AN AMERICAN NATIONAL STANDARD

CAST BRONZE THREADED FITTINGS

ANSI/ASME B16.15-1985

CLASSES 125 and 250

(REVISION OF ANSI B16.15-1978)

REAFFIRMED 1994

FOR CURRENT COMMITTEE PERSONNEL
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FOREWORD

(This Foreword is not a part of ANSI/ASME B16.15-1985.)

As early as the spring of 1921, the consolidation and further development of threaded and flanged fittings standards in force in this country seemed desirable. To meet this need, the American Standards Association (ASA) [now the American National Standards Institute (ANSI)] authorized the organization of a Sectional Committee on the Standardization of Pipe Flanges and Flanged Fittings (B16), with the Heating, Piping, and Air Conditioning Contractors' National Association (now known as the Mechanical Contractors Association of America), the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), and The American Society of Mechanical Engineers acting as joint sponsors.

In June 1927, the Manufacturers Standardization Society of the Valve and Fittings Industry appointed a committee on Nonferrous Screw Fittings for the purpose of developing standards for products commonly designated as threaded pipe fittings of brass, bronze, or other nonferrous materials. At the time brass threaded fittings were furnished from a number of different patterns with wide variations in dimensions and weights.

MSS SP-10 for 125 lb Bronze Screwed Fittings and MSS SP-11 for 250 lb Bronze Screwed Fittings were developed and adopted by the MSS in September, 1930. The lighter fittings were patterned after malleable iron threaded fittings, then standardized in ASA B16c, while the heavier products were patterned after the cast iron threaded fittings covered by ASA B16d. Thus a practice was standardized that had been found satisfactory in the valve and fittings industry over many years.

Following the publication of revised editions in 1941 and 1943, SP-10 was submitted to Subcommittee No. 2 of ASA Sectional Committee B16 for adoption as an American Standard. Final approval of that edition was granted on January 23, 1947 with the designation ASA B16.15. A reaffirmation of the Standard was granted in 1952 and a complete revision for updating the Standard was approved by ASA on March 25, 1958.

After revision in 1944, SP-11 was submitted to Subcommittee No. 2 in August, 1947 and ASA granted the approval of B16.17 on April 6, 1949.

In 1961, Subcommittee No. 2 reviewed the two Standards and noted that the historical reason for their separate existence no longer applied. Accordingly, the two were combined into ASA B16.15 with final ASA approval granted on February 6, 1964.

In 1969, the document was reviewed by Subcommittee No. 2 and minor changes were proposed. Final ANSI approval was granted on April 14, 1971.

In 1977, the MSS submitted a proposed revision to Subcommittee B (formerly No. 2) for B16 review and approval. Changes included the addition of metric (SI) units and editorial updating. ANSI granted final approval on December 4, 1978.

In 1982, American National Standards Committee B16 was reorganized as the ASME B16 Committee, operating under procedures accredited by ANSI. The current revision, following regular five year review by Subcommittee B, involves rationalization of metric equivalent dimensions and updating of reference standards. Following approval within ASME, ANSI approval was granted on July 30, 1985 with the new designation ANSI/ASME B16.15-1985.

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AN AMERICAN NATIONAL STANDARD

CAST BRONZE THREADED FITTINGS, CLASSES 125 AND 250

1 SCOPE

This Standard pertains primarily to cast Class 125 and Class 250 bronze threaded pipe fittings. Certain requirements also pertain to wrought or cast plugs, bushings, couplings, and caps. This Standard covers:

(*a*) pressure-temperature ratings;

(*b*) size[1] and method of designating openings of reducing pipe fittings;

(*c*) marking;

(*d*) minimum requirements for casting quality and materials;

(*e*) dimensions[1] and tolerances in U.S. customary and metric (SI) units;

(*f*) threading.

2 PRESSURE-TEMPERATURE RATINGS

(*a*) Pressure-temperature ratings for these pipe fittings are shown in Table 1. SI Table A1 is included in Annex A. All pressures are gage.

(*b*) Ratings are independent of the contained fluid and are the maximum non-shock pressures at the tabulated temperatures. Intermediate ratings may be obtained by linear interpolation between the temperatures shown.

(*c*) The temperature shown for the corresponding pressure rating shall be the material temperature of the pressure retaining structure. It may be assumed that the material temperature is the same as the fluid temperature. Use of a pressure rating at a material temperature other than that of the contained fluid is the responsibility of the user and subject to the requirements of any applicable code.

(*d*) Use of cored plugs and hexagon head bushings should be limited to Class 125 pipe fittings. Solid plugs and face bushings are recommended for use with Class 250 pipe fittings.

TABLE 1 PRESSURE-TEMPERATURE RATINGS

Temperature, °F	Class 125, psi	Class 250, psi
−20 to 150	200	400
200	190	385
250	180	365
300	165	335
350	150	300
400	125	250

3 SIZE

(*a*) The size of the pipe fittings scheduled in the following tables is identified by the corresponding nominal pipe size.[1]

(*b*) In the case of reducing tees, crosses, and Y branches (laterals), the size of the largest run opening shall be given first, followed by the size of the opening at the opposite end of the run. Where the pipe fitting is a tee or Y branch (lateral), the size of the outlet is given last. Where the pipe fitting is a cross, the largest side-outlet opening is the third dimension given, followed by the opening opposite. The straight line sketches of Fig. 1 illustrate how the reducing pipe fittings are read.

4 MARKING

(*a*) Each Class 125 pipe fitting shall be marked for identification with the manufacturer's name or trademark.

(*b*) Each Class 250 pipe fitting shall be marked for identification with the manufacturer's name or trademark, and the numerals "250."

(*c*) Omission of markings is permissible when fittings are too small to provide sufficient marking area.

[1]The use of the word *nominal* as a modifier of a dimension or size is intended to indicate that the stated dimension or size is used for purposes of designation. The actual dimension may be the nominal dimension subject to the variation of established tolerances.

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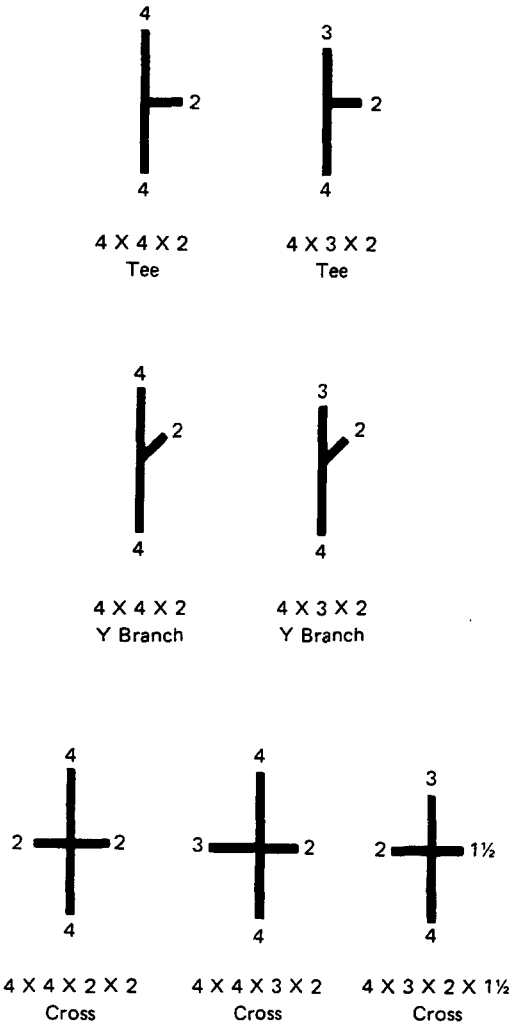

FIG. 1 IDENTIFICATION OF REDUCING FITTINGS

(*d*) In addition to the rules above, see paras. 7(b) and 7(c).

5 MATERIAL

(*a*) Castings shall be produced to meet:

(*1*) the requirements of ASTM B 62, Alloy C83600; or

(*2*) the chemical and tensile requirements of ASTM B 584, Alloys C83800 or C84400;

and in all other respects shall conform to the requirements of ASTM B 62.

(*b*) Bar stock, when used for manufacturing smaller sizes of wrought plugs, bushings, caps, and couplings, shall be in accordance with the requirements of ASTM B 16 Alloy C36000 for Free Cutting Brass Rod, Bar and Shapes for Use in Screw Machines; or with ASTM B 140 for Leaded Red Brass (Hardware Bronze), Alloys C32000 or C31400.

6 THREADING

(*a*) *Pipe Fittings.* All pipe fittings shall be threaded with ANSI/ASME B1.20.1 general purpose pipe threads and shall have taper threads, except wrought couplings (Table 3), wrought caps (Table 8), and wrought bushings (Table 13) in nominal pipe sizes 1/8, 1/4, 3/8, and 1/2, which may have straight internal threads. The variations in taper threading shall be limited to one turn large or one turn small from the gaging face on ring and gaging notch on plug, when using working gages. The variations in straight threading shall be limited to one and one-half turns large or small from gaging notch on plug, when using taper pipe thread working gage. When gaging internal threads the notch should be flush with the bottom of the chamfer, which shall be considered as being the intersection of the chamfer cone and the pitch cone of the thread. This depth is approximately equal to one-half thread from the face of the pipe fitting.

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

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

(*d*) The maximum allowable variation in the alignment of threads of all openings of threaded pipe fittings shall be 0.06 in./ft (1 mm/m), or 0.5%.

(*e*) *Bushings.* All bushings shall be threaded with American National Standard taper pipe threads, except those sizes of wrought bushings listed in para. 6.1 which may have straight internal threads. Gaging of all threads shall comply with ANSI/ASME B1.20.1 except those sizes of outside hex bushings where the external thread lengths are shorter than required by ANSI/ASME B1.20.1. These bushings should be threaded so that when making up the joint, the shoulder of the head will not interfere. To ensure this, the threads, when made to the minimum length, shall be

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gaged as listed below with a tolerance of one turn large or small:

1/4 in. to 1 1/2 in. incl.	1 turn large
2 in.	1 1/2 turns large
2 1/2 in. to 8 in. incl.	2 turns large

(*f*) An outside hexagon bushing is one having any part of the hexagon protruding beyond the outside diameter of the large end of the external thread.

7 RIBS

(*a*) The addition of ribs or lugs is permitted on threaded pipe fittings. Where ribs are used, it is recommended that their thickness shall be the same as specified for metal thickness of the pipe fitting.

(*b*) Right-hand couplings shall have not more than two ribs.

(*c*) Right- and left-hand couplings shall have four or more ribs unless the left-hand opening is clearly marked "L" in which case the use of ribs is optional with the manufacturer.

8 SURFACE FINISH

Pipe fittings shall be regularly furnished with a rough exterior surface, free of sand inclusions, fins, and gate protrusions. From these rough pipe fittings, smooth exteriors may be produced by machining or wheel grinding and polishing the surface. This operation is frequently performed by someone other than the manufacturer.

9 FITTING DIMENSIONS[2]

(*a*) Tables of center-to-end dimensions are given for both straight and reducing pipe fittings.

[2]Dimensions and tolerances shown as whole or multiples of 0.5 mm in the Metric (SI) Tables may differ slightly in absolute value from the customary dimensions. Any dimension that is within tolerance by either metric or customary measurement is considered to be in conformance with this Standard.

TABLE 2 INSPECTION TOLERANCES, CENTER-TO-END AND CENTER-TO-CENTER

Nominal Pipe Size	Plus or Minus, in.
1/8	0.03
1/4	0.04
3/8	0.05
1/2, 3/4	0.06
1, 1 1/4	0.07
1 1/2, 2	0.08
2 1/2, 3	0.10
4	0.12

(*b*) The dimensions shown in Tables 4, 5, 6, 10, and 11 for fittings are for use only when making patterns for the specific reducing pipe fitting in question and do not apply when a larger size pattern is bushed to make the reducing pipe fitting wanted. Reducing pipe fitting patterns shall be designed to produce wall thicknesses and detail and dimensions as required for the sizes involved.

(*c*) The sketches of fittings accompanying Tables 3 through 13 are representative and are included for the purpose of illustration.

10 TOLERANCES[2]

(*a*) It is recognized that some variations are unavoidable in the making of patterns and castings. Patterns shall be designed to produce castings of metal thicknesses given in the tables. Metal thickness at no point shall be less than 90% of the thicknesses given in the tables.

(*b*) The tolerances shown in Table 2 shall be permitted in center-to-end and center-to-center dimensions of fittings; tolerances for end-to-end dimensions shall be twice those given. SI Table A2 is included in Annex A. The largest opening in reducing pipe fittings governs the tolerances to be applied to all openings.

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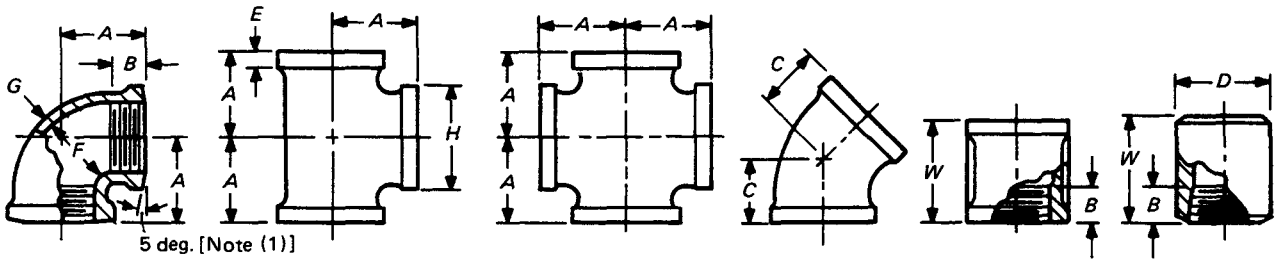

90 deg. Elbow | Tee | Cross | 45 deg. Elbow | Cast | Wrought

Couplings [Note (2)]

TABLE 3 DIMENSIONS OF 90 DEG. ELBOWS, TEES, CROSSES, 45 DEG. ELBOWS, AND COUPLINGS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End Elbows, Tees, Crosses *A*	Length of Thread (3) *B*, Min.	Center-to-End 45 deg. Elbows *C*	Diameter, Wrought Coupling (4) *D*	Band Length *E*, Min.	Inside Diameter of Cast Fitting *F*		Metal Thickness (5) *G*	Band Diameter *H*, Min.	End-to-End Straight Coupling *W*	
						Min.	Max.			Cast	Wrought
1/8	0.54	0.25	0.42	0.56	0.14	0.41	0.44	0.08	0.67	0.80	0.83
1/4	0.71	0.32	0.56	0.69	0.16	0.54	0.58	0.08	0.81	0.97	1.03
3/8	0.82	0.36	0.63	0.84	0.17	0.68	0.72	0.09	1.00	1.05	1.11
1/2	1.01	0.43	0.78	1.06	0.19	0.84	0.90	0.09	1.17	1.29	1.36
3/4	1.18	0.50	0.89	1.31	0.23	1.05	1.11	0.10	1.42	1.43	1.50
1	1.43	0.58	1.06	. . .	0.27	1.32	1.39	0.11	1.72	1.68	. . .
1 1/4	1.69	0.67	1.22	. . .	0.31	1.66	1.73	0.12	2.10	1.86	. . .
1 1/2	1.84	0.70	1.30	. . .	0.34	1.90	1.97	0.13	2.38	1.92	. . .
2	2.12	0.75	1.45	. . .	0.41	2.38	2.45	0.15	2.92	2.20	. . .
2 1/2 (6)	2.70	0.92	1.95	. . .	0.48	2.88	2.98	0.17	3.49	2.88	. . .
3	3.08	0.98	2.17	. . .	0.55	3.50	3.60	0.19	4.20	3.18	. . .
4	3.79	1.08	2.61	. . .	0.66	4.50	4.60	0.22	5.31	3.69	. . .

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) On right-hand couplings, the use of ribs is optional with the manufacturer, but no right-hand couplings shall have more than two ribs. Right- and left-hand couplings shall have four or more ribs unless the left-hand opening is clearly marked "L", in which case the use of ribs is optional with the manufacturer. See Section 7.
(2) A 5 deg. bevel on face is optional.
(3) Dimension *B* for wrought couplings includes minimum length of perfect thread. The length of useful thread (*B* plus threads with fully formed roots and flat crests) shall be not less than L_2 (effective length of external thread) required by ANSI/ASME B1.20.1. See Section 6.
(4) Couplings sizes NPS 3/4 and smaller may be cast or made from rod at the option of the manufacturer. Diameters *D* are commercial rod sizes.
(5) For metal thickness tolerance, see para. 10(a).
(6) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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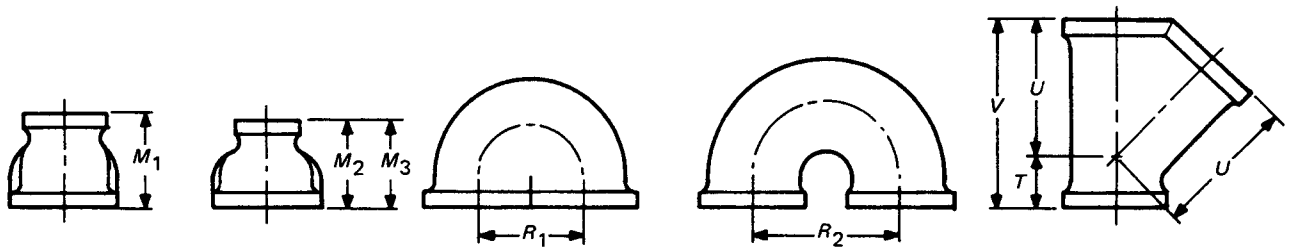

Reducer (1 Size) | Reducer (2 and 3 Sizes) | Closed Pattern Return Bend | Open Pattern Return Bend | 45 deg. Y Branch Straight

TABLE 4 DIMENSIONS OF REDUCERS, CLOSED AND OPEN PATTERN RETURN BENDS, AND 45 DEG. Y BRANCHES (STRAIGHT SIZES)[1,2]

Nominal Pipe Size	Reducers			Return Bends		45 deg. Y Branch		
	End-to-End Reducing (3)			Center-to-Center				
	One Size M_1	Two Sizes M_2	Three Sizes M_3	Closed Pattern R_1	Open Pattern R_2	Center-to-End Inlet T	Center-to-End Outlet U	End-to-End V
1/4	0.88	...	...	...	...	...	...	...
3/8	1.01	0.92	...	...	...	0.50	1.28	1.78
1/2	1.17	1.13	...	1.00	1.50	0.61	1.58	2.19
3/4	1.36	1.24	1.24	1.25	2.00	0.72	1.90	2.62
1	1.56	1.49	...	1.50	2.50	0.85	2.33	3.18
1 1/4	1.77	1.65	...	...	3.00	1.02	2.83	3.85
1 1/2	1.89	1.80	1.80	...	3.50	1.10	3.14	4.24
2	2.06	2.03	2.03	...	4.00	1.24	3.76	5.00
2 1/2 (4)	3.25	...	...	...	...	...	...	...
3	3.69	3.69	...	...	...	...	...	...
4	4.38	...	...	...	...	...	...	...

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) See para. 9(b) for requirements concerning patterns for reducing fittings.
(2) For dimensions not given, see Table 3.
(3) The reduced sizes refer to the indicated nominal sizes listed in column 1, except that dimension 0.88 in. in column 2 refers to the NPS 1/4 × 1/8 reducer.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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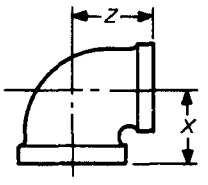

90 deg. Elbow,
Reducing

TABLE 5 DIMENSIONS OF 90 DEG. ELBOWS (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End		Nominal Pipe Size	Center-to-End	
	X	*Z*		*X*	*Z*
1/4 × 1/8	0.65	0.60	1 1/4 × 3/4	1.39	1.48
3/8 × 1/4	0.75	0.78	1 1/2 × 1 1/4	1.72	1.81
1/2 × 3/8	0.93	0.90	1 1/2 × 1	1.55	1.72
3/4 × 1/2	1.08	1.11			
			2 × 1 1/2	1.89	2.07
1 × 3/4	1.30	1.31	2 1/2 × 2 (4)	2.39	2.60
1 × 1/2	1.20	1.24	3 × 2 1/2	2.83	2.99
1 1/4 × 1	1.52	1.60	4 × 3	3.30	3.60

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) NPS 3/8 × 1/8, 1/2 × 1/4, 2 × 1 1/4, and 3 × 2 are also available but not to standard center-to-end dimensions. The demand for these sizes is insufficient to warrant unification.
(2) See para. 9(b) for requirements concerning patterns for reducing fittings.
(3) For dimensions not given, see Table 3.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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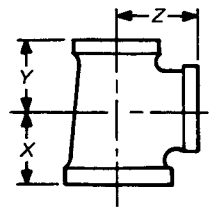

Tee, Reducing

TABLE 6 DIMENSIONS OF TEES (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End		
	X	Y	Z		X	Y	Z
1/4 × 1/4 × 1/8	0.65	0.65	0.60	1 1/4 × 1 × 3/4	1.39	1.30	1.48
3/8 × 3/8 × 1/4	0.75	0.75	0.78	1 1/4 × 3/4 × 1 1/4	1.69	1.48	1.69
3/8 × 1/4 × 3/8	0.82	0.78	0.82	1 1/4 × 1/2 × 1 1/4	1.69	1.40	1.69
3/8 × 1/4 × 1/4	0.75	0.71	0.78	1 × 1 × 1 1/4	1.60	1.60	1.52
1/2 × 1/2 × 3/8	0.93	0.93	0.90	1 1/2 × 1 1/2 × 1 1/4	1.72	1.72	1.81
1/2 × 1/2 × 1/4	0.87	0.87	0.87	1 1/2 × 1 1/2 × 1	1.55	1.55	1.72
1/2 × 3/8 × 1/2	1.01	0.90	1.01	1 1/2 × 1 1/2 × 3/4	1.42	1.42	1.60
1/2 × 3/8 × 3/8	0.93	0.82	0.90	1 1/2 × 1 1/2 × 1/2	1.32	1.32	1.53
3/8 × 3/8 × 1/2	0.90	0.90	0.93	1 1/2 × 1 1/4 × 1 1/2	1.84	1.81	1.84
3/4 × 3/4 × 1/2	1.08	1.08	1.11	1 1/2 × 1 1/4 × 1 1/4	1.72	1.69	1.81
3/4 × 3/4 × 3/8	1.00	1.00	1.00	1 1/2 × 1 1/4 × 1	1.55	1.52	1.72
3/4 × 1/2 × 3/4	1.18	1.11	1.18	1 1/2 × 3/4 × 1 1/2	1.84	1.60	1.84
3/4 × 1/2 × 1/2	1.08	1.01	1.11	1 1/4 × 1 1/4 × 1 1/2	1.81	1.81	1.72
1/2 × 1/2 × 3/4	1.11	1.11	1.08	1 × 1 × 1 1/2	1.72	1.72	1.55
1 × 1 × 3/4	1.30	1.30	1.31	2 × 2 × 1 1/2	1.89	1.89	2.07
1 × 1 × 1/2	1.20	1.20	1.24	2 × 2 × 1 1/4	1.77	1.77	2.04
1 × 1 × 3/8	1.12	1.12	1.13	2 × 2 × 1	1.59	1.59	1.95
1 × 3/4 × 1	1.43	1.31	1.43	2 × 2 × 3/4	1.47	1.47	1.84
1 × 3/4 × 3/4	1.30	1.18	1.31	2 × 1 1/2 × 2	2.12	2.07	2.12
1 × 3/4 × 1/2	1.20	1.08	1.24	2 × 1 1/2 × 1 1/2	1.89	1.84	2.07
1 × 1/2 × 1	1.43	1.24	1.43	1 1/2 × 1 1/2 × 2	2.07	2.07	1.89
1 × 1/2 × 3/4	1.30	1.11	1.31	2 1/2 × 2 1/2 × 2 (4)	2.39	2.39	2.60
3/4 × 3/4 × 1	1.31	1.31	1.30	2 1/2 × 2 × 2	2.39	2.25	2.60
1 1/4 × 1 1/4 × 1	1.52	1.52	1.60	2 × 2 × 2 1/2	2.60	2.60	2.39
1 1/4 × 1 1/4 × 3/4	1.39	1.39	1.48	3 × 3 × 2 1/2	2.83	2.83	2.99
1 1/4 × 1 1/4 × 1/2	1.29	1.29	1.41	3 × 3 × 2	2.52	2.52	2.89
1 1/4 × 1 × 1 1/4	1.69	1.60	1.69	4 × 4 × 3	3.30	3.30	3.60
1 1/4 × 1 × 1	1.52	1.43	1.60	4 × 4 × 2	2.74	2.74	3.41

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) NPS 1 × 1/2 × 1/2, 1 1/2 × 1 × 1 1/2, 1 1/2 × 1 × 1 1/4, 1 1/2 × 1 × 1, and 2 × 2 × 1/2 are also available but not to standard center-to-end dimensions. The demand for these sizes is insufficient to warrant unification.
(2) See para. 9(b) for requirements concerning patterns for reducing fittings.
(3) For dimensions not given, see Table 3.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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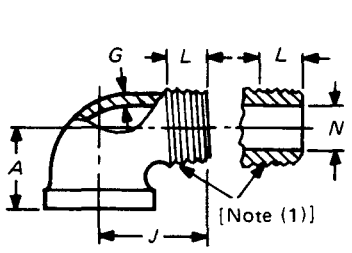
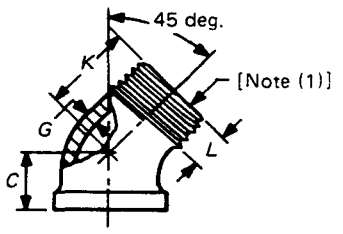


90 deg. Street Elbow



45 deg. Street Elbow

TABLE 7 DIMENSIONS OF 90 DEG. AND 45 DEG. STREET ELBOWS[2,3]

Nominal Pipe Size	Center-to-Female End, 90 deg. Elb. *A*	Center-to Female End, 45 deg. Elb. *C*	Metal Thickness (4) *G*	Center-to-Male End, 90 deg. Elb. *J*	Center-to-Male End, 45 deg. Elb. *K*	Length of Thread Male End *L*, Min.	Port Diameter Male End *N*, Max.
1/8	0.54	0.42	0.08	0.92	0.78	0.27	0.22
1/4	0.71	0.56	0.08	1.11	0.88	0.41	0.28
3/8	0.82	0.63	0.09	1.24	0.92	0.41	0.40
1/2	1.01	0.78	0.09	1.48	1.06	0.54	0.53
3/4	1.18	0.89	0.10	1.65	1.23	0.55	0.72
1	1.43	1.06	0.11	1.98	1.40	0.69	0.93
1 1/4	1.69	1.22	0.12	2.24	1.64	0.71	1.25
1 1/2	1.84	1.30	0.13	2.46	1.80	0.73	1.47
2	2.12	1.45	0.15	2.88	2.14	0.76	1.91

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Both designs illustrated for external thread ends of street pipe fittings are approved.
(2) For dimensions not given, see Table 3.
(3) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.
(4) For metal thickness tolerance, see para. 10(a).

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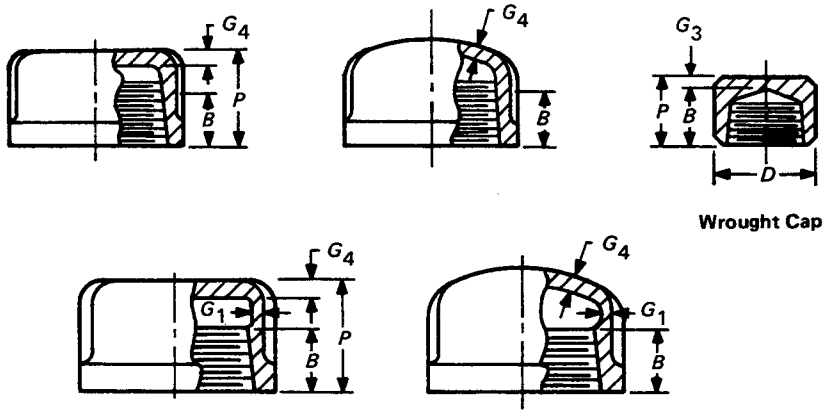

Wrought Cap

Cast Caps — All Designs Approved

TABLE 8 DIMENSIONS OF CAPS[1]

Nominal Pipe Size	Length of Thread (2)		Diameter Wrought Cap (3)	Metal Thickness (4)			Height of Cap *P*, Min.	
	B, Min.	L_2, Min.	*D*	G_1	G_3	G_4	Cast	Wrought
1/8	0.25	0.2639	0.56	0.08	0.11	0.09	0.49	0.49
1/4	0.32	0.4018	0.69	0.08	0.13	0.10	0.59	0.59
3/8	0.36	0.4078	0.84	0.09	0.13	0.11	0.64	0.68
1/2	0.43	0.5337	1.06	0.09	0.14	0.12	0.76	0.84
3/4	0.50	0.5457	1.31	0.10	0.15	0.13	0.84	0.94
1	0.58	0.6828	. . .	0.11	. . .	0.15	0.99	. . .
1 1/4	0.67	0.7068	. . .	0.12	. . .	0.17	1.10	. . .
1 1/2	0.70	0.7235	. . .	0.13	. . .	0.19	1.15	. . .
2	0.75	0.7565	. . .	0.15	. . .	0.22	1.32	. . .
2 1/2 (5)	0.92	1.1375	. . .	0.17	. . .	0.25	1.70	. . .
3	0.98	1.2000	. . .	0.19	. . .	0.29	1.80	. . .
4	1.08	1.3000	. . .	0.22	. . .	0.36	2.08	. . .

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) For dimensions not given, see Table 3.
(2) Caps may be made without recess. Caps so made shall be of such height *P* that the length of perfect thread shall be not less than *B*, and the length of useful thread (*B* plus threads with fully formed roots and flat crests) shall be not less than L_2 (effective length of external thread) required by ANSI/ASME B1.20.1. All other dimensions shall be as specified for other caps.
(3) Caps NPS 3/4 and smaller may be cast or made from rod at the option of the manufacturer. Dimensions *D* are commercial rod sizes.
(4) For metal thickness tolerance, see para. 10(a).
(5) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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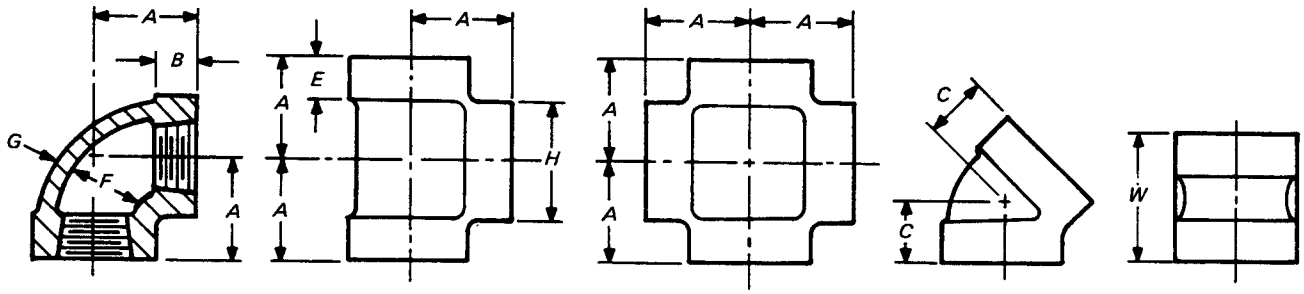

90 deg. Elbow | Tee | Cross | 45 deg. Elbow | Coupling

TABLE 9 DIMENSIONS OF 90 DEG. ELBOWS, TEES, CROSSES, 45 DEG. ELBOWS, AND COUPLINGS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End Elbows, Tees, and Crosses (1) *A*	Length of Thread *B*, Min.	Center-to-End 45 deg. Elbows (1) *C*	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness (2) *G*	Outside Diameter of Band *H*, Min.	End-to-End Coupling *W*
					Min.	Max.			
1/4	0.81	0.32	0.73	0.38	0.54	0.58	0.11	0.93	1.06
3/8	0.95	0.36	0.80	0.44	0.68	0.72	0.12	1.12	1.16
1/2	1.12	0.43	0.88	0.50	0.84	0.90	0.13	1.34	1.34
3/4	1.31	0.50	0.98	0.56	1.05	1.11	0.16	1.63	1.52
1	1.50	0.58	1.12	0.62	1.32	1.38	0.17	1.95	1.67
1 1/4	1.75	0.67	1.29	0.69	1.66	1.73	0.19	2.39	1.93
1 1/2	1.94	0.70	1.43	0.75	1.90	1.97	0.20	2.68	2.15
2	2.25	0.75	1.68	0.84	2.38	2.45	0.22	3.28	2.53
2 1/2	2.70	0.92	1.95	0.94	2.88	2.98	0.24	3.86	2.88
3	3.08	0.98	2.17	1.00	3.50	3.60	0.26	4.62	3.18
4	3.79	1.08	2.61	1.12	4.50	4.60	0.31	5.79	3.69

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) The dimensions for 90 deg. elbows, tees, crosses, and 45 deg. elbows are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(2) For metal thickness tolerance, see para. 10(a).

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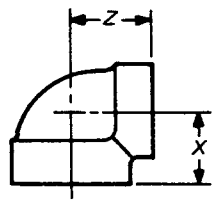

90 deg. Elbow,
Reducing

TABLE 10 DIMENSIONS OF 90 DEG. ELBOWS (REDUCING SIZES)[1,2,3]

	Center-to-End	
Nominal Pipe Size	*X*	*Z*
1/2 × 3/8	1.04	1.03
3/4 × 1/2	1.20	1.22
1 × 3/4	1.37	1.45
1 × 1/2	1.26	1.36
1 1/4 × 1	1.58	1.67
1 1/4 × 3/4	1.45	1.62
1 1/2 × 1 1/4	1.82	1.88
1 1/2 × 1	1.65	1.80
2 × 1 1/2	2.02	2.16
2 × 1 1/4	1.90	2.10
2 1/2 × 2	2.39	2.60
3 × 2 1/2	2.83	2.99
3 × 2	2.52	2.89
4 × 3	3.50	3.60

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) For dimensions not given, see Table 9.
(2) All dimensions given in Table 10 are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(3) See para. 9(b) for requirements concerning patterns for reducing fittings.

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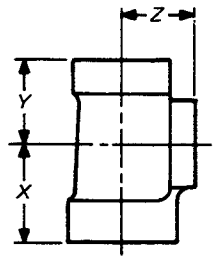

Tee, Reducing

TABLE 11 DIMENSIONS OF TEES (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End		
	X	Y	Z		X	Y	Z
1/2 × 1/2 × 3/8	1.04	1.04	1.03	1 1/2 × 1 1/2 × 1	1.65	1.65	1.80
3/4 × 3/4 × 1/2	1.20	1.20	1.22	1 1/2 × 1 1/2 × 3/4	1.52	1.52	1.75
3/4 × 3/4 × 3/8	1.12	1.12	1.13	1 1/2 × 1 1/2 × 1/2	1.41	1.41	1.66
3/4 × 1/2 × 3/4	1.31	1.22	1.31	1 1/2 × 1 1/4 × 1 1/4	1.82	1.75	1.88
3/4 × 1/2 × 1/2	1.20	1.12	1.22				
1/2 × 1/2 × 3/4	1.22	1.22	1.20	1 1/2 × 1 1/4 × 1	1.65	1.58	1.80
				1 1/2 × 1 × 1 1/2	1.94	1.80	1.94
1 × 1 × 3/4	1.37	1.37	1.45	1 1/4 × 1 1/4 × 1 1/2	1.88	1.88	1.82
1 × 1 × 1/2	1.26	1.26	1.36	2 × 2 × 1 1/2	2.02	2.02	2.16
1 × 3/4 × 1	1.50	1.45	1.50	2 × 2 × 1 1/4	1.90	1.90	2.10
1 × 3/4 × 3/4	1.37	1.31	1.45				
3/4 × 3/4 × 1	1.45	1.45	1.37	2 × 2 × 1	1.73	1.73	2.02
				2 × 2 × 3/4	1.60	1.60	1.97
1 1/4 × 1 1/4 × 1	1.58	1.58	1.67	2 × 2 × 1/2	1.49	1.49	1.88
1 1/4 × 1 1/4 × 3/4	1.45	1.45	1.62	2 1/2 × 2 1/2 × 2	2.39	2.39	2.60
1 1/4 × 1 1/4 × 1/2	1.34	1.34	1.53	3 × 3 × 2	2.52	2.52	2.89
1 1/4 × 1 × 1 1/4	1.75	1.67	1.75				
1 1/4 × 1 × 1	1.58	1.50	1.67	3 × 2 1/2 × 3	3.08	2.99	3.08
1 1/4 × 3/4 × 1 1/4	1.75	1.62	1.75	3 × 2 × 3	3.08	2.89	3.08
				4 × 4 × 3	3.30	3.30	3.60
1 × 1 × 1 1/4	1.67	1.67	1.58	4 × 4 × 2	2.74	2.74	3.41
1 1/2 × 1 1/2 × 1 1/4	1.82	1.82	1.88	4 × 3 × 4	3.79	3.60	3.79

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) For dimensions not given, see Table 9.
(2) All dimensions given in Table 11 are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(3) See para. 9(b) for requirements concerning patterns for reducing fittings.

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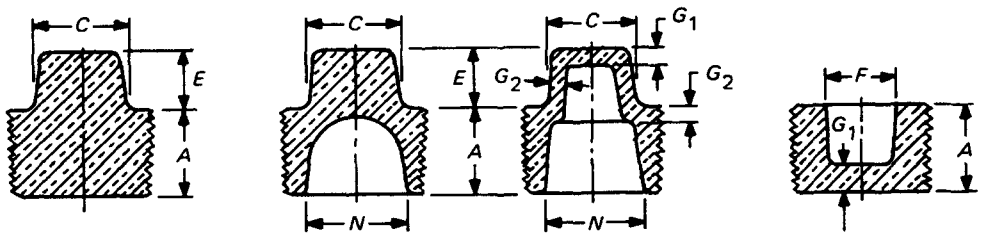

Solid Pattern

Cored Patterns
Both Designs Approved

Countersunk
Pattern

TABLE 12 DIMENSIONS OF SQUARE HEAD AND SQUARE SOCKET PLUGS[1]

Nominal Pipe Size	Thread Length *A*, Min.	Nominal Width Across Flats (2) *C*	Height of Plug Square *E*, Min.	Metal Thickness (3)		Inside Diameter of Plug *N*, Max.	Nominal Size of Square Socket (4) *F*
				G_1	G_2		
1/8	0.27	9/32	0.24	...	...	...	...
1/4	0.41	3/8	0.28	...	...	...	...
3/8	0.41	7/16	0.31	...	...	...	...
1/2	0.54	9/16	0.38	0.09	0.12	0.53	3/8
3/4	0.55	5/8	0.44	0.10	0.13	0.72	1/2
1	0.69	13/16	0.50	0.11	0.14	0.93	1/2
1 1/4	0.71	15/16	0.56	0.12	0.15	1.25	3/4
1 1/2	0.73	1 1/8	0.62	0.13	0.16	1.47	3/4
2	0.76	1 5/16	0.68	0.15	0.17	1.91	7/8
2 1/2	1.07	1 1/2	0.74	0.17	0.18	2.32	1 1/8
3	1.13	1 11/16	0.80	0.19	0.19	2.90	1 3/8
4	1.22	2 1/4	0.92	0.22	0.22	3.83	2

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) For pressure class recommendations, see para. 2(d).
(2) These dimensions *C* are the nominal size of wrench as given in Appendix V, Wrench Openings of ANSI/ASME B18.2.1 Square and Hex Bolts and Screws. Square head plugs are designed to fit these wrenches. Plug squares may have opposite sides tapered a maximum of 4 deg. total.
(3) For metal thickness tolerance, see para. 10(a).
(4) Square socket of countersunk plugs shall have dimensions *F* to fit commercial square bars of sizes indicated. Countersunk square sockets may have opposite sides tapered a maximum of 4 deg. total.

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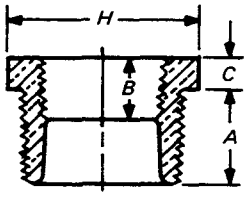
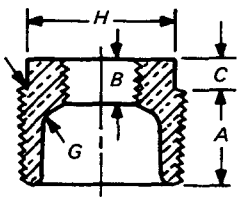
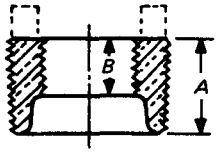


Outside Head



Inside Head



Face [Note (1)]

TABLE 13 DIMENSIONS OF OUTSIDE HEAD, INSIDE HEAD, AND FACE BUSHINGS[2,3]

Nominal Pipe Size	Length of External Thread *A*, Min.	Length of Internal Thread *B*, Min.	Height of Head *C*, Min.	Width of Head (4) *H*, Min.		Metal Thickness (5) *G*
				Outside	Inside	
1/4 × 1/8	0.44	0.26 (6)	0.14	0.64 (7)	...	...
3/8 × 1/4	0.48	0.40 (6)	0.16	0.68 (7)	...	...
3/8 × 1/8	0.48	0.25	0.16	0.68 (7)	...	...
1/2 × 3/8	0.56	0.41 (6)	0.19	0.87 (7)	...	...
1/2 × 1/4	0.56	0.32	0.19	0.87 (7)	...	...
1/2 × 1/8	0.56	0.25	0.19	0.87 (7)	...	...
3/4 × 1/2	0.63	0.53 (6)	0.22	1.15 (7)	...	...
3/4 × 3/8	0.63	0.36	0.22	1.15 (7)	...	...
3/4 × 1/4	0.63	0.32	0.22	1.15 (7)	...	...
1 × 3/4	0.75	0.50	0.25	1.42 (7)	...	...
1 × 1/2	0.75	0.43	0.25	1.42 (7)	...	...
1 × 3/8	0.75	0.36	0.30	...	1.12	...
1 × 1/4	0.75	0.32	0.30	...	1.12	...
1 1/4 × 1	0.80	0.58	0.28	1.76	...	...
1 1/4 × 3/4	0.80	0.50	0.28	1.76	...	...
1 1/4 × 1/2	0.80	0.43	0.34	...	1.34	0.185
1 1/4 × 3/8	0.80	0.36	0.34	...	1.12	0.185
1 1/2 × 1 1/4	0.83	0.71 (6)	0.31	2.00	...	...
1 1/2 × 1	0.83	0.58	0.31	2.00	...	...
1 1/2 × 3/4	0.83	0.50	0.37	...	1.63	0.200
1 1/2 × 1/2	0.83	0.43	0.37	...	1.34	0.200
2 × 1 1/2	0.88	0.70	0.34	2.48	...	...
2 × 1 1/4	0.88	0.67	0.34	2.48	...	...
2 × 1	0.88	0.58	0.41	...	1.95	0.220
2 × 3/4	0.88	0.50	0.41	...	1.63	0.220
2 × 1/2	0.88	0.43	0.41	...	1.34	0.220
2 1/2 × 2	1.07	0.75	0.37	2.98	...	...
2 1/2 × 1 1/2	1.07	0.70	0.44	2.68	...	...
2 1/2 × 1 1/4	1.07	0.67	0.44	...	2.39	0.240
2 1/2 × 1	1.07	0.58	0.44	...	1.95	0.240
3 × 2 1/2	1.13	0.92	0.40	3.86	...	...
3 × 2	1.13	0.75	0.48	3.28	...	...
3 × 1 1/2	1.13	0.70	0.48	...	2.68	0.260
3 × 1 1/4	1.13	0.67	0.48	...	2.39	0.260
4 × 3	1.22	0.98	0.50	4.62	...	...
4 × 2 1/2	1.22	0.92	0.60	...	3.86	0.310
4 × 2	1.22	0.75	0.60	...	3.28	0.310
4 × 1 1/2	1.22	0.70	0.60	...	2.68	0.310

Refer to notes on page 15.

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TABLE 13 (CONT'D):

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) The addition of lugs on face bushings is not prohibited.
(2) For pressure class recommendations, see para. 2(d).
(3) Bushings reducing to pipe sizes smaller than given are bushed from the smallest reduction appearing in the table.
(4) Heads of bushings shall be hexagonal or octagonal.
(5) Metal thickness *G* is the same as Class 125 Cast Iron Threaded Fittings of ANSI/ASME B16.4. For tolerance, see para. 10(a).
(6) To provide proper metal thickness, these sizes shall not be cored out to diameters greater than the root diameter of the internal thread. The length of the internal thread may be equal to the minimum dimension *B* or greater, up to the full length of bushing.
(7) Bushings in these sizes may be made from regular hexagon or octagon bar stock sizes.

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ANNEX A — METRIC (SI) TABLES

(This Annex is an integral part of ANSI/ASME B16.15-1985 which is placed after the main text for convenience.)

The technique of rounding the metric conversions of the inch dimensions recognized two basic categories of dimensions occurring in this Standard, based upon the function or safety significance of variations in the dimensions.

Where some slight shift of the absolute value of the minimum and maximum dimensions permitted by the inch dimensions and those provided by the converted metric dimensions do not unacceptably affect the functional or safety characteristics of the fitting, the metric conversions have been rounded to whole millimeter values in order to facilitate ease of measurement by ordinary measuring tapes or rulers with nonmagnified vision. Furthermore, the rounding has not always been made to the nearest whole millimeter. In some cases it has been made to the whole millimeter which would facilitate tables manifesting logical increments in both the dimensions and their tolerances. It is recognized that the introduction of such variances will create a conflict in the acceptance dimensions or gaging between the inch and metric data. Experience indicates a probability that no serious difficulties will result from this conflict. Hence it is the intent of this Standard that any dimension which is within tolerance by either metric or inch measurement is considered to be in conformance with this Standard.

Where it was considered advisable to limit the variance between the minimum and maximum dimensions permitted by the existing tolerances and those permitted by the converted metric dimensions, closer rounding was utilized.

TABLE A1 PRESSURE–TEMPERATURE RATINGS

Temperature, °C	Class 125, bar	Class 250, bar
−29 to 66	13.8	27.6
100	12.9	26.2
125	12.3	24.9
150	11.3	23.0
175	10.4	20.8
200	8.9	17.8

GENERAL NOTES:
(a) 1 bar = 14.5 psi = 10^5 Pa
(b) °C = 0.5556 (°F − 32)

TABLE A2 INSPECTION TOLERANCES, CENTER-TO-END AND CENTER-TO-CENTER

Nominal Pipe Size	Plus or Minus, mm
1/8	1.0
1/4	1.0
3/8	1.5
1/2, 3/4	1.5
1, 1 1/4	2.0
1 1/2, 2	2.0
2 1/2, 3	2.5
4	3.0

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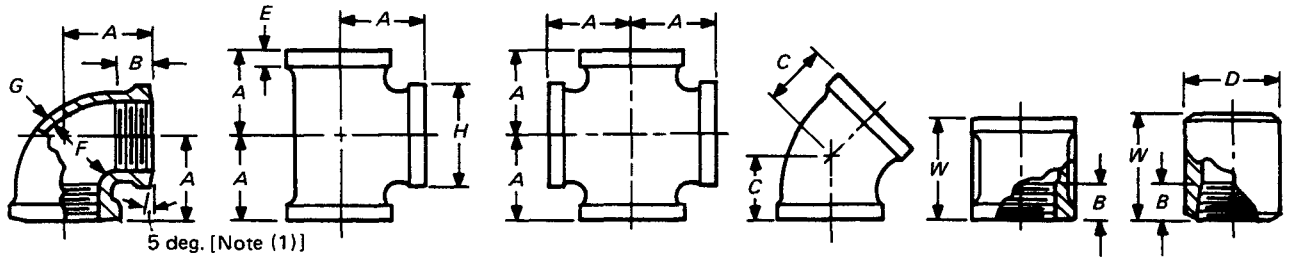

90 deg. Elbow | Tee | Cross | 45 deg. Elbow | Cast | Wrought

Couplings [Note (2)]

TABLE A3 DIMENSIONS OF 90 DEG. ELBOWS, TEES, CROSSES, 45 DEG. ELBOWS, AND COUPLINGS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End Elbows, Tees, Crosses *A*	Length of Thread (3) *B*, Min.	Center-to-End 45 deg. Elbows *C*	Diameter, Wrought Coupling (4) *D*	Band Length *E*, Min.	Inside Diameter of Cast Fitting *F*		Metal Thickness (5) *G*	Band Diameter *H*, Min.	End-to-End Straight Coupling *W*	
						Min.	Max.			Cast	Wrought
1/8	14	6	11	14	4	10	11	2.0	17	20	21
1/4	18	8	14	17	4	14	15	2.0	21	25	26
3/8	21	9	16	21	4	17	18	2.2	25	27	28
1/2	26	11	20	27	5	21	23	2.2	30	33	35
3/4	30	13	23	33	6	27	28	2.5	36	36	38
1	36	15	27	. . .	7	34	35	2.7	44	43	. . .
1 1/4	43	17	31	. . .	8	42	44	3.0	53	47	. . .
1 1/2	47	18	33	. . .	9	48	50	3.3	60	49	. . .
2	54	19	37	. . .	10	60	62	3.8	74	56	. . .
2 1/2 (6)	69	23	50	. . .	12	73	76	4.3	89	73	. . .
3	78	25	55	. . .	14	89	91	4.8	107	81	. . .
4	96	27	66	. . .	17	114	117	5.5	135	94	. . .

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) On right-hand couplings, the use of ribs is optional with the manufacturer, but no right-hand couplings shall have more than two ribs. Right- and left-hand couplings shall have four or more ribs unless the left-hand opening is clearly marked "L", in which case the use of ribs is optional with the manufacturer. See Section 7.
(2) A 5 deg. bevel on face is optional.
(3) Dimension *B* for wrought couplings includes minimum length of perfect thread. The length of useful thread (*B* plus threads with fully formed roots and flat crests) shall be not less than L_2 (effective length of external thread) required by ANSI/ASME B1.20.1. See Section 6.
(4) Couplings sizes NPS 3/4 and smaller may be cast or made from rod at the option of the manufacturer. Diameters *D* are commercial rod sizes.
(5) For metal thickness tolerance, see para. 10(a).
(6) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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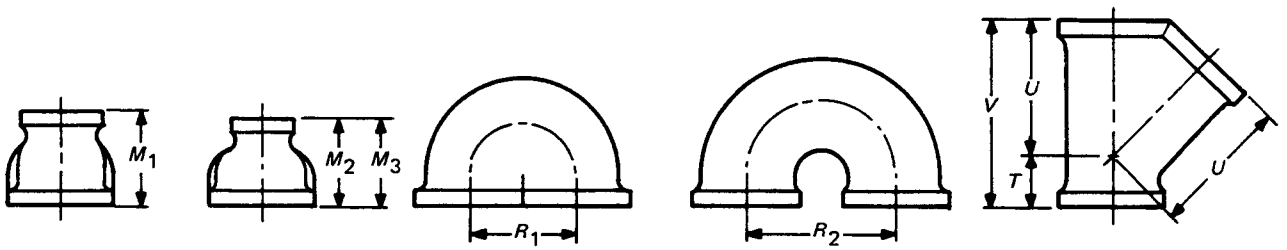

Reducer (1 Size) | Reducer (2 and 3 Sizes) | Closed Pattern Return Bend | Open Pattern Return Bend | 45 deg. Y Branch Straight

TABLE A4 DIMENSIONS OF REDUCERS, CLOSED AND OPEN PATTERN RETURN BENDS, AND 45 DEG. Y BRANCHES (STRAIGHT SIZES)[1,2]

Nominal Pipe Size	Reducers			Return Bends		45 deg. Y Branch		
	End-to-End Reducing (3)			Center-to-Center				
	One Size M_1	Two Sizes M_2	Three Sizes M_3	Closed Pattern R_1	Open Pattern R_2	Center-to-End Inlet T	Center-to-End Outlet U	End-to-End V
1/4	22	...	...	...	...	...	...	...
3/8	26	23	...	...	...	13	32	45
1/2	30	29	...	25	38	16	40	56
3/4	35	31	31	32	51	18	48	66
1	40	38	...	38	64	22	59	81
1 1/4	45	42	...	...	76	26	72	93
1 1/2	48	45	45	...	89	28	80	108
2	52	52	52	...	102	31	96	127
2 1/2 (4)	83	...	...	...	114	...	...	...
3	94	94	...	...	127	...	...	...
4	111	...	...	...	...	...	...	...

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) See para. 9(b) for requirements concerning patterns for reducing fittings.
(2) For dimensions not given, see Table A3.
(3) The reduced sizes refer to the indicated nominal sizes listed in column 1, except that dimension 22 mm in column 2 refers to the NPS 1/4 × 1/8 reducer.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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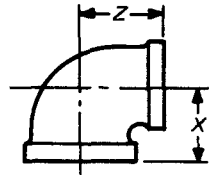

90 deg. Elbow, Reducing

TABLE A5 DIMENSIONS OF 90 DEG. ELBOWS (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End		Nominal Pipe Size	Center-to-End	
	X	*Z*		*X*	*Z*
1/4 × 1/8	17	15	1 1/4 × 3/4	35	38
3/8 × 1/4	19	20	1 1/2 × 1 1/4	44	46
1/2 × 3/8	24	23	1 1/2 × 1	39	44
3/4 × 1/2	27	28			
			2 × 1 1/2	48	53
1 × 3/4	33	33	2 1/2 × 2 (4)	61	66
1 × 1/2	30	31	3 × 2 1/2	72	76
1 1/4 × 1	39	41	4 × 3	84	91

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) NPS 3/8 × 1/8, 1/2 × 1/4, 2 × 1 1/4, and 3 × 2 are also available but not to standard center-to-end dimensions. The demand for these sizes is insufficient to warrant unification.
(2) See para. 9(b) for requirements concerning patterns for reducing fittings.
(3) For dimensions not given, see Table A3.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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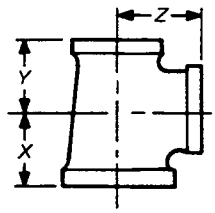

Tee, Reducing

TABLE A6 DIMENSIONS OF TEES (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End		
	X	Y	Z		X	Y	Z
1/4 × 1/4 × 1/8	17	17	15	1 1/4 × 1 × 3/4	35	33	38
3/8 × 3/8 × 1/4	19	19	20	1 1/4 × 3/4 × 1 1/4	43	38	43
3/8 × 1/4 × 3/8	21	20	21	1 1/4 × 1/2 × 1 1/4	43	36	43
3/8 × 1/4 × 1/4	19	18	20	1 × 1 × 1 1/4	41	41	39
1/2 × 1/2 × 3/8	24	24	23	1 1/2 × 1 1/2 × 1 1/4	44	44	46
1/2 × 1/2 × 1/4	22	22	22	1 1/2 × 1 1/2 × 1	39	39	44
1/2 × 3/8 × 1/2	26	23	26	1 1/2 × 1 1/2 × 3/4	36	36	41
1/2 × 3/8 × 3/8	24	21	23	1 1/2 × 1 1/2 × 1/2	34	34	39
3/8 × 3/8 × 1/2	23	23	24	1 1/2 × 1 1/4 × 1 1/2	47	46	47
3/4 × 3/4 × 1/2	27	27	28	1 1/2 × 1 1/4 × 1 1/4	44	43	46
3/4 × 3/4 × 3/8	25	25	25	1 1/2 × 1 1/4 × 1	39	39	44
3/4 × 1/2 × 3/4	30	28	30	1 1/2 × 3/4 × 1 1/2	47	41	47
3/4 × 1/2 × 1/2	27	26	28	1 1/4 × 1 1/4 × 1 1/2	46	46	44
1/2 × 1/2 × 3/4	28	28	27	1 × 1 × 1 1/2	44	44	39
1 × 1 × 3/4	33	33	33	2 × 2 × 1 1/2	48	48	53
1 × 1 × 1/2	30	30	31	2 × 2 × 1 1/4	45	45	52
1 × 1 × 3/8	28	28	29	2 × 2 × 1	40	40	50
1 × 3/4 × 1	36	33	36	2 × 2 × 3/4	37	37	47
1 × 3/4 × 3/4	33	30	33	2 × 1 1/2 × 2	54	53	54
1 × 3/4 × 1/2	30	27	31	2 × 1 1/2 × 1 1/2	48	47	53
1 × 1/2 × 1	36	31	36	1 1/2 × 1 1/2 × 2	53	53	48
1 × 1/2 × 3/4	33	28	33	2 1/2 × 2 1/2 × 2 (4)	61	61	66
3/4 × 3/4 × 1	33	33	33	2 1/2 × 2 × 2	61	57	66
1 1/4 × 1 1/4 × 1	39	39	41	2 × 2 × 2 1/2	66	66	61
1 1/4 × 1 1/4 × 3/4	35	35	38	3 × 3 × 2 1/2	72	72	76
1 1/4 × 1 1/4 × 1/2	33	33	36	3 × 3 × 2	64	64	73
1 1/4 × 1 × 1 1/4	43	41	43	4 × 4 × 3	84	84	91
1 1/4 × 1 × 1	39	36	41	4 × 4 × 2	70	70	87

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) NPS 1 × 1/2 × 1/2, 1 1/2 × 1 × 1 1/2, 1 1/2 × 1 × 1 1/4, 1 1/2 × 1 × 1, and 2 × 2 × 1/2 are also available but not to standard center-to-end dimensions. The demand for these sizes is insufficient to warrant unification.
(2) See para. 9(b) for requirements concerning patterns for reducing fittings.
(3) For dimensions not given, see Table A3.
(4) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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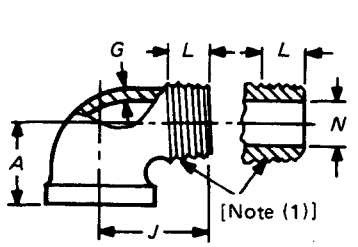
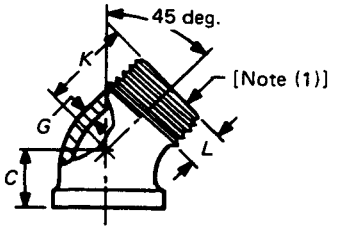


90 deg. Street Elbow



45 deg. Street Elbow

TABLE A7 DIMENSIONS OF 90 DEG. AND 45 DEG. STREET ELBOWS[2,3]

Nominal Pipe Size	Center-to-Female End, 90 deg. Elb. *A*	Center-to Female End, 45 deg. Elb. *C*	Metal Thickness (4) *G*	Center-to-Male End, 90 deg. Elb. *J*	Center-to-Male End, 45 deg. Elb. *K*	Length of Thread Male End *L*, Min.	Port Diameter Male End *N*, Max.
1/8	14	11	2.0	23	20	7	6
1/4	18	14	2.0	28	22	10	7
3/8	21	16	2.3	31	23	10	10
1/2	26	20	2.3	38	27	14	13
3/4	30	23	2.5	42	31	14	18
1	36	27	2.8	50	36	18	24
1 1/4	43	31	3.0	57	42	18	32
1 1/2	47	33	3.3	62	46	19	37
2	54	37	3.8	73	54	19	49

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) Both designs illustrated for external thread ends of street pipe fittings are approved.
(2) For dimensions not given, see Table A3.
(3) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.
(4) For metal thickness tolerance, see para. 10(a).

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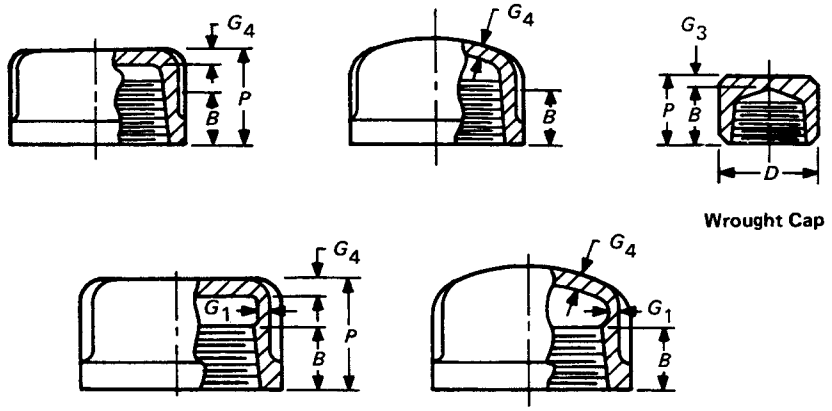

Wrought Cap

Cast Caps — All Designs Approved

TABLE A8 DIMENSIONS OF CAPS[1]

Nominal Pipe Size	Length of Thread (2)		Diameter Wrought Cap (3)	Metal Thickness (4)			Height of Cap *P*, Min.	
	B, Min.	L_2, Min.	*D*	G_1	G_3	G_4	Cast	Wrought
1/8	6	6.703	14	2.0	2.8	2.3	12	12
1/4	8	10.206	18	2.0	3.3	2.5	15	15
3/8	9	10.358	21	2.3	3.3	2.8	16	17
1/2	11	13.556	27	2.3	3.6	3.0	19	21
3/4	13	13.861	33	2.5	3.8	3.3	21	24
1	15	17.343	. . .	2.8	. . .	3.8	25	. . .
1 1/4	17	17.953	. . .	3.0	. . .	4.3	28	. . .
1 1/2	18	18.377	. . .	3.3	. . .	4.8	29	. . .
2	19	19.215	. . .	3.8	. . .	5.6	34	. . .
2 1/2 (5)	23	28.892	. . .	4.3	. . .	6.3	43	. . .
3	25	30.480	. . .	4.8	. . .	7.4	46	. . .
4	27	33.020	. . .	5.6	. . .	9.1	53	. . .

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) For dimensions not given, see Table A3.
(2) Caps may be made without recess. Caps so made shall be of such height *P* that the length of perfect thread shall be not less than *B*, and the length of useful thread (*B* plus threads with fully formed roots and flat crests) shall be not less than L_2 (effective length of external thread) required by ANSI/ASME B1.20.1. All other dimensions shall be as specified for other caps.
(3) Caps NPS 3/4 and smaller may be cast or made from rod at the option of the manufacturer. Dimensions *D* are commercial rod sizes.
(4) For metal thickness tolerance, see para. 10(a).
(5) The dimensions for NPS 2 1/2 and larger are in accordance with ANSI/ASME B16.3 for Class 150 Malleable Iron Threaded Fittings.

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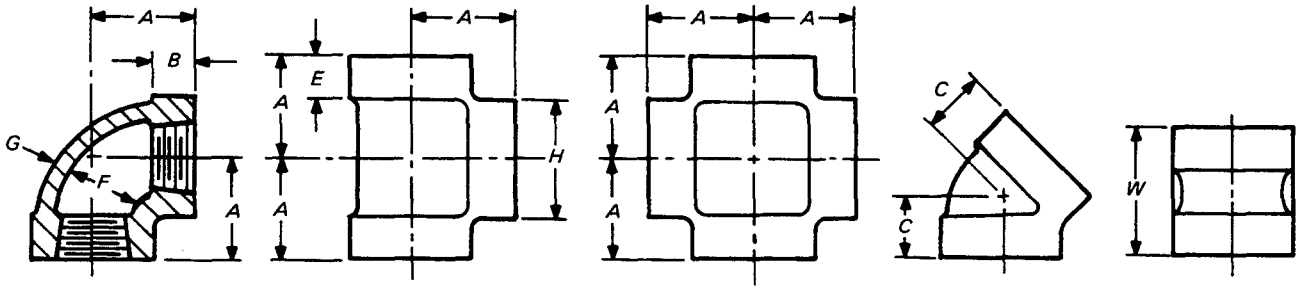

90 deg. Elbow | Tee | Cross | 45 deg. Elbow | Coupling

TABLE A9 DIMENSIONS OF 90 DEG. ELBOWS, TEES, CROSSES, 45 DEG. ELBOWS, AND COUPLINGS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End Elbows, Tees, and Crosses (1) *A*	Length of Thread *B*, Min.	Center-to-End 45 deg. Elbows (1) *C*	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness (2) *G*	Outside Diameter of Band *H*, Min.	End-to-End Coupling *W*
					Min.	Max.			
1/4	20	8	19	10	14	15	2.8	24	27
3/8	24	9	20	11	17	18	3.0	28	29
1/2	28	11	22	13	21	23	3.3	34	34
3/4	33	13	25	14	27	28	4.1	41	39
1	38	15	28	16	34	35	4.3	50	42
1 1/4	44	17	33	18	42	44	4.8	61	49
1 1/2	49	18	36	19	48	50	5.1	68	55
2	57	19	43	21	60	62	5.6	83	64
2 1/2	69	23	50	24	73	76	6.1	98	73
3	78	25	55	25	89	91	6.6	117	81
4	96	27	66	28	114	117	7.9	147	94

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) The dimensions for 90 deg. elbows, tees, crosses, and 45 deg. elbows are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(2) For metal thickness tolerance, see para. 10(a).

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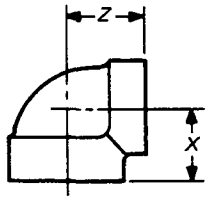

90 deg. Elbow,
Reducing

TABLE A10 DIMENSIONS OF 90 DEG. ELBOWS (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End	
	X	Z
1/2 × 3/8	26	26
3/4 × 1/2	30	31
1 × 3/4	35	37
1 × 1/2	32	35
1 1/4 × 1	40	42
1 1/4 × 3/4	37	41
1 1/2 × 1 1/4	46	48
1 1/2 × 1	42	46
2 × 1 1/2	51	55
2 × 1 1/4	48	53
2 1/2 × 2	61	66
3 × 2 1/2	72	76
3 × 2	64	73
4 × 3	89	91

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) For dimensions not given, see Table A9.
(2) All dimensions given in Table A10 are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(3) See para. 9(b) for requirements concerning patterns for reducing fittings.

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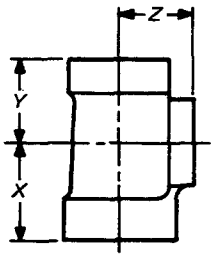
CLASS 250



Tee, Reducing

TABLE A11 DIMENSIONS OF TEES (REDUCING SIZES)[1,2,3]

Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End		
	X	Y	Z		X	Y	Z
1/2 × 1/2 × 3/8	26	26	26	1 1/2 × 1 1/2 × 1	42	42	46
3/4 × 3/4 × 1/2	30	30	31	1 1/2 × 1 1/2 × 3/4	39	39	44
3/4 × 3/4 × 3/8	28	28	29	1 1/2 × 1 1/2 × 1/2	36	36	42
3/4 × 1/2 × 3/4	33	31	33	1 1/2 × 1 1/4 × 1 1/4	46	44	48
3/4 × 1/2 × 1/2	30	28	31				
1/2 × 1/2 × 3/4	31	31	30	1 1/2 × 1 1/4 × 1	42	40	46
				1 1/2 × 1 × 1 1/2	49	46	49
1 × 1 × 3/4	35	35	37	1 1/4 × 1 1/4 × 1 1/2	48	48	46
1 × 1 × 1/2	32	32	34	2 × 2 × 1 1/2	51	51	55
1 × 3/4 × 1	38	37	38	2 × 2 × 1 1/4	48	48	53
1 × 3/4 × 3/4	34	33	37				
3/4 × 3/4 × 1	37	37	34	2 × 2 × 1	44	44	51
				2 × 2 × 3/4	41	41	50
1 1/4 × 1 1/4 × 1	40	40	42	2 × 2 × 1/2	38	38	48
1 1/4 × 1 1/4 × 3/4	37	37	41	2 1/2 × 2 1/2 × 2	61	61	66
1 1/4 × 1 1/4 × 1/2	34	34	39	3 × 3 × 2	64	64	73
1 1/4 × 1 × 1 1/4	44	42	44				
1 1/4 × 1 × 1	40	38	42	3 × 2 1/2 × 3	78	76	78
1 1/4 × 3/4 × 1 1/4	44	41	44	3 × 2 × 3	78	73	78
				4 × 4 × 3	84	84	91
1 × 1 × 1 1/4	42	42	40	4 × 4 × 2	70	70	87
1 1/2 × 1 1/2 × 1 1/4	46	46	48	4 × 3 × 4	96	91	96

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) For dimensions not given, see Table A9.
(2) All dimensions given in Table A11 are in accordance with ANSI/ASME B16.4 for Class 125 Cast Iron Threaded Fittings.
(3) See para. 9(b) for requirements concerning patterns for reducing fittings.

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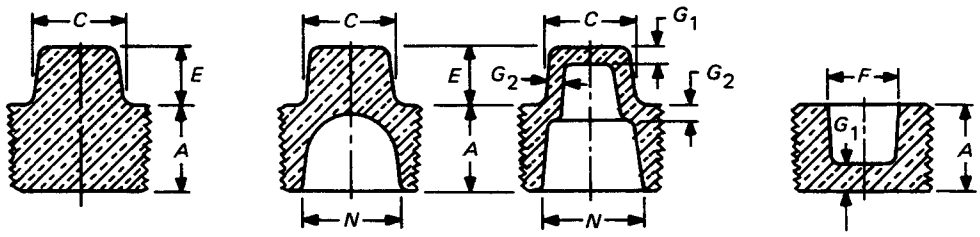

Solid Pattern

Cored Patterns
Both Designs Approved

Countersunk
Pattern

TABLE A12 DIMENSIONS OF SQUARE HEAD AND SQUARE SOCKET PLUGS[1]

Nominal Pipe Size	Thread Length *A*, Min.	Nominal Width Across Flats (2) *C*	Height of Plug Square *E*, Min.	Metal Thickness (3)		Inside Diameter of Plug *N*, Max.	Nominal Size of Square Socket (4) *F*
				G_1	G_2		
1/8	7	7.1	6	. . .	. . .	. . .	. . .
1/4	10	9.5	7	. . .	. . .	. . .	. . .
3/8	10	11.1	8	. . .	. . .	. . .	. . .
1/2	14	14.3	10	2.3	3.0	13	9.5
3/4	14	15.8	11	2.5	3.3	19	12.7
1	18	20.6	13	2.8	3.6	24	12.7
1 1/4	18	23.8	14	3.0	3.8	32	19.1
1 1/2	19	28.5	16	3.3	4.1	37	19.1
2	19	33.3	17	3.8	4.3	49	22.2
2 1/2	27	38.1	19	4.3	4.6	59	28.6
3	29	42.8	20	4.8	4.8	74	34.9
4	31	57.1	23	5.6	5.6	97	50.8

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) For pressure class recommendations, see para. 2(d).
(2) These dimensions *C* are the nominal size of wrench as given in Appendix V, Wrench Openings of ANSI/ASME B18.2.1 Square and Hex Bolts and Screws. Square head plugs are designed to fit these wrenches. Plug squares may have opposite sides tapered a maximum of 4 deg. total.
(3) For metal thickness tolerance, see para. 10(a).
(4) Square socket of countersunk plugs shall have dimensions *F* to fit commercial square bars of sizes indicated. Countersunk square sockets may have opposite sides tapered a maximum of 4 deg. total.

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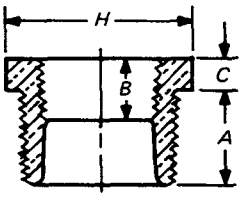
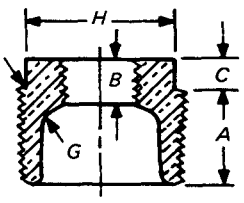
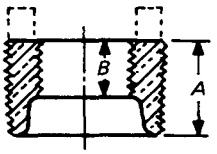


Outside Head



Inside Head



Face [Note (1)]

TABLE A13 DIMENSIONS OF OUTSIDE HEAD, INSIDE HEAD, AND FACE BUSHINGS[2,3]

Nominal Pipe Size	Length of External Thread *A*, Min.	Length of Internal Thread *B*, Min.	Height of Head *C*, Min.	Width of Head (4) *H*, Min.		Metal Thickness (5) *G*
				Outside	Inside	
1/4 × 1/8	11	7 (6)	4	16 (7)	...	...
3/8 × 1/4	12	10 (6)	4	17 (7)	...	...
3/8 × 1/8	12	6	4	17 (7)	...	...
1/2 × 3/8	14	10 (6)	5	22 (7)	...	...
1/2 × 1/4	14	8	5	22 (7)	...	...
1/2 × 1/8	14	6	5	22 (7)	...	...
3/4 × 1/2	16	13 (6)	6	29 (7)	...	...
3/4 × 3/8	16	9	6	29 (7)	...	...
3/4 × 1/4	16	8	6	29 (7)	...	...
1 × 3/4	19	13	6	36 (7)	...	...
1 × 1/2	19	11	6	36 (7)	...	...
1 × 3/8	19	9	8	...	28	...
1 × 1/4	19	8	8	...	28	...
1 1/4 × 1	20	15	7	45	...	...
1 1/4 × 3/4	20	13	7	45	...	...
1 1/4 × 1/2	20	11	9	...	34	4.7
1 1/4 × 3/8	20	9	9	...	28	4.7
1 1/2 × 1 1/4	21	18 (6)	8	51	...	...
1 1/2 × 1	21	15	8	51	...	...
1 1/2 × 3/4	21	13	9	...	41	5.1
1 1/2 × 1/2	21	11	9	...	34	5.1
2 × 1 1/2	22	18	9	63	...	...
2 × 1 1/4	22	17	9	63	...	...
2 × 1	22	15	10	...	50	5.6
2 × 3/4	22	13	10	...	41	5.6
2 × 1/2	22	11	10	...	34	5.6
2 1/2 × 2	27	19	9	76	...	...
2 1/2 × 1 1/2	27	18	11	68	...	...
2 1/2 × 1 1/4	27	17	11	...	61	6.1
2 1/2 × 1	27	15	11	...	50	6.1
3 × 2 1/2	29	23	10	98	...	...
3 × 2	29	19	12	83	...	...
3 × 1 1/2	29	18	12	...	68	6.6
3 × 1 1/4	29	17	12	...	61	6.6
4 × 3	31	25	13	117	...	...
4 × 2 1/2	31	23	15	...	98	7.9
4 × 2	31	19	15	...	83	7.9
4 × 1 1/2	31	18	15	...	68	7.9

Refer to notes on page 29.

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TABLE A13 (CONT'D):

GENERAL NOTE: Dimensions are in millimeters.

NOTES:
(1) The addition of lugs on face bushings is not prohibited.
(2) For pressure class recommendations, see para. 2(d).
(3) Bushings reducing to pipe sizes smaller than given are bushed from the smallest reduction appearing in the table.
(4) Heads of bushings shall be hexagonal or octagonal.
(5) Metal thickness *G* is the same as Class 125 Cast Iron Threaded Fittings of ANSI/ASME B16.4. For tolerance, see para. 10(a).
(6) To provide proper metal thickness, these sizes shall not be cored out to diameters greater than the root diameter of the internal thread. The length of the internal thread may be equal to the minimum dimension *B* or greater, up to the full length of bushing.
(7) Bushings in these sizes may be made from regular hexagon or octagon bar stock sizes.

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ANNEX B
REFERENCES

(This Annex is an integral part of ANSI/ASME B16.15-1985 which is placed after the main text for convenience.)

The following is a list of Standards and Specifications referenced in this Standard, showing the year of approval.

ASME Publications (approved as American National Standards)

ANSI/ASME B1.20.1-1983	Pipe Threads General Purpose (Inch)
ANSI/ASME B16.3-1985	Malleable Iron Threaded Fittings, Classes 150 and 300
ANSI/ASME B16.4-1985	Cast Iron Threaded Fittings, Classes 125 and 250
ANSI B18.2.2-1981	Square and Hex Bolts and Screws, Including Hex Cap Screws and Lag Screws

ASTM Publications

ASTM B 16-83	Specification for Free Cutting Brass Rod, Bar, and Shapes for Use in Screw Machines
ASTM B 62-82	Specification for Composition Bronze or Ounce Metal Castings
ASTM B 140-83	Specification for Copper-Zinc-Lead (Leaded Red Brass or Hardware Bronze) Rod, Bar, and Shapes
ASTM B 584-83	Specification for Copper Alloy Sand Castings for General Applications

Publications of the following organizations appear on the above list:

ASME	The American Society of Mechanical Engineers 345 East 47th Street, New York, New York 10017 ASME Order Department 22 Law Drive, Box 2300 Fairfield, New Jersey 07007-2300
ASTM	American Society for Testing and Materials 1916 Race Street, Philadelphia, Pennsylvania 19103

Publications appearing above which have been approved as American National Standards may also be obtained from:

ANSI	American National Standards Institute 1430 Broadway, New York, New York 10018

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INTERPRETATIONS TO ANSI/ASME B16.15

(These Interpretations are not part of ANSI/ASME B16.15-1985 and are included for information only.)

INTRODUCTION

As a service to persons who use the B16 Standards, the B16 Committee renders interpretations of the requirements upon request. The procedure for requesting an interpretation is described in the following paragraphs.

The Interpretations include all replies which have been approved by the B16 Main Committee, in response to inquiries concerning interpretation of this Standard.

An interpretation applies either to the Edition and Addenda in effect on the date of issuance of the interpretation or the Edition and Addenda stated in the interpretation. Subsequent revisions to this Standard may supersede the interpretation.

PROCEDURE FOR REQUESTING INTERPRETATIONS

On request, the B16 Committee will render an interpretation of any requirement of this Standard. Interpretations can only be rendered in response to a written request, which should be addressed to:

Secretary, B16 Main Committee
The American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, NY 10017

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his request using the following format:

(a) Subject. Cite the applicable paragraph number(s) and/or give a concise description of the subject.

(b) 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 which are not in this format may be rewritten in this format prior to being answered, which may inadvertently change the original intent of the request.

ASME procedures provide for reconsideration of an interpretation when or if additional information is available which the inquirer believes might affect the interpretation. 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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INTERPRETATIONS NO. 1

Replies to Technical Inquiries Issued From January 1, 1984 Through June 30, 1985

Interpretation: 15-1

Subject: Measurement of Dimension *H* of Table 13, ANSI B16.15-1978

Date Issued: January 5, 1984

Question: For an outside head bushing, is dimension *H* of Table 13 in ANSI B16.15-1978 measured across the width of the corners or the flats?

Reply: Dimension *H* of Table 13 for an outside head bushing is measured across the flats.

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

Scheme for the Identification of Piping Systems ..... A13.1-1981(R1985)
Pipe Threads — General Purpose (Inch) B1.20.1-1983
Dryseal Pipe Threads (Inch) ..... B1.20.3-1976(R1982)
Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800 ..... B16.1-1975
Malleable Iron Threaded Fittings, Classes 150 and 300 ..... B16.3-1985
Cast Iron Threaded Fittings, Classes 125 and 250 ..... B16.4-1985
Pipe Flanges and Flanged Fittings B16.5-1981
Factory-Made Wrought Steel Buttwelding Fittings B16.9-1978
Face-to-Face and End-to-End Dimensions of Ferrous Valves B16.10-1973
Forged Steel Fittings, Socket-Welding and Threaded B16.11-1980
Cast Iron Threaded Drainage Fittings B16.12-1983
Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads B16.14-1983
Cast Bronze Threaded Fittings, Classes 125 and 250 ..... B16.15-1985
Cast Copper Alloy Solder Joint Pressure Fittings B16.18-1984
Ring-Joint Gaskets and Grooves for Steel Pipe Flanges B16.20-1973
Nonmetallic Flat Gaskets for Pipe Flanges B16.21-1978
Wrought Copper and Copper Alloy Solder Joint Pressure Fittings B16.22-1980
Cast Copper Alloy Solder Joint Drainage Fittings — DWV B16.23-1984
Bronze Pipe Flanges and Flanged Fittings, Class 150 and 300 ..... B16.24-1979
Buttwelding Ends B16.25-1979
Cast Copper Alloy Fittings for Flared Copper Tubes B16.26-1983
Wrought Steel Buttwelding Short Radius Elbows and Returns B16.28-1978
Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings — DWV B16.29-1980
Cast Copper Alloy Solder Joint Fittings for Sovent® Drainage Systems B16.32-1984
Manually Operated Metallic Gas Valves for Use in Gas Piping Systems Up to 125 psig (Sizes ½ Through 2) B16.33-1981
Valves — Flanged and Buttwelding End B16.34-1981
Steel Orifice Flanges, Class 300, 600, 900, 1500 and 2500 Including 1979 Addenda — Class 400 ..... B16.36-1975
Hydrostatic Testing of Control Valves B16.37-1980
Large Metallic Valves for Gas Distribution (Manually Operated, NPS 2½ to 12, 125 psig Maximum) B16.38-1985
Malleable Iron Threaded Pipe Unions, Class 150, 250 and 300 ..... B16.39-1977
Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems B16.40-1985
Ductile Iron Pipe Flanges and Flanged Fittings, Class 150 and 300 ..... B16.42-1979
Wrought Copper and Copper Alloy Solder Joint Fittings for Sovent® Drainage Systems B16.43-1982
Power Piping B31.1-1983
Fuel Gas Piping B31.2-1968
Chemical Plant and Petroleum Refinery Piping B31.3-1984
Liquid Petroleum Transportation Piping Systems B31.4-1979
Refrigeration Piping B31.5-1983
Gas Transmission and Distribution Piping Systems B31.8-1982
Building Services Piping B31.9-1982
ASME Guide for Gas Transmission and Distribution Piping Systems — 1983 (not an ANSI Standard) .....
Corrosion Control for ANSI B31.1 Power Piping Systems (not an ANSI Standard) .....
Welded and Seamless Wrought Steel Pipe B36.10M-1985
Stainless Steel Pipe B36.19M-1985
Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard ..... N278.1-1975(R1984)

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