

**ASME B16.26-2006**  
(Revision of ASME/ANSI B16.26-1988)

# **Cast Copper Alloy Fittings for Flared Copper Tubes**

**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Three Park Avenue • New York, NY 10016

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# FOREWORD

The development of a standard for brass fittings for flared copper water tubes was initiated by a subcommittee of the Copper Tube and Fitting Manufacturers Standardization Committee in the year 1929. When a general agreement had been reached, the draft of the proposed standard was submitted to Sectional Committee A40 on Minimum Requirements for Plumbing and Standardization of Plumbing Equipment, of the American Standards Association. Sectional Committee A40 was jointly sponsored by the American Society of Sanitary Engineering and The American Society of Mechanical Engineers.

Final ASA approval and designation as an American Standard, ASA A40.2-1936, was granted January 20, 1936.

The Standard remained unchanged and without reaffirmation until 1955 when this activity was transferred from Sectional Committee A40 to Sectional Committee B16 on Standardization of Pipe Flanges and Fittings, under the sponsorship of The American Society of Mechanical Engineers, the Mechanical Contractors Association of America, Inc., and the Manufacturers Standardization Society of the Valve and Fittings Industry.

Subcommittee No. 9 B16 on Solder-Joint Fittings was instructed to develop a revised standard. The revised draft of this Standard was submitted to industry for criticism and comment. The final draft was approved by Sectional Committee B16 and its sponsors by letter ballot.

ASA approval and designation as ASA B16.26-1958 was granted on February 12, 1958. Beginning in 1965, consideration was given to reviewing the standard in light of progress made in the production of these fittings. Subcommittee No. 9 completed its work by recommending the updating of referenced standards and thread specifications, and including additional material. Following approval by the USA Standards Committee and Sponsors, the revision was approved by the new USA Standards Institute on April 21, 1967.

In 1982 American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI. In this 1988 edition, metric units were omitted and references to other standards have been updated. Following approval by the B16 Main Committee and the ASME Supervisory Board, and after public review, the standard was approved as an American National Standard by ANSI on August 23, 1988.

This 2006 Edition includes metric units as the primary reference units while maintaining U.S. Customary units in either parenthetical or separate forms. The goal is to delete the U.S. Customary units when the standard is next issued. SI values were positioned in the main text; U.S. Customary values were positioned in Appendix I. The Scope was clarified and a section on hydrostatic testing was added, along with a quality assurance recommendation in Appendix B. Additional information concerning the design of the tube flare was also incorporated, in answer to user requests for such information, and is reported in Appendix A. Following approval by the B16 Main Committee and the ASME Supervisory Board and after public review, the standard was approved as an American National Standard by ANSI on May 23, 2006.

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

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**General.** ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, B16 Standards Committee  
The American Society of Mechanical Engineers  
Three Park Avenue  
New York, NY 10016-5990

**Proposing Revisions.** Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

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

**Interpretations.** Upon request, the B16 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B16 Standards Committee.

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

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

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

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

**Attending Committee Meetings.** The B16 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the B16 Standards Committee.



# CAST COPPER ALLOY FITTINGS FOR FLARED COPPER TUBES

## 1 SCOPE

### 1.1 General

This Standard establishes specifications for cast copper alloy fittings and nuts used with flared seamless copper tube conforming to ASTM B 88 (water and general plumbing systems). Included are requirements for the following:

- (a) pressure rating
- (b) size
- (c) marking
- (d) material
- (e) dimensions
- (f) threading
- (g) hydrostatic testing

### 1.2 References

Codes, standards, and specifications, containing provisions to the extent referenced herein, constitute requirements of this Standard. These reference documents are listed in Mandatory Appendix II.

### 1.3 Convention

For the purpose of determining conformance with this Standard, the convention for fixing significant digits, where units or maximum or minimum values are specified, shall be "rounding off" as defined in ASTM E 29, Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications. This requires that an observed or calculated value be rounded off to the nearest unit in the last right-hand digit used for expressing the limit. Decimal values and tolerances do not imply a particular method of measurement.

### 1.4 Relevant Units

This Standard states values in both metric and U.S. Customary units. These systems of units are to be regarded separately as standard. Within the text, the U.S. Customary units are shown in parentheses or in separate tables. The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Combining values from the two systems constitutes non-conformance with the standard.

### 1.5 Quality Systems

Requirements relating to the product manufacturer's quality system programs are described in Nonmandatory Appendix B.

### 1.6 Service Conditions

Criteria for selection of materials suitable for particular fluid service are not within the scope of this Standard.

## 2 PRESSURE RATING

The fittings covered by this Standard are designed for a maximum cold water service-pressure of 1 200 kPa (175 psig).

## 3 SIZE

The sizes of the fittings shown in Table 1 (Table I-1) correspond to standard water tube size as defined in ASTM B 88.

## 4 MARKING

Each fitting shall be marked with the manufacturer's name or trademark and other applicable markings as required by MSS SP-25, Standard Marking System for Valves, Fittings, Flanges and Unions. Marking of fittings less than nominal size  $\frac{1}{2}$  is optional.

## 5 MATERIAL

Castings shall be copper alloy produced to meet the following:

- (a) the requirements of ASTM B 62, Standard Specification for Composition Bronze or Ounce Metal Castings, UNS C83600; or
- (b) the chemical and tensile requirements of ASTM B 584, Standard Specification for Copper Alloy Sand Castings for General Applications, UNS C83800 or C84400, and in all other respects shall comply with the requirement of ASTM B 62.

## 6 DIMENSIONS

### 6.1 Fitting and Nut

The dimensions and tolerances of fittings and nuts shall be as shown in Table 1 (Table I-1). Design of the

sealing surfaces of the fitting and nut shall be at the discretion of the manufacturer.

## **6.2 Tube Flare**

Dimensions relating to the flared end of the tube are described in Nonmandatory Appendix A. SI units are shown in Table A-1 and U.S. Customary units are shown in Table A-2.

## **7 THREADING**

Straight threads shall conform to ASME B1.1 Unified Inch Screw Threads (UN and UNR Thread Form) Class

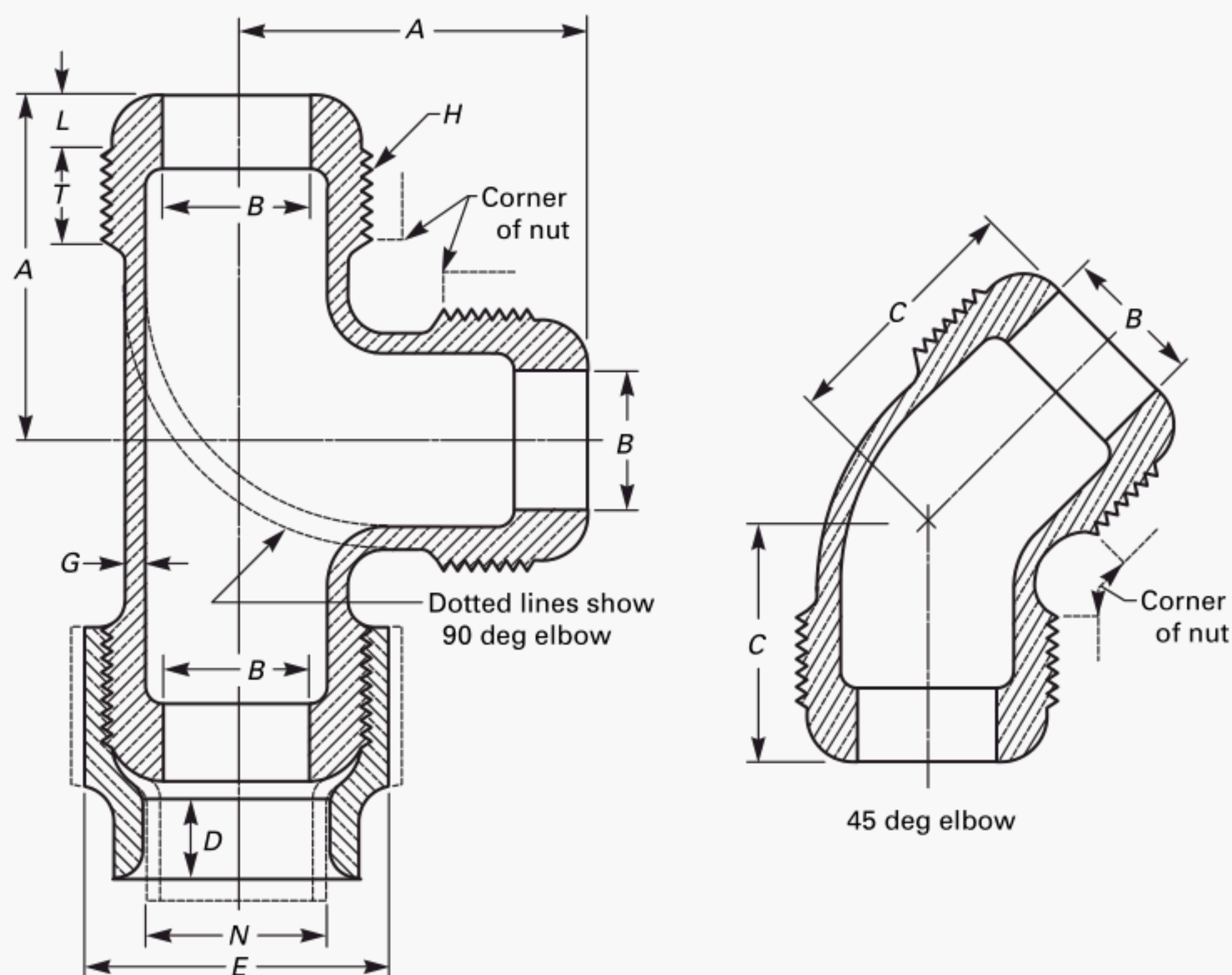
2A external and Class 2B internal. The dimensions of straight threads are given in Tables 2 and 3 (Tables I-2 and I-3).

Taper pipe threads (NPT) shall conform to ANSI/ASME B1.20.1, Pipe Threads, General Purpose (Inch).

## **8 HYDROSTATIC TEST**

Hydrostatic testing is not required.



**Table 1 General Dimensions — Cast Copper Alloy Fittings for Flared Copper Tubes**

Standard Water Tube Size	Outside Diameter of Tube	Diameter of Fitting Bore, <i>B</i> [Note (1)]	Min. Center-to-Face, <i>A</i>	Minimum Center-to-Face of 45 deg Elbow, <i>C</i>	Length of Seat Projection, <i>L</i>	Minimum Metal Thickness, <i>G</i>	Diameter of Bore of Nut, <i>N</i>	Min. Length of Bore in Nut, <i>D</i>	Width Across Flats of Nut, <i>E</i>	Number of Flats on Nut
$\frac{3}{8}$	12.7	9.62	36	27.0	6.5	2.4	13.1	5.0	27.4	6
$\frac{1}{2}$	15.9	12.70	39	29.0	6.5	2.4	16.7	6.5	31.0	6
$\frac{3}{4}$	22.2	19.05	45	32.0	7.0	2.5	23.0	9.5	37.6	6
1	28.6	25.40	53	37.5	7.5	2.8	29.4	12.5	48.4	6
$1\frac{1}{4}$	34.9	31.75	58	40.0	8.0	3.2	35.7	16.0	54.8	8
$1\frac{1}{2}$	41.3	38.10	65	44.0	8.5	3.3	42.1	19.0	65.1	8
2	54.0	50.80	78	52.0	9.5	4.0	54.8	25.5	82.9	10

## GENERAL NOTES:

(a) All dimensions are in millimeters.

(b) Nuts with 45 deg taper seat or convex curved seat are interchangeable on ball-joint fittings.

## NOTE:

(1) Tolerance on diameter of bores through fitting and nut, all sizes,  $\pm 0.12$  mm.

**Table 2 Thread Specifications: External Threads on Fittings — Class 2A**

Standard Water Tube Size	Thread Designation, <i>H</i>	Length of Thread, <i>T</i>	Major Diameter		Pitch Diameter		Maximum Minor Diameter
			Max.	Min.	Max.	Min.	
$\frac{3}{8}$	$\frac{7}{8}$ -14 UNF	11.0	22.184	21.923	21.005	20.869	19.959
$\frac{1}{2}$	1-14 UNS	11.0	25.356	25.096	24.178	24.037	23.131
$\frac{3}{4}$	$1\frac{1}{4}$ -14 UNS	12.5	31.709	31.448	30.530	30.394	29.484
1	$1\frac{5}{8}$ -12 UNS	14.0	41.229	40.940	39.855	39.706	38.663
$1\frac{1}{4}$	$1\frac{7}{8}$ -12 UN	15.5	47.579	47.290	46.205	46.053	44.983
$1\frac{1}{2}$	$2\frac{1}{4}$ -12 UN	17.5	57.104	56.815	55.730	55.576	54.508
2	$2\frac{7}{8}$ -12 UN	20.5	72.976	72.688	71.602	71.443	70.380

GENERAL NOTE: All dimensions are in millimeters, except thread designation.

**Table 3 Thread Specifications: Internal Threads on Nuts — Class 2B**

Standard Water Tube Size	Thread Designation, <i>H</i>	Length of Thread, <i>T</i>	Maximum Major Diameter	Pitch Diameter		Minor Diameter	
				Max.	Min.	Max.	Min.
$\frac{3}{8}$	$\frac{7}{8}$ -14 UNF	11.0	22.225	21.224	21.047	20.68	20.27
$\frac{1}{2}$	1-14 UNS	11.0	25.400	24.406	24.222	23.82	23.44
$\frac{3}{4}$	$1\frac{1}{4}$ -14 UNS	12.5	31.750	30.749	30.572	30.18	29.79
1	$1\frac{5}{8}$ -12 UNS	14.0	41.275	40.093	39.901	39.45	38.99
$1\frac{1}{4}$	$1\frac{7}{8}$ -12 UN	15.5	47.625	46.448	46.251	45.80	45.34
$1\frac{1}{2}$	$2\frac{1}{4}$ -12 UN	17.5	57.150	55.976	55.776	55.32	54.86
2	$2\frac{7}{8}$ -12 UN	20.5	73.025	71.869	71.651	71.20	70.74

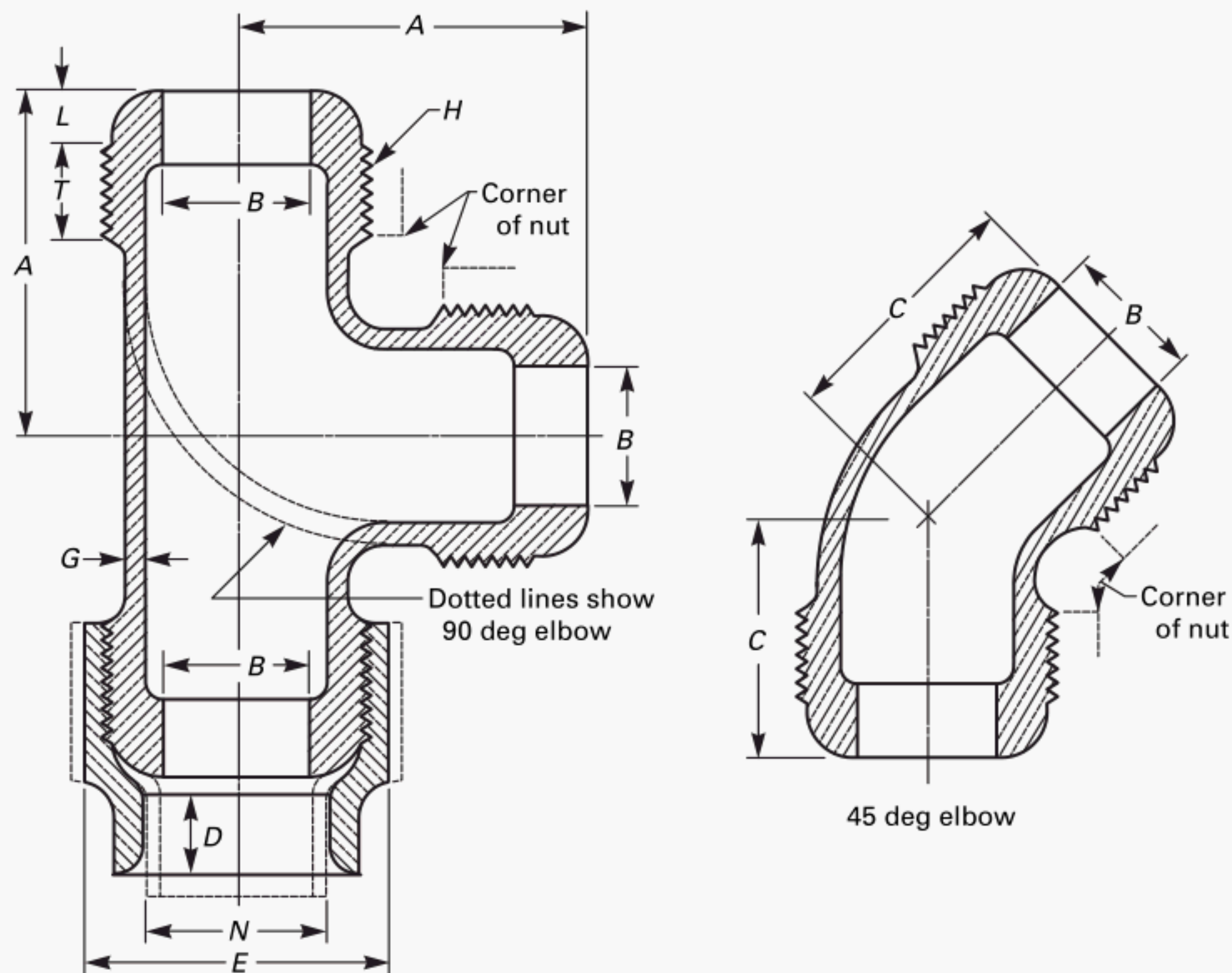
GENERAL NOTE: All dimensions are in millimeters, except thread designation.



# MANDATORY APPENDIX I

## U.S. CUSTOMARY UNITS

**Table I-1 General Dimensions — Cast Copper Alloy Fittings for Flared Copper Tubes**



Standard Water Tube Size	Outside Diameter of Tube	Diameter of Fitting Bore, <i>B</i> [Note (1)]	Min. Center-to-Face, <i>A</i>	Minimum Center-to-Face of 45 deg Elbow, <i>C</i>	Length of Seat Projection, <i>L</i>	Minimum Metal Thickness, <i>G</i>	Diameter of Bore of Nut, <i>N</i> [Note (1)]	Min. Length of Bore in Nut, <i>D</i>	Width Across Flats of Nut, <i>E</i>	Number of Flats on Nut
$\frac{3}{8}$	0.50	0.375	1.42	1.06	0.25	0.09	0.52	0.19	1.08	6
$\frac{1}{2}$	0.62	0.500	1.53	1.12	0.26	0.09	0.65	0.25	1.22	6
$\frac{3}{4}$	0.88	0.750	1.78	1.26	0.28	0.10	0.90	0.38	1.48	6
1	1.12	1.000	2.09	1.44	0.30	0.11	1.15	0.50	1.90	6
$1\frac{1}{4}$	1.38	1.250	2.28	1.56	0.32	0.12	1.41	0.63	2.16	8
$1\frac{1}{2}$	1.62	1.500	2.56	1.75	0.34	0.13	1.66	0.75	2.56	8
2	2.12	2.000	3.06	2.06	0.38	0.15	2.16	1.00	3.26	10

**GENERAL NOTES:**

(a) All dimensions are in inches.

(b) Nuts with 45 deg taper seat or convex curved seat are interchangeable on ball-joint fittings.

**NOTE:**

(1) Tolerance on diameter of bores through fitting and nut, all sizes,  $\pm 0.005$  in.

**Table I-2 Thread Specifications: External Threads on Fittings — Class 2A**

Standard Water Tube Size	Thread Designation, <i>H</i>	Length of Thread, <i>T</i>	Major Diameter		Pitch Diameter		Maximum Minor Diameter
			Max.	Min.	Max.	Min.	
$\frac{3}{8}$	$\frac{7}{8}$ -14 UNF	0.43	0.8734	0.8631	0.8270	0.8216	0.7858
$\frac{1}{2}$	1-14 UNS	0.43	0.9983	0.9880	0.9519	0.9463	0.9107
$\frac{3}{4}$	$1\frac{1}{4}$ -14 UNS	0.50	1.2484	1.2381	1.2020	1.1966	1.1608
1	$1\frac{5}{8}$ -12 UNS	0.56	1.6232	1.6118	1.5691	1.5632	1.5210
$1\frac{1}{4}$	$1\frac{7}{8}$ -12 UN	0.62	1.8732	1.8618	1.8191	1.8131	1.7710
$1\frac{1}{2}$	$2\frac{1}{4}$ -12 UN	0.69	2.2482	2.2368	2.1941	2.1880	2.1460
2	$2\frac{7}{8}$ -12 UN	0.81	2.8731	2.8617	2.8190	2.8127	2.7709

GENERAL NOTE: All dimensions are in inches, except thread designation.

**Table I-3 Thread Specifications: Internal Threads on Nuts — Class 2B**

Standard Water Tube Size	Thread Designation, <i>H</i>	Length of Thread, <i>T</i>	Maximum Major Diameter	Pitch Diameter		Minor Diameter	
				Max.	Min.	Max.	Min.
$\frac{3}{8}$	$\frac{7}{8}$ -14 UNF	0.43	0.8750	0.8356	0.8286	0.814	0.798
$\frac{1}{2}$	1-14 UNS	0.43	1.000	0.9609	0.9536	0.938	0.923
$\frac{3}{4}$	$1\frac{1}{4}$ -14 UNS	0.50	1.2500	1.2106	1.2036	1.188	1.173
1	$1\frac{5}{8}$ -12 UNS	0.56	1.6250	1.5785	1.5709	1.553	1.535
$1\frac{1}{4}$	$1\frac{7}{8}$ -12 UN	0.62	1.8750	1.8287	1.8209	1.803	1.785
$1\frac{1}{2}$	$2\frac{1}{4}$ -12 UN	0.69	2.2500	2.2038	2.1959	2.178	2.160
2	$2\frac{7}{8}$ -12 UN	0.81	2.8750	2.8291	2.8209	2.803	2.785

GENERAL NOTE: All dimensions are in inches, except thread designation.



## MANDATORY APPENDIX II

### REFERENCES

The following is a list of publications referenced in this Standard.

ASME B1.1-2003, Unified Inch Screw Threads (UN and UNR Thread Form)<sup>1</sup>

ASME B1.20.1-1983(R2001), Pipe Threads, General Purpose (Inch)<sup>1</sup>

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300

ASTM B 62-02, Standard Specification for Composition Bronze or Ounce Metal Castings

ASTM B 88-03, Standard Specification for Seamless Copper Water Tube

ASTM B 584-04 Standard Specification for Copper Alloy Sand Castings for General Applications

E 29-04 Standard Practice for Using Significant Digits in Test Data to Determine Conformance With Specifications

Publisher: ASTM International (ASTM), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959

ISO 9000: 2000, Quality Management Systems – Fundamentals and Vocabulary

ISO 9001: 2000, Quality Management Systems – Requirements

ISO 9004: 2000, Quality Management Systems – Guidelines for Performance Improvements

Publisher: International Organization for Standardization (ISO), 1 rue de Varembé, Case Postale 56, CH-1211, Genève 20, Switzerland/Suisse

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

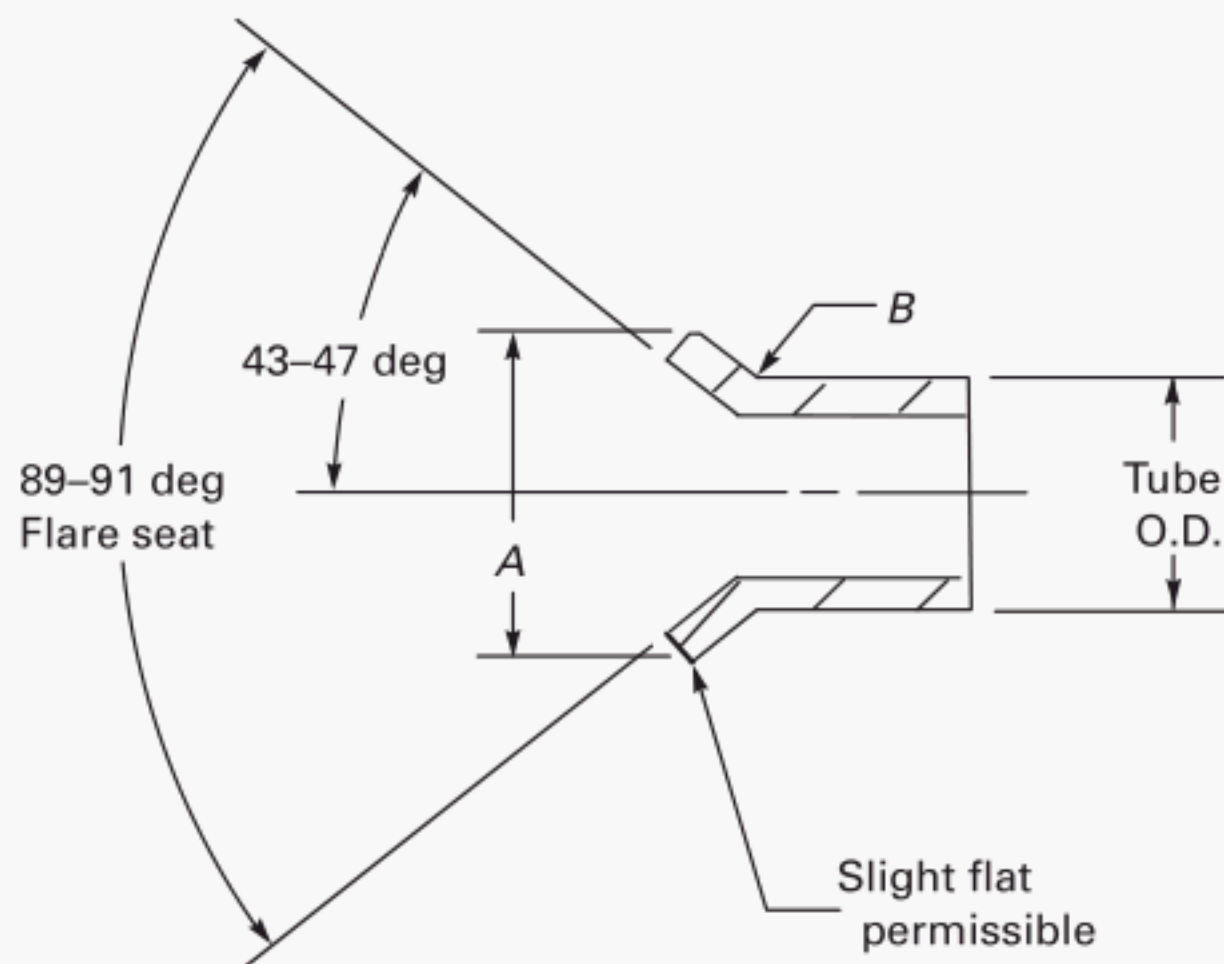
Publisher: Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS), 127 Park Street, NE, Vienna, VA 22180-4602

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<sup>1</sup> May also be obtained from American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036.

## NONMANDATORY APPENDIX A FLARED TUBE DIMENSIONS

**Table A-1 Flared Tube Dimensions (SI)**

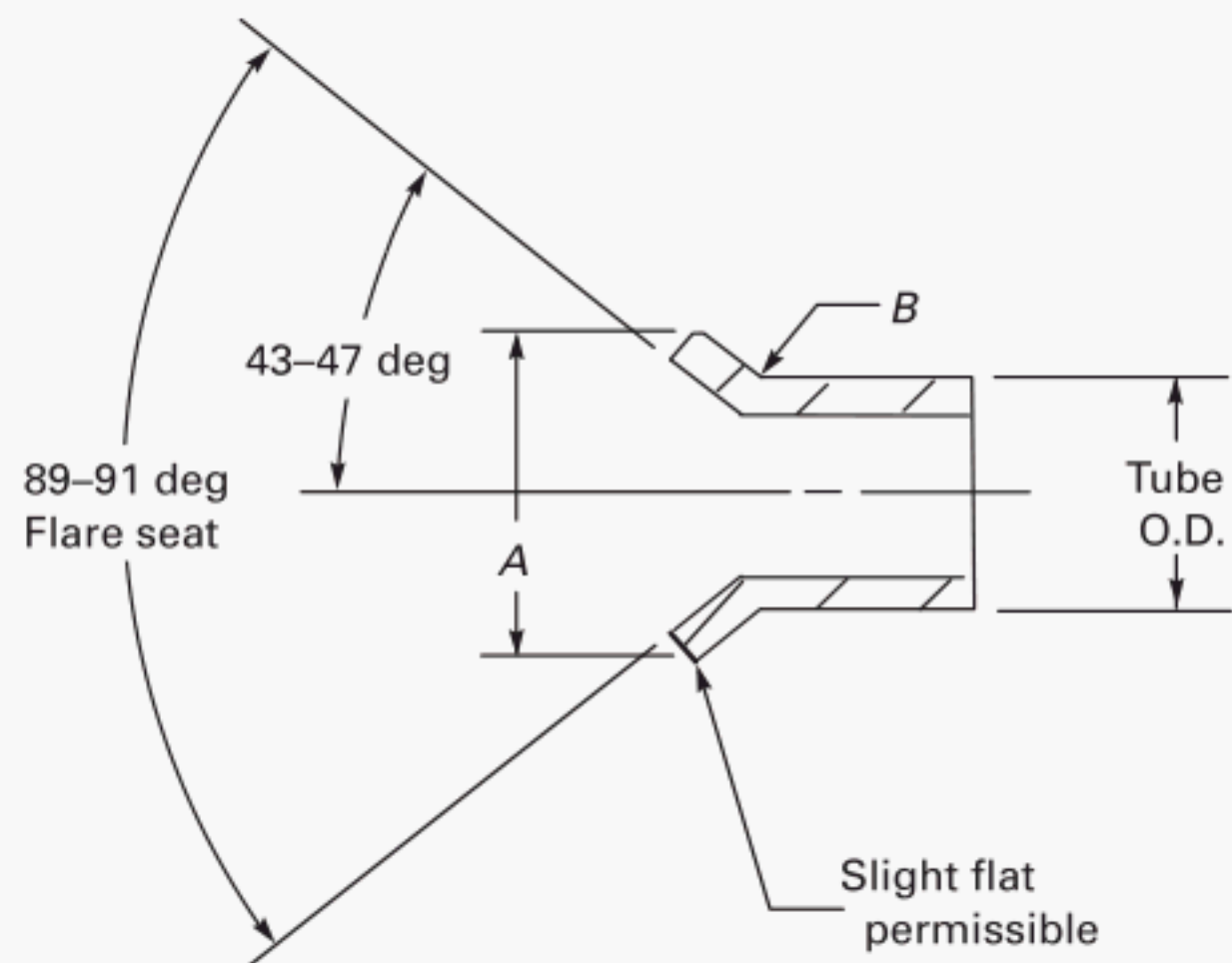


Standard Water Tube Size	Outside Diameter of Tube	Minimum Flared Tube Diameter, A	Maximum Flared Tube Diameter, A	Flare Radius, B, $\pm 0.3$
$\frac{3}{8}$	12.7	16	17	0.5
$\frac{1}{2}$	15.9	19	20	0.5
$\frac{3}{4}$	22.2	26	27	0.5
1	28.6	33	34	0.5
$1\frac{1}{4}$	34.9	40	41	0.5
$1\frac{1}{2}$	41.3	48	49	0.5
2	54.0	62	63	0.5

**GENERAL NOTES:**

- (a) All dimensions are in millimeters.
- (b) Considerations such as the effects of wall thickness on working pressures, length of thread engagements, etc., shall be the responsibility of the user.

**Table A-2 Flared Tube Dimensions (Customary)**



Standard Water Tube Size	Outside Diameter of Tube	Minimum Flared Tube Diameter, A	Maximum Flared Tube Diameter, A	Flare Radius, B, $\pm 0.01$
$\frac{3}{8}$	0.50	0.63	0.67	0.02
$\frac{1}{2}$	0.62	0.75	0.79	0.02
$\frac{3}{4}$	0.88	1.01	1.05	0.02
1	1.12	1.31	1.35	0.02
$1\frac{1}{4}$	1.50	1.56	1.60	0.02
$1\frac{1}{2}$	1.62	1.87	1.91	0.02
2	2.12	2.44	2.48	0.02

**GENERAL NOTES:**

- (a) All dimensions are in inches.
- (b) Considerations such as the effects of wall thickness on working pressures, length of thread engagements, etc., shall be the responsibility of the user.



## **NONMANDATORY APPENDIX B**

### **QUALITY SYSTEM PROGRAM**

The products manufactured in accordance with this Standard shall be produced under ISO 9001.<sup>1</sup> A determination of the need for registration and/or certification of the product manufacturer's quality system program

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<sup>1</sup> ISO 9001 is also available from the American National Standards Institute (ANSI) and the American Society for Quality (ASQ) as American National Standards that are identified by a prefix "Q" replacing the prefix "ISO." ISO 9001 is listed in Mandatory Appendix II.

by an independent organization shall be the responsibility of the manufacturer. The detailed documentation demonstrating program compliance shall be available to the purchaser at the manufacturer's facility. A written summary description of the program utilized by the product manufacturer shall be available to the purchaser upon request. The product manufacturer is defined as the entity whose name or trademark appears on the product in accordance with the marking or identification requirements of this Standard.

## B16 AMERICAN NATIONAL STANDARDS FOR PIPING, PIPE FLANGES, FITTINGS, AND VALVES

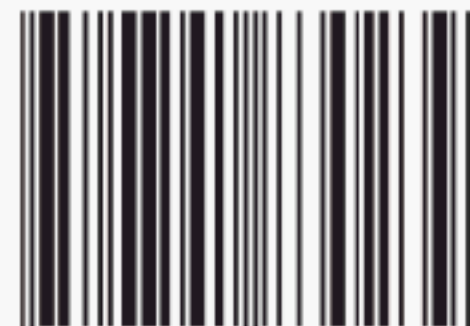
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