AN AMERICAN NATIONAL STANDARD

Malleable Iron Threaded Fittings

ASME B16.3-1992

The American Society of Mechanical Engineers

345 East 47th Street, New York, N.Y. 10017

Date of Issuance: January 29, 1993

The 1992 edition of this Standard is being issued with an automatic addenda subscription service. The use of an addenda allows revisions made in response to public review comments or committee actions to be published as necessary; revisions published in addenda will become effective 6 months after the Date of Issuance of the addenda. The next edition of this Standard is scheduled for publication in 1997.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. The interpretations will be included with the above addenda service. Interpretations are not part of the Standard or addenda to the Standard.

FOREWORD

(This Foreword is not a part of ASME B16.3-1992.)

In 1921 the American Engineering Standards Committee, later 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, with the following organizations as joint sponsors: Heating, Piping, and Air Conditioning Contractors National Association (later the Mechanical Contractors Association of America, MCAA), Manufacturers Standardization Society of the Valves and Fittings Industry (MSS), and The American Society of Mechanical Engineers.

Threaded fittings were also included in the scope of the B16 Committee, and Subcommittee No. 2 (now Subcommittee B) was made responsible for threaded fittings other than steel. The first edition of a standard covering malleable iron fittings, 150 lb, was approved as American Tentative Standard by ASA in December 1927. In 1936 a revision was undertaken to add hydraulic service ratings, material specifications, alignment tolerances, and dimensions for additional sizes. It was approved with the designation American Standard B16c-1939.

Pipe plugs, bushings, and locknuts, included in the first editions, are now covered in a separate standard, B16.14.

A revision begun in 1947 amplified the sections on threading, inspection, and tolerances, and added dimensions for additional sizes of elbows, reducing crosses, reducing tees, straight and reducing couplings, caps, and return bends. It was approved as ASA B16.3-1951.

Meanwhile, MSS, in cooperation with the Association of American Railroads (AAR), developed the first standard for 300 lb malleable iron threaded fittings, published as MSS SP-31 of 1932. The 1950 edition of SP-31, which agreed with AAR Purchase Specification M-404, was submitted to ASA Sectional Committee B16 and assigned to Subcommittee No. 2. After balloting, it was approved as a separated standard, ASA B16.19-1951.

In 1961 work was begun to combine the two standards (for 150 lb and 300 lb) in a single document. The resulting Standard was approved as ASA B16.3-1963.

Subsequent reviews of the Standard, leading to revisions approved as ANSI B16.3-1971 and ANSI B16.3-1977, involved updating of referenced standards and the introduction of metric (SI) dimensions and ratings. In the 1977 Edition, 150 lb and 300 lb were redesignated as Class 150 and Class 300.

In 1982, American National Standards Committee B16 became the ASME B16 Standards Committee, operating with the same scope under ASME procedures accredited by ANSI. A further revision of the standard, approved and published as ANSI/ASME B16.3-1985, provided for electrodeposition as an alternative to hot dipping when zinc coating was required.

This 1992 edition of B16.3 omits metric units, establishing U.S. customary units as the standard. Clarifying and editorial revisions were made in order to improve the text. Following approval by the Standards Committee and ASME, approval as an American National Standard was given on December 2, 1992, with the designation ASME B16.3–1992.

Requests for interpretation and suggestions for revision should be sent to the Secretary, B16 Committee, The American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017.

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CONTENTS

MALLEABLE IRON THREADED FITTINGS, CLASSES 150 AND 300

1 SCOPE

This Standard for malleable iron threaded fittings, Class 150 and 300 covers:

(*a*) pressure-temperature ratings;

(*b*) size and method of designating openings of reducing fittings;

(*c*) marking;

(*d*) material;

(*e*) dimensions and tolerances;

(*f*) threading;

(*g*) coatings.

2 PRESSURE-TEMPERATURE RATINGS

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

(*b*) The temperatures 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.

(*c*) Class 300 street elbows are not recommended for gage pressures above 600 psi.

TABLE 1 PRESSURE–TEMPERATURE RATINGS

Temperature, °F	Class 150, psig	Class 300, psig		
		Sizes ¼–1	Sizes 1¼–2	Sizes 2½–3
−20 to 150	300	2000	1500	1000
200	265	1785	1350	910
250	225	1575	1200	825
300	185	1360	1050	735
350	150[1]	1150	900	650
400	...	935	750	560
450	...	725	600	475
500	...	510	450	385
550	...	300	300	300

NOTE:
(1) Permissible for service temperature up to 366 °F, reflecting the temperature of saturated steam at 150 psig.

3 SIZE

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

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. Where the 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 fittings are read.

4 MARKING

4.1 Class 150 Fittings

Each Class 150 fitting shall be marked for identification with the manufacturer's name or trademark.

[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.

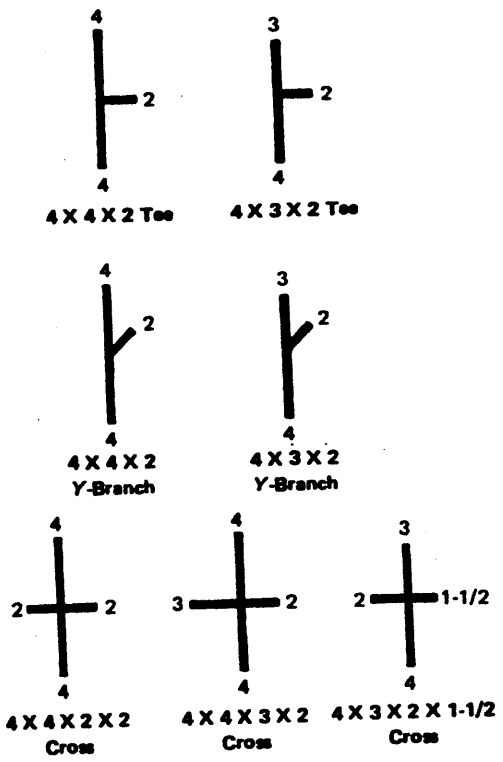


FIG. 1 IDENTIFICATION OF REDUCING FITTINGS

4.2 Class 300 Fittings

Each Class 300 fitting shall be marked for identification with:

(*a*) the manufacturer's name or trademark;

(*b*) the numerals "300";

(*c*) the letters "MI" to designate malleable iron;

(*d*) the size;

(*e*) other markings as permitted by MSS SP-25, Standard Practice Marking System for Valves, Fittings, Flanges, and Unions.

5 MATERIAL

5.1 Malleable Iron

The chemical and physical properties of the castings shall be in accordance with ASTM A 197, Specification for Cupola Malleable Iron. The manufacturer shall be prepared to certify that the product has been so produced.

5.2 Steel

Class 150 couplings and caps in NPS ⅛, ¼, and ⅜ may be made from steel rod or bar with a minimum yield strength of 30 ksi at the manufacturer's option.

6 DIMENSIONS AND TOLERANCES

6.1 General

Tables 3 through 18 of center-to-end dimensions are given for both straight and reducing fittings.

6.2 Reducing Fittings

The dimensions in Tables 3 through 18 of reducing fittings are for use only when making patterns for the specific reducing fitting in question and do not apply when a larger size pattern is bushed to make the reducing fitting wanted.

6.3 Tolerances

It is recognized that some variations are absolutely unavoidable in the making of patterns and castings. The following tolerances shall be permitted.

(*a*) *Metal Thickness Tolerances.* Metal thickness at no point in the castings shall be less than 90% of the value given in the tables.

(*b*) *Center-To-End Tolerances.* Permitted tolerances on the center-to-end dimensions of the fittings are shown in Table 2. Tolerances for end-to-end dimensions and lengths of couplings and reducers shall be twice those given. The largest opening in a reducing fitting governs the tolerances to be applied to all openings. These tolerances do not apply to return bends and caps.

7 THREADING

7.1 Types of Threads

All fittings shall be threaded with ANSI/ASME B1.20.1 Pipe Threads, General Purpose (Inch) and shall have taper threads except wrought couplings (Table 8), and wrought caps (Table 9) in NPS ⅛, ¼, and ⅜ which may have straight threads.

7.2 Tolerances

Variations in taper threading shall be limited to 1 turn large or 1 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 1½ turns large or small from the gaging notch on plug, when using a taper pipe thread working gage. The reference point for gaging internal fittings threads depends upon the chamfer diameter. When the internal chamfer diameter exceeds the major diameter of the internal thread, the reference point is the last thread scratch on the chamfer cone. When the internal chamfer diameter does not exceed the major diameter of the internal thread, the reference point is the end of the fitting (see Fig. 2).

TABLE 2 INSPECTION TOLERANCES

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, 3 1/2	0.10
4, 5	0.12
6	0.14

7.3 Countersink or Chamfer

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 deg. 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.

7.4 Thread Length

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

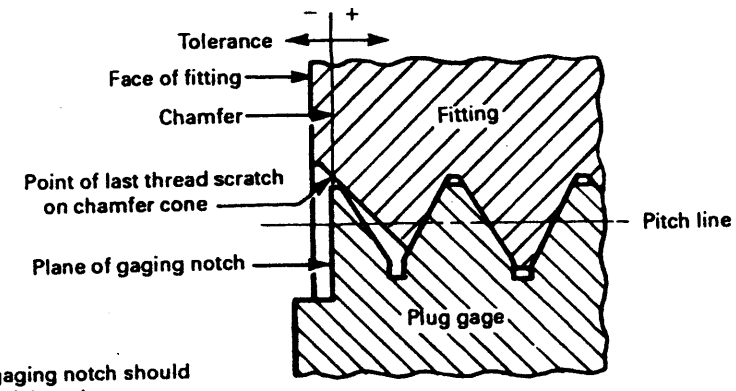
7.5 Alignment

The maximum allowable variation in the alignment of threads of all openings of threaded fittings shall be 0.06 in./ft (0.5%).

8 RIBS

8.1 General

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



NOTE: Plane of gaging notch should intersect crest of thread on gage

Enlarged view showing chamfered internal thread of basic size with chamfer exceeding the major diameter

The chamfer illustrated is at 45 deg. angle and is approximately 3/8 pitch in depth. However, these details are not requirements and are given only for information on the illustration shown.

FIG. 2 GAGING OF CHAMFERED INTERNAL THREADS

thickness of the fitting. Right-hand couplings shall have not more than 2 ribs.

8.2 Special Couplings

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.

9 PLUGS, BUSHINGS, AND LOCKNUTS

For dimensions of plugs, bushings, and locknuts to be used in connection with Classes 150 and 300 malleable iron threaded fittings, see ASME B16.14 Ferrous Pipe Plugs, Bushings, and Locknuts With Pipe Threads.

10 FACE BEVEL

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

11 COATINGS

11.1 Malleable Iron Fittings

When malleable iron fittings are zinc coated, they shall be hot dipped in accordance with ASTM A 153 or have an electrodeposited zinc coating conforming to ASTM B 633 Type I, Service Condition 4. Hot dipped coatings shall be 0.0034 in. minimum thickness and applied prior to threading. Electrodeposited zinc shall be 0.001 in. minimum thickness and applied following threading.

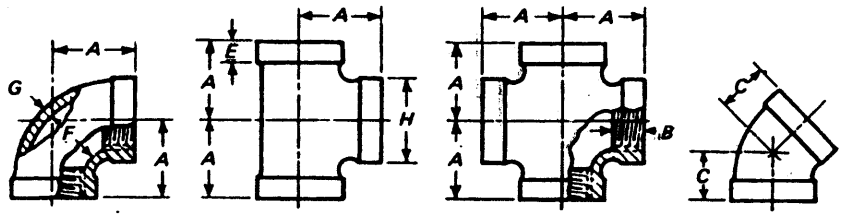
11.2 Steel Fittings

Couplings and caps made from steel rod or bar may have electrodeposited zinc coatings conforming to ASTM B 633, Type 1, Service Coating 4, or cadmium coatings conforming to ASTM B 766, Type NS. The electrodeposited coatings shall be applied after threading.

11.3 Other Coatings

Other coatings specified by the purchaser shall be furnished meeting the agreed requirements.

CLASS 150



Elbow Tee Cross 45 deg. Elbow

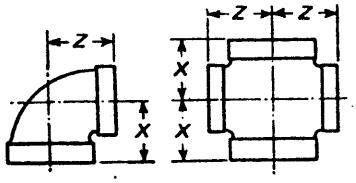
TABLE 3 DIMENSIONS OF 90 deg. ELBOWS, TEES, CROSSES, AND 45 deg. ELBOWS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End, Elbows, Tees, and Crosses[1] *A*	Center-to-End, 45 deg. Elbows *C*	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.
					Min.	Max.		
1/8	0.69	...	0.25	0.20	0.40	0.43	0.09	0.69
1/4	0.81	0.73	0.32	0.21	0.54	0.58	0.09	0.84
3/8	0.95	0.80	0.36	0.23	0.67	0.72	0.10	1.01
1/2	1.12	0.88	0.43	0.25	0.84	0.90	0.10	1.20
3/4	1.31	0.98	0.50	0.27	1.05	1.11	0.12	1.46
1	1.50	1.12	0.58	0.30	1.31	1.38	0.13	1.77
1 1/4	1.75	1.29	0.67	0.34	1.66	1.73	0.14	2.15
1 1/2	1.94	1.43	0.70	0.37	1.90	1.97	0.15	2.43
2	2.25	1.68	0.75	0.42	2.37	2.44	0.17	2.96
2 1/2	2.70	1.95	0.92	0.48	2.87	2.97	0.21	3.59
3	3.08	2.17	0.98	0.55	3.50	3.60	0.23	4.28
3 1/2	3.42	2.39	1.03	0.60	4.00	4.10	0.25	4.84
4	3.79	2.61	1.08	0.66	4.50	4.60	0.26	5.40
5	4.50	3.05	1.18	0.78	5.56	5.66	0.30	6.58
6	5.13	3.46	1.28	0.90	6.62	6.72	0.34	7.77

GENERAL NOTE: Dimensions are in inches.

NOTE:
(1) Dimensions for reducing elbows and reducing crosses are given in Table 4 and dimensions for reducing tees in Table 5.

CLASS 150



Elbow Cross

TABLE 4 DIMENSIONS OF 90 deg. ELBOWS AND CROSSES (REDUCING SIZES)

Elbows						Crosses		
Nominal Pipe Size	Center-to-End		Nominal Pipe Size	Center-to-End		Nominal Pipe Size	Center-to-End	
	X	Z		X	Z		X	Z
1/4 × 1/8	0.74	0.76	1 1/2 × 1	1.65	1.80	3/4 × 3/4 × 1/2 × 1/2	1.20	1.22
3/8 × 1/4	0.88	0.90	1 1/2 × 3/4	1.52	1.75	1 × 1 × 3/4 × 3/4	1.37	1.45
3/8 × 1/8	0.81	0.85	2 × 1 1/2	2.02	2.16	1 × 1 × 1/2 × 1/2	1.26	1.36
1/2 × 3/8	1.04	1.03	2 × 1 1/4	1.90	2.10	1 1/4 × 1 1/4 × 1 × 1	1.58	1.67
1/2 × 1/4	0.97	0.98	2 × 1	1.73	2.02	1 1/4 × 1 1/4 × 3/4 × 3/4	1.45	1.62
3/4 × 1/2	1.20	1.22	2 × 3/4	1.60	1.97	1 1/2 × 1 1/2 × 1 1/4 × 1 1/4	1.82	1.88
3/4 × 3/8	1.12	1.13	2 1/2 × 2	2.39	2.60	1 1/2 × 1 1/2 × 1 × 1	1.65	1.80
3/4 × 1/4	1.05	1.08	2 1/2 × 1 1/2	2.16	2.51	1 1/2 × 1 1/2 × 3/4 × 3/4	1.52	1.75
1 × 3/4	1.37	1.45	3 × 2 1/2	2.83	2.99	2 × 2 × 1 1/2 × 1 1/2	2.02	2.16
1 × 1/2	1.26	1.36	3 × 2	2.52	2.89	2 × 2 × 1 1/4 × 1 1/4	1.90	2.10
1 × 3/8	1.18	1.27	4 × 3	3.30	3.60	2 × 2 × 1 × 1	1.73	2.02
1 1/4 × 1	1.58	1.67				2 × 2 × 3/4 × 3/4	1.60	1.97
1 1/4 × 3/4	1.45	1.62				2 1/2 × 2 1/2 × 2 × 2	2.39	2.60
1 1/4 × 1/2	1.34	1.53				3 × 3 × 2 × 2	2.52	2.89
1 1/2 × 1 1/4	1.82	1.88						

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given, see Table 3.
(c) Reducing sizes of fittings for which dimensions are not given in tables may be produced from regular patterns for listed sizes by sand bushing.

CLASS 150

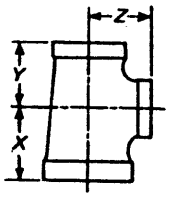


TABLE 5 DIMENSIONS OF TEES (REDUCING SIZES)

Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End			Nominal Pipe Size	Center-to-End		
	X	Y	Z		X	Y	Z		X	Y	Z
1/4 × 1/4 × 1/8	0.74	0.74	0.76	1 1/4 × 1 × 1	1.58	1.50	1.67	2 × 3/4 × 2	2.25	1.97	2.25
1/8 × 1/8 × 1/4	0.76	0.76	0.74	1 1/4 × 1 × 3/4	1.45	1.37	1.62	2 × 1/2 × 2	2.25	1.88	2.25
3/8 × 3/8 × 1/4	0.88	0.88	0.90	1 1/4 × 1 × 1/2	1.34	1.26	1.53	1 1/2 × 1 1/2 × 2	2.16	2.16	2.02
3/8 × 3/8 × 1/8	0.81	0.81	0.85	1 1/4 × 3/4 × 1 1/4	1.75	1.62	1.75	1 1/4 × 1 1/4 × 2	2.10	2.10	1.90
3/8 × 1/4 × 3/8	0.95	0.90	0.95	1 1/4 × 3/4 × 1	1.58	1.45	1.67	1 × 1 × 2	2.02	2.02	1.73
3/8 × 1/4 × 1/4	0.88	0.81	0.90	1 1/4 × 3/4 × 3/4	1.45	1.31	1.62	2 1/2 × 2 1/2 × 2	2.39	2.39	2.60
1/4 × 1/4 × 3/8	0.90	0.90	0.88	1 1/4 × 1/2 × 1 1/4	1.75	1.53	1.75	2 1/2 × 2 1/2 × 1 1/2	2.16	2.16	2.51
1/2 × 1/2 × 3/8	1.04	1.04	1.03	1 1/4 × 1/2 × 1	1.58	1.36	1.67	2 1/2 × 2 1/2 × 1 1/4	2.04	2.04	2.45
1/2 × 1/2 × 1/4	0.97	0.97	0.98	1 × 1 × 1 1/4	1.67	1.67	1.58	2 1/2 × 2 1/2 × 1	1.87	1.87	2.37
1/2 × 3/8 × 1/2	1.12	1.03	1.12	3/4 × 3/4 × 1 1/4	1.62	1.62	1.45	2 1/2 × 2 1/2 × 3/4	1.74	1.74	2.32
1/2 × 3/8 × 3/8	1.04	0.95	1.03	1 1/2 × 1 1/2 × 1 1/4	1.82	1.82	1.88	2 1/2 × 2 × 2 1/2	2.70	2.60	2.70
1/2 × 1/4 × 1/2	1.12	0.98	1.12	1 1/2 × 1 1/2 × 1	1.65	1.65	1.80	2 1/2 × 2 × 2	2.39	2.25	2.60
3/8 × 3/8 × 1/2	1.03	1.03	1.04	1 1/2 × 1 1/2 × 3/4	1.52	1.52	1.75	2 1/2 × 1 1/2 × 2 1/2	2.70	2.51	2.70
3/4 × 3/4 × 1/2	1.20	1.20	1.22	1 1/2 × 1 1/2 × 1/2	1.41	1.41	1.66	2 1/2 × 1 1/2 × 2	2.39	2.16	2.60
3/4 × 3/4 × 3/8	1.12	1.12	1.13	1 1/2 × 1 1/4 × 1 1/2	1.94	1.88	1.94	2 × 2 × 2 1/2	2.60	2.60	2.39
3/4 × 3/4 × 1/4	1.05	1.05	1.08	1 1/2 × 1 1/4 × 1 1/4	1.82	1.75	1.88	3 × 3 × 2 1/2	2.83	2.83	2.99
3/4 × 1/2 × 3/4	1.31	1.22	1.31	1 1/2 × 1 1/4 × 1	1.65	1.58	1.80	3 × 3 × 2	2.52	2.52	2.89
3/4 × 1/2 × 1/2	1.20	1.12	1.22	1 1/2 × 1 1/4 × 3/4	1.52	1.45	1.75	3 × 3 × 1 1/2	2.29	2.29	2.80
3/4 × 1/2 × 3/8	1.12	1.04	1.13	1 1/2 × 1 1/4 × 1/2	1.41	1.34	1.66	3 × 3 × 1 1/4	2.17	2.17	2.74
3/4 × 3/8 × 3/4	1.31	1.13	1.31	1 1/2 × 1 × 1 1/2	1.94	1.80	1.94	3 × 3 × 1	2.00	2.00	2.66
3/4 × 3/8 × 3/8	1.12	0.95	1.13	1 1/2 × 1 × 1 1/4	1.82	1.67	1.88	3 × 3 × 3/4	1.87	1.87	2.61
3/4 × 1/4 × 3/4	1.31	1.08	1.31	1 1/2 × 1 × 1	1.65	1.50	1.80	3 × 2 1/2 × 3	3.08	2.99	3.08
1/2 × 1/2 × 3/4	1.22	1.22	1.20	1 1/2 × 3/4 × 1 1/2	1.94	1.75	1.94	3 × 2 1/2 × 2 1/2	2.83	2.70	2.99
1 × 1 × 3/4	1.37	1.37	1.45	1 1/2 × 1/2 × 1 1/2	1.94	1.66	1.94	3 × 2 1/2 × 2	2.52	2.39	2.89
1 × 1 × 1/2	1.26	1.26	1.36	1 1/4 × 1 1/4 × 1 1/2	1.88	1.88	1.82	3 × 2 × 3	3.08	2.89	3.08
1 × 1 × 3/8	1.18	1.18	1.27	1 × 1 × 1 1/2	1.80	1.80	1.65	3 × 2 × 2	2.52	2.25	2.89
1 × 1 × 1/4	1.11	1.11	1.22	2 × 2 × 1 1/2	2.02	2.02	2.16	2 1/2 × 2 1/2 × 3	2.99	2.99	2.83
1 × 3/4 × 1	1.50	1.45	1.50	2 × 2 × 1 1/4	1.90	1.90	2.10	3 1/2 × 3 1/2 × 2 1/2	2.93	2.93	3.24
1 × 3/4 × 3/4	1.37	1.31	1.45	2 × 2 × 1	1.73	1.73	2.02	4 × 4 × 3	3.30	3.30	3.60
1 × 3/4 × 1/2	1.26	1.20	1.36	2 × 2 × 3/4	1.60	1.60	1.97	4 × 4 × 2 1/2	3.05	3.05	3.51
1 × 1/2 × 1	1.50	1.36	1.50	2 × 2 × 1/2	1.49	1.49	1.88	4 × 4 × 2	2.74	2.74	3.41
1 × 1/2 × 3/4	1.37	1.22	1.45	2 × 1 1/2 × 2	2.25	2.16	2.25	4 × 4 × 1 1/2	2.51	2.51	3.32
1 × 1/2 × 1/2	1.26	1.12	1.36	2 × 1 1/2 × 1 1/2	2.02	1.94	2.16	4 × 3 × 4	3.79	3.60	3.79
3/4 × 3/4 × 1	1.45	1.45	1.37	2 × 1 1/2 × 1 1/4	1.90	1.82	2.10	3 × 3 × 4	3.60	3.60	3.30
1/2 × 1/2 × 1	1.36	1.36	1.26	2 × 1 1/2 × 1	1.73	1.65	2.02	5 × 5 × 3	3.51	3.51	4.22
1 1/4 × 1 1/4 × 1	1.58	1.58	1.67	2 × 1 1/4 × 2	2.25	2.10	2.25	6 × 6 × 4	4.13	4.13	4.94
1 1/4 × 1 1/4 × 3/4	1.45	1.45	1.62	2 × 1 1/4 × 1 1/2	2.02	1.88	2.16	6 × 6 × 3	3.64	3.64	4.75
1 1/4 × 1 1/4 × 1/2	1.34	1.34	1.53	2 × 1 1/4 × 1 1/4	1.90	1.75	2.10	6 × 6 × 2 1/2	3.39	3.39	4.66
1 1/4 × 1 1/4 × 3/8	1.26	1.26	1.44	2 × 1 × 2	2.25	2.02	2.25	6 × 6 × 2	3.08	3.08	4.56
1 1/4 × 1 × 1 1/4	1.75	1.67	1.75	2 × 1 × 1 1/2	2.02	1.80	2.16				

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TABLE 5 (CONT'D)

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given, see Table 3.
(c) Reducing sizes of fittings for which dimensions are not given in tables may be produced from regular patterns for listed sizes by sand bushing.

CLASS 150

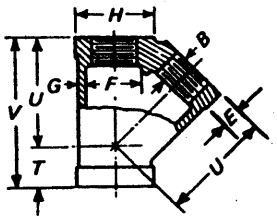
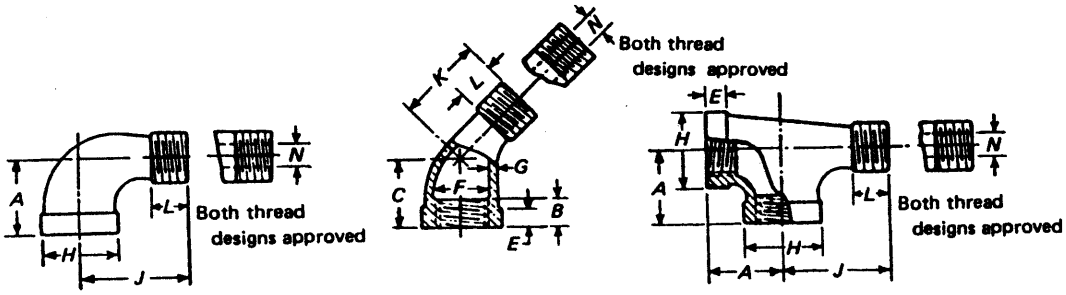


TABLE 6 DIMENSIONS OF 45 deg. Y-BRANCHES (STRAIGHT SIZES)

Nominal Pipe Size	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fittings *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.	Center-to-End Inlet *T*	Center-to-End Outlet *U*	End-to-End *V*
			Min.	Max.					
3/8	0.36	0.23	0.67	0.72	0.10	1.01	0.50	1.43	1.93
1/2	0.43	0.25	0.84	0.90	0.10	1.20	0.61	1.71	2.32
3/4	0.50	0.27	1.05	1.11	0.12	1.46	0.72	2.05	2.77
1	0.58	0.30	1.31	1.38	0.13	1.77	0.85	2.43	3.28
1 1/4	0.67	0.34	1.66	1.73	0.14	2.15	1.02	2.92	3.94
1 1/2	0.70	0.37	1.90	1.97	0.15	2.43	1.10	3.28	4.38
2	0.75	0.42	2.37	2.44	0.17	2.96	1.24	3.93	5.17
2 1/2	0.92	0.48	2.87	2.97	0.21	3.59	1.52	4.73	6.25
3	0.98	0.55	3.50	3.60	0.23	4.28	1.71	5.55	7.26
4	1.08	0.66	4.50	4.60	0.26	5.40	2.01	6.97	8.98

GENERAL NOTE: Dimensions are in inches.

CLASS 150



Street Elbow 45 Deg. Street Elbow Street Tee

TABLE 7 DIMENSIONS OF STREET TEES AND 90 deg. AND 45 deg. STREET ELBOWS

Nominal Pipe Size	Center-to-End, Elbows, Tees *A*	Center-to-End, 45 deg. Elbows *C*	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fittings *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.	Center-to-Male End Elbows, Tees *J*	Center-to-Male End 45 deg. Elbows *K*	Length of External Thread *L*, Min.	Max. Port Diameter Male End *N*
					Min.	Max.						
1/8	0.69[1]	. . .	0.25	0.20	0.40	0.43	0.09	0.69	1.00[1]	. . .	0.26	0.20
1/4	0.81	0.73	0.32	0.21	0.54	0.58	0.09	0.84	1.19	0.94	0.40	0.26
3/8	0.95	0.80	0.36	0.23	0.67	0.72	0.10	1.01	1.44	1.03	0.41	0.37
1/2	1.12	0.88	0.43	0.25	0.84	0.90	0.10	1.20	1.63	1.15	0.53	0.51
3/4	1.31	0.98	0.50	0.27	1.05	1.11	0.12	1.46	1.89	1.29	0.55	0.69
1	1.50	1.12	0.58	0.30	1.31	1.38	0.13	1.77	2.14	1.47	0.68	0.91
1 1/4	1.75	1.29	0.67	0.34	1.66	1.73	0.14	2.15	2.45	1.71	0.71	1.19
1 1/2	1.94	1.43	0.70	0.37	1.90	1.97	0.15	2.43	2.69	1.88	0.72	1.39
2	2.25	1.68	0.75	0.42	2.37	2.44	0.17	2.96	3.26	2.22	0.76	1.79
2 1/2	2.70[1]	1.95	0.92	0.48	2.87	2.97	0.21	3.59	3.86[1]	2.57	1.14	2.20
3	3.08[1]	2.17	0.98	0.55	3.50	3.60	0.23	4.28	4.51[1]	3.00	1.20	2.78
4	3.79	2.61	1.08	0.66	4.50	4.60	0.26	5.40	5.69	3.70	1.30	3.70
5	4.50[1]	. . .	1.18	0.78	5.56	5.66	0.30	6.58	6.86[1]	. . .	1.41	4.69
6	5.13[1]	. . .	1.28	0.90	6.62	6.72	0.34	7.77	8.03[1]	. . .	1.51	5.67

GENERAL NOTE: Dimensions are in inches.

NOTE:
(1) This dimension applies to street elbows only. Street tees are not made in these sizes.

CLASS 150

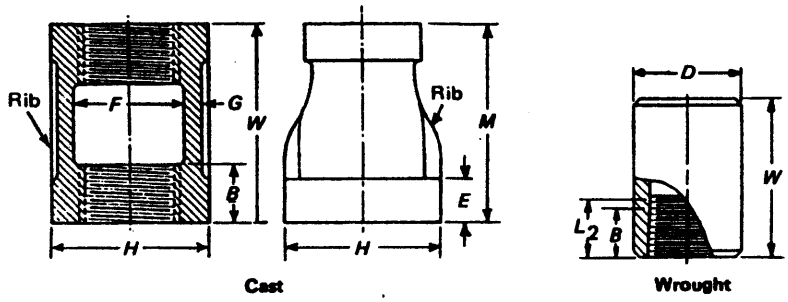


TABLE 8 DIMENSIONS OF COUPLINGS (STRAIGHT AND REDUCING SIZES)[1]

Nominal Pipe Size	Length of Thread, Min.		Width of Band *E*, Min.	Inside Diameter of Fittings *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.	Thickness of Ribs	Length of Straight Couplings *W*	Length[2,3] of Reducing Concentric Couplings *M*	Steel Couplings[3,4]	
	B	L_2		Min.	Max.						Length *W*	Outside Diameter *D*
1/8	0.25	0.2639	0.20	0.40	0.43	0.09	0.69	0.09	0.96	...	0.81	0.56
1/4	0.32	0.4018	0.21	0.54	0.58	0.09	0.84	0.09	1.06	1.00	1.19	0.72
3/8	0.36	0.4078	0.23	0.67	0.72	0.10	1.01	0.10	1.16	1.13	1.19	0.87
1/2	0.43	...	0.25	0.84	0.90	0.10	1.20	0.10	1.34	1.25	...	...
3/4	0.50	...	0.27	1.05	1.11	0.12	1.46	0.12	1.52	1.44	...	...
1	0.58	...	0.30	1.31	1.38	0.13	1.77	0.13	1.67	1.69	...	...
1 1/4	0.67	...	0.34	1.66	1.73	0.14	2.15	0.14	1.93	2.06	...	...
1 1/2	0.70	...	0.37	1.90	1.97	0.15	2.43	0.15	2.15	2.31	...	...
2	0.75	...	0.42	2.37	2.44	0.17	2.96	0.17	2.53	2.81	...	...
2 1/2	0.92	...	0.48	2.87	2.97	0.21	3.59	0.21	2.88	3.25	...	...
3	0.98	...	0.55	3.50	3.60	0.23	4.28	0.23	3.18	3.69	...	...
4	1.08	...	0.66	4.50	4.60	0.26	5.40	0.26	3.69	4.38	...	...

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Right- and left-hand pattern couplings are standard only in sizes up to and including NPS 2.
(2) Dimension *M* for all reduction of reducing couplings (concentric only) shall be the same as shown for the largest opening. Dimension *M* for eccentric couplings is not standard, and such information should be obtained from the manufacturer.
(3) Couplings NPS 3/8 and smaller may be cast or made from steel rod with a minimum yield strength of 30 ksi at the option of the manufacturer.
(4) Steel couplings are made without recess. Dimension *B* for steel couplings is minimum length of perfect thread, 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 Pipe Threads, General Purpose (Inch). See Section 7.

CLASS 150

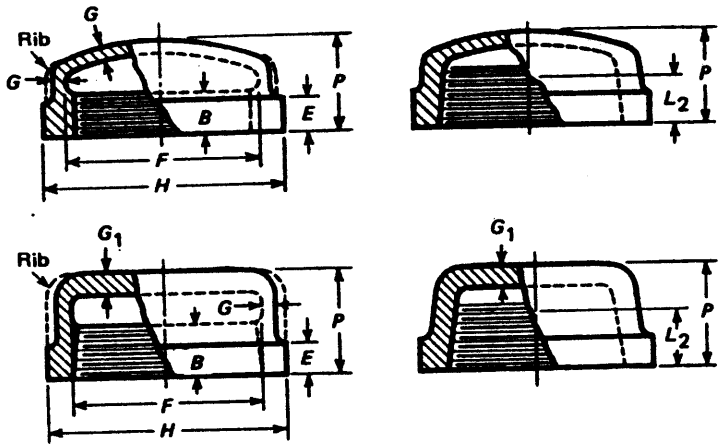


TABLE 9 DIMENSIONS OF CAPS

Nominal Pipe Size	Length of Thread, Min.		Width of Band *E*, Min.	Inside Diameter of Fittings *F*		Metal Thickness of Side *G*	Outside Diameter[1] of Band *H*, Min.	Height *P*,[2] Min.	Thickness of Ribs	Thickness of Flat Top Caps G_1
	B	L_2		Min.	Max.					
1/8[1]	0.25	0.2639	0.20	0.40	0.43	0.09	0.69	0.53	...	...
1/4[1]	0.32	0.4018	0.21	0.54	0.58	0.09	0.84	0.63	...	...
3/8[1]	0.36	0.4078	0.23	0.67	0.72	0.10	1.01	0.74	...	...
1/2	0.43	0.5337	0.25	0.84	0.90	0.10	1.20	0.87	0.10	...
3/4	0.50	0.5457	0.27	1.05	1.11	0.12	1.46	0.97	0.12	0.13
1	0.58	0.6828	0.30	1.31	1.38	0.13	1.77	1.16	0.13	0.15
1 1/4	0.67	0.7068	0.34	1.66	1.73	0.14	2.15	1.28	0.14	0.17
1 1/2	0.70	0.7235	0.37	1.90	1.97	0.15	2.43	1.33	0.15	0.19
2	0.75	0.7565	0.42	2.37	2.44	0.17	2.46	1.45	0.17	0.22
2 1/2	0.92	1.1375	0.48	2.87	2.97	0.21	3.59	1.70	0.21	0.25
3	0.98	1.2000	0.55	3.50	3.60	0.23	4.28	1.80	0.23	0.29
3 1/2	1.03	1.2500	0.60	4.00	4.10	0.25	4.84	1.90	0.25	0.30
4	1.08	1.3000	0.66	4.50	4.60	0.26	5.40	2.08	0.26	0.36
5	1.18	1.4063	0.78	5.56	5.66	0.30	6.58	2.32	0.30	...
6	1.28	1.5125	0.90	6.62	6.72	0.34	7.77	2.55	0.34	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Caps sizes 1/8, 1/4, and 3/8 may be malleable castings or made from steel rod with a minimum yield strength of 30 ksi at the option of the manufacturer. When made from steel rod, diameters shall be 0.56, 0.69, and 0.84, respectively. Caps made from steel rod have no recess.

(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 Pipe Threads, General Purpose (Inch).

CLASS 150

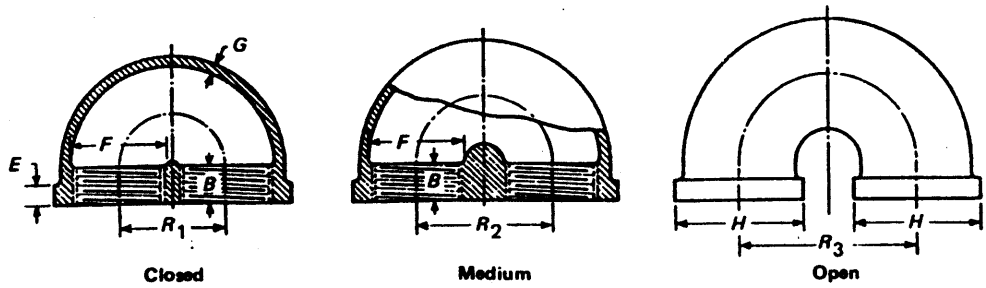


TABLE 10 DIMENSIONS OF CLOSED, MEDIUM, AND OPEN PATTERN RETURN BENDS[1]

Nominal Pipe Size	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fittings *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.	Center-to-Center (Closed Pattern) R_1	Center-to-Center (Medium Pattern) R_2	Center-to-Center (Open Pattern) R_3
			Min.	Max.					
1/2	0.43	0.25	0.84	0.90	0.12	1.20	1.00	1.25	1.50
3/4	0.50	0.27	1.05	1.11	0.13	1.46	1.25	1.50	2.00
1	0.58	0.30	1.31	1.38	0.15	1.77	1.50	1.87	2.50
1 1/4	0.67	0.34	1.66	1.73	0.16	2.15	1.75	2.25	3.00
1 1/2	0.70	0.37	1.90	1.97	0.18	2.43	2.19	2.50	3.50
2	0.75	0.42	2.37	2.44	0.20	2.96	2.62	3.00	4.00
2 1/2	0.92	0.48	2.87	2.97	0.24	3.59	...	...	4.50
3	0.98	0.55	3.50	3.60	0.27	4.28	...	...	5.00
4	1.08	0.66	4.50	4.60	0.31	5.40	...	...	6.00

GENERAL NOTE: Dimensions are in inches.

NOTE:
(1) It is permissible to furnish closed pattern return bends not banded. Closed pattern return bends will not make up equally spaced coils, as the distance center-to-center of two adjacent bends is greater than the center-to-center of openings of a single bend.

CLASS 300

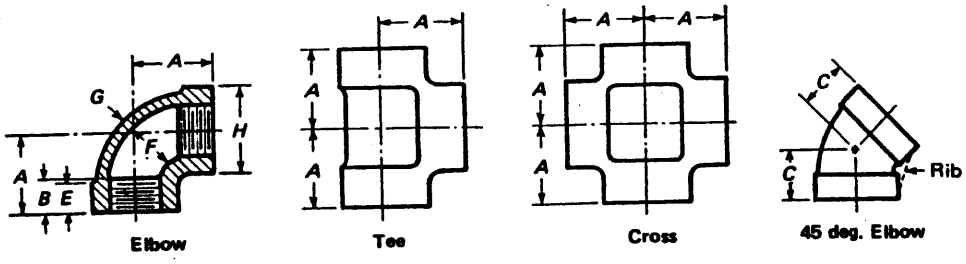
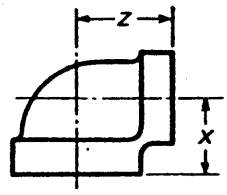


TABLE 11 DIMENSIONS OF 90 deg. ELBOWS, TEES, CROSSES, AND 45 deg. ELBOWS (STRAIGHT SIZES)

Nominal Pipe Size	Center-to-End, Elbows, Tees, and Crosses *A*	Center-to-End, 45 deg. Elbows *C*	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.
					Min.	Max.		
1/4	0.94	0.81	0.43	0.38	0.54	0.58	0.14	0.93
3/8	1.06	0.88	0.47	0.44	0.67	0.72	0.15	1.12
1/2	1.25	1.00	0.57	0.50	0.84	0.90	0.16	1.34
3/4	1.44	1.13	0.64	0.56	1.05	1.11	0.18	1.63
1	1.63	1.31	0.75	0.62	1.31	1.38	0.20	1.95
1 1/4	1.94	1.50	0.84	0.69	1.66	1.73	0.22	2.39
1 1/2	2.13	1.69	0.87	0.75	1.90	1.97	0.24	2.68
2	2.50	2.00	1.00	0.84	2.37	2.44	0.26	3.28
2 1/2	2.94	2.25	1.17	0.94	2.87	2.97	0.31	3.86
3	3.38	2.50	1.23	1.00	3.50	3.60	0.35	4.62

GENERAL NOTE: Dimensions are in inches.

CLASS 300



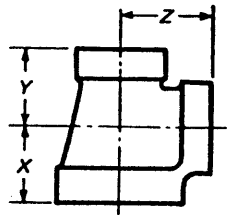


TABLE 12 CENTER-TO-END DIMENSIONS OF 90 deg. ELBOWS (REDUCING SIZES)

Nominal Pipe Size	Center-to-End	
	X	Z
1/2 × 3/8	1.19	1.19
3/4 × 1/2	1.31	1.38
1 × 3/4	1.50	1.56
1 1/4 × 1	1.75	1.81
1 1/2 × 1 1/4	2.00	2.06
2 × 1 1/2	2.25	2.38
2 1/2 × 2	2.69	2.75
3 × 2 1/2	3.06	3.31

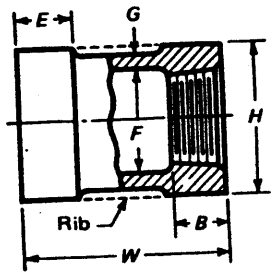
GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given, see Table 11.
(c) Reducing sizes of fittings for which dimensions are not given in tables may be produced from regular patterns for listed sizes by sand bushing.

TABLE 13 CENTER-TO-END DIMENSIONS OF TEES (REDUCING SIZES)

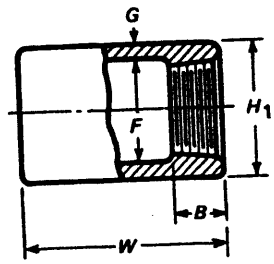
Nominal Pipe Size	Center-to-End		
	X	Y	Z
1/2 × 1/2 × 3/8	1.19	1.19	1.19
1/2 × 3/8 × 1/2	1.25	1.19	1.25
3/4 × 3/4 × 1/2	1.31	1.31	1.38
3/4 × 1/2 × 3/4	1.44	1.38	1.44
1 × 1 × 3/4	1.50	1.50	1.56
1 × 1 × 1/2	1.44	1.44	1.50
1 × 1 × 3/8	1.31	1.31	1.44
1 × 3/4 × 1	1.63	1.56	1.63
1 1/4 × 1 1/4 × 1	1.75	1.75	1.81
1 1/4 × 1 1/4 × 3/4	1.63	1.63	1.75
1 1/4 × 1 1/4 × 1/2	1.50	1.50	1.69
1 1/4 × 1 × 1 1/4	1.94	1.81	1.94
1 1/2 × 1 1/2 × 1 1/4	2.00	2.00	2.06
1 1/2 × 1 1/2 × 1	1.81	1.81	2.00
1 1/2 × 1 1/2 × 3/4	1.69	1.69	1.88
1 1/2 × 1 1/2 × 1/2	1.63	1.63	1.81
1 1/2 × 1 1/4 × 1 1/2	2.13	2.06	2.13
2 × 2 × 1 1/2	2.25	2.25	2.38
2 × 2 × 1 1/4	2.13	2.13	2.31
2 × 2 × 1	2.00	2.00	2.25
2 × 2 × 3/4	1.81	1.81	2.13
2 × 2 × 1/2	1.75	1.75	2.06
2 × 1 1/2 × 2	2.50	2.38	2.50
2 1/2 × 2 1/2 × 2	2.69	2.69	2.75
2 1/2 × 2 1/2 × 1 1/2	2.44	2.44	2.63
2 1/2 × 2 × 2 1/2	2.94	2.75	2.94
3 × 3 × 2 1/2	3.06	3.06	3.31
3 × 3 × 2	2.81	2.81	3.13
3 × 2 1/2 × 3	3.38	3.31	3.38

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given, see Table 11.
(c) Reducing sizes of fittings for which dimensions are not given in tables may be produced from regular patterns for listed sizes by sand bushing.

CLASS 300



Couplings With Bands



Couplings Without Bands

TABLE 14 DIMENSIONS OF COUPLINGS

Nominal Pipe Size	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness *G*	Outside Diameter of Coupling H_1, Min.[1]	Outside Diameter of Band *H*, Min.[2]	Length of Straight Coupling *W*
			Min.	Max.				
1/4	0.43	0.38	0.54	0.58	0.14	0.82	0.93	1.37
3/8	0.47	0.44	0.67	0.72	0.15	0.97	1.12	1.62
1/2	0.57	0.50	0.84	0.90	0.16	1.16	1.34	1.87
3/4	0.64	0.56	1.05	1.11	0.18	1.41	1.63	2.12
1	0.75	0.62	1.31	1.38	0.20	1.71	1.95	2.37
1 1/4	0.84	0.69	1.66	1.73	0.22	2.10	2.39	2.87
1 1/2	0.87	0.75	1.90	1.97	0.24	2.38	2.68	2.87
2	1.00	0.84	2.37	2.44	0.26	2.89	3.28	3.62
2 1/2	1.17	0.94	2.87	2.97	0.31	3.49	3.86	4.12
3	1.23	1.00	3.50	3.60	0.35	4.20	4.62	4.12

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) H_1 diameter is standard for couplings without bands. $H_1 = F$ min. + $2G$.
(2) *H* min. is for couplings with bands and is optional with the manufacturer. For information on ribs, see Section 8.

CLASS 300

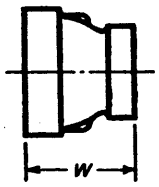
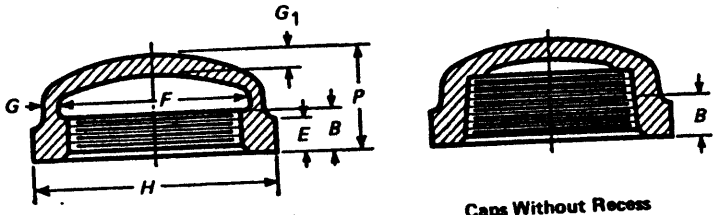


TABLE 15 DIMENSIONS OF REDUCING COUPLINGS

Nominal Pipe Size	Length W
3/8 × 1/4	1.44
1/2 × 3/8	1.69
1/2 × 1/4	1.69
3/4 × 1/2	1.75
3/4 × 3/8	1.75
3/4 × 1/4	1.75
1 × 3/4	2.00
1 × 1/2	2.00
1 × 3/8	2.00
1 × 1/4	2.00
1 1/4 × 1	2.38
1 1/4 × 3/4	2.38
1 1/4 × 1/2	2.38
1 1/2 × 1 1/4	2.69
1 1/2 × 1	2.69
1 1/2 × 3/4	2.69
1 1/2 × 1/2	2.69
2 × 1 1/2	3.19
2 × 1 1/4	3.19
2 × 1	3.19
2 × 3/4	3.19
2 × 1/2	3.19
2 1/2 × 2	3.69
2 1/2 × 1 1/2	3.69
3 × 2 1/2	4.06
3 × 2	4.06
3 × 1 1/2	4.06

GENERAL NOTES:
(a) Dimensions are in inches.
(b) For dimensions not given, see Table 11.
(c) Reducing sizes of fittings for which dimensions are not given in the tables may be produced from regular patterns for listed sizes by sand bushing.

CLASS 300



Caps With Recess

Caps Without Recess

TABLE 16 DIMENSIONS OF CAPS

Nominal Pipe Size	Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness		Outside Diameter of Band *H*, Min.	Height *P*, Min.[2]
			Min.	Max.	Min. *G*	Recommended[1] G_1		
1/4	0.43	0.38	0.54	0.58	0.14	0.18	0.93	0.78
3/8	0.47	0.44	0.67	0.72	0.15	0.19	1.12	0.83
1/2	0.57	0.50	0.84	0.90	0.16	0.20	1.34	0.98
3/4	0.64	0.56	1.05	1.11	0.18	0.23	1.63	1.08
1	0.75	0.62	1.31	1.38	0.20	0.25	1.95	1.26
1 1/4	0.84	0.69	1.66	1.73	0.22	0.28	2.39	1.38
1 1/2	0.87	0.75	1.90	1.97	0.24	0.30	2.68	1.43
2	1.00	0.84	2.37	2.44	0.26	0.33	3.28	1.68
2 1/2	1.17	0.94	2.87	2.97	0.31	0.39	3.86	2.06
3	1.23	1.00	3.50	3.60	0.35	0.44	4.62	2.17

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Dimension G_1 is recommended but shall in no case be less than dimension *G*.
(2) Dimension *P* may be varied to comply with manufacturer's practice and for caps without recess shall be of such height that the length of effective thread shall be not less than *B*.

CLASS 300

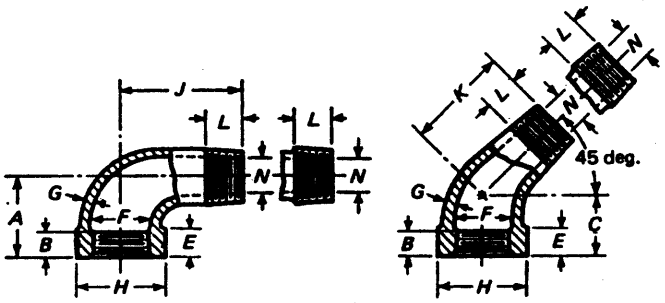
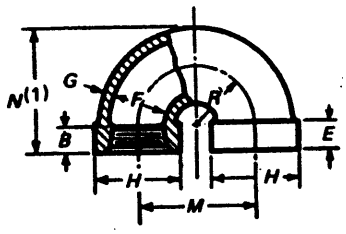


TABLE 17 DIMENSIONS OF 90 deg. AND 45 deg. STREET ELBOWS

Nominal Pipe Size	90 deg. Elbows		45 deg. Elbows		Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness *G*	Outside Diameter of Band *H*, Min.	Length of External Thread *L*, Min.	Max. Port Diameter Male End *N*
	Center-to-End *A*	Center-to-Male End *J*	Center-to-End *C*	Center-to-Male End *K*			Min.	Max.				
1/4	0.94	1.44	. . .	. . .	0.43	0.38	0.54	0.58	0.14	0.93	0.40	0.26
3/8	1.06	1.63	. . .	. . .	0.47	0.44	0.67	0.72	0.15	1.12	0.41	0.36
1/2	1.25	2.00	1.00	1.38	0.57	0.50	0.84	0.90	0.16	1.34	0.53	0.49
3/4	1.44	2.19	1.13	1.56	0.64	0.56	1.05	1.11	0.18	1.63	0.55	0.67
1	1.63	2.56	1.31	1.81	0.75	0.62	1.31	1.38	0.20	1.95	0.68	0.88
1 1/4	1.94	2.88	1.50	2.13	0.84	0.69	1.66	1.73	0.22	2.39	0.71	1.16
1 1/2	2.13	3.13	1.69	2.31	0.87	0.75	1.90	1.97	0.24	2.68	0.72	1.35
2	2.50	3.69	2.00	2.69	1.00	0.84	2.37	2.44	0.26	3.28	0.76	1.75
2 1/2	2.94	4.50	. . .	. . .	1.17	0.94	2.87	2.97	0.31	3.86	1.14	2.16
3	3.38	5.13	. . .	. . .	1.23	1.00	3.50	3.60	0.35	4.62	1.20	2.67

GENERAL NOTE: Dimensions are in inches.

CLASS 300



For *R*, see Note (2)

TABLE 18 DIMENSIONS OF RETURN BENDS

Nominal Pipe Size	Center-to-Center *M*			Length of Thread *B*, Min.	Width of Band *E*, Min.	Inside Diameter of Fitting *F*		Metal Thickness[3] *G*	Outside Diameter of Band *H*, Min.
	Closed Pattern	Medium Pattern	Open Pattern			Min.	Max.		
1	1.75	2.50	3.00	0.75	0.62	1.31	1.38	0.20	1.95
1 1/4	2.25	2.50	3.00	0.84	0.69	1.66	1.73	0.22	2.39
1 1/2	3.00	3.50	6.00	0.87	0.75	1.90	1.97	0.24	2.68
2	4.00	6.00	8.00	1.00	0.84	2.37	2.44	0.26	3.28

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Dimension *N* may be varied to comply with manufacturer's practice.
(2) It is recommended that the distance from end of fitting to center of radius *R* be approximately equal to dimension *B*; radius *R* is recommended as being one-half of dimension *M*.
(3) Dimension *G* is shown the same as for other Class 300 fittings. It is recommended that *G* for return bends be increased by 10% or more.

ANNEX A
REFERENCES

(This Annex is an integral part of ASME B16.3–1992 and is placed after the 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)
ASME B16.14–1991	Ferrous Pipe Plugs, Bushings and Locknuts With Pipe Threads

ASTM Publications

ASTM A 153-87	Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B 633-85	Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM B 766-86	Specification for Electrodeposited Coatings of Cadmium
ASTM A 197-87	Specification for Cupola Malleable Iron

MSS Publications

MSS SP-25-1978 (R83, 88)	MSS Standard Practice Marking System for Valves, Fittings, Flanges and Unions

Publications of the following organizations appear on the above list:

ASME	The American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017
	ASME Order Department 22 Law Drive, Box 2300 Fairfield, NJ 07007–2300
ASTM	American Society for Testing and Materials 1916 Race Street, Philadelphia, PA 19103
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 127 Park St. N.E., Vienna, VA 22180

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

ANSI	American National Standards Institute, Inc. 11 West 42nd St., New York, NY 10036