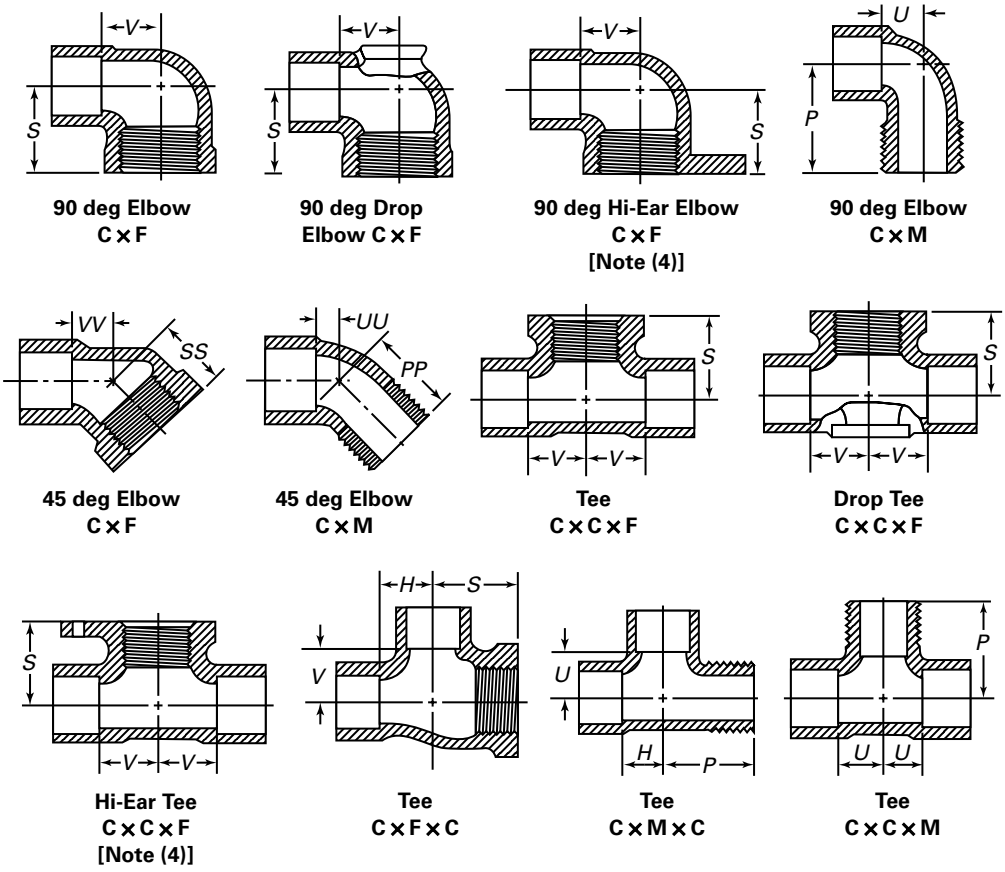

TABLE 10 AND 11 ILLUSTRATION

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TABLE 10 DIMENSIONS OF SOLDER JOINT ELBOWS AND TEES WITH PIPE THREAD ENDS (STRAIGHT SIZES)

Standard Water Tube and Pipe Thread Size [Note (1)]	Internal Threads [Note (2)]					External Threads [Note (2)]				
	Center-to-End [Note (3)]		Laying Length [Note (3)]			Center-to-End [Note (3)]		Laying Length [Note (3)]		
	Ell and Tee, *S*	45 deg Ell, *SS*	Ell and Tee, *V*	Tee, *H*	45 deg Ell, *VV*	Ell and Tee, *P*	45 deg Ell, *PP*	Ell and Tee, *U*	Tee, *H*	45 deg Ell, *UU*
1/4	0.56	...	0.38	...	...	0.94	...	0.25	...	...
3/8	0.69	0.69	0.44	0.31	0.19	1.06	0.81	0.31	0.31	0.19
1/2	0.88	0.94	0.56	0.44	0.19	1.31	1.00	0.44	0.44	0.19
3/4	1.00	1.00	0.69	0.56	0.25	1.50	1.19	0.56	0.56	0.25
1	1.25	1.19	0.88	0.75	0.31	1.64	1.31	0.75	0.75	0.31
1 1/4	1.50	...	1.00	0.88	...	2.00	...	0.88	...	...
1 1/2	1.62	...	1.12	1.00	...	2.19	...	1.00	...	...
2	1.94	...	1.38	1.25	...	2.62	...	1.25	...	...
2 1/2	2.50	...	1.62	...	...	...	...	...	...	...
3	2.81	...	1.94	...	...	...	...	...	...	...
4	3.44	...	2.44	...	...	...	...	...	...	...
6	4.88	...	3.88	...	...	...	...	...	...	...

GENERAL NOTES:
(a) For reference, see Table 10 Illustration beginning on page 17.
(b) Dimensions are in inches.
(c) For dimensions of threaded ends, see ASME B16.15. For configuration of threaded end, see Section 10. For dimensions of solder joint ends, see Table 3.
(d) For dimensions of reducing tees and ells, see Table 11.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For threads of threaded ends, see Section 9.
(3) For inspection tolerances, see Section 8 and Table 2.
(4) Hi-ear fittings are designed for use with 9/16 in. maximum width strap.

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TABLE 11 DIMENSIONS OF SOLDER JOINT ELBOWS AND TEES WITH PIPE THREAD ENDS (REDUCING SIZES)

	Internal Threads [Note (2)]							External Threads [Note (2)]	
								Center-to-End	Laying Length [Note (3)]
Standard Water Tube and Pipe Thread Size [Note (1)]	Center-to-End S			Laying Length [Note (3)] V			H	P	U
	90 deg Ell C-F	Tee C-C-F	Tee C-F-C	90 deg Ell C-F	Tee C-C-F	Tee C-F-C	Tee C-F-C	90 deg Ell C-M	90 deg Ell C-M
3/8 × 3/8 × 1/2	...	0.81	...	...	0.56	...	...	...	...
3/8 × 1/2	0.81	...	...	0.56	...	...	...	1.25	0.44
1/2 × 1/2 × 3/4	...	0.94	...	...	0.69	...	...	...	...
1/2 × 3/4	0.94	...	...	0.69	...	...	...	1.38	0.56
1/2 × 1/2 × 3/8	...	0.81	...	...	0.50	...	...	...	...
1/2 × 3/8	0.81	...	...	0.50	...	...	...	1.12	0.31
3/4 × 3/4 × 1	...	1.12	...	...	0.88	...	...	...	...
3/4 × 1	1.12	...	...	0.88	...	...	...	1.69	0.75
3/4 × 3/4 × 1/2	...	0.94	0.94	...	0.56	0.69	0.44	...	...
3/4 × 1/2	0.94	...	...	0.56	...	...	...	1.44	0.44
3/4 × 3/4 × 3/8	...	0.88	...	...	0.50	...	...	...	...
3/4 × 3/8	0.88	...	...	0.50	...	...	...	...	...
3/4 × 1/2 × 3/4	...	...	0.94	...	...	0.56	0.56	...	...
3/4 × 1/2 × 1/2	...	0.94	0.88	...	0.56	0.56	0.44	...	...
1 × 1 1/4	1.38	...	...	1.00	...	...	...	...	...
1 × 1 × 3/4	...	1.19	...	...	0.69	...	...	...	...
1 × 3/4	1.19	...	...	0.69	...	...	...	1.62	0.56
1 × 1 × 1/2	...	1.12	...	...	0.56	...	...	...	...
1 × 1 × 3/8	...	1.06	...	...	0.50	...	...	...	...
1 × 3/4 × 1	...	1.25	1.19	...	0.88	0.75	0.75	...	...
1 × 3/4 × 3/4	...	1.19	...	...	0.69	...	...	...	...
1 × 3/4 × 1/2	...	1.12	...	...	0.56	...	...	...	...
1 × 1/2 × 1	...	...	1.12	...	...	0.75	0.75	...	...
1 × 1/2	1.12	...	...	0.56	...	...	...	...	...
1 1/4 × 1 1/4 × 1	...	1.44	...	...	0.88	...	...	...	...
1 1/4 × 1	1.44	...	...	0.88	...	...	...	...	...
1 1/4 × 1 1/4 × 3/4	...	1.31	...	...	0.69	...	...	...	...
1 1/4 × 1 1/4 × 1/2	...	1.25	...	...	0.56	...	...	...	
1 1/4 × 1 1/4 × 3/8	...	1.19	...	...	0.50	...	...	...	...
1 1/4 × 3/4 × 1	...	...	1.19	...	...	0.88	0.75	...	...
1 1/2 × 1 1/2 × 1	...	1.50	1.38	...	0.88	1.12	0.75	...	...
1 1/2 × 1 1/2 × 3/4	...	1.44	...	...	0.69	...	...	...	...
1 1/2 × 1 1/2 × 1/2	...	1.38	...	...	0.56	...	...	...	...
1 1/2 × 3/4 × 1	...	...	1.19	...	...	1.00	0.75	...	...
2 × 2 × 1 1/2	...	1.88	...	...	1.12	...	...	...	...
2 × 2 × 1	...	1.75	...	...	0.88	...	...	...	...
2 × 2 × 3/4	...	1.69	...	...	0.69	...	...	...	...
2 × 2 × 1/2	...	1.62	...	...	0.56	...	...	...	...
2 1/2 × 2 1/2 × 3/4	...	2.06	...	...	0.69	...	...	...	...

(continued)

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TABLE 11 (CONT'D)

GENERAL NOTES:
(a) For reference, see Table 11 Illustration beginning on page 17.
(b) Dimensions are in inches.
(c) For dimensions of threaded ends, see ASME B16.15. For configuration of threaded ends, see Section 10. For dimensions of solder joint ends, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For threads of threaded ends, see Section 8.
(3) For inspection tolerance, see Section 8 and Table 2.

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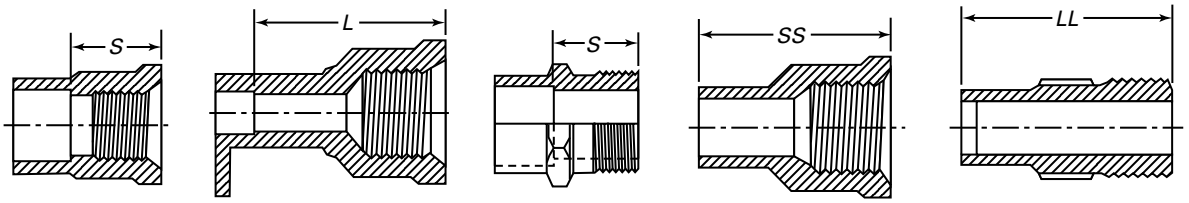

Adapter C × F | **Hi-Ear Adapter C × F [Note (2)]** | **Adapter C × M** | **Fitting Adapter FTG × F** | **Fitting Adapter FTG × M**

TABLE 12 DIMENSIONS OF SOLDER JOINT ADAPTERS AND FITTING ADAPTERS WITH PIPE THREAD ENDS (STRAIGHT AND REDUCING SIZES)

Standard Water Tube and Pipe Thread Size [Note (1)]		Shoulder-to-End	End-to-End		End-to-Tube Stop
Solder Joint	Pipe Thread	*S*	*SS*	*LL*	*L*
1/4	3/8	0.62	. . .	. . .	. . .
1/4	1/4	0.62	. . .	1.00	. . .
3/8	1/2	0.75	. . .	1.25	. . .
3/8	3/8	0.62	1.06	1.12	. . .
1/2	1	1.00	. . .	. . .	. . .
1/2	3/4	0.88	1.44	1.47	. . .
1/2	1/2	0.75	1.38	1.38	1.25
1/2	3/8	0.62	1.22	1.25	. . .
3/4	1	1.00	1.81	1.91	. . .
3/4	3/4	0.88	1.66	1.72	. . .
3/4	1/2	0.75	1.62	1.62	. . .
1	1 1/4	1.06	2.09	2.16	. . .
1	1	1.00	1.97	2.09	. . .
1	3/4	0.88	1.81	1.91	. . .
1 1/4	2	1.12	. . .	2.38	. . .
1 1/4	1 1/2	1.06	2.22	2.28	. . .
1 1/4	1 1/4	1.06	2.03	2.22	. . .
1 1/4	1	1.06	2.03	2.12	. . .
1 1/2	2	1.12	. . .	2.50	. . .
1 1/2	1 1/2	1.06	2.22	2.41	. . .
1 1/2	1 1/4	1.06	2.22	2.34	. . .
1 1/2	1	1.00	. . .	2.25	. . .
2	2	1.12	2.53	2.75	. . .
2	1 1/2	1.12	. . .	2.66	. . .
2 1/2	2 1/2	1.38	3.09	3.12	. . .
3	3	1.50	3.22	3.41	. . .
4	4	1.69	3.81	4.12	. . .
6	6	2.00	5.34	5.75	. . .
8	8	2.25	. . .	. . .	. . .

(continued)

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TABLE 12 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For threaded ends, see Section 9.
(c) For dimensions of threaded ends, see ASME B16.15, Class 125. For sizes not listed in ASME B16.15, Class 125, refer to ASME B16.3, Class 150. For configuration of threaded ends, see Section 10. For dimensions of solder joint ends, see Table 3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) Hi-ear fittings are designed for use with $^{9}/_{16}$ in. maximum width strap.

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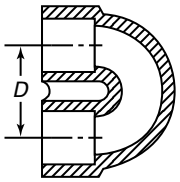
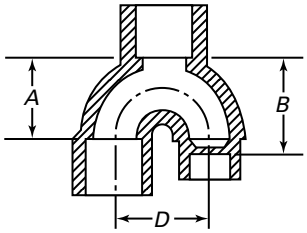


Return Bend
C × C



Supply & Return Tee
C × C × C

TABLE 13 DIMENSIONS OF RETURN BENDS (STRAIGHT SIZES)

Standard Water Tube Size [Note (1)]	Center-to-Center, *D*
1/2	1.00
3/4	1.31
1	1.88
1 1/4	2.00
1 1/2	2.50
2	3.00
3	4.00
4	5.00

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.

NOTE:
(1) For size designation of fitting, see Section 4.

TABLE 14 DIMENSIONS OF SUPPLY AND RETURN TEES

Standard Water Tube Size [Note 1]	Laying Lengths		Center-to-Center, *D*
	A	*B*	
1/2	0.81	0.81	1.00
3/4	1.09	1.09	1.31
3/4 × 3/4 × 1/2	1.09	1.09	1.31
3/4 × 1/2 × 1/2	1.09	1.28	1.31

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.

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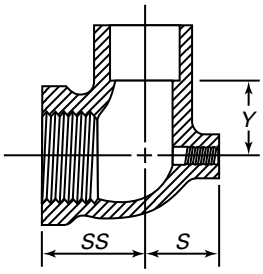


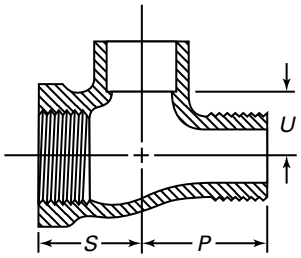
Baseboard Tee
F × F × C

TABLE 15 DIMENSIONS OF BASEBOARD TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	SS	*S*	*Y*
$\frac{1}{2} \times \frac{1}{8} \times 1$	1.12	0.81	0.56
$\frac{1}{2} \times \frac{1}{8} \times \frac{3}{4}$	0.94	0.69	0.56
$\frac{3}{4} \times \frac{1}{8} \times 1$	1.19	0.81	0.69
$\frac{3}{4} \times \frac{1}{8} \times \frac{3}{4}$	1.00	0.69	0.69
$1\frac{1}{4} \times \frac{1}{8} \times 1\frac{1}{4}$	1.84	0.94	0.88

GENERAL NOTES:
(a) Dimensions are inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Sections 8, 9 and Table 3.

NOTE:
(1) For size designation of fittings, see Section 4.



Tee
F × M × C

TABLE 16 DIMENSIONS OF TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	U	*P*	*S*
$\frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$	0.69	1.22	0.97
$\frac{3}{4}$	0.69	1.34	1.00
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	0.69	1.22	0.97

GENERAL NOTE:
(a) Dimensions are inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Sections 8, 9 and Table 3.

NOTE:
(1) For size designation of fittings, see Section 4.

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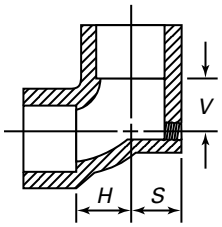

Baseboard Tee
C × F × C

TABLE 17 DIMENSIONS OF BASEBOARD TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	H	*S*	*V*
3/8 × 1/8 × 3/8	0.59	0.97	0.59
1/2 × 1/8 × 1	0.75	0.81	0.44
1/2 × 1/8 × 3/4	0.56	0.69	0.44
1/2 × 1/8 × 1/2	0.44	0.56	0.44
3/4 × 1/8 × 1 1/4	0.81	0.94	0.56
3/4 × 1/8 × 1	0.75	0.81	0.62
3/4 × 1/8 × 3/4	0.56	0.69	0.56
1 × 1/8 × 1	0.72	0.75	0.72
1 1/4 × 1/8 × 1 1/4	0.88	0.94	0.88

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Sections 8, 9 and Table 3.

NOTE:
(1) For size designations of fittings, see Section 4.

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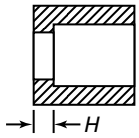


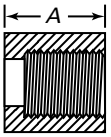
Flush Bushing
FTG × C

TABLE 18 DIMENSIONS OF FLUSH BUSHINGS

Standard Water Tube Size [Note (1)]	Laying Length, *H*
1/4 × 1/8	0.06
3/8 × 1/4	0.06
1/2 × 3/8	0.09
1/2 × 1/4	0.25
5/8 × 1/2	0.06
3/4 × 5/8	0.19
3/4 × 1/2	0.09
3/4 × 3/8	0.44
1 × 3/4	0.12
1 × 1/2	0.47
1 1/4 × 1	0.09
1 1/2 × 1 1/4	0.16
2 × 1 1/2	0.12

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Section 8 and Table 3.

NOTE:
(1) For size designation of fittings, see Section 4.



Flush Bushing
FTG × F

TABLE 19 DIMENSIONS OF FLUSH BUSHINGS

Standard Water Tube Size [Note (1)]	Laying Length, *A*
1/2 × 1/8	0.56
3/4 × 3/8	0.81
1 × 1/2	0.97
1 1/4 × 3/4	1.03
1 1/2 × 1	1.16
2 × 1 1/2	1.41

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given in this table, see Table 3.
(c) For inspection tolerances, see Sections 8, 9 and Table 3.

NOTE:
(1) For size designation of fittings, see Section 4.

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NONMANDATORY ANNEX A
STRENGTH OF SOLDER JOINTS

The maximum recommended pressure–temperature ratings for solder joints made with copper tube and cast copper alloy pressure fittings, using representative commercial solders, are listed in Table A1. These pressure/temperature ratings are based on solder joints made in accordance with the requirements of ASTM B 828.

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TABLE A1 PRESSURE–TEMPERATURE RATINGS

Joining Material	Working Temperature °F	Working Temperature °C	Maximum Working Gage Pressure, for Standard Water Tube Sizes (1) ⅛ Through 1 psi	⅛ Through 1 kPa	1¼ Through 2 psi	1¼ Through 2 kPa	2½ Through 4 psi	2½ Through 4 kPa	5 Through 8 psi	5 Through 8 kPa	10 Through 12 psi	10 Through 12 kPa
Alloy Sn50 50-50 tin-lead solder (2, 3)	100	38	200	1375	175	1205	150	1030	135	930	100	685
	150	66	150	1030	125	860	100	685	90	620	70	480
	200	93	100	685	90	620	75	515	70	480	50	340
	250	120	85	585	75	515	50	340	45	310	40	275
Alloy Sb5 95-5 tin-antimony solder (4)	100	38	1090 (9)	7540 (9)	850 (8)	5880 (8)	705 (8)	4880 (8)	660 (8)	4555 (8)	500 (9)	3460 (9)
	150	66	625 (10)	4315 (10)	485 (10)	3365 (10)	405 (10)	2790 (10)	375 (10)	2605 (10)	285 (12)	1975 (11)
	200	93	505 (11)	3500 (11)	395 (10)	2730 (10)	325 (10)	2265 (10)	305 (10)	2115 (10)	230 (11)	1605 (11)
	250	120	270	1885	210	1475	175	1220	165	1135	125	865
Alloy E (5)	100	38	710 (10)	4905 (10)	555 (10)	3825 (10)	460 (10)	3175 (10)	430 (10)	2965 (10)	325 (11)	2255 (11)
	150	66	475 (11)	3275 (11)	370 (10)	2550 (10)	305 (10)	2115 (10)	285 (11)	1975 (11)	215 (11)	1500 (11)
	200	93	375	2595	290	2025	240 (11)	1680 (11)	225 (11)	1570 (11)	170	1190
	250	120	320	2230	250	1735	205	1440	195	1340	145	1020
Alloy HB (6)	100	38	1035 (9)	7135 (9)	805 (8)	5560 (8)	670 (8)	4615 (8)	625 (9)	4305 (9)	475 (9)	3275 (9)
	150	66	710 (10)	4905 (10)	555 (10)	3825 (10)	460 (10)	3175 (10)	430 (10)	2965 (10)	325 (10)	2255 (10)
	200	93	440 (11)	3045 (11)	345 (11)	2375 (11)	285 (11)	1970 (11)	265 (11)	1840 (11)	200	1400
	250	120	430 (11)	2970 (11)	335 (11)	2315 (11)	275 (11)	1920 (11)	260 (11)	1800 (11)	195	1365
Joining materials melting at or above 1100°F (593°C) (7)	Pressure–temperature ratings consistent with the materials and procedures employed.											

GENERAL NOTE: For extremely low working temperatures in the 0°F to minus 200°F (minus 18°C to minus 93°C) range, it is recommended that a joint material melting at or above 1100°F (593°C) be employed [see Note (7)].

NOTES:
(1) Standard water tube sizes per ASTM B 88.
(2) ASTM B 32 Alloy Grade Sn50.
(3) The Safe Drinking Water Act Amendment of 1986 prohibits the use in potable water systems of any solder having a lead content in excess of 0.2%.
(4) ASTM B 32 Alloy Grade Sb5.
(5) ASTM B 32 Alloy Grade E.
(6) ASTM B 32 Alloy Grade HB.
(7) These joining materials are defined as *brazing alloys* by the American Welding Society.
(8) The solder joint exceeds the strength of Types K, L, and M tube in drawn and annealed tempers.
(9) The solder joint exceeds the strength of Types L and M tube in drawn temper and Type K tube in annealed temper.
(10) The solder joint exceeds the strength of Type M tube in drawn temper and Types K and L tube in annealed temper.
(11) The solder joint exceeds the strength of Type L tube in annealed temper.

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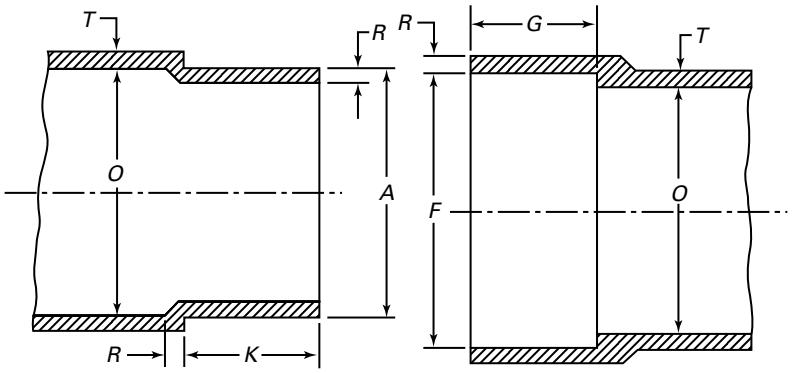
NONMANDATORY ANNEX B
METRIC (SI) TABLES

(Table designators with the prefix "B" correspond to the table numbers in the body of the standard.)



Male End (FTG) (a) **Female End (C) (b)**

TABLE B3 DIMENSIONS OF SOLDER JOINT ENDS

Standard Water Tube Size [Note (1)]	Male End			Female End			Metal Thickness [Note (3)]		Inside Diameter of Fitting, *O*
	Outside Diameter [Note (2)], *A*		Length, *K*	Inside Diameter, *F*		Depth, *G*	Body, *T*	Joint, *R*	
	Min.	Max.	Min.	Min.	Max.	Min.			Min.
1/4	9.47	9.55	9.5	9.58	9.68	8.0	2.0	1.3	7.9
3/8	12.62	12.73	11.0	12.75	12.85	9.5	2.3	1.3	10.9
1/2	15.80	15.90	14.5	15.93	16.03	12.5	2.3	1.3	13.7
3/4	22.15	22.25	20.5	22.28	22.38	19.0	2.5	1.5	19.8
1	28.50	28.63	24.5	28.65	28.75	23.0	2.8	1.8	25.9
1 1/4	34.85	34.98	26.0	35.00	35.10	24.5	3.0	1.8	32.0
1 1/2	41.17	41.33	29.5	41.35	41.48	28.0	3.3	2.0	38.1
2	53.87	54.03	35.5	54.05	54.18	34.0	3.8	2.3	50.3
2 1/2	66.57	66.73	39.0	66.75	66.88	37.5	4.3	2.5	62.5
3	79.27	79.43	43.5	79.45	79.58	42.0	4.8	2.8	74.7
3 1/2	91.97	92.13	50.0	92.15	92.28	48.5	5.1	3.0	86.9
4	104.67	104.83	56.5	104.85	104.98	55.0	5.6	3.3	99.1
5	130.07	130.23	69.0	130.25	130.38	67.5	7.1	4.3	123.7
6	155.47	155.63	82.0	155.65	155.78	78.5	8.6	5.1	148.3
8	206.22	206.43	104.0	206.45	206.58	101.0	9.5	7.9	196.1
10	257.02	257.23	104.6	257.25	257.38	101.6	12.2	12.2	244.3
12	307.82	308.03	117.3	308.05	308.18	114.3	14.2	14.2	293.6

(continued)

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TABLE B3 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in milimeters.
(b) The sketches and designs of fittings are illustrative only. Dimensions herin shall govern in all cases.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For ovality and gaging tolerances, see Section 8.
(3) For metal thickness, see Section 7.

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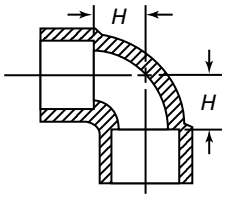
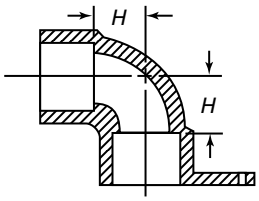
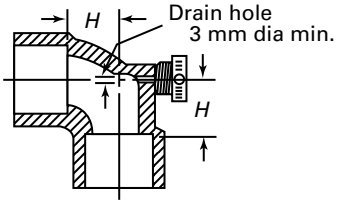


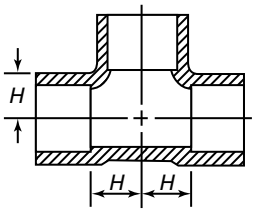
90 deg Elbow
C × C



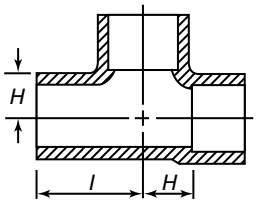
90 deg Hi-Ear Elbow
C × C
[Note (3)]



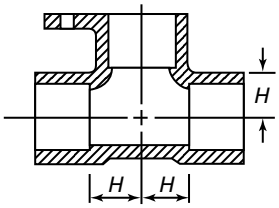
90 deg Drain Elbow
C × C



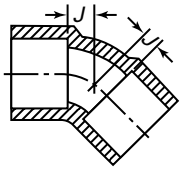
Tee
C × C × C



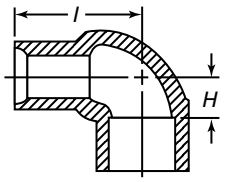
Fitting Tee
FTG × C × C



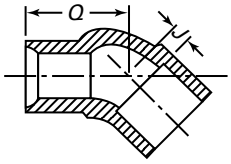
Hi-Ear Tee
C × C × C
[Note (3)]



45 deg Elbow
C × C



90 deg Elbow
FTG × C



45 deg Elbow
FTG × C

TABLE B4 DIMENSIONS OF ELBOWS, TEES, AND 45 deg ELBOWS

Standard Water Tube Size [Note (1)]	Laying Length Tee and 90 deg Elbow [Note (2)], *H*	Center-to-End 90 deg Elbow and Tee, [Note (2)], *I*	Laying Length 45 deg Elbow [Note (2)], *J*	Center-to-End 45 deg Elbow [Note (2)], *Q*
1/4	6.5	19.0	. . .	. . .
3/8	8.0	22.0	5.0	19.0
1/2	11.0	28.5	5.0	22.0
3/4	14.5	38.0	6.5	30.0
1	19.0	47.0	8.0	33.5
1 1/4	22.0	51.5	11.0	39.5
1 1/2	25.5	58.0	12.5	44.5
2	32.0	70.5	14.5	54.0
2 1/2	38.0	80.0	16.0	. . .
3	44.5	91.5	19.0	. . .
3 1/2	51.0	. . .	22.0	. . .
4	57.0	116.5	24.0	. . .
5	79.5	. . .	36.5	. . .
6	92.0	. . .	41.5	. . .
8	124.0	. . .	54.0	. . .

(continued)

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TABLE B4 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.
(3) Hi-ear fittings are designed for use with 14mm maximum width strap.

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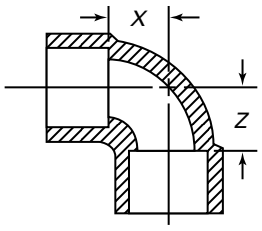

90 deg Elbow
C × C

TABLE B5 DIMENSIONS OF REDUCING 90 deg ELBOWS

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]	
	X	*Z*
3/8 × 1/4	6.5	8.0
1/2 × 3/8	9.5	11.0
3/4 × 1/2	11.0	14.5
1 × 3/4	16.0	19.0
1 × 1/2	12.5	19.0
1 1/4 × 1	19.0	22.0
1 1/4 × 3/4	16.0	22.0
1 1/4 × 1/2	12.5	22.0
1 1/2 × 1 1/4	22.0	25.5
1 1/2 × 1	19.0	25.5
1 1/2 × 3/4	16.0	25.5
2 × 1 1/2	25.5	31.5
2 × 1 1/4	22.0	31.5
2 × 1	19.0	31.5
2 × 3/4	16.0	31.5
2 1/2 × 2	31.5	38.0
2 1/2 × 1 1/2	25.5	38.0
2 1/2 × 1 1/4	22.0	38.0
2 1/2 × 1	19.0	38.0
3 × 2 1/2	38.0	44.5
3 × 2	31.5	44.5
3 × 1 1/2	25.5	44.5
3 × 1 1/4	22.0	44.5
4 × 3	44.5	57.0
4 × 2 1/2	38.0	57.0
4 × 2	31.5	57.0
6 × 4	66.5	92.0
6 × 3	51.0	92.0
8 × 6	98.5	124.0

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.

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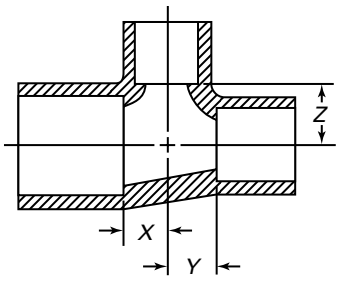

Tee
C × C × C

TABLE B6 DIMENSIONS OF REDUCING TEES

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]			Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]		
	X	*Y*	*Z*		*X*	*Y*	*Z*
3/8 × 3/8 × 1/2	11.0	11.0	9.5	1 1/4 × 3/4 × 3/4	16.0	16.0	22.0
3/8 × 3/8 × 1/4	6.5	6.5	8.0	1 1/4 × 1/2 × 1 1/4	22.0	22.0	22.0
1/2 × 1/2 × 3/4	14.5	14.5	11.0	1 1/4 × 1/2 × 1	19.0	19.0	22.0
1/2 × 1/2 × 3/8	9.5	9.5	11.0	1 1/2 × 1 1/2 × 2 1/2	38.0	38.0	25.5
1/2 × 1/2 × 1/4	8.0	8.0	11.0	1 1/2 × 1 1/2 × 2	32.0	32.0	25.5
1/2 × 3/8 × 1/2	11.0	11.0	11.0	1 1/2 × 1 1/2 × 1 1/4	22.0	22.0	25.5
1/2 × 3/8 × 3/8	9.5	9.5	11.0	1 1/2 × 1 1/2 × 1	19.0	19.0	25.5
3/4 × 3/4 × 1	19.0	19.0	16.0	1 1/2 × 1 1/2 × 3/4	16.0	16.0	25.5
3/4 × 3/4 × 1/2	11.0	11.0	14.5	1 1/2 × 1 1/2 × 1/2	12.5	12.5	25.5
3/4 × 3/4 × 3/8	9.5	9.5	14.5	1 1/2 × 1 1/4 × 1 1/2	25.5	25.5	25.5
3/4 × 1/2 × 3/4	14.5	14.5	14.5	1 1/2 × 1 1/4 × 1 1/4	22.0	22.0	25.5
3/4 × 1/2 × 1/2	11.0	11.0	14.5	1 1/2 × 1 1/4 × 1	19.0	19.0	25.5
3/4 × 1/2 × 3/8	9.5	9.5	14.5	1 1/2 × 1 1/4 × 3/4	16.0	16.0	25.0
1 × 1 × 1/2	25.5	25.5	19.0	1 1/2 × 1 1/4 × 1/2	12.5	12.5	25.5
1 × 1 × 1 1/4	22.0	22.0	19.0	1 1/2 × 1 × 1 1/2	25.5	25.5	25.5
1 × 1 × 3/4	16.0	16.0	19.0	1 1/2 × 1 × 1 1/4	22.0	22.0	25.5
1 × 1 × 1/2	12.5	12.5	19.0	1 1/2 × 1 × 1	19.0	19.0	25.5
1 × 1 × 3/8	11.0	11.0	19.0	1 1/2 × 3/4 × 1 1/2	25.5	25.5	25.5
1 × 3/4 × 1	19.0	19.0	19.0	1 1/2 × 1/2 × 1 1/2	25.5	25.0	25.5
1 × 3/4 × 3/4	16.0	16.0	19.0	2 × 2 × 4	57.0	57.0	32.0
1 × 3/4 × 1/2	12.5	12.5	19.0	2 × 2× 3	44.5	44.5	32.0
1 × 1/2 × 1	19.0	19.0	19.0	2 × 2× 2 1/2	38.0	38.0	32.0
1 × 1/2 × 3/4	16.0	16.0	19.0	2 × 2 × 1 1/2	25.5	25.5	32.0
1 × 1/2 × 1/2	12.5	12.5	19.0	2 × 2 × 1 1/4	22.0	22.0	32.0
1 1/4 × 1 1/4 × 2	32.0	32.0	22.0	2 × 2 × 1	19.0	19.0	32.0
1 1/4 × 1 1/4 × 1 1/2	25.5	25.5	22.0	2 × 2 × 3/4	16.0	16.0	32.0
1 1/4 × 1 1/4 × 1	19.0	19.0	22.0	2 × 2 × 1/2	12.5	12.5	32.0
1 1/4 × 1 1/4 × 3/4	16.0	16.0	22.0	2 × 1 1/2 × 2	32.0	32.0	32.0
1 1/4 × 1 1/4 × 1/2	12.5	12.5	22.0	2 × 1 1/2 × 1 1/2	25.5	25.5	32.0
1 1/4 × 1 × 1 1/4	22.0	22.0	22.0	2 × 1 1/2 × 1 1/4	22.0	22.0	32.0
1 1/4 × 1 × 1	19.0	19.0	22.0	2 × 1 1/2 × 1	19.0	19.0	32.0
1 1/4 × 1 × 3/4	16.0	16.0	22.0	2 × 1 1/2 × 3/4	16.0	16.0	32.0
1 1/4 × 1 × 1/2	12.5	12.5	22.0	2 × 1 1/2 × 1/2	12.5	12.5	32.0
1 1/4 × 3/4 × 1 1/4	22.0	22.0	22.0	2 × 1 1/4 × 2	32.0	32.0	32.0
1 1/4 × 3/4 × 1	19.0	19.0	22.0	2 × 1 1/4 × 1 1/2	25.5	25.5	32.0

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TABLE B6 DIMENSIONS OF REDUCING TEES (CONT'D)

Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]			Standard Water Tube Size [Note (1)]	Laying Length [Note (2)]		
	X	*Y*	*Z*		*X*	*Y*	*Z*
2 × 1¼ × 1¼	22.0	22.0	32.0	3 × 2 × 1½	25.5	25.0	44.5
2 × 1 × 2	32.0	32.0	32.0	3 × 1½ × 3	44.5	44.5	44.5
2 × ¾ × 2	32.0	32.0	32.0	3 × 1¼ × 3	44.5	44.5	44.5
2 × ½ × 2	32.0	32.0	32.0	3 × 1 × 3	44.5	44.5	44.5
2½ × 2½ × 4	57.0	57.0	38.0	3½ × 3½ × 3	44.5	44.5	51.0
2½ ×2½ ×3	44.5	44.5	38.0	3½ × 3 × 3½	51.0	51.0	51.0
2½ × 2½ × 2	32.0	32.0	38.0	4 × 4 × 6	92.0	92.0	66.0
2½ × 2½ × 1½	25.5	25.5	38.0	4 × 4 × 3	44.5	44.5	57.0
2½ × 2½ × 1¼	22.0	22.0	38.0	4 × 4 ×2½	38.0	38.0	57.0
2½ × 2½ ×1	19.0	19.0	38.0	4 × 4 × 2	32.0	32.0	57.0
2½ × 2½ × ¾	16.0	16.0	38.0	4 × 4 × 1½	25.5	25.5	57.0
2½ × 2½ × ½	12.5	12.5	38.0	4 × 4 × 1¼	22.0	22.0	57.0
2½ × 2 × 2½	38.0	38.0	38.0	4 × 4 × 1	19.0	19.0	57.0
2½ × 2 × 2	32.0	32.0	38.0	4 × 4 × ¾	16.0	16.0	57.0
2½ × 2 × 1½	25.5	25.5	38.0	4 × 3 × 4	57.0	57.0	57.0
2½ × 2 × 1¼	22.0	22.0	38.0	4 × 3 ×3	44.5	44.5	57.0
2½ × 2 × 1	19.0	19.0	38.0	4 × 3 × 2½	38.0	38.0	57.0
2½ × 2 × ¾	16.0	16.0	38.0	4 × 3 × 2	32.0	32.0	57.0
2½ × 2 × ½	12.5	12.5	38.0	4 × 2½ × 4	57.0	57.0	57.0
2½ × 1½ × 2½	38.0	38.0	38.0	4 × 2 × 4	57.0	57.0	57.0
2½ × 1½ × 2	32.0	32.0	38.0	4 × 2 × 3	44.5	44.5	57.0
2½ × 1½ × 1½	25.5	25.5	38.0	4 × 2 × 2	32.0	32.0	57.0
2½ × 1¼ × 2½	38.0	38.0	38.0	4 × 1½ × 4	57.0	57.0	57.0
2½ × 1 × 2½	38.0	38.0	38.0	4 × 1¼ × 4	57.0	57.0	57.0
2½ × ¾ × 2½	38.0	38.0	38.0	4 × 1 × 4	57.0	57.0	57.0
2½ × ½ × 2½	38.0	38.0	38.0	5 × 5 × 4	66.0	66.0	79.5
3 × 3 × 4	57.0	57.0	44.5	5 × 4 × 5	79.5	79.5	79.5
3 × 3 × 2½	38.0	38.0	44.5	6 × 6 × 8	124.0	124.0	98.5
3 × 3 × 2	32.0	32.0	44.5	6 × 6 × 4	66.5	66.5	92.0
3 × 3 × 1½	25.5	25.5	44.5	6 × 6 × 3	50.5	50.5	92.0
3 × 3 × 1¼	22.0	22.0	44.5	6 × 6 × 2½	47.5	47.5	92.0
3 × 3 × 1	19.0	19.0	44.5	6 × 6 × 2	41.5	41.5	92.0
3 × 3 × ¾	16.0	16.0	44.5	6 × 6 × 1½	35.0	35.0	92.0
3 × 3 × ½	12.5	12.5	44.5	6 × 6 × 1¼	32.0	32.0	92.0
3 × 2½ × 3	44.5	44.5	44.5	6 × 6 × 1	28.5	285	92.0
3 × 2½ × 2½	38.0	38.0	44.5	6 × 4 × 6	92.0	92.0	92.0
3 × 2½ × 2	32.0	32.0	44.5	6 × 4 × 4	66.5	66.5	92.0
3 × 2½ × 1½	25.5	25.5	44.5	6 × 3 × 6	92.0	92.0	92.0
3 × 2½ × 1¼	22.0	22.0	44.5	6 × 2½ × 6	92.0	92.0	92.0
3 × 2½ × 1	19.0	19.0	44.5	6 × 2 × 6	92.0	92.0	92.0
3 × 2 × 3	44.5	44.5	44.5	8 × 8 × 6	98.5	98.5	124.0
3 × 2 × 2½	38.0	38.0	44.5	8 × 8 × 4	73.0	73.0	124.0
3 × 2 × 2	32.0	32.0	44.5	. . .	. . .	. . .	. . .

(continued)

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TABLE B6 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For inspection tolerances, see Section 8 and Table 2.

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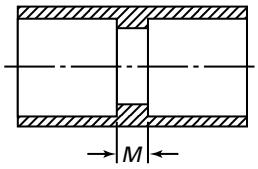
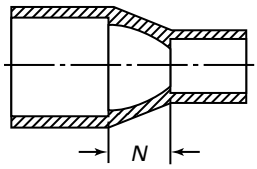
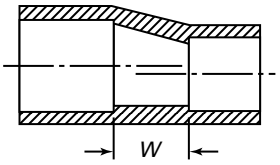


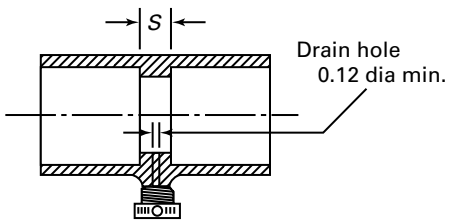
Coupling
C × C



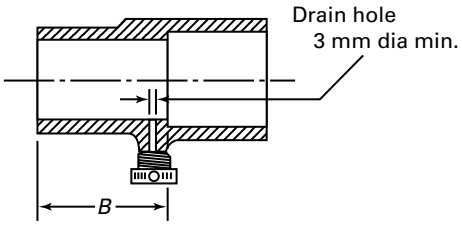
Reducing Coupling
C × C



Eccentric Coupling
C × C



Drain Coupling
C × C



Fitting Drain Coupling
FTG × C

TABLE B7 DIMENSIONS OF COUPLINGS

Straight		Reducing		Eccentric		Drain	
Standard Water Tube Size [Note (1)]	Laying Length [Note (2)], *M*	Standard Water Tube Size [Note (1)]	Laying Length Size [Note (2)]	Standard Water Tube Size [Note (1)]	Laying Length [Note(2)], *W*	Laying Length [Note(2)], *S*	Laying Length [Note(2)], *B*
1/4	1.5	3/4 × 1/2	8.0	3/4 × 1/2	16.0	6.5	. . .
3/8	1.5	1 × 3/4	9.5	1 × 3/4	17.5	6.5	. . .
1/2	3.0	1 1/4 × 1	9.5	1 1/4 × 1	19.0	6.5	25.5
3/4	3.0	1 1/4 × 3/4	9.5	1 1/4 × 3/4	19.0	6.5	32.5
1	3.0	1 1/2 × 1 1/4	9.5	1 1/2 × 1 1/4	17.5	6.5	. . .
1 1/4	3.0	1 1/2 × 1	9.5	1 1/2 × 1	17.5	6.5	. . .
1 1/2	3.0	1 1/2 × 3/4	11.0	2 × 1 1/2	28.5	6.5	. . .
2	4.5	2 × 1 1/2	12.5	2 × 1 1/4	24.0	. . .	. . .
2 1/2	4.5	2 × 1 1/4	12.5	2 1/2 × 2	30.0	. . .	. . .
3	4.5	2 × 1	12.5	3 × 2 1/2	32.0	. . .	. . .
3 1/2	6.5	2 × 3/4	12.5	3 × 2	33.5	. . .	. . .
4	6.5	2 1/2 × 2	14.5	4 × 3	51.0	. . .	. . .
5	6.5	2 1/2 × 1 1/2	14.5	. . .	. . .	. . .	. . .
6	6.5	2 1/2 × 1 1/4	16.0	. . .	. . .	. . .	. . .
8	16.0	2 1/2 × 1	16.0	. . .	. . .	. . .	. . .
. . .	. . .	3 × 2 1/2	16.0	. . .	. . .	. . .	. . .
. . .	. . .	3 × 2	16.0	. . .	. . .	. . .	. . .
. . .	. . .	4 × 3	17.5	. . .	. . .	. . .	. . .
. . .	. . .	4 × 2 1/2	28.5	. . .	. . .	. . .	. . .
. . .	. . .	4 × 2	30.0	. . .	. . .	. . .	. . .
. . .	. . .	6 × 4	33.5	. . .	. . .	. . .	. . .
. . .	. . .	8 × 6	35.0	. . .	. . .	. . .	. . .

(continued)

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TABLE B7 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in milimeters.
(b) For dimensions not given in this table, see Table B3.

NOTES:
(1) For size designation of fittings, see Section 4.
(2) For inspection tolerances, see Section 8 Table 2.

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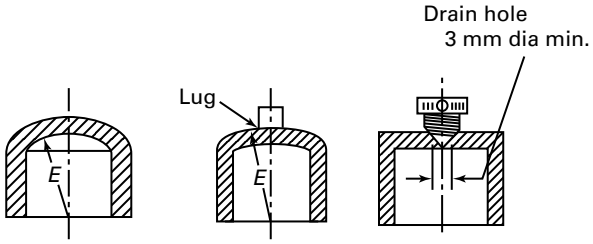

Cap C **Plug FTG** **Drain Cap C**

TABLE B8 DIMENSIONS OF CAPS AND PLUGS

Standard Water Tube Size [Note (1)]	Caps and Plugs Radius [Note (2)], *B*
1/4	9.5
3/8	12.5
1/2	16.0
3/4	22.0
1	28.5
1 1/4	35.0
1 1/2	41.5
2	54.0
2 1/2	66.5
3	79.5
3 1/2	92.0
4	105.0
5	130.0
6	155.5

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) Casting of lug or square on plugs shall be optional.

NOTES:
(1) For size designation of fitting see, Section 4.
(2) Caps may have either flat or rounded top.

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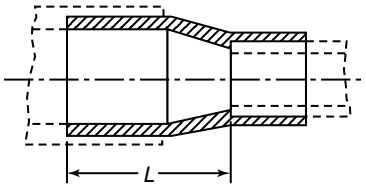

Fitting reducer
(or Bushing)
FTG × C

TABLE B9 DIMENSIONS OF FITTING REDUCERS

Standard Water Tube Size [Note (1)]	Length, *L*
$\frac{3}{8} \times \frac{1}{4}$	17.5
$\frac{1}{2} \times \frac{3}{8}$	24.0
$\frac{1}{2} \times \frac{1}{4}$	24.0
$\frac{3}{4} \times \frac{1}{2}$	30.0
$\frac{3}{4} \times \frac{3}{8}$	32.0
$1 \times \frac{3}{4}$	38.0
$1 \times \frac{1}{2}$	38.0
$1\frac{1}{4} \times 1$	41.5
$1\frac{1}{4} \times \frac{3}{4}$	41.5
$1\frac{1}{4} \times \frac{1}{2}$	41.5
$1\frac{1}{2} \times 1\frac{1}{4}$	46.0
$1\frac{1}{2} \times 1$	46.0
$1\frac{1}{2} \times \frac{3}{4}$	46.0
$2 \times 1\frac{1}{2}$	54.0
$2 \times 1\frac{1}{4}$	54.0
2×1	54.0
$2\frac{1}{2} \times 2$	60.5
$2\frac{1}{2} \times 1\frac{1}{2}$	60.5
$2\frac{1}{2} \times 1\frac{1}{4}$	60.5
$3 \times 2\frac{1}{2}$	66.5
3×2	66.5
$3 \times 1\frac{1}{2}$	66.5
4×3	87.5
$4 \times 2\frac{1}{2}$	87.5
4×2	87.5

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.

NOTE:
(1) For size designation of fitting, see Section 4.

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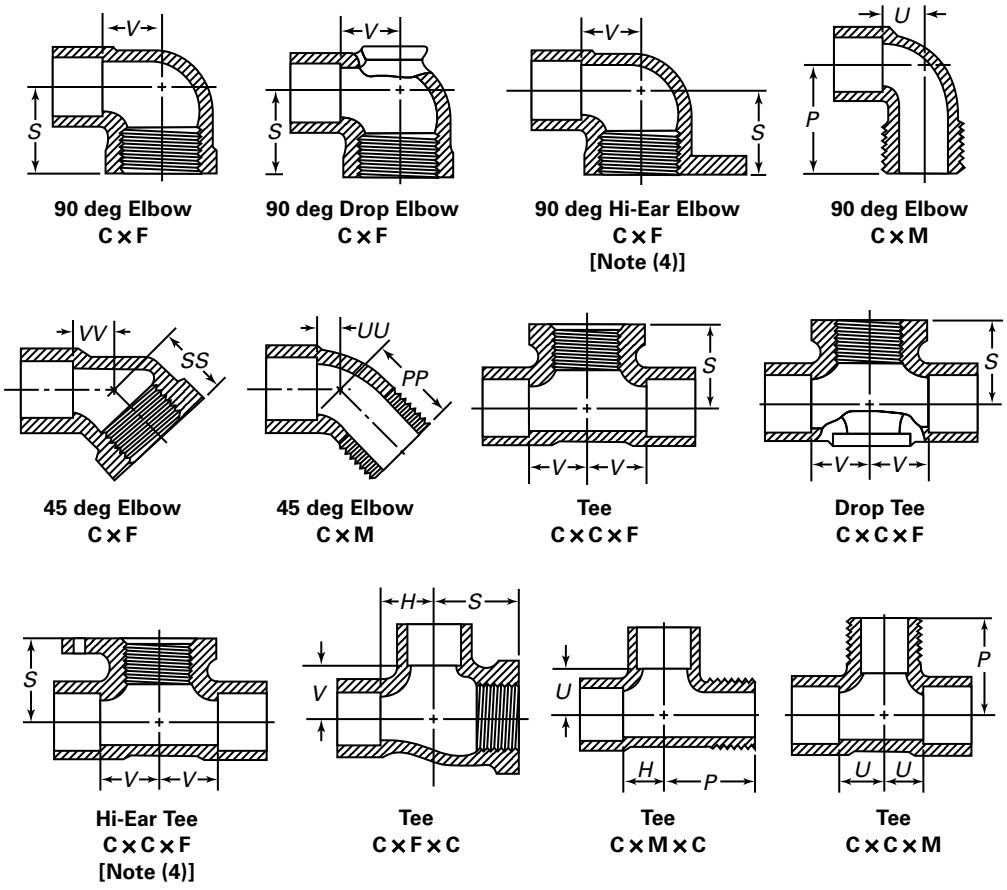

TABLE B10 AND B11 ILLUSTRATION

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TABLE B10 DIMENSIONS OF SOLDER JOINT ELBOWS AND TEES WITH PIPE THREAD ENDS (STRAIGHT SIZES)

Standard Water Tube and Pipe Thread Size [Note (1)]	Internal Threads [Note (2)]					External Threads [Note (2)]				
	Center-to-End [Note (3)]		Laying Length [Note (3)]			Center-to-End [Note (3)]		Laying Length [Note (3)]		
	Ell and Tee, *S*	45 deg Ell, *SS*	Ell and Tee, *V*	Tee, *H*	45 deg Ell, *VV*	Ell and Tee, *P*	45 deg Ell, *PP*	Ell and Tee, *U*	Tee, *H*	45 deg Ell, *UU*
1/4	14.5	. . .	9.5	. . .	. . .	24.0	. . .	6.5	. . .	. . .
3/8	17.5	17.5	11.0	8.0	4.5	27.0	20.5	8.0	8.0	4.5
1/2	22.0	24.0	14.5	11.0	4.5	33.5	25.5	11.0	11.0	4.5
3/4	25.5	25.5	17.5	14.5	6.5	38.0	30.0	14.5	14.5	6.5
1	32.0	30.0	22.0	19.0	8.0	41.5	33.5	19.0	19.0	8.0
1 1/4	38.0	. . .	25.5	22.0	. . .	51.0	. . .	22.0	. . .	. . .
1 1/2	41.5	. . .	28.5	25.5	. . .	55.5	. . .	25.5	. . .	. . .
2	49.0	. . .	35.0	32.0	. . .	66.5	. . .	32.0	. . .	. . .
2 1/2	63.5	. . .	41.5	. . .	. . .	. . .	. . .	. . .	. . .	. . .
3	71.5	. . .	49.0	. . .	. . .	. . .	. . .	. . .	. . .	. . .
4	87.5	. . .	62.0	. . .	. . .	. . .	. . .	. . .	. . .	. . .
6	124.0	. . .	98.5	. . .	. . .	. . .	. . .	. . .	. . .	. . .

GENERAL NOTES:
(a) For reference, see Table B10 Illustration beginning on page 40.
(b) Dimensions are in millimeters.
(c) For dimensions of threaded ends, see ASME B16.15. For configuration of threaded ends, see Section 10. For dimensions of solder joint ends, see Table B3.
(d) For dimensions of reducing tees and ells, see Table B11.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) For threads of threaded ends, see Section 9.
(3) For inspection tolerances, see Section 8 and Table 2.
(4) Hi-ear fittings are designed for use with 14 mm maximum width strap.

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TABLE B11 DIMENSIONS OF SOLDER JOINT ELBOWS AND TEES WITH PIPE THREAD ENDS (REDUCING SIZES)

Standard Water Tube and Pipe Thread Size [Note (1)]	Internal Threads [Note (2)]							External Threads [Note (2)]	
	Center-to-End			Laying Length [Note (3)]				Center–to–End	Laying Length [Note (3)]
	S			*V*			*H*	*P*	*U*
	90 deg Ell C-F	Tee C-C-F	Tee C-F-C	90 deg Ell C-F	Tee C-C-F	Tee C-F-C	Tee C-F-C	90 deg Ell C-M	90 deg Ell C-M
$\frac{3}{8} \times \frac{3}{8} \times \frac{1}{2}$	...	20.5	...	...	14.5	...	...	...	...
$\frac{3}{8} \times \frac{1}{2}$	20.5	...	...	14.5	...	...	...	32.0	11.0
$\frac{1}{2} \times \frac{1}{2} \times \frac{3}{4}$	...	23.5	...	...	17.5	...	...	...	...
$\frac{1}{2} \times \frac{3}{4}$	24.0	...	...	17.5	...	...	...	35.0	14.5
$\frac{1}{2} \times \frac{1}{2} \times \frac{3}{8}$	...	20.5	...	...	12.5	...	...	...	...
$\frac{1}{2} \times \frac{3}{8}$	20.5	...	...	12.5	...	...	...	28.5	8.0
$\frac{3}{4} \times \frac{3}{4} \times 1$	...	28.5	...	...	22.0	...	...	...	...
$\frac{3}{4} \times 1$	28.5	...	...	22.0	...	...	...	43.0	19.0
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	...	24.0	24.0	...	14.5	17.5	11.0	...	...
$\frac{3}{4} \times \frac{1}{2}$	24.0	...	...	14.5	...	...	...	36.5	11.0
$\frac{3}{4} \times \frac{3}{4} \times \frac{3}{8}$	...	22.0	...	...	12.5	...	...	...	...
$\frac{3}{4} \times \frac{3}{8}$	22.0	...	...	12.5	...	...	...	...	...
$\frac{3}{4} \times \frac{1}{2} \times \frac{3}{4}$	...	...	24.0	...	...	14.5	14.5	...	...
$\frac{3}{4} \times \frac{1}{2} \times \frac{1}{2}$	...	24.0	22.0	...	14.5	14.5	11.0	...	...
$1 \times 1\frac{1}{4}$	35.0	...	...	25.5	...	...	...	...	...
$1 \times 1 \times \frac{3}{4}$	...	30.0	...	...	17.5	...	...	...	...
$1 \times \frac{3}{4}$	30.0	...	...	17.5	...	...	...	41.5	14.5
$1 \times 1 \times \frac{1}{2}$	...	28.5	...	...	14.5	...	...	...	...
$1 \times 1 \times \frac{3}{8}$	...	27.0	...	...	12.5	...	...	...	...
$1 \times \frac{3}{4} \times 1$	...	32.0	30.0	...	22.0	19.0	19.0	...	...
$1 \times \frac{3}{4} \times \frac{3}{4}$	...	30.0	...	...	17.5	...	...	...	...
$1 \times \frac{3}{4} \times \frac{1}{2}$	...	28.5	...	...	14.5	...	...	...	...
$1 \times \frac{1}{2} \times 1$	...	...	28.5	...	...	19.0	19.0	...	...
$1 \times \frac{1}{2}$	28.5	...	...	14.5	...	...	...	...	...
$1\frac{1}{4} \times 1\frac{1}{4} \times 1$	...	36.5	...	...	22.0	...	...	...	...
$1\frac{1}{4} \times 1$	36.5	...	...	22.0	...	...	...	...	...
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{4}$	...	33.5	...	...	17.5	...	...	...	...
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{2}$	...	32.0	...	...	14.5	...	...	...	...
$1\frac{1}{4} \times 1\frac{1}{4} \times \frac{3}{8}$	...	30.0	...	...	12.5	...	...	...	...
$1\frac{1}{4} \times \frac{3}{4} \times 1$	...	...	30.0	...	...	22.0	19.0	...	...
$1\frac{1}{2} \times 1\frac{1}{2} \times 1$	...	38.0	35.0	...	22.0	28.5	19.0	...	...
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{3}{4}$	...	36.5	...	...	17.5	...	...	...	...
$1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{2}$	...	35.0	...	...	14.5	...	...	...	...
$1\frac{1}{2} \times \frac{3}{4} \times 1$	...	...	30.0	...	...	25.5	19.0	...	...
$2 \times 2 \times 1\frac{1}{2}$	...	47.5	...	...	28.5	...	...	...	...
$2 \times 2 \times 1$	...	44.5	...	...	22.0	...	...	...	...
$2 \times 2 \times \frac{3}{4}$	...	43.0	...	...	17.5	...	...	...	...
$2 \times 2 \times \frac{1}{2}$	...	41.5	...	...	14.5	...	...	...	...
$2\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{4}$	...	52.5	...	...	17.5	...	...	...	...

(continued)

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TABLE B11 (CONT'D)

GENERAL NOTES:
(a) For reference, see Table B11 Illustration beginning on page 40.
(b) Dimensions are in millimeters.
(c) For dimensions of threaded ends, see ASME B16.15. For configuration of threaded ends, see Section 10. For dimensions of solder joint ends, see Table B3.

NOTES:
(1) For designation of fitting, see Section 4.
(2) For threads of threaded ends, see Section 9.
(3) For inspection tolerance, see Section 8 and Table 2.

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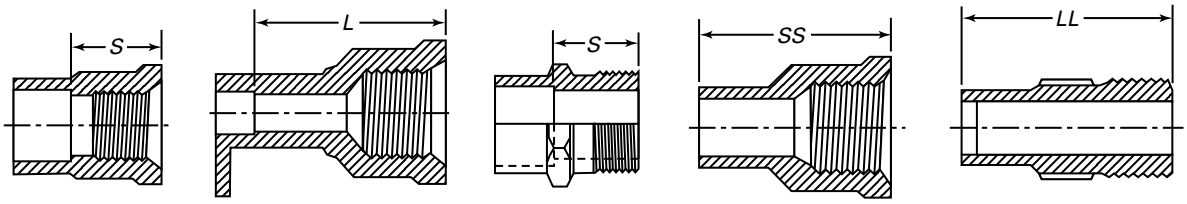

Adapter C × F | **Hi-Ear Adapter C × F [Note (2)]** | **Adapter C × M** | **Fitting Adapter FTG × F** | **Fitting Adapter FTG × M**

TABLE B12 DIMENSIONS OF SOLDER JOINT ADAPTERS AND FITTING ADAPTERS WITH PIPE THREAD ENDS (STRAIGHT AND REDUCING SIZES)

Standard Water Tube and Pipe Thread Size [Note (1)]		Shoulder-to-End	End-to-End		End-to-Tube Stop
Solder Joint	Pipe Thread	*S*	*SS*	*LL*	*L*
1/4	3/8	16.0	. . .	. . .	. . .
1/4	1/4	16.0	. . .	25.5	. . .
3/8	1/2	19.0	. . .	32.0	. . .
3/8	3/8	16.0	27.0	28.5	. . .
1/2	1	25.5	. . .	. . .	. . .
1/2	3/4	22.0	36.5	37.5	. . .
1/2	1/2	18.0	35.0	35.0	32.0
1/2	3/8	16.0	31.0	32.0	. . .
3/4	1	25.5	46.0	48.5	. . .
3/4	3/4	22.0	42.0	43.5	. . .
3/4	1/2	19.0	41.5	41.5	. . .
1	1 1/4	27.0	53.0	55.0	. . .
1	1	25.5	50.0	53.0	. . .
1	3/4	22.0	46.0	48.5	. . .
1 1/4	2	28.5	. . .	60.5	. . .
1 1/4	1 1/2	27.0	56.5	58.0	. . .
1 1/4	1 1/4	27.0	51.5	56.5	. . .
1 1/4	1	27.0	51.5	54.0	. . .
1 1/2	2	28.5	. . .	63.5	. . .
1 1/2	1 1/2	27.0	56.5	61.0	. . .
1 1/2	1 1/4	27.0	56.5	59.5	. . .
1 1/2	1	25.5	. . .	57.0	. . .
2	2	28.5	64.5	70.0	. . .
2	1 1/2	28.5	. . .	67.5	. . .
2 1/2	2 1/2	35.0	78.5	79.5	. . .
3	3	38.0	82.0	86.5	. . .
4	4	43.0	97.0	105.0	. . .
6	6	50.5	135.5	146.0	. . .
8	8	57.0	. . .	. . .	. . .

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TABLE B12 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For threaded ends, see Section 9.
(c) For dimensions of threaded ends, see ASME B16.15, Class 125. For sizes not listed in ASME B16.15, Class 125, refer to ASME B16.3, Class 150. For configuration of threaded ends, see Section 10. For dimensions of solder joint ends, see Table B3.

NOTES:
(1) For size designation of fitting, see Section 4.
(2) Hi-ear fittings are designed for use with 14 mm maximum width strap.

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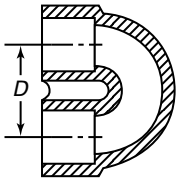


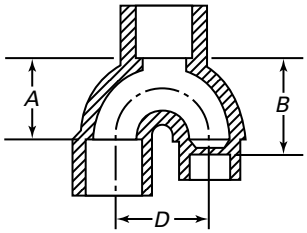
Return Bend
C × C

TABLE B13 DIMENSIONS OF RETURN BENDS (STRAIGHT SIZES)

Standard Water Tube Sizes [Note (1)]	Center-to-Center, *D*
1/2	25.5
3/4	33.5
1	47.5
1 1/4	51.0
1 1/2	63.5
2	76.0
3	101.5
4	127.0

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.

NOTE:
(1) For size designation of fitting, see Section 4.



Supply & Return Tee
C × C × C

TABLE B14 DIMENSIONS OF SUPPLY AND RETURN TEES

Standard Water Tube Size [Note(1)]	Laying Lengths		Center-to-Center,
	A	*B*	*D*
1/2	20.5	20.5	25.5
3/4	28.0	28.0	33.5
3/4 × 3/4 × 1/2	28.0	28.0	33.5
3/4 × 1/2 × 1/2	28.0	32.5	33.5

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.

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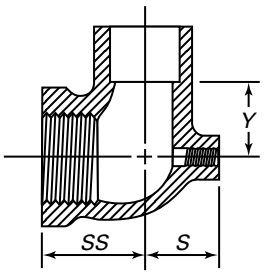


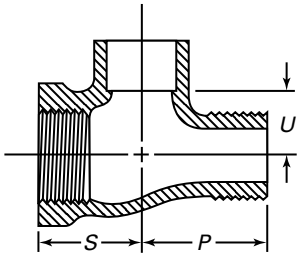
Baseboard Tee
F × F × C

TABLE B15 DIMENSIONS OF BASEBOARD TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	SS	*S*	*Y*
$\frac{1}{2} \times \frac{1}{8} \times 1$	28.5	20.5	14.5
$\frac{1}{2} \times \frac{1}{8} \times \frac{3}{4}$	24.0	17.5	14.5
$\frac{3}{4} \times \frac{1}{8} \times 1$	30.0	20.5	17.5
$\frac{3}{4} \times \frac{1}{8} \times \frac{3}{4}$	25.5	17.5	17.5
$1\frac{1}{4} \times \frac{1}{8} \times 1\frac{1}{4}$	47.0	24.0	22.0

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.



Tee
F × M × C

TABLE B16 DIMENSIONS OF TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	U	*P*	*S*
$\frac{1}{2} \times \frac{3}{4} \times \frac{1}{2}$	17.5	31.0	24.5
$\frac{3}{4}$	17.5	34.0	25.5
$\frac{3}{4} \times \frac{3}{4} \times \frac{1}{2}$	17.5	31.0	24.5

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.

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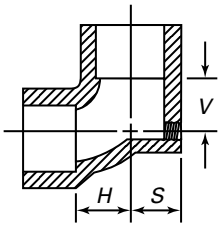


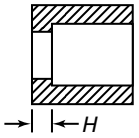
Baseboard Tee
C × F × C

TABLE B17 DIMENSIONS OF BASEBOARD TEES

Standard Water Tube Size [Note (1)]	Laying Lengths		
	H	*S*	*V*
3/8 × 1/8 × 3/8	15.0	24.5	15.0
1/2 × 1/8 × 1	19.0	20.5	11.0
1/2 × 1/8 × 3/4	14.5	17.5	11.0
1/2 × 1/8 × 1/2	11.0	14.5	11.0
3/4 × 1/8 × 1 1/4	20.5	24.0	14.5
3/4 × 1/8 × 1	19.0	20.5	16.0
3/4 × 1/8 × 3/4	11.0	17.5	11.0
1 × 1/8 × 1	18.0	19.0	15.0
1 1/4 × 1/8 × 1 1/4	22.0	24.0	22.0

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.



Flush Bushing
FTG × C

TABLE B18 DIMENSIONS OF FLUSH BUSHINGS

Standard Water Tube Size [Note (1)]	Laying Length [Note (1)], *H*
1/4 × 1/8	2.0
3/8 × 1/4	2.0
1/2 × 3/8	2.5
1/2 × 1/4	6.5
5/8 × 1/2	2.0
3/4 × 5/8	5.0
3/4 × 1/2	2.5
3/4 × 3/8	11.0
1 × 3/4	3.0
1 × 1/2	12.0
1 1/4 × 1	2.5
1 1/2 × 1 1/4	4.0
2 × 1 1/2	3.0

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.

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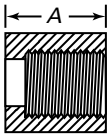

Flush Bushing
FTG × F

TABLE B19 DIMENSIONS OF FLUSH BUSHINGS

Standard Water Tube Size [Note (1)]	Laying Length, *A*
$\frac{1}{2} \times \frac{1}{8}$	14.0
$\frac{3}{4} \times \frac{3}{8}$	20.5
$1 \times \frac{1}{2}$	24.5
$1\frac{1}{4} \times \frac{3}{4}$	26.0
$1\frac{1}{2} \times 1$	29.5
$2 \times 1\frac{1}{2}$	35.5

GENERAL NOTES:
(a) Dimensions are in millimeters.
(b) For dimensions not given in this table, see Table B3.
(c) For inspection tolerances, see Section 8 and Table 2.

NOTE:
(1) For size designation of fittings, see Section 4.

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NONMANDATORY ANNEX C
FITTING RATING

The rated internal working pressures of the fitting are shown in Table 1. These values are the same as those calculated for annealed temper ASTM B88 Type L copper water tube. The rated internal working pressures for annealed temper ASTM B88 Type L copper water tube are calculated as follows:

$$P = \frac{2St}{D - 0.8t}$$

P = rated working pressure at temperature, psi
S = allowable stress at temperature, psi from ASME B31.1 or ASME B31.9 for annealed temper ASTM B88 Type L copper water tube
D = maximum outside diameter, in. from annealed temper ASTM B88 for Type L copper water tube
t = minimum wall thickness, in. from annealed temper ASTM B88 for Type L copper water tube

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NONMANDATORY ANNEX D
REFERENCES

The following is a list of standards and specifications referenced in this Standard showing the year of approval.

ASME B1.20.1-1983 (R92), Pipe Threads, General Purpose (Inch)[1]
ASME B16.3-1998, Malleable Iron Threaded Fittings[1]
ASME B16.15-1985 (R94), Cast Bronze Threaded Fittings, 125 and 250 lb[1]

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990

ASTM B 32-96, Specification for Solder Metal
ASTM B 62-93, Specification for Composition Bronze or Ounce Metal Castings
ASTM B 88-99, Specification for Seamless Copper Water Tube
ASTM B 584-98a, Specification for Copper Alloy Sand Castings for General Applications
ASTM E 29-93a (R1999), Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

Publisher: American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959

ISO 9000-1: 1994, Quality management and quality assurance standards — Part 1: Guidelines for selection and use
ISO 9000-2: 1997, Quality management and quality assurance standard — Part 2: Generic guidelines for the application of ISO 9001, ISO 9002, and ISO 9003
ISO 9000-3:1997, Quality management and quality assurance standards — Part 3: Guidelines for the application of ISO 9001 to the development, supply and maintenance of software
ISO 9001: 1994, Quality systems — Model for quality assurance in design, development, production, installation, and servicing
ISO 9002: 1994, Quality systems — Model for quality assurance in production and servicing
ISO 9003: 1994, Quality systems — Model for quality assurance in final inspection and test

Publisher: International Organization for Standardization (ISO), 1 rue de Varembé, Case Postale 131, CH-1211, Genève 20, Switzerland/Suisse

MSS SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions

Publisher: Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park Street, N.E., Vienna, VA 22180

[1] May also be obtained from American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036.

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NONMANDATORY ANNEX E
QUALITY SYSTEM PROGRAM

The products manufactured in accordance with this Standard shall be produced under a quality system program following the principles of an appropriate standard from the ISO 9000 series.[1] A determination of the need for registration or certification of the product manufacturer's quality system program by an independent organization, or both, shall be the responsibility of the manufacturer. The detailed documentation demonstrating program compliance shall be available to the purchaser at the manufacturer's facility. A written summarized description of the program utilized by the product manufacturer shall be available to the purchaser upon request. The product manufacturer is defined as the entity whose name, or trademark, appears on the product in accordance with the marking or identification requirements of this standard.

[1] The series is also available from the American National Standard Institute (ANSI) and the American Society for Quality Control (ASQC). As American National Standards that are identified by the prefix "Q," replacing the prefix "ISO." Each standard of the series is listed under Appendix II, References.

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AMERICAN NATIONAL STANDARDS FOR PIPING, PIPE FLANGES, FITTINGS, AND VALVES

Scheme for the Identification of Piping Systems. A13.1-1996
Pipe Threads, General Purpose (Inch) . . . . . B1.20.1-1983(R1992)
Dryseal Pipe Threads (Inch) . . . . . B1.20.3-1976(R1998)
Cast Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 . . . . . B16.1-1998
Malleable Iron Threaded Fittings: Classes 150 and 300 . . . . . B16.3-1998
Gray Iron Threaded Fittings: Classes 125 and 250 . . . . . B16.4-1998
Pipe Flanges and Flanged Fittings (NPS ½ Through NPS 24) B16.5-1996
Factory-Made Wrought Buttwelding Fittings B16.9-2001
Face-to-Face and End-to-End Dimensions of Valves B16.10-2000
Forged Fittings, Socket-Welding and Threaded B16.11-2001
Cast Iron Threaded Drainage Fittings B16.12-1998
Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads B16.14-1991
Cast Bronze Threaded Fittings: Classes 125 and 250 . . . . . B16.15-1985(R1994)
Cast Copper Alloy Solder Joint Pressure Fittings B16.18-2001
Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed B16.20-1998
Nonmetallic Flat Gaskets for Pipe Flanges B16.21-1992
Wrought Copper and Copper Alloy Solder Joint Pressure Fittings B16.22-1995
Cast Copper Alloy Solder Joint Drainage Fittings — DWV B16.23-1992
Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500, and 2500 . . . . . B16.24-2001
Buttwelding Ends B16.25-1997
Cast Copper Alloy Fittings for Flared Copper Tubes B16.26-1988
Wrought Steel Buttwelding Short Radius Elbows and Returns B16.28-1994
Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings — DWV B16.29-1994
Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes ½ Through 2) B16.33-1990
Valves — Flanged, Threaded, and Welding End B16.34-1996
Orifice Flanges B16.36-1996
Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2½ to 12, 125 psig Maximum) . . . . . B16.38-1985(R1994)
Malleable Iron Threaded Pipe Unions B16.39-1998
Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems . . . . . B16.40-1985(R1994)
Functional Qualification Requirements for Power Operated Active Valve Assemblies for Nuclear Power Plants . . . . . B16.41-1983(R1989)
Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300 . . . . . B16.42-1998
Manually Operated Metallic Gas Valves for Use in House Piping Systems B16.44-1995
Cast Iron Fittings for Sovent® Drainage Systems B16.45-1998
Large Diameter Steel Flanges (NPS 26 Through NPS 60) B16.47-1996
Steel Line Blanks B16.48-1997
Factory-Made Wrought Steel Buttwelding Induction Bends for Transportation and Distribution Systems B16.49-2000
Power Piping B31.1-1998
Fuel Gas Piping (not an ANSI standard) B31.2-1968
Process Piping B31.3-1999
Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids B31.4-1998
Refrigeration Piping and Heat Exchanger Components B31.5-2000
Gas Transmission and Distribution Piping Systems B31.8-1999
Building Services Piping B31.9-1996
Slurry Transportation Piping Systems . . . . . B31.11-1989(R1998)
Manual for Determining the Remaining Strength of Corroded Pipelines B31G-1991
Welded and Seamless Wrought Steel Pipe B36.10M-1996
Stainless Steel Pipe . . . . . B36.19M-1985(R1994)
Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard . . . . . N278.1-1975(R1992)

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