

**Corrosion Resistant
Pipe Fittings
Threaded and Socket Welding
Class 150 and 1000**

Standard Practice
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This MSS Standard Practice was developed under the consensus of the MSS Technical Committee 108 and the MSS Coordinating Committee. The content of this Standard Practice is the result of the efforts of competent and concerned volunteers to provide an effective, clear, and non-exclusive specification that will benefit the industry as a whole. This MSS Standard Practice is intended as a basis for common practice by the manufacturer, the user, and the general public. The existence of an MSS Standard Practice does not in itself preclude the manufacture, sale, or use of products not conforming to the Standard Practice. Mandatory conformance is established only by reference in a code, specification, sales contract, or public law, as applicable.

Unless otherwise specifically noted in this MSS SP, any standard referred to herein is identified by the date of issue that was applicable to the referenced standard(s) at the date of issue of this MSS SP. (See Annex A.)

Non-toleranced dimensions in this Standard Practice are nominal, and, unless otherwise specified, shall be considered “for reference only”.

In this Standard Practice all notes, annexes, tables, and figures are construed to be essential to the understanding of the message of the standard, and are considered part of the text unless noted as "supplemental". All appendices appearing in this document are construed as "supplemental". Supplemental" information does not include mandatory requirements.

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FOREWORD

This document established a standard for corrosion resistant pipe fittings, threaded and socket-welding. Class 150 and Class 1000, produced for a number of years by various manufacturers to somewhat different dimensions although basically similar in principle.

These fittings were originally developed for use in the paper, food, pharmaceutical, distillery, sanitary, chemical, petro-chemical, and other corrosive and high temperature industry environments. The original design of these fittings was based on the dimensions of ASME B16.3, Malleable Iron Threaded Fittings.

This Standard Practice, originally approved May 1995, was revised in 2001 to include Class 150 and Class 1000 square head plugs, hex head plugs and bushings, locknuts, and threaded and socket-welding unions.

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**CORROSION RESISTANT PIPE FITTINGS
THREADED AND SOCKET WELDING
CLASS 150 AND 1000**

1. SCOPE

1.1 This Standard Practice for corrosion resistant pipe fittings threaded and socket welding, Class 150 and 1000, establishes requirements for the following:

- a) Pressure-temperature ratings
- b) Size and method of designating openings of reducing fittings
- c) Marking
- d) Minimum requirements for materials
- e) Dimensions and tolerances
- f) Threading
- g) Tests

2. PRESSURE-TEMPERATURE RATINGS

2.1 Pressure-temperature ratings for these fittings are shown in Table 1. Ratings are independent of the contained fluid and are the maximum allowable working pressures at the tabulated temperatures. Intermediate ratings may be obtained by linear interpolation between the temperatures shown.

2.2 The temperatures shown for the corresponding pressure rating shall be the material temperature of the pressure retaining structure. It is implied 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.

2.3 For purposes of this Standard Practice, castings are included for Class 150 fittings only.

2.4 The wall thickness of the fittings covered by this Standard Practice corresponds to Schedule 40 pipe. When thinner pipe of equivalent material is used, its strength may govern the rating. When Schedule 40 pipe of equivalent material is used, the strength of the fitting governs the rating.

**TABLE 1
Pressure-Temperature Ratings**

Temperature (°F)	Class 150 (castings) PSIG	Class 1000 (Wrought) PSIG
-20 to 150	300	1000
200	265	910
250	225	825
300	185	735
350	150 ^(a)	650
400	—	560
450	—	475
500	—	385
550	—	300

NOTE:

(a) Permissible for service temperature up to 366 degrees Fahrenheit, reflecting the temperature of saturated steam at 150 psig.

3. SIZE

3.1 The size of the fittings listed in the following Tables is identified by the corresponding nominal ^(b) pipe size (NPS).

NOTE:

(b) 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.

3.2 For 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 fitting is a tee or Y-branch (lateral), the size of the outlet is given last. The straight line sketches of Fig. 1 illustrate how the reducing fittings are read.

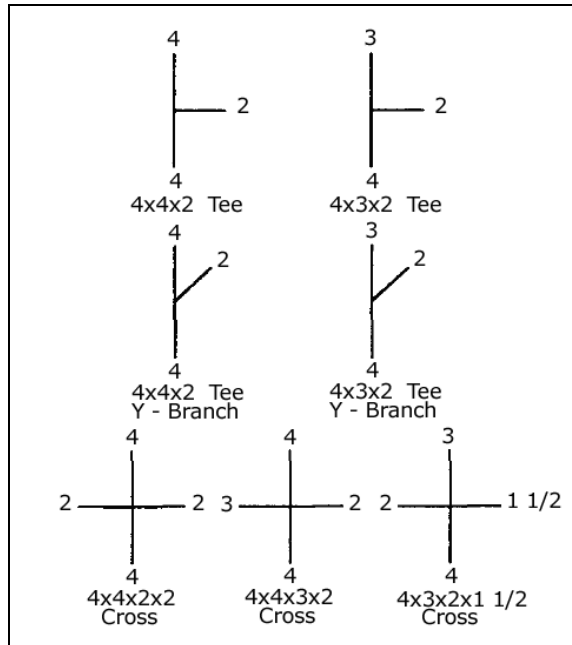


FIGURE 1
Identification of Reducing Fittings

4. MARKING

4.1 **Class 150 Fittings** Each Class 150 fitting shall be marked for identification with:

- The manufacturer's name or trademark
- Material identification
- The symbol "SP114" to denote compliance with this Standard Practice
- Class 150
- Size
- Other markings in accordance with MSS SP-25. Where size and shape of fittings do not permit all of the above markings, they may be omitted in the reverse order given.
- The marking of plugs, bushings, and locknuts is not required by this Standard Practice.

4.2 **Class 1000 Fittings** Each Class 1000 fitting shall be marked for identification with:

- The manufacturer's name or trademark
- Material identification
- The symbol "SP114" to denote compliance with this Standard Practice
- Class 1000 or 1M
- Size
- Other markings in accordance with MSS SP-25. Where size and shape of fittings do not permit all of the above markings, they may be omitted in the reverse order given.
- The marking of plugs, bushings, and locknuts is not required by this Standard Practice.

5. MATERIAL

5.1 Class 150 fittings shall be cast or may be wrought. Class 1000 fittings shall be wrought only.

5.2 **Castings** The chemical and mechanical properties of the castings shall be at least equal to the grades contained in ASTM A 351. Castings shall be heat treated by the solution annealing method specified in ASTM A 351. The castings shall be capable of passing the intergranular corrosion tests performed in accordance with practice B of ASTM A 262 with a corrosion rate established between the manufacturer and purchaser. Alternatively, the castings shall be capable of passing the intergranular tests performed in accordance with practice E, alternate method B, of ASTM A 262. The manufacturer shall be prepared to certify that the product has been so produced.

5.3 **Wrought** Fittings, couplings, and caps shall be made from wrought forgings, seamless tubing, or bar stock. The chemical and mechanical properties shall be as a minimum equal to the grades contained in ASTM A 182, A 479 or A 511. Wrought material shall be heat treated by the solution method as specified in ASTM A 182, A 479, or A 511. The wrought material shall be capable of passing the intergranular corrosion tests performed in accordance with practice E of ASTM A 262. The manufacturer shall be prepared to certify that the product has been so produced.

6. DIMENSIONS AND TOLERANCES

6.1 **General** The dimensions and tolerances of cast and wrought fittings are given in Tables 2 through 22.

6.2 **Reducing Fittings** Reducing fittings shall have the same center-to-end dimensions and band diameter as the straight-size fittings corresponding to the largest size opening in the reducing fittings.

6.3 **Tolerances** Unless otherwise noted, the dimensions in this Standard Practice are nominal and are subject to the designated manufacturing tolerances. The following tolerances apply:

- a) **Metal Thickness** Metal thickness at no point shall be less than 90% of the value given in Tables 3 through 10 and 12 through 22.
- b) **Center-to-End** Permitted center-to-end tolerances of fittings are shown in Table 2. Tolerances for end-to-end dimensions, lengths of couplings, and reducers shall be twice those given for center-to-end dimensions. The largest nominal pipe size in a reducing fitting governs the tolerance to be applied to all openings.

TABLE 2
Center-to-End Tolerances

NOMINAL PIPE SIZE	PLUS OR MINUS, IN.
1/8, 1/4 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

7. THREADING

7.1 **Types of Threads** All fittings, except locknuts, shall be threaded in accordance with ANSI/ASME B1.20.1, and shall have tapered threads. Locknut threads shall be NPSL straight pipe threads in accordance with ANSI/ASME B1.20.1.

7.2 **Countersink or Chamfer** Internal threads shall be countersunk or chamfered a distance of not less than one half the pitch of the thread at an angle of approximately 45° with the axis of the thread, and external threads shall be chamfered at an angle of 30° to 45° 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.

7.3 Thread Gaging

7.3.1 **External Threads** Variations in threading shall be limited to one turn large or one turn small from the gage face of the ring gage. The reference point for gaging shall be the end of the thread.

7.3.2 **Internal Threads** Variations in threading shall be limited to one turn large or one turn small from the gaging notch of the plug gage. The reference point for gaging is the last thread scratch on the chamfer cone.

7.4 **Length** The thread length specified in all Tables shall be measured to include the countersink or chamfer.

7.5 **Alignment** The maximum allowable variation in the alignment of threads of all openings of threaded fittings shall be 0.06 in./ft.

8. SOCKET-WELDING

8.1 Dimensions for socket-welding fittings shall conform to Tables 2, 7, 13, 17, and 22 and the general values given in Tables 3, 5, 6, 14, and 16.

8.2 The ends of socket-welding fittings shall be flat and at right angles to the socket axis and shall provide a minimum of 75% of the socket wall thickness for the fillet welding surface.

8.3 The socket bore shall be of uniform depth and diameter and exhibit a good workmanship finish that is free of burrs.

9. RIBS

9.1 *General* The addition of ribs or lugs is permitted. Where ribs are used, it is recommended that their thickness should be the same as specified for the metal thickness of the fitting.

10. PLUGS, BUSHINGS, AND LOCKNUTS

10.1 For dimensions of plugs, bushings, and lock nuts, see Tables 8, 9, 10, 11, 18, 19, and 20.

11. FACE BEVEL

11.1 A bevel not exceeding 5 degrees is permitted on the faces of threaded fitting openings. Center-to-end, end-to-end, and width of band dimensions may include or exclude the bevel.

12. WELDING

12.1 Installation welding requirements are outside the scope of this Standard Practice.

13. TESTING

13.1 Hydrostatic testing of fittings is not required by this Standard Practice. All fittings shall be capable of withstanding, without leakage or impairment of serviceability, a pressure equal to that listed in Table 1 at the -20 to 150°F pressure rating for the applicable Class.

14. PIPE UNIONS

14.1 Union parts from different manufacturers are not functionally interchangeable and such usage is not recommended.

Class 150

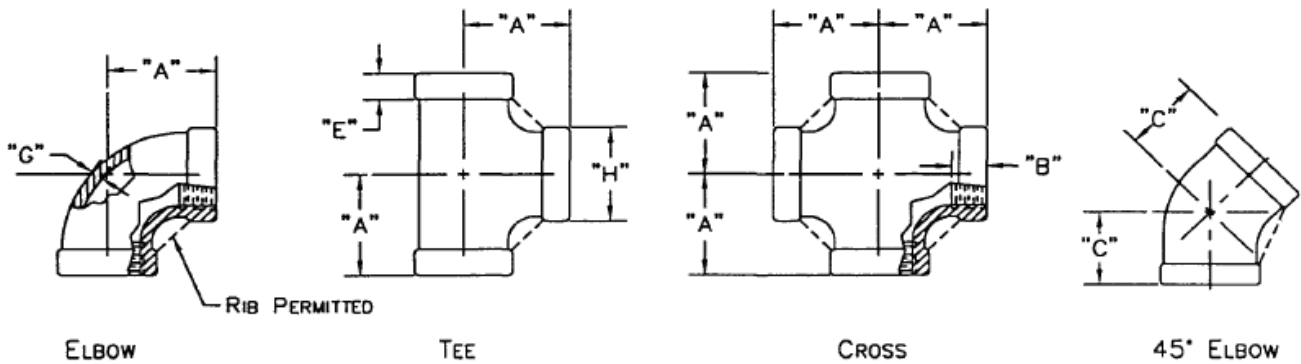


TABLE 3 Dimensions of Class 150 Cast Threaded 90° Elbows, Tees, Crosses, and 45° Elbows

Nominal Pipe Size	Center-to-End, Elbows, Tees, & Crosses A	Center-to-End, 45 Deg Elbows C	Length of Thread B, Min ^(b)	Width of Band E, Min.	Metal Thickness G ^(a)	Outside Diameter of Band H, Min
1/8	0.81	0.69	0.25	0.20	0.09	0.75
1/4	0.81	0.69	0.32	0.20	0.09	0.84
3/8	0.93	0.81	0.36	0.21	0.10	1.01
1/2	1.12	0.87	0.43	0.25	0.10	1.20
3/4	1.31	1.00	0.50	0.27	0.12	1.46
1	1.50	1.12	0.58	0.30	0.13	1.77
1-1/4	1.75	1.31	0.67	0.34	0.14	2.15
1-1/2	1.93	1.43	0.70	0.37	0.15	2.43
2	2.25	1.68	0.75	0.42	0.17	2.96
2-1/2	2.68	1.93	0.92	0.48	0.21	3.31
3	3.06	2.18	0.98	0.55	0.23	4.00
4	3.81	2.62	1.08	0.66	0.26	5.06

GENERAL NOTE: Dimensions are in inches.

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Tables.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.

Class 150

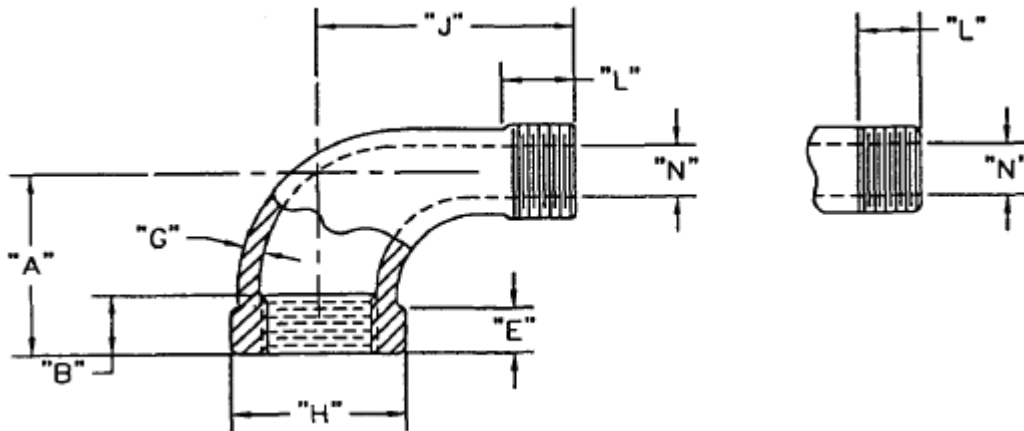


TABLE 4 Dimensions of Class 150 Cast Threaded 90° Street Elbows

Nominal Pipe Size	Center-to-End A	Length of Internal Thread B, Min. ^(b)	Width of Band E, Min.	Metal Thickness G ^(a)	Outside Diameter of Band H, Min.	Center-to-End J	Length Of External Thread L, Min.	Port Diameter Male End N, Max.
1/8	0.81	0.25	0.20	0.09	0.75	1.06	0.26	0.20
1/4	0.81	0.32	0.20	0.09	0.84	1.18	0.40	0.26
3/8	0.93	0.36	0.21	0.10	1.01	1.43	0.41	0.37
1/2	1.12	0.43	0.25	0.10	1.20	1.62	0.53	0.51
3/4	1.31	0.50	0.27	0.12	1.46	1.87	0.55	0.69
1	1.50	0.58	0.30	0.13	1.77	2.12	0.68	0.91
1-1/4	1.75	0.67	0.34	0.14	2.15	2.50	0.71	1.19
1-1/2	1.93	0.70	0.37	0.15	2.43	2.75	0.72	1.39
2	2.25	0.75	0.42	0.17	2.96	3.25	0.76	1.79
2-1/2	2.68	0.92	0.48	0.21	3.31	3.87	1.14	2.20
3	3.06	0.98	0.55	0.23	4.00	4.50	1.20	2.78
4	3.81	1.08	0.66	0.26	5.06	5.68	1.30	3.70

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Tables.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.

Class 150

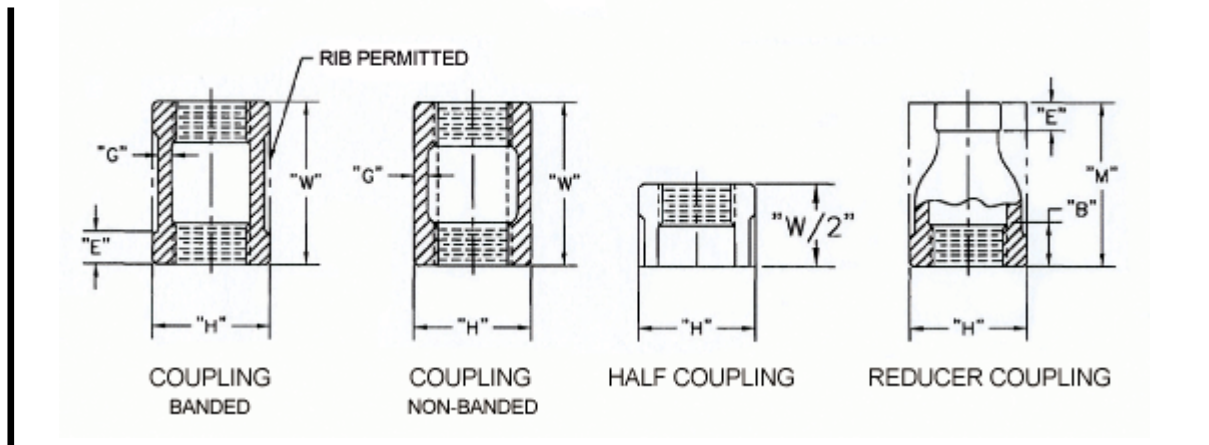


TABLE 5 Dimensions of Class 150 Cast Threaded Couplings (Straight and Reducing Sizes)

Nominal Pipe Size	Length of Thread B, Min. ^(b)	Width of Band E, Min.	Metal Thickness G ^(a)	Outside Diameter of Band H, Min. ^(c)	Length of Straight Couplings W, Min.	Length of Concentric Reducing Couplings M, Min.
1/8	0.25	0.20	0.09	0.75	1.00	
1/4	0.32	0.20	0.09	0.84	1.00	1.00
3/8	0.36	0.21	0.10	1.01	1.12	1.12
1/2	0.43	0.25	0.10	1.20	1.38	1.38
3/4	0.50	0.27	0.12	1.46	1.50	1.50
1	0.58	0.30	0.13	1.77	1.62	1.62
1-1/4	0.67	0.34	0.14	2.15	2.00	2.00
1-1/2	0.70	0.37	0.15	2.43	2.12	2.12
2	0.75	0.42	0.17	2.96	2.50	2.50
2-1/2	0.92	0.48	0.21	3.31	2.87	3.25
3	0.98	0.55	0.23	4.00	3.18	3.68
4	1.08	0.66	0.26	5.06	3.68	4.38

GENERAL NOTES:

Dimensions are in inches. Reducing couplings may be either bell or straight. The outside diameter (H) of straight reducing couplings shall correspond to the largest size end connection of the reducing fitting.

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Tables.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.
- (c) Couplings, half couplings and reducing couplings may be banded or nonbanded.

Class 150

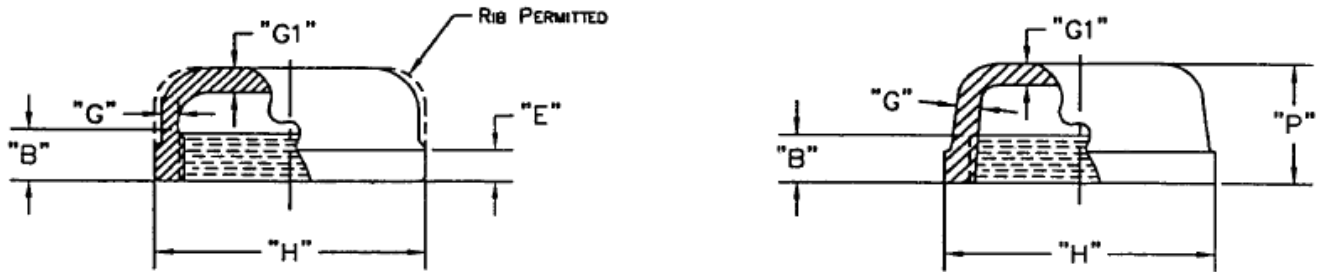


TABLE 6 Dimensions of Class 150 Cast Threaded Caps

Nominal Pipe Size	Length of Thread B, Min. ^(b)	Width of Band E, Min.	Metal Thickness of Side G ^(a)	Outside Diameter of Band H, Min.	Height P, Min.	Thickness of Flat Top Caps G1, Min.
1/8	0.25	0.20	0.09	0.75	0.68	0.09
1/4	0.32	0.20	0.09	0.84	0.68	0.09
3/8	0.36	0.21	0.10	1.01	0.81	0.10
1/2	0.43	0.25	0.10	1.20	0.93	0.12
3/4	0.50	0.27	0.12	1.46	1.06	0.13
1	0.58	0.30	0.13	1.77	1.31	0.15
1-1/4	0.67	0.34	0.14	2.15	1.62	0.17
1-1/2	0.70	0.37	0.15	2.43	1.62	0.19
2	0.75	0.42	0.17	2.96	1.75	0.22
2-1/2	0.92	0.48	0.21	3.31	2.00	0.25
3	0.98	0.55	0.23	4.00	2.25	0.29
4	1.08	0.66	0.26	5.06	2.50	0.36

GENERAL NOTES:

Dimensions are in inches. Caps may be made without recess. Caps so made shall be of such height P that the length of perfect thread shall not be less than B, and the length of useful thread (B plus threads with fully formed roots and flat crests) shall be not less than L2 (effective length of external thread) required by ANSI/ASME B1.20.1.

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Tables.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.

Class 150

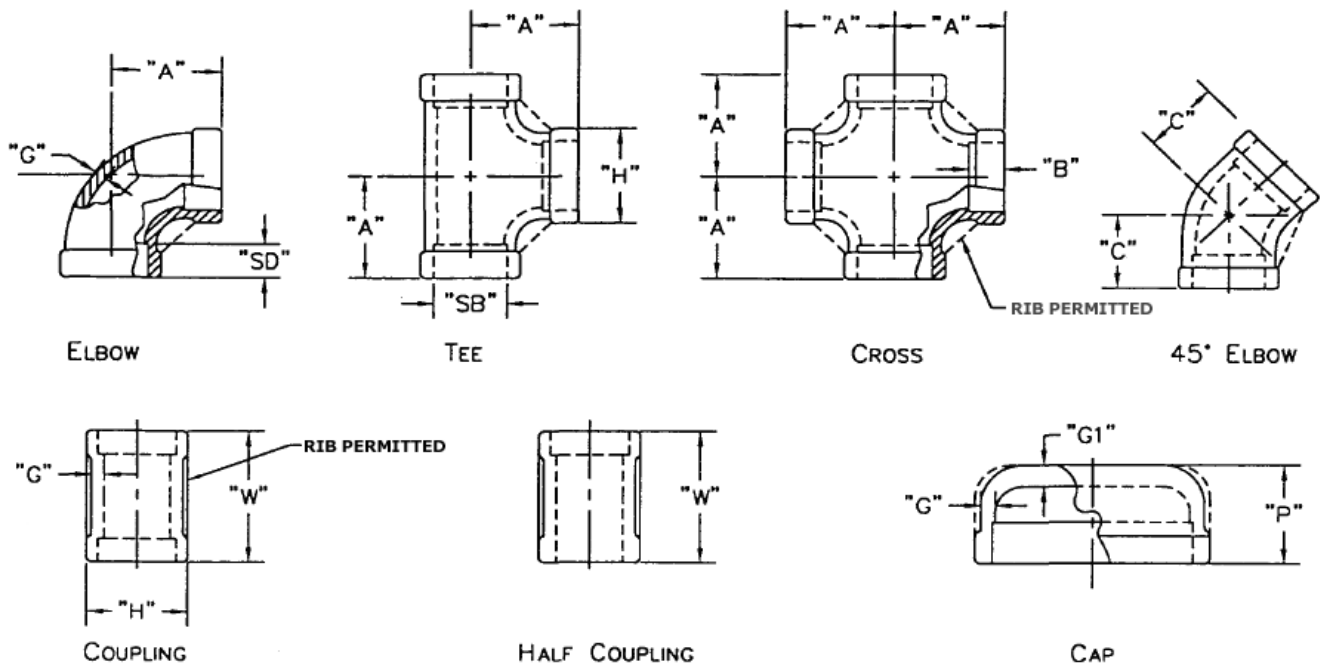


TABLE 7 Dimensions of Class 150 Cast Socket Welding Fittings

Nominal Pipe Size	Center-to-End Elbows, Tees, & Crosses A	Center-to-End 45° Elbows C	Socket Bore SB	Socket Depth SD, Min. ^(b)	Metal Thickness G ^(a)	Outside Band Diameter H, Min.	Full Cplg. Length W, Min.	Cap Height P, Min.	Flat Top Cap Thickness G1, Min.
1/8	0.81	0.69	0.420 / .440	0.32	0.09	0.75	1.00	0.68	0.09
1/4	0.81	0.69	0.555 / .575	0.32	0.09	0.84	1.00	0.68	0.09
3/8	0.93	0.81	0.690 / .710	0.32	0.10	1.01	1.12	0.81	0.10
1/2	1.12	0.87	0.855 / .875	0.32	0.10	1.20	1.38	0.93	0.12
3/4	1.31	1.00	1.065 / 1.085	0.37	0.12	1.46	1.50	1.06	0.13
1	1.50	1.12	1.330 / 1.350	0.44	0.13	1.77	1.62	1.31	0.15
1-1/4	1.75	1.31	1.675 / 1.695	0.50	0.14	2.15	2.00	1.62	0.17
1-1/2	1.93	1.43	1.915 / 1.935	0.50	0.15	2.43	2.12	1.62	0.19
2	2.25	1.68	2.406 / 2.426	0.56	0.17	2.96	2.50	1.75	0.22
2-1/2	2.68	1.93	2.906 / 2.931	0.56	0.21	3.31	2.87	2.00	0.25
3	3.06	2.18	3.535 / 3.560	0.56	0.23	4.00	3.18	2.25	0.29
4	3.81	2.62	4.545 / 4.570	0.69	0.26	5.06	3.68	2.50	0.36

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Tables.
- (b) The depth of socket may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the bottom of the socket.

Class 150

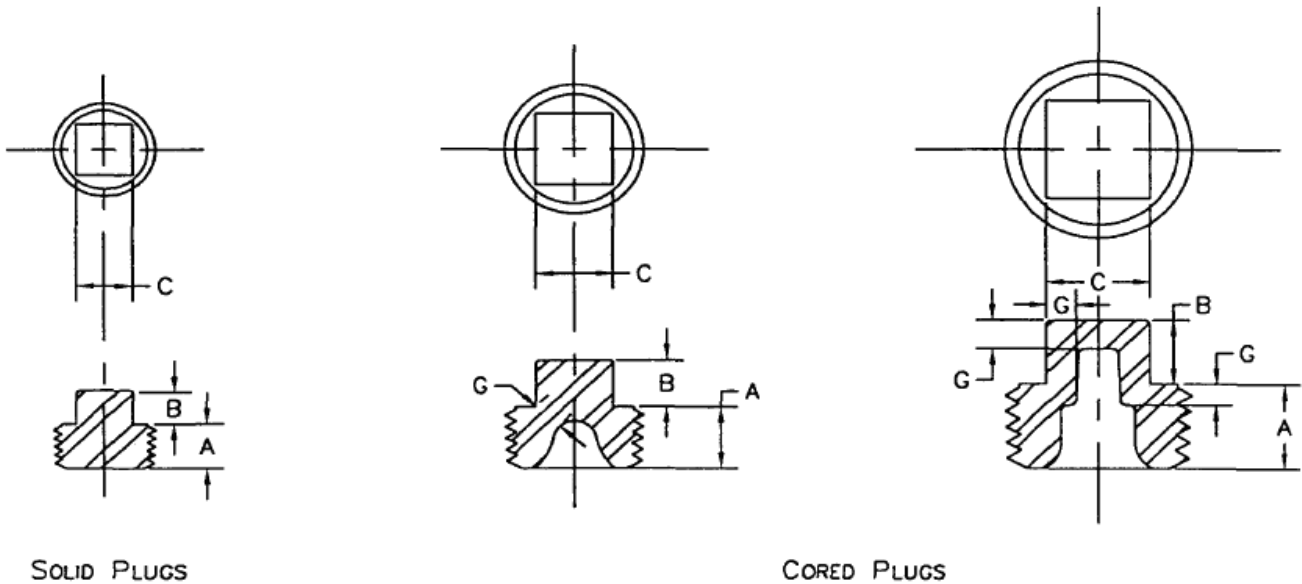


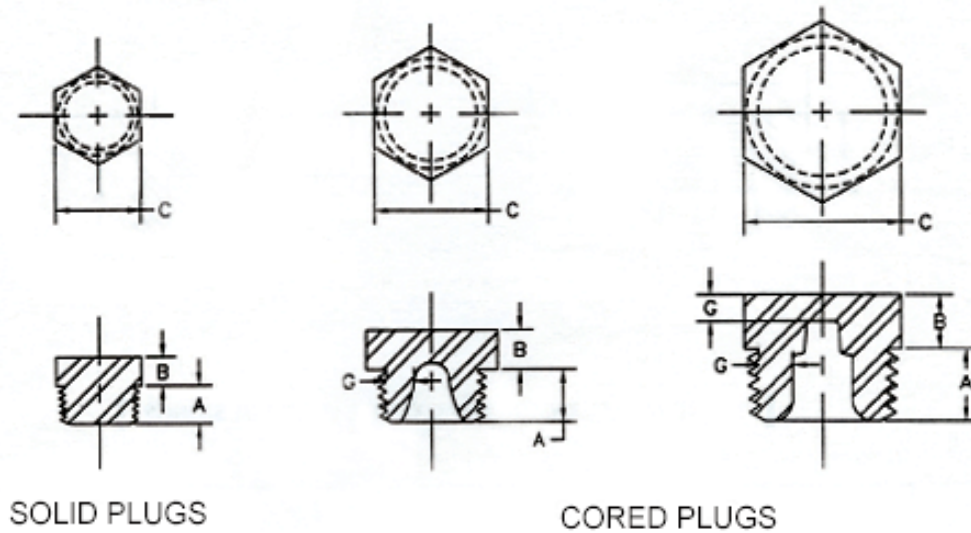
TABLE 8 Dimensions of Class 150 Cast Threaded Square Head Plugs

Nominal Pipe Size	Thread Length, Min. A	Height of Square, Min. B	Nominal Width Across Flats C ^(b)	Nominal Metal Thickness G ^(a)
1/8	0.37	0.24	9/32	....
1/4	0.44	0.28	3/8	....
3/8	0.48	0.31	7/16	....
1/2	0.56	0.38	9/16	0.16
3/4	0.63	0.44	5/8	0.18
1	0.75	0.50	13/16	0.20
1-1/4	0.80	0.56	15/16	0.22
1-1/2	0.83	0.62	1-1/8	0.24
2	0.88	0.68	1-5/16	0.26
2-1/2	1.07	0.74	1-1/2	0.29
3	1.13	0.80	1-11/16	0.31
4	1.22	1.00	2-1/4	0.38

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) These dimensions are the nominal size of wrench as given in Appendix V of American National Standard, Square and Hex Bolts and Screws (ASME B18.2.1). Square head plugs are designed to fit these wrenches.

Class 150

**TABLE 9 Dimensions of Class 150 Cast Threaded Hex Head Plugs**

Nominal Pipe Size	Thread Length, Min. A	Height of Head, Min. B	Nominal Width Across Flats C	Nominal Metal Thickness G ^(a)
1/8	0.37	0.14	.50	....
1/4	0.44	0.14	.62 (b)	....
3/8	0.48	0.16	.68 (b)	....
1/2	0.56	0.19	.87 (b)	0.16
3/4	0.63	0.22	1.20 (b)	0.18
1	0.75	0.25	1.43 (b)	0.20
1 1/4	0.80	0.28	1.76	0.22
1 1/2	0.83	0.31	2.00	0.24
2	0.88	0.34	2.48	0.26
2 1/2	1.07	0.37	2.98	0.29
3	1.13	0.40	3.86	0.31
4	1.22	0.50	4.62	0.38

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) When made from bar stock, the dimensions may be 5/8, 1-1/16, 7/8, 1-1/8, and 1-7/16 In. respectively, in order to use regular bar stock sizes.

Class 150

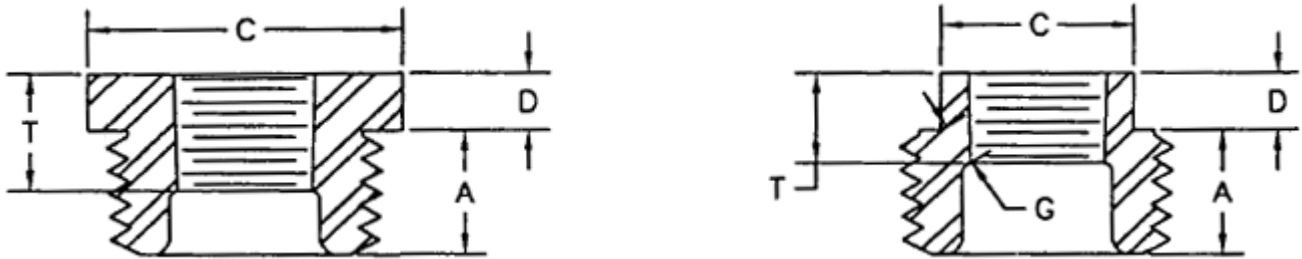


TABLE 10 Dimensions of Class 150 Cast Threaded Hex Head Bushings

Nominal Pipe Size	Length of External Thread Min. A	Length of Internal Thread, Min. T	Nominal Metal Thickness G ^(a)	Height Of Head, Min. D ^(b)	Width of Flat Nominal C ^(c)
1/4 x 1/8	0.44	0.26	...	0.12	5/8
3/8 x 1/4	0.50	0.40	...	0.16	11/16
3/8 x 1/8	0.50	0.26	...	0.16	11/16
1/2 x 3/8	0.56	0.41	...	0.19	7/8
1/2 x 1/4	0.56	0.40	...	0.19	7/8
1/2 x 1/8	0.56	0.26	...	0.19	7/8
3/4 x 1/2	0.62	0.53	...	0.22	1 1/16
3/4 x 3/8	0.62	0.41	...	0.22	1 1/16
3/4 x 1/4	0.62	0.40	...	0.22	1 1/16
3/4 x 1/8	0.62	0.26	...	0.22	1 1/16
1 x 3/4	0.75	0.55	...	0.25	1 3/8
1 x 1/2	0.75	0.53	...	0.25	1 3/8
1 x 3/8	0.75	0.41	...	0.25	1 3/8
1 x 1/4	0.75	0.40	...	0.25	1 3/8
1 x 1/8	0.75	0.26	...	0.25	1 3/8
1 1/4 x 1	0.81	0.68	...	0.28	1 3/4
1 1/4 x 3/4	0.81	0.55	...	0.28	1 3/4
1 1/4 x 1/2	0.81	0.53	0.18	0.28	1 3/4
1 1/4 x 3/8	0.81	0.41	0.18	0.28	1 3/4
1 1/4 x 1/4	0.81	0.40	0.18	0.28	1 3/4
1 1/2 x 1 1/4	0.81	0.71	...	0.31	2
1 1/2 x 1	0.81	0.68	...	0.31	2
1 1/2 x 3/4	0.81	0.55	0.20	0.31	2
1 1/2 x 1/2	0.81	0.53	0.20	0.31	2
1 1/2 x 3/8	0.81	0.41	0.20	0.31	2
1 1/2 x 1/4	0.81	0.40	0.20	0.31	2

continued next page

TABLE 10 Dimensions of Class 150 Cast Threaded Hex Head Bushings (Continued)

Nominal Pipe Size	Length of External Thread Min. A	Length of Internal Thread, Min. T	Nominal Metal Thickness G ^(a)	Height Of Head, Min. D ^(b)	Width of Flat Nominal C ^(c)
2 x 1 1/2	0.88	0.72	...	0.34	2 1/2
2 x 1 1/4	0.88	0.71	...	0.34	2 1/2
2 x 1	0.88	0.68	0.22	0.34	2 1/2
2 x 3/4	0.88	0.55	0.22	0.34	2 1/2
2 x 1/2	0.88	0.53	0.22	0.34	2 1/2
2 x 3/8	0.88	0.41	0.22	0.34	2 1/2
2 x 1/4	0.88	0.40	0.22	0.34	2 1/2
2 1/2 x 2	1.06	0.76	...	0.38	3
2 1/2 x 1 1/2	1.06	0.72	...	0.38	3
2 1/2 x 1 1/4	1.06	0.71	0.24	0.38	3
2 1/2 x 1	1.06	0.68	0.24	0.38	3
2 1/2 x 3/4	1.06	0.55	0.24	0.38	3
2 1/2 x 1/2	1.06	0.53	0.24	0.38	3
3 x 2 1/2	1.12	1.14	...	0.41	3 1/2
3 x 2	1.12	0.76	...	0.41	3 1/2
3 x 1 1/2	1.12	0.72	0.26	0.41	3 1/2
3 x 1 1/4	1.12	0.70	0.26	0.41	3 1/2
3 x 1	1.12	0.68	0.26	0.41	3 1/2
3 x 3/4	1.12	0.55	0.26	0.41	3 1/2
3 x 1/2	1.12	0.53	0.26	0.41	3 1/2
4 x 3	1.25	1.20	...	0.50	4 5/8
4 x 2 1/2	1.25	1.14	0.31	0.60	4 5/8
4 x 2	1.25	0.76	0.31	0.60	4 5/8
4 x 1 1/2	1.25	0.72	0.31	0.60	4 5/8
4 x 1 1/4	1.25	0.70	0.31	0.60	4 5/8
4 x 1	1.25	0.68	0.31	0.60	4 5/8

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of the values given in the Table.
- (b) When made from bar stock; the dimensions may be 5/8, 11/16, 7/8, 1 1/8, and 1 7/16 in. respectively, in order to use regular bar stock sizes.
- (c) These dimensions are the nominal size of wrench as given in Appendix V of American National Standard, Square and Hex Bolts and Screws (ASME B18.2.1). Hex bushings are designed to fit these wrenches.

Locknuts

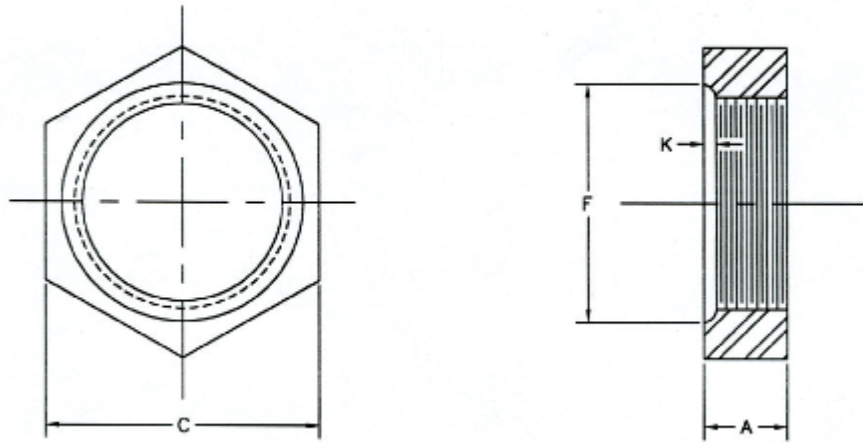


TABLE 11 Dimensions of Threaded Locknuts

Nominal Pipe Size	Nominal Thickness, Min. A	Width Across Flats		Diameter of Packing Recess ^(a) Min. F	Depth of Packing Recess ^(a) K
		Steel Min. ^(b) C	Cast Min. C		
1/8	0.19	0.69	....	0.50	0.04
1/4	0.25	0.84	....	0.66	0.06
3/8	0.28	1.00	....	0.77	0.06
1/2	0.31	1.18	....	0.97	0.06
3/4	0.34	1.43	....	1.23	0.06
1	0.38	1.75	....	1.50	0.06
1 1/4	0.42	2.10	....	1.86	0.06
1 1/2	0.47	2.35	....	2.12	0.06
2	0.53	2.88	....	2.63	0.09
2 1/2	0.59	3.50	3.86	3.18	0.09
3	0.67	4.27	4.62	3.84	0.09
4	0.80	5.38	5.79	5.00	0.13

GENERAL NOTES:

Dimensions are in inches.

Threads shall be NPSL straight Pipe threads in accordance with ANSI/ASME B1.20.1.

- (a) For castings, the packing recess may be a cast finish (not tool finish).
- (b) Locknuts in these sizes may be made from bar stock, in which case dimension C may be 11/16, 7/8, 1, 1 3/16, and 1 7/16, in., respectively, in order to conform to regular hexagon bar stock sizes.

Class 150

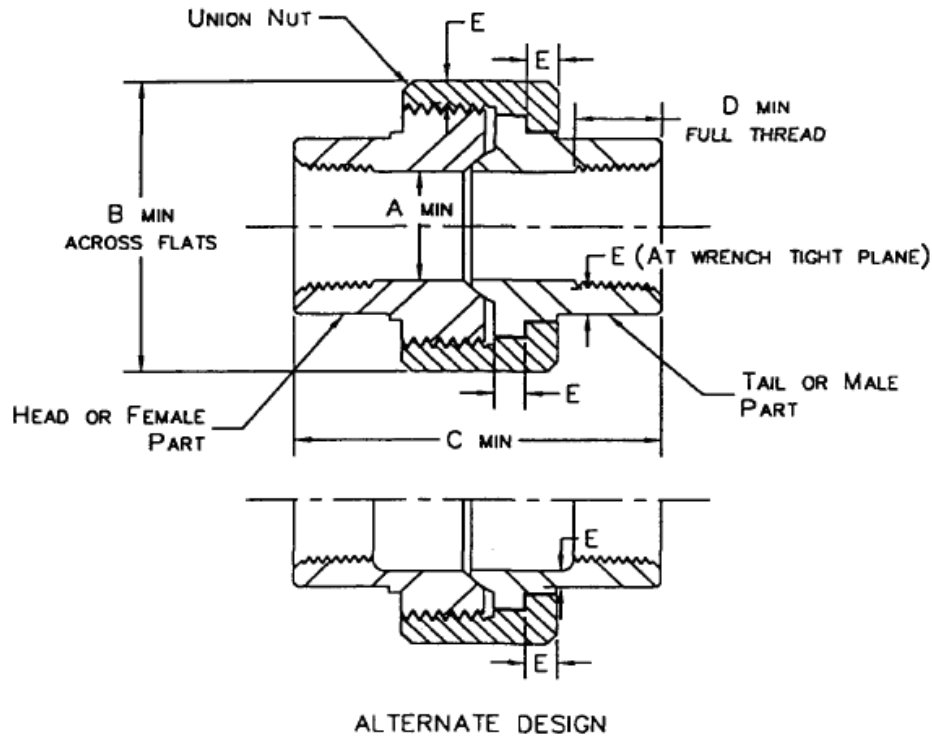


TABLE 12 Dimensions of Class 150 Cast Threaded Unions

Nominal Pipe Size	A Min.	B Min.	C Min.	D Min. ^(b)	E Min. ^(a)
1/8	0.21	0.93	1.26	0.25	0.09
1/4	0.36	1.10	1.44	0.32	0.09
3/8	0.52	1.26	1.61	0.36	0.10
1/2	0.61	1.45	1.72	0.43	0.10
3/4	0.80	1.71	1.94	0.50	0.12
1	1.00	2.07	2.06	0.58	0.13
1-1/4	1.31	2.50	2.26	0.67	0.14
1-1/2	1.55	2.82	2.41	0.70	0.15
2	2.03	3.41	2.75	0.75	0.17
2-1/2	2.38	4.12	3.22	0.92	0.21
3	3.00	4.75	3.50	0.98	0.23
4	4.03	6.00	3.85	1.08	0.26

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness (E) given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (E) must be maintained at the end of the thread.

Class 150

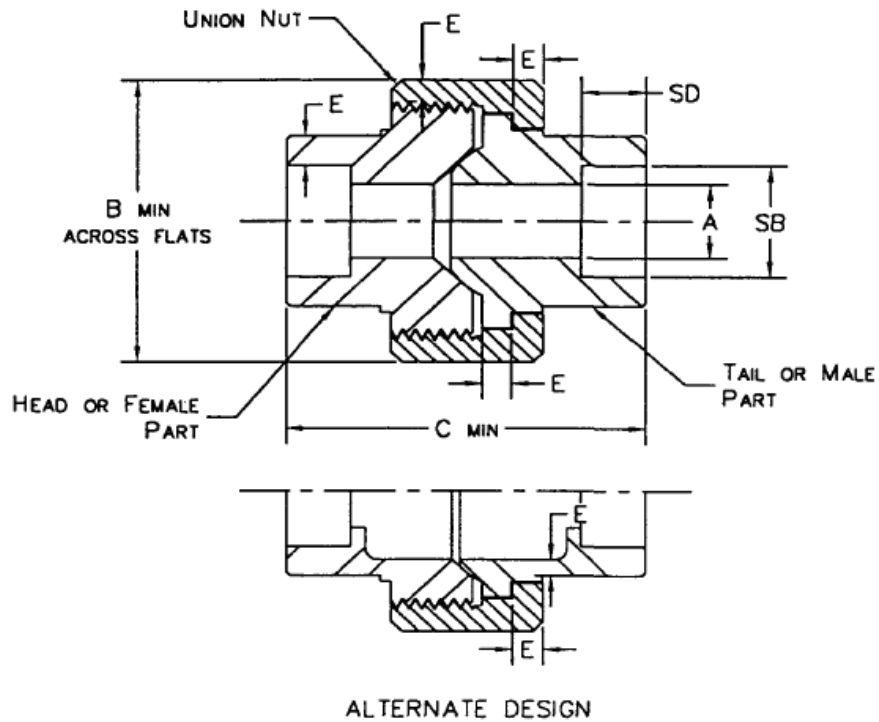


TABLE 13 Dimensions of Class 150 Cast Socket Welding Unions

Nominal Pipe Size	A Min.	B Min.	C Min.	E Min. ^(a)	SB	SD Min.
1/8	0.21	0.93	1.26	0.09	.420/.440	0.32
1/4	0.36	1.10	1.44	0.09	.555/.575	0.32
3/8	0.52	1.26	1.61	0.10	.690/.710	0.32
1/2	0.61	1.45	1.72	0.10	.855/.875	0.32
3/4	0.80	1.71	1.94	0.12	1.065/1.085	0.37
1	1.00	2.07	2.06	0.13	1.330/1.350	0.44
1 1/4	1.31	2.50	2.26	0.14	1.675/1.695	0.50
1 1/2	1.55	2.82	2.41	0.15	1.915/1.935	0.50
2	2.03	3.41	2.75	0.17	2.406/2.426	0.56
2 1/2	2.38	4.12	3.22	0.21	2.906/2.931	0.56
3	3.00	4.75	3.50	0.23	3.535/3.560	0.56
4	4.03	6.00	3.85	0.26	4.545/4.570	0.69

GENERAL NOTE: Dimensions are in inches

- (a) Patterns shall be designed to produce castings of metal thickness (E) given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.

Class 1000

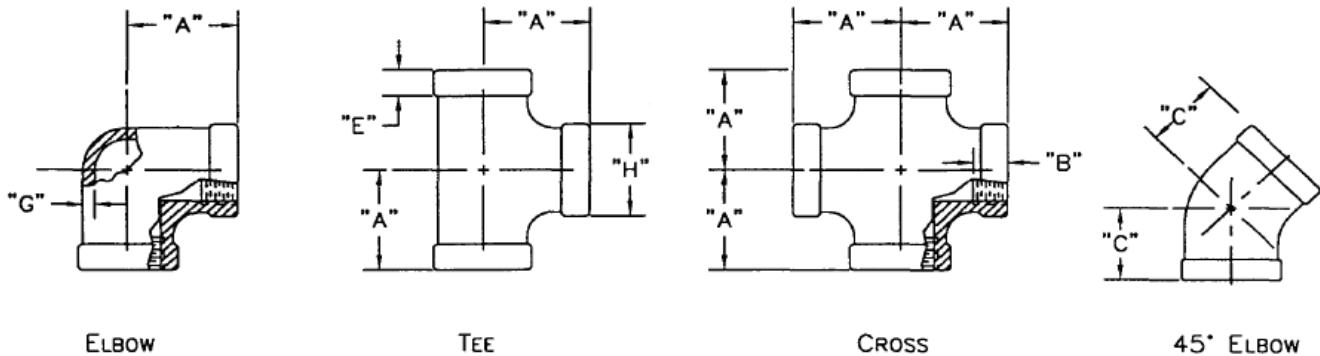


TABLE 14

Dimensions of Class 1000 Wrought Threaded 90° Elbows, Tees, Crosses, and 45° Elbows

Nominal Pipe Size	Center-to-End, Elbows Tees, & Crosses A	Center-to-End, 45 deg. Elbows C	Length of Thread B, Min. ^(b)	Width of Band E, Min.	Metal Thickness G ^(a)	Outside Diameter of Band H, Min.
1/8	0.81	0.69	0.26	0.25	0.09	0.75
1/4	0.81	0.69	0.40	0.25	0.09	0.75
3/8	0.93	0.81	0.41	0.25	0.10	0.87
1/2	1.12	0.87	0.53	0.38	0.10	1.12
3/4	1.31	1.00	0.55	0.50	0.12	1.34

GENERAL NOTE: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.

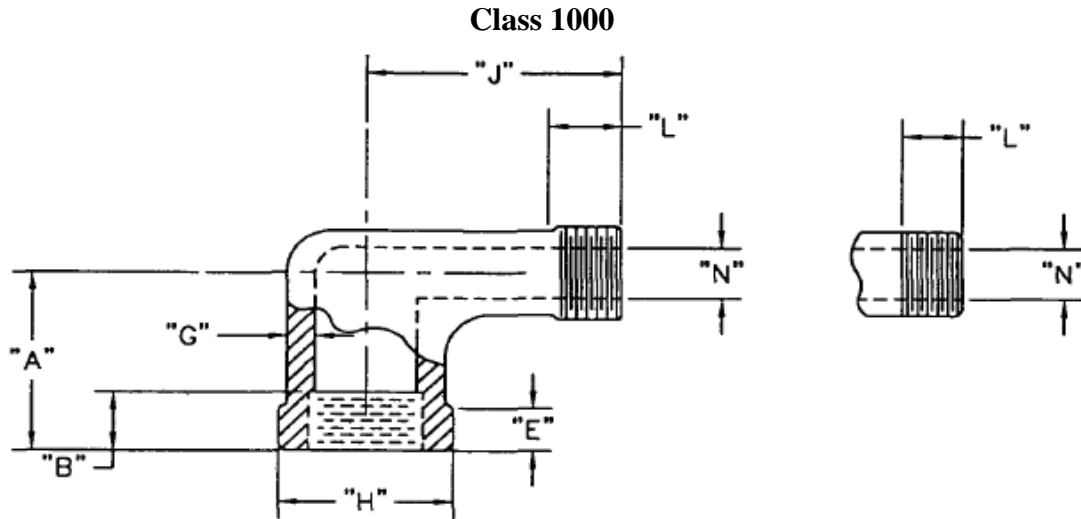


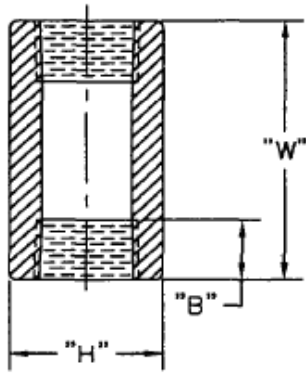
TABLE 15 Dimensions of Class 1000 Wrought Threaded 90° Street Elbows

Nominal Pipe Size	Center-to-End A	Length Of Internal Thread B, Min. ^(b)	Width of Band E, Min.	Metal Thickness G ^(a)	Outside Diameter of Band H, Min.	Center-to-End J	Length of External Thread L, Min.	Port Diameter Male End N, Max.
1/8	0.75	0.26	0.21	0.09	0.75	1.06	0.26	0.18
1/4	0.81	0.40	0.21	0.09	0.87	1.18	0.40	0.25
3/8	0.97	0.41	0.23	0.10	1.01	1.43	0.41	0.37
1/2	1.12	0.53	0.25	0.10	1.21	1.62	0.53	0.50
3/4	1.31	0.55	0.27	0.12	1.37	1.87	0.55	0.62

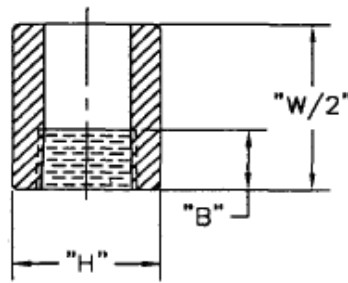
GENERAL NOTE: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the end of the thread.

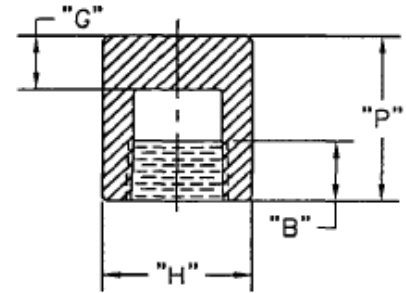
Class 1000



COUPLINGS



HALF COUPLING



CAP

TABLE 16

Dimensions of Class 100 Wrought Threaded Couplings (Straight and Reducing Sizes) and Caps

Nominal Pipe Size	Length of Thread B, Min.	Length of Couplings W, Min.	Outside Diameter H, Min.	End Wall Thickness G, Min.	Length of Cap P, Min.
1/8	0.26	1.00	0.55	0.09	0.68
1/4	0.40	1.00	0.74	0.09	0.68
3/8	0.41	1.12	0.86	0.10	0.81
1/2	0.53	1.38	1.05	0.12	0.93
3/4	0.55	1.50	1.30	0.13	1.06
1	0.68	1.62	1.61	0.15	1.31
1-1/4	0.71	2.00	1.86	0.17	1.62
1-1/2	0.72	2.12	2.17	0.19	1.62
2	0.76	2.50	2.74	0.22	1.75
2-1/2	1.14	2.87	3.31		
3	1.20	3.18	4.00		
4	1.30	3.68	5.06		

GENERAL NOTE: Dimensions are in inches

Class 1000

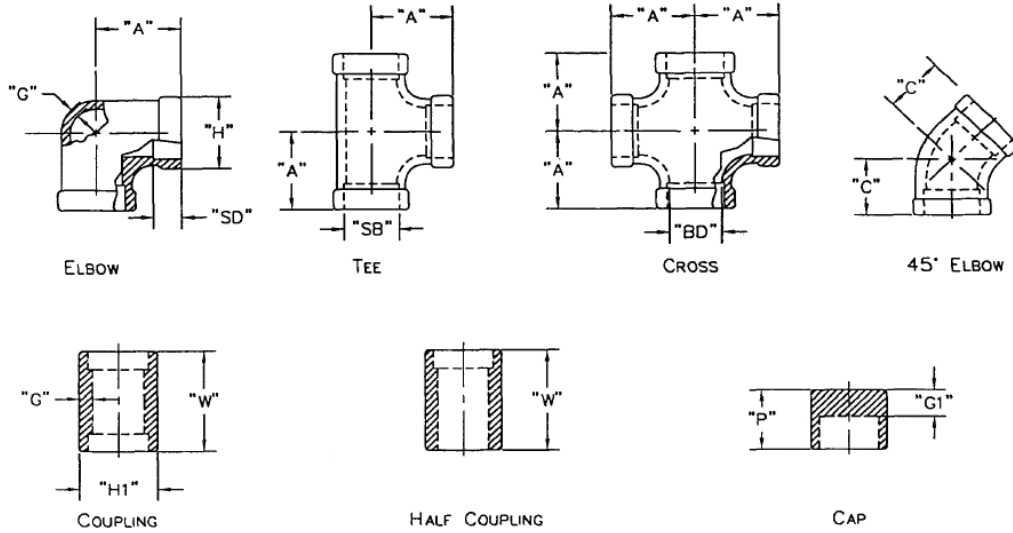


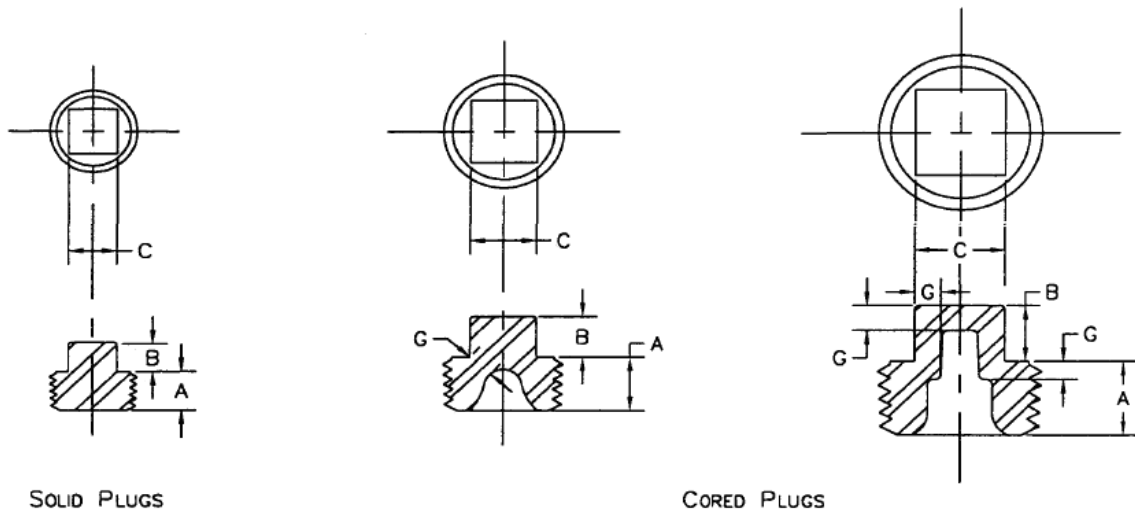
TABLE 17 Dimensions of Class 1000 Wrought Socket Welding Fittings

Nom. Pipe Size	Center-to-End Elbows, Tees, & Crosses A	Center-to-End 45° Elbows C	Outside Band Diameter H, Min.	Socket Bore SB	Bore Diameter BD	Socket Depth SD, (b) Min.	Metal Thickness G (a)	Coupling & Cap Outside Diameter H1, Min.	Coupling Length W, Min.	End Wall Thickness G1, Min.
1/8	0.81	0.69	0.75	.420 / .400	.227 / .337	0.32	0.09	0.55	1.00	0.09
1/4	0.81	0.69	0.75	.555 / .575	.380 / .440	0.32	0.09	0.74	1.00	0.09
3/8	0.93	0.81	0.87	.690 / .710	.515 / .575	0.32	0.10	0.86	1.12	0.10
1/2	1.12	0.87	1.12	.855 / .875	.644 / .704	0.32	0.10	1.05	1.38	0.12
3/4	1.31	1.00	1.34	1.065 / 1.085	.854 / .914	0.37	0.12	1.30	1.50	0.13
1	N/A	N/A	N/A	1.330 / 1.350	1.067 / 1.127	0.44	0.13	1.61	1.62	0.15
1 - 1/4	N/A	N/A	N/A	1.675 / 1.695	1.412 / 1.472	0.50	0.14	1.86	2.00	0.17
1 - 1/2	N/A	N/A	N/A	1.915 / 1.935	1.652 / 1.712	0.50	0.15	2.17	2.12	0.19
2	N/A	N/A	N/A	2.406 / 2.426	2.127 / 2.187	0.56	0.17	2.74	2.50	0.22

GENERAL NOTE: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) The depth of socket may extend beyond the width of band. However, minimum metal thickness (G) must be maintained at the bottom of the socket.

Class 1000

**TABLE 18** Dimensions of Class 1000 Wrought Threaded Square Head Plugs

Nominal Pipe Size	Thread Length, Min. A	Height of Square, Min. B	Nominal Width Across Flats C ^(b)	Nominal Metal Thickness G ^(a)
1/8	0.38	0.25	9/32	0.19
1/4	0.44	0.25	3/8	0.19
3/8	0.50	0.31	7/16	0.19
1/2	0.56	0.38	9/16	0.25
3/4	0.62	0.44	5/8	0.25
1	0.75	0.50	13/16	0.38
1-1/4	0.81	0.56	15/16	0.38
1-1/2	0.81	0.62	1 1/8	0.44
2	0.88	0.69	1 5/16	0.50
2-1/2	1.06	0.75	1 1/2	0.62
3	1.12	0.81	1 11/16	0.75
4	1.25	1.00	2 1/4	0.88

GENERAL NOTE: Dimensions are in inches.

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) These dimensions are the nominal size of wrench as given in Appendix V of American National Standard, Square and Hex Bolts and Screws (ASME B18.2.1). Square head plugs are designed to fit these wrenches.

Class 1000

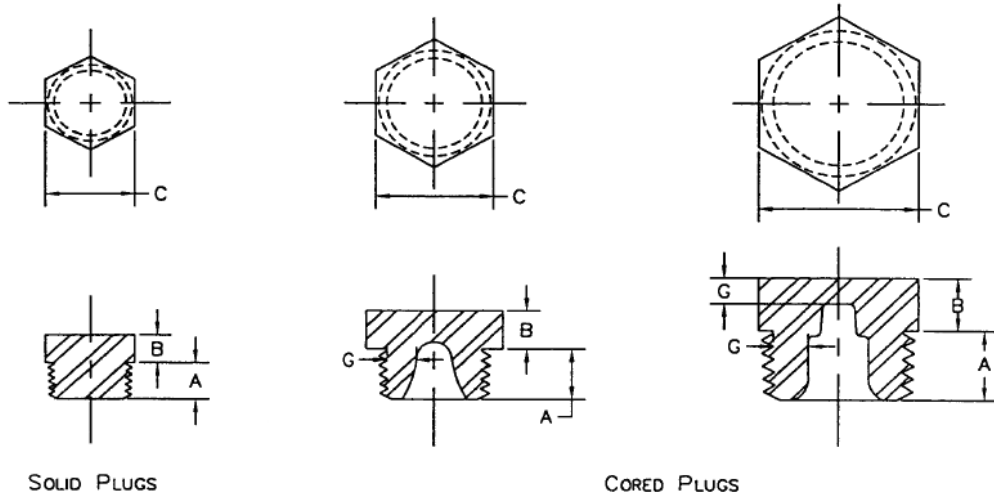


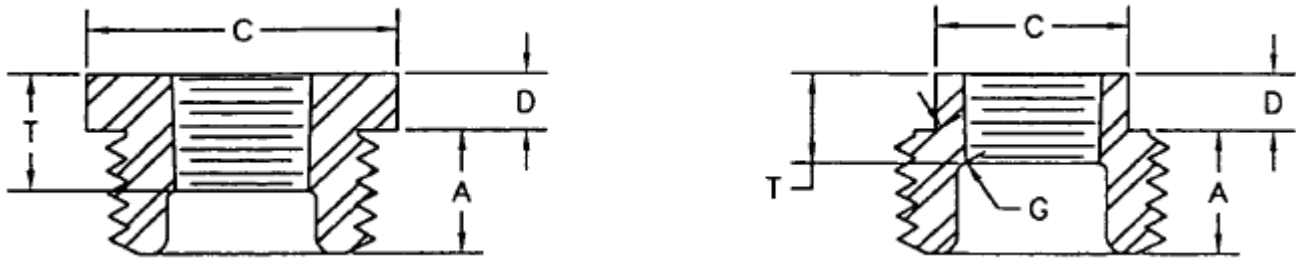
TABLE 19 Dimensions of Class 1000 Wrought Threaded Hex Head Plugs

Nominal Pipe Size	Thread Length, Min. A	Height of Head, Min. B	Nominal Width Across Flats C ^(b)	Nominal Metal Thickness G ^(a)
1/8	0.38	0.12	7/16	0.19
1/4	0.44	0.12	5/8	0.19
3/8	0.50	0.16	11/16	0.19
1/2	0.56	0.19	7/8	0.25
3/4	0.62	0.22	1 1/16	0.25
1	0.75	0.25	1 3/8	0.38
1-1/4	0.81	0.28	1 3/4	0.38
1-1/2	0.81	0.31	2	0.44
2	0.88	0.34	2 1/2	0.50
2-1/2	1.06	0.38	3	0.62
3	1.12	0.41	3 1/2	0.75
4	1.25	0.50	4 5/8	0.88

GENERAL NOTE: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) These dimensions are the nominal size of wrench as given in Appendix V of American National Standard, Square and Hex Bolts and Screws (ASME B18.2.1). Hex head plugs are designed to fit these wrenches.

Class 1000

**TABLE 20** Dimensions of Class 1000 Wrought Threaded Hex Head Bushings

Nominal Pipe Size	Length of External Thread Min. A	Length of Internal Thread, Min. T	Nominal Metal Thickness G ^(a)	Height Of Head, Min. D	Width of Flat Nominal C ^{(b)(c)}
1/4 x 1/8	0.44	0.26	...	0.12	5/8
3/8 x 1/4	0.50	0.40	...	0.16	11/16
3/8 x 1/8	0.50	0.26	...	0.16	11/16
1/2 x 3/8	0.56	0.41	...	0.19	7/8
1/2 x 1/4	0.56	0.40	...	0.19	7/8
1/2 x 1/8	0.56	0.26	...	0.19	7/8
3/4 x 1/2	0.62	0.53	...	0.22	1 1/16
3/4 x 3/8	0.62	0.41	...	0.22	1 1/16
3/4 x 1/4	0.62	0.40	...	0.22	1 1/16
3/4 x 1/8	0.62	0.26	...	0.22	1 1/16
1 x 3/4	0.75	0.55	...	0.25	1 3/8
1 x 1/2	0.75	0.53	...	0.25	1 3/8
1 x 3/8	0.75	0.41	...	0.25	1 3/8
1 x 1/4	0.75	0.40	...	0.25	1 3/8
1 x 1/8	0.75	0.26	...	0.25	1 3/8
1 1/4 x 1	0.81	0.68	...	0.28	1 3/4
1 1/4 x 3/4	0.81	0.55	...	0.28	1 3/4
1 1/4 x 1/2	0.81	0.53	0.18	0.28	1 3/4
1 1/4 x 3/8	0.81	0.41	0.18	0.28	1 3/4
1 1/4 x 1/4	0.81	0.40	0.18	0.28	1 3/4
1 1/2 x 1 1/4	0.81	0.71	...	0.31	2
1 1/2 x 1	0.81	0.68	...	0.31	2
1 1/2 x 3/4	0.81	0.55	0.20	0.31	2
1 1/2 x 1/2	0.81	0.53	0.20	0.31	2
1 1/2 x 3/8	0.81	0.41	0.20	0.31	2
1 1/2 x 1/4	0.81	0.40	0.20	0.31	2

continued next page

TABLE 20 Dimensions of Class 1000 Wrought Threaded Hex Head Bushings (Continued)

Nominal Pipe Size	Length of External Thread Min. A	Length of Internal Thread, Min. T	Nominal Metal Thickness G ^(a)	Height Of Head, Min. D	Width of Flat Nominal C ^{(b)(c)}
2 x 1 1/2	0.88	0.72	...	0.34	2 1/2
2 x 1 1/4	0.88	0.71	...	0.34	2 1/2
2 x 1	0.88	0.68	0.22	0.34	2 1/2
2 x 3/4	0.88	0.55	0.22	0.34	2 1/2
2 x 1/2	0.88	0.53	0.22	0.34	2 1/2
2 x 3/8	0.88	0.41	0.22	0.34	2 1/2
2 x 1/4	0.88	0.40	0.22	0.34	2 1/2
2 1/2 x 2	1.06	0.76	...	0.38	3
2 1/2 x 1 1/2	1.06	0.72	...	0.38	3
2 1/2 x 1 1/4	1.06	0.71	0.24	0.38	3
2 1/2 x 1	1.06	0.68	0.24	0.38	3
2 1/2 x 3/4	1.06	0.55	0.24	0.38	3
2 1/2 x 1/2	1.06	0.53	0.24	0.38	3
3 x 2 x 1/2	1.12	1.14	...	0.41	3 1/2
3 x 2	1.12	0.76	...	0.41	3 1/2
3 x 1 1/2	1.12	0.72	0.26	0.41	3 1/2
3 x 1 1/4	1.12	0.70	0.26	0.41	3 1/2
3 x 1	1.12	0.68	0.26	0.41	3 1/2
3 x 3/4	1.12	0.55	0.26	0.41	3 1/2
3 x 1/2	1.12	0.53	0.26	0.41	3 1/2
4 x 3	1.25	1.20	...	0.50	4 5/8
4 x 2 1/2	1.25	1.14	0.31	0.60	4 5/8
4 x 2	1.25	0.76	0.31	0.60	4 5/8
4 x 1 1/2	1.25	0.72	0.31	0.60	4 5/8
4 x 1 1/4	1.25	0.70	0.31	0.60	4 5/8
4 x 1	1.25	0.68	0.31	0.60	4 5/8

General Note: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness given in the Table. Metal thickness at no point shall be less than 90% of the values given in the Table.
- (b) May be made from bar stock.
- (c) These dimensions are the nominal size of wrench as given in Appendix V of American National Standard, Square and Hex Bolts and Screws (ASME B18.2.1). Hex bushings are designed to fit these wrenches.

Class 1000

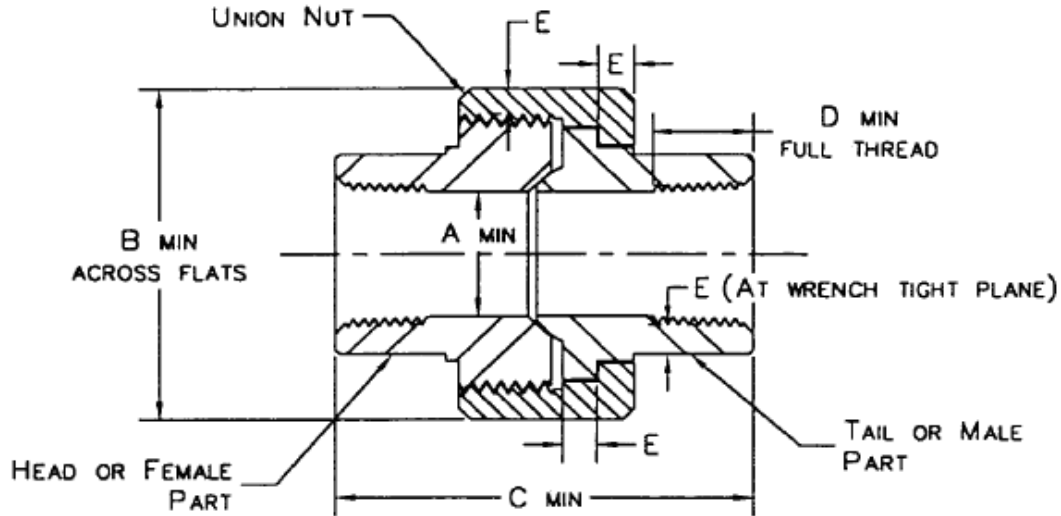


TABLE 21 Dimensions of Class 1000 Wrought Threaded Unions

Nominal Pipe Size	A Min.	B Min.	C Min.	D Min. ^(b)	E Pipe Size Min ^(a)
1/8	0.21	0.93	1.26	0.30	0.09
1/4	0.36	1.10	1.44	0.32	0.09
3/8	0.52	1.26	1.50	0.36	0.10
1/2	0.61	1.45	1.72	0.43	0.10
3/4	0.80	1.71	1.94	0.50	0.12
1	1.00	2.07	2.00	0.58	0.13
1 1/4	1.31	2.50	2.26	0.67	0.14
1 1/2	1.55	2.82	2.41	0.70	0.15
2	2.03	3.41	2.75	0.75	0.17
2 1/2	2.38	4.12	3.22	0.92	0.21
3	3.00	4.75	3.50	0.98	0.23
4	4.03	6.00	3.85	1.08	0.26

GENERAL NOTE: Dimensions are in inches

- (a) Forgings shall be designed to produce fittings of metal thickness (E) given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.
- (b) The length of thread may extend beyond the width of band. However, minimum metal thickness (E) must be maintained at the end of the thread.

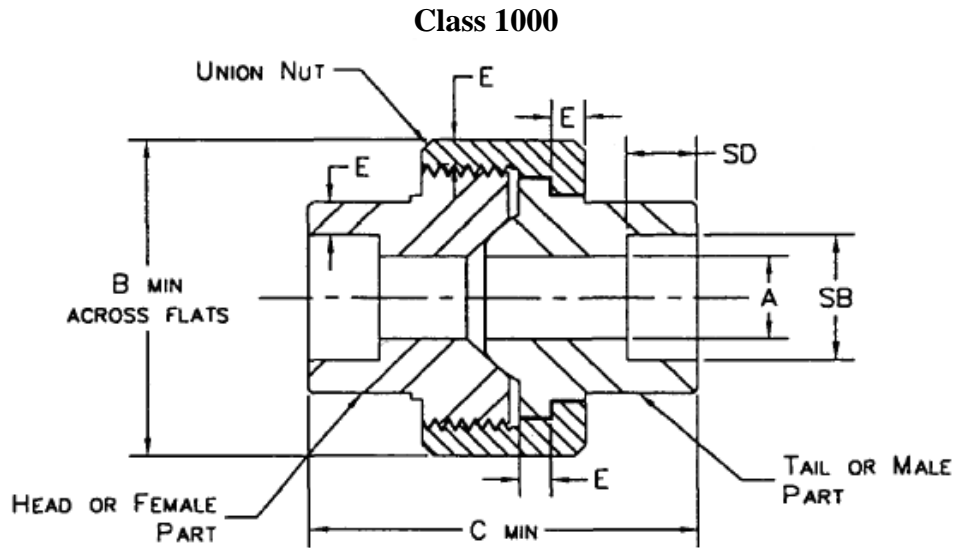


TABLE 22 Dimensions of Class 1000 Wrought Socket Welding Unions

Nominal Pipe Size	A Min.	B Min.	C Min.	E Min. ^(a)	SB	SD Min.
1/8	0.21	0.93	1.26	0.09	.420/.440	0.32
1/4	0.36	1.10	1.44	0.09	.555/.575	0.32
3/8	0.52	1.26	1.50	0.10	.690/.710	0.32
1/2	0.61	1.45	1.72	0.10	.855/.875	0.32
3/4	0.80	1.71	1.94	0.12	1.065/1.085	0.37
1	1.00	2.07	2.06	0.13	1.330/1.350	0.44
1 1/4	1.31	2.50	2.26	0.14	1.675/1.695	0.50
1 1/2	1.55	2.82	2.41	0.15	1.915/1.935	0.50
2	2.03	3.41	2.75	0.17	2.406/2.426	0.56
2 1/2	2.38	4.12	3.22	0.21	2.906/2.931	0.56
3	3.00	4.75	3.50	0.23	3.535/3.560	0.56
4	4.03	6.00	3.85	0.26	4.545/4.570	0.69

GENERAL NOTE: Dimensions are in inches.

(a) Forgings shall be designed to produce fittings of metal thickness (E) given in the Table. Metal thickness at no point shall be less than 90% of values given in the Table.

ANNEX A

Referenced Standards and Applicable Dates

This annex is an integral part of this Standard Practice and is placed after the main text for convenience.

ASME, ANSI/ASME, ASME/ANSI

B1.20.1-1983 (R 1992)	Pipe Threads, General Purpose (Inch)
B18.2.1-1981 (R1996)	Square and Hex Bolts and Screws, Inch Series

ASTM

Standard Specification for:

A 182-00b	Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service
A262 – 98	Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels
A 351-00	Castings, Austenitic, Austenitic-Ferritic (Duplex) for Pressure Containing Parts
A 479-00	Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other Pressure Vessels
A 511-96	Seamless Stainless Steel Mechanical Tubing

MSS

SP-25-1998	Standard Marking System for Valves, Fittings, Flanges, and Unions
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Publications of the following organizations appear in the above list:

ANSI	American National Standards Institute 25 West 43rd Street, Fourth Floor New York NY 10036
ASME	ASME International Three Park Avenue New York, NY 10016-5990
ASTM	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Street, N.E. Vienna, VA 22180-4602

List of MSS Standard Practices (Price List Available Upon Request)

Number	
SP-6-2007	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings
SP-9-2001	(R 05) Spot Facing for Bronze, Iron and Steel Flanges
SP-25-1998	Standard Marking System for Valves, Fittings, Flanges and Unions
SP-42-2004	Class 150 Corrosion Resistant Gate, Globe, Angle and Check Valves with Flanged and Butt Weld Ends
SP-43-1991	(R 01) Wrought Stainless Steel Butt-Welding Fittings
SP-44-2006	Steel Pipeline Flanges
SP-45-2003	Bypass and Drain Connections
SP-51-2007	Class 150LW Corrosion Resistant Flanges and Cast Flanged Fittings
SP-53-1999	(R 07) Quality Standard for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components - Magnetic Particle Examination Method
SP-54-1999	(R 07) Quality Standard for Steel Castings for Valves, Flanges, and Fittings and Other Piping Components - Radiographic Examination Method
SP-55-2006	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components - Visual Method for Evaluation of Surface Irregularities
SP-58-2002	Pipe Hangers and Supports - Materials, Design and Manufacture
SP-60-2004	Connecting Flange Joint Between Tapping Sleeves and Tapping Valves
SP-61-2003	Pressure Testing of Steel Valves
SP-65-2004	High Pressure Chemical Industry Flanges and Threaded Stubs for Use with Lens Gaskets
SP-67-2002a	Butterfly Valves
SP-68-1997	(R 04) High Pressure Butterfly Valves with Offset Design
SP-69-2003	Pipe Hangers and Supports - Selection and Application (ANSI/MSS Edition)
SP-70-2006	Gray Iron Gate Valves, Flanged and Threaded Ends
SP-71-2005	Gray Iron Swing Check Valves, Flanged and Threaded Ends
SP-72-1999	Ball Valves with Flanged or Butt-welding Ends for General Service
SP-75-2004	Specification for High Test Wrought Butt Welding Fittings
SP-77-1995	(R 00) Guidelines for Pipe Support Contractual Relationships
SP-78-2005a	Gray Iron Plug Valves, Flanged and Threaded Ends
SP-79-2004	Socket-Welding Reducer Inserts
SP-80-2003	Bronze Gate, Globe, Angle and Check Valves
SP-81-2006	Stainless Steel, Bonnetless, Flanged, Knife Gate Valves
SP-83-2006	Class 3000 Steel Pipe Unions, Socket-Welding and Threaded
SP-85-2002	Gray Iron Globe & Angle Valves, Flanged and Threaded Ends
SP-86-2002	Guidelines for Metric Data in Standards for Valves, Flanges, Fittings and Actuators
SP-88-1993	(R 01) Diaphragm Valves
SP-89-2003	Pipe Hangers and Supports - Fabrication and Installation Practices
SP-90-2000	Guidelines on Terminology for Pipe Hangers and Supports
SP-91-1992	(R 96) Guidelines for Manual Operation of Valves
SP-92-1999	MSS Valve User Guide
SP-93-1999	(R 04) Quality Standard for Steel Castings and Forgings for Valves, Flanges, and Fittings and Other Piping Components - Liquid Penetrant Examination Method
SP-94-1999	(R 04) Quality Std for Ferritic and Martensitic Steel Castings for Valves, Flanges, and Fittings and Other Piping Components - Ultrasonic Examination Method
SP-95-2006	Swage(d) Nipples and Bull Plugs
SP-96-2001	(R 05) Guidelines on Terminology for Valves and Fittings
SP-97-2006	Integrally Reinforced Forged Branch Outlet Fittings - Socket Welding, Threaded and Buttwelding Ends
SP-98-2001	(R 05) Protective Coatings for the Interior of Valves, Hydrants, and Fittings
SP-99-1994	(R 05) Instrument Valves
SP-100-2002	Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Valves
SP-101-1989	(R 01) Part-Turn Valve Actuator Attachment - Flange and Driving Component Dimensions and Performance Characteristics
SP-102-1989	(R 01) Multi-Turn Valve Actuator Attachment - Flange and Driving Component Dimensions and Performance Characteristics
SP-104-2003	Wrought Copper Solder Joint Pressure Fittings
SP-105-1996	(R 05) Instrument Valves for Code Applications
SP-106-2003	Cast Copper Alloy Flanges and Flanged Fittings, Class 125, 150 and 300
SP-108-2002	Resilient-Seated Cast-Iron Eccentric Plug Valves
SP-109-1997	(R 06) Welded Fabricated Copper Solder Joint Pressure Fittings
SP-110-1996	Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
SP-111-2001	(R 05) Gray-Iron and Ductile-Iron Tapping Sleeves
SP-112-1999	(R 04) Quality Standard for Evaluation of Cast Surface Finishes -Visual and Tactile Method. This SP must be sold with a 10-surface, three Dimensional Cast Surface Comparator, which is a necessary part of the Standard. Additional Comparators may be sold separately.
SP-113-2001	(R 07) Connecting Joint between Tapping Machines and Tapping Valves
SP-114-2007	Corrosion Resistant Pipe Fittings Threaded and Socket Welding, Class 150 and 1000
SP-115-2006	Excess Flow Valves, 1 1/4 NPS and Smaller, for Fuel Gas Service
SP-116-2003	Service Line Valves and Fittings for Drinking Water Systems
SP-117-2006	Bellows Seals for Globe and Gate Valves
SP-118-2007	Compact Steel Globe & Check Valves - Flanged, Flangeless, Threaded & Welding Ends (Chemical & Petroleum Refinery Service)
SP-119-2003	Factory-Made Belled End Socket Welding Fittings
SP-120-2006	Flexible Graphite Packing System for Rising Stem Steel Valves (Design Requirements)
SP-121-2006	Qualification Testing Methods for Stem Packing for Rising Stem Steel Valves
SP-122-2005	Plastic Industrial Ball Valves
SP-123-1998	(R 06) Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube
SP-124-2001	Fabricated Tapping Sleeves
SP-125-2000	Gray Iron and Ductile Iron In-Line, Spring-Loaded, Center-Guided Check Valves
SP-126-2007	Steel In-Line Spring-Assisted Center Guided Check Valves
SP-127-2001	Bracing for Piping Systems Seismic-Wind-Dynamic Design, Selection, Application
SP-128-2006	Ductile Iron Gate Valves
SP-129-2003	Copper-Nickel Socket-Welding Fittings and Unions
SP-130-2003	Bellows Seals for Instrument Valves
SP-131-2004	Metallic Manually Operated Gas Distribution Valves
SP-132-2004	Compression Packing Systems for Instrument Valves
SP-133-2005	Excess Flow Valves for Low Pressure Fuel Gas Appliances
SP-134-2006a	Valves for Cryogenic Service Including Requirements for Body/Bonnet Extensions
SP-135-2006	High Pressure Steel Knife Gate Valves
SP-136-2007	Ductile Iron Swing Check Valves
(R-YEAR)	Indicates year standard reaffirmed without substantive changes

A large number of former MSS Practices have been approved by the ANSI or ANSI Standards, published by others. In order to maintain a single source of authoritative information, the MSS withdraws its Standard Practices in such cases.

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