ASME B16.5-2020
(Revision of ASME B16.5-2017)

Pipe Flanges and Flanged Fittings

NPS ½ Through NPS 24 Metric/Inch Standard

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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The next edition of this Standard is scheduled for publication in 2024.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Periodically certain actions of the ASME B16 Committee may be published as Cases. Cases and interpretations are published on the ASME website under the Committee Pages at http://cstools.asme.org/ as they are issued.

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The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

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FOREWORD

In 1920, the American Engineering Standards Committee [later the American Standards Associations (ASA) and currently the American National Standards Institute (ANSI)] organized Sectional Committee B16 to unify and further develop standards for pipe flanges and fittings (and later for valves and gaskets). Cosponsors of the B16 Committee were The American Society of Mechanical Engineers (ASME), the Heating and Piping Contractors National Association [now Mechanical Contractors Association of America (MCAA)], and the Manufacturers Standardization Society of the Valves and Fittings Industry (MSS). Cosponsors were later designated as cosecretariat organizations.

The Committee soon recognized the need for standardization of steel pipe flanges. In May 1923, Subcommittee 3 was organized to develop such standards for pressures in the 250-psi to 3,200-psi range and for elevated temperatures. Active work began in October, including on steel flanged fittings. The first proposed standard was submitted to the Committee in April 1926 and approved by letter ballot in December. After favorable review by the three sponsor organizations, the Standard was approved as American Tentative Standard B16e in June 1927.

Experience in using the Standard showed the need for hub dimensions of companion flanges and/or other changes, including rerating of 250-lb and 1,350-lb flanges and development of flanged fittings with integral bases. An investigation was made into the factors determining stiffness of flanges and flange hubs. The revised standard was approved as ASA B16e-1932.

A revision was initiated in 1936, stimulated by suggestions from Committee members and industrial users. The resulting 1939 edition contained standards for welding neck flanges (completed in March 1937), 1,500-lb flanges in the 14-in. through 24-in. range, 2,500-lb flanges and flanged fittings in the $\frac{1}{2}$-in. through 12-in. range, and dimensions for a full line of ring joint flanges developed by the American Petroleum Institute. Pressure–temperature ratings for alloy steel flanges and fittings, developed by Subcommittee 4, were included for the first time.

In August 1942, the War Production Board requested a review of measures to conserve vital materials in piping components. A special War Committee of B16 was appointed and operating under War Standard Procedure, developed revised pressure–temperature ratings for all materials and pressure classes. The ratings were published as American War Standard B16e5-1943. In 1945, under normal procedures, Subcommittees 3 and 4 reviewed the 1939 standard and 1943 ratings and recommended adoption of the wartime ratings. Their report was approved as Supplement No. 1 to B16e-1939 and published as ASA B16e6-1949. In addition to ratings, the supplement updated material specification references and added a table of metal wall thickness for welding-end valves.

Subcommittee 3 then began a revision of the entire standard. Technically, the 1949 Supplement was absorbed, new materials were recognized, a general rating method was developed and added as an appendix, and welding end preparations were expanded. Editorially, a new style of presentation was worked out, including tables rearranged for easier use. Approval by Sectional Committee, cosponsors, and ASA resulted in the publication of ASA B16.5-1953 (designation changed from B16e).

Work soon began on further revisions. Class B ratings were deleted, and Class A ratings were clarified as the standard. An appendix defined qualifications for gaskets, other than ring joint, which would merit the ratings. Another appendix defined the method for calculating bolt lengths, including the measurement of stud bolt length between thread ends instead of points. Pressure–temperature ratings for several new materials were added, the table of welding end dimensions was expanded, and the temperatures used in determining ratings were redefined. The resulting new edition, after approval, was published as ASA B16.5-1957.

The more modest revision approved as ASA B16.5-1961 changed the text to clarify the intent or to make requirements easier to administer. The next revision began in 1963 with nearly 100 comments and suggestions. No fundamental changes were made, but the text was further clarified, and wall thicknesses less than $\frac{1}{4}$ in. for flanged fittings were reorganized in the 1968 edition.

A new joint study of ratings between Subcommittees 3 and 4 was initiated before the next revision. Based on the Subcommittee 4 report, the rating procedure was revised, and a rating basis for Class 150 (150-lb) flanges was developed. New product forms, bar and plate, were added for special applications, including fabricated flanged valves and fittings. Reference to welding-end valves was not included, because a separate standard for them was planned. Bolt length calculations based on worst case tolerances led to a revision of tabulated lengths. Testing of valves subsequently published by Subcommittee 15 closure members was added to the test requirements. Following final approval on October 23, the Standard was published as ANSI B16.5-1973.

Subcommittee N (formerly 15) was assigned responsibility for all valve standards in late 1973. Subcommittee C (formerly 3) continued to have responsibility for flange standards. A revision was accordingly initiated to remove all references to valves. At the same time, comments from users and changes in the ASME Boiler and Pressure Vessel Code (BPVC) led to significant revisions in the Class 150 rating basis and in the ratings of stainless steel and certain alloy steel flanges and flanged fittings in all rating classes. Extensive public review comments led to the addition of considerations for bolting and gaskets for flanged joints and of marking requirements. To avoid having to make frequent and confusing changes to the ratings as a result of further changes to the BPVC-allowable stresses, Subcommittees C and N agreed that ratings would be left alone unless the relevant BPVC stress values were changed by more than 10%. After final approval by the Standards Committee, cosponsors, and ANSI, ANSI B16.5-1977, Steel Pipe Flanges and Flanged Fittings, was published on June 16, 1977.

In 1979, work began on another new edition. Materials coverage was expanded by the addition of nickel and nickel alloys. Bolting rules were revised to cover nickel alloy bolts. Bolt hole and bolting were changed to provide interchangeability between inch and metric dimensions. Metric dimensional tables were made informational rather than alternative requirements of the Standard. Final approval was granted for ANSI B16.5-1984, Pipe Flanges and Flanged Fittings, on August 14.

In 1982, American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI. The 1988 edition of the Standard extended nickel alloy ratings to higher temperatures, clarifying flat face flange requirements, and included other minor revisions. The Committee determined that any metric standard for flanges would stand alone, with metric bolting and gaskets; hence, metric equivalents were deleted. Following approval by the Standards Committee and ASME, approval as an American National Standard was given by ANSI on April 7, 1988, with the new designation ASME/ANSI B16.5-1988.

The 1996 edition allowed flanges marked with more than one material grade or specification, revised flange facing finish requirements, revised pressure–temperature ratings for several material groups, added a nonmandatory quality system annex, and included several other revisions. The 1996 edition was approved by ANSI on October 3, 1996, with the new designation ASME B16.5-1996.

The 2003 edition included metric units as the primary reference units while maintaining U.S. Customary units in either parenthetical or separate forms. New materials were added, some materials were shifted from one group to another, and new material groups were established.

All pressure–temperature ratings were recalculated using data from the latest edition of ASME BPVC, Section II, Part D. Annex F was added to cover pressure–temperature ratings and dimensional data for Classes 150 through 2500 flanges and Classes 150 and 300 flanged fittings in U.S. Customary units. Table and figure numbers in Annex F were prefixed by the letter F and corresponded to table and figure numbers in the main text for the metric version, with the exception of some table and figure numbers that were not used in Annex F. Of note, the flange thickness designations for Classes 150 and 300 were revised with reference to their raised face. For these classes, the flange thickness dimensional reference planes were altered; however, required flange thicknesses remained unchanged. The minimum flange thickness designation was changed from C to t_f, and it did not include 2.0 mm (0.06 in.) raised face for Classes 150 and 300 raised face flanges and flanged fittings. Because of diminished interest, flanged end fittings conforming to ASME Class 400 and higher were listed only with U.S. Customary units in Annex G. In addition, straight hub welding flanges were incorporated as a new set of flanges in Classes 150 through 2500. Also, there were numerous requirement clarifications and editorial revisions. The 2003 edition was approved by ANSI on July 9, 2003, with the designation ASME B16.5-2003.

The 2009 edition added new materials, updated some pressure–temperature ratings, and designated the annexes as mandatory and nonmandatory appendices. The mandatory appendices were numbered using roman numerals, and the nonmandatory appendices were referenced using capital letters. The 2009 edition was approved by ANSI on February 19, 2009, with the designation ASME B16.5-2009.

The 2013 edition included a revision to para. 5.1 and the addition of perpendicularity tolerances. Additional errata and clarifying revisions were also applied. Following approval of the Standards Committee and ASME, approval for the 2013 edition was granted by ANSI on February 5, 2013.

The 2017 edition included the use of bar stock for blind flanges without hubs; added requirements for forgings, size NPS 22 and updated materials and working pressures.

In the 2020 edition, the U.S. Customary tables in former Mandatory Appendix II have been relocated to the main text and redesignated with a "C" suffix (e.g., Table II-2-1.1 is now Table 2-1.1C) and U.S. Customary figures have been merged with SI figures. Former Mandatory Appendix II has been deleted and the subsequent Mandatory Appendix has been redesignated. Cross-references have been updated accordingly.

Following approval by the ASME B16 Standards Committee, this revision to the 2017 edition was approved by ANSI as an American National Standard on January 5, 2021, with the new designation ASME B16.5-2020.

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Standardization of Valves, Flanges, Fittings, and Gaskets

(The following is the roster of the Committee at the time of approval of this Standard.)

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Secretary, B16 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

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.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the B16 Standards 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.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may e-mail the request to the Secretary of the B16 Standards Committee at SecretaryB16@asme.org, or mail it to the above address. The request for an 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 in one or two words.
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. Please provide a condensed and precise question, composed in such a way that a “yes” or “no” reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of “Yes” or “No,” with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

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

Moreover, ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the inquiry information submitted, it is the opinion of the Committee that the inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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 and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the B16 Standards Committee.

ASME B16.5-2020
SUMMARY OF CHANGES

Following approval by the ASME B16 Standards Committee and ASME, and after public review, ASME B16.5-2020 was approved by the American National Standards Institute on January 5, 2021.

In ASME B16.5-2020, the U.S. Customary tables formerly in Mandatory Appendix II have been relocated to the main text and redesignated with a "C" suffix, and U.S. Customary figures have been merged with SI figures. Former Mandatory Appendix II has been deleted, and the subsequent appendix redesignated. In addition, this edition includes the following changes identified by a margin note, **(20)**. The Record Numbers listed below are explained in more detail in the "List of Changes in Record Number Order" following this Summary of Changes.

Page	*Location*	*Change*
1	Section 1	Title revised *(18-808)*
1	1.1	Title and subpara. (b)(2) revised *(18-808)*
1	1.6	Revised *(18-2734)*
2	1.10	Added *(18-808)*
3	2.8.3	Revised *(11-539)*
4	4.2.2	Subparagraph (e) added *(19-2978)*
4	4.2.9	Added *(18-808)*
5	Table 1.1-1	(1) Redesignated from Table 1A (2) Revised A182 F91 to A182 F91 Type 1 *(20-887)* (3) Added A182 Gr. N08020 and A240 Gr. N08020 to Material Group 3.1, A182 Gr. N08800 and A240 Gr. N08800 to Material Group 3.6, and A182 Gr. N08810 and A240 Gr. N08810 to Material Group 3.15 *(11–540)* (4) Updated A479 Gr. N08904 to A182 Gr. N08904 *(18-2777)*
7	5.3.4	Revised *(14-2169)*
10	6.4.1	Revised *(19-520)*
10	6.4.3.2	Revised *(19-520)*
11	6.7	Revised in its entirety *(19-918)*
11	6.9.1	Revised *(19-1820)*
13	7.2	Subparagraphs (a) through (d) revised *(19-520)*
13	7.3	Subparagraphs (b), (c), and (e) revised *(19-520)*
13	7.4	Revised *(19-520)*
13	7.5	Paragraphs 7.5.1 through 7.5.3 revised *(19-520)*
14	7.6	Revised *(19-520)*
14	7.7	Paragraphs 7.7.1 and 7.7.2 revised *(19-520)*
17	Figure 6	Revised *(19-520)*
19	Figure 7	(1) Title revised *(19-918)* (2) Figure revised, General Note (1) deleted, General Note (d) added, and subsequent notes redesignated *(14-2172)*
20	Figure 8	(1) Title and figure revised *(19-918)* (2) General Notes added
22	Figure 11	Revised *(19-520)*

Page	*Location*	*Change*
22	Figure 13	Revised *(19-520)*
24	Table 2-1.1	Added A350 Gr. LF3, moved A537 Cl.1 under C-Mn-Si, and revised Notes 3 and 4 (errata) *(19-629)*
46	Table 2-1.15	(1) Revised A182 F91 to A182 F91 Type 1 *(20-887)* (2) Last three rows revised *(20-887)*
47	Table 2-1.15C	(1) Former Table II-2-1.15, revised A182 F91 to A182 F91 Type 1 *(20-887)* (2) Last three rows revised *(20-887)*
50	Table 2-1.18	Note (1) revised
74	Table 2-3.1	Revised A182 Gr. N08020 and A240 Gr. N08020 *(11-540)*
74	Table 2-3.1C	Former Table II-2-3.1, revised A182 Gr. N08020 and A240 Gr. N08020 *(11-540)*
81	Table 2-3.6	Revised A182 Gr. N08800 and A240 Gr. N08800 *(11-540)*
82	Table 2-3.6C	Former Table II-2-3.1, revised A182 Gr. N08800 and A240 Gr. N08800 *(11-540)*
88	Table 2-3.10	Revised *(11-540)*
88	Table 2-3.10C	Former Table II-2-3.10, revised *(11-540)*
89	Table 2-3.11	Updated A479 Gr. N08904 to A182 Gr. N08904 *(18-2777)*
89	Table 2-3.11C	Former Table II-2-3.11, updated A479 Gr. N08904 to A182 Gr. N08904 *(18-2777)*
90	Table 2-3.12	Revised *(11-540)*
90	Table 2-3.12C	Former Table II-2-3.12, revised *(11-540)*
94	Table 2-3.15	Revised A182 Gr. N08810 and A240 Gr. N08810 *(11-540)*
95	Table 2-3.15C	Former Table II-2-3.15, revised A182 Gr. N08810 and A240 Gr. N08810 *(11-540)*
101	Table 3	(1) Third column added *(18-578)* (2) Columns 2, 3, and 4 revised *(19-520)*
102	Table 3C	(1) Former Table II-3, third column added *(18-578)* (2) Columns 2, 3, and 4 revised *(19-520)*
103	Table 4	Revised *(19-520)*
108	Table 5	(1) Revised metric values (dimensions) to align with U.S. Customary values (dimensions) *(19-520)* (2) Below Notes, Tolerance for *P* revised
115	Table 5C	(1) Former Table II-5, for pages 120 and 121, rows rearranged by errata *(20-2623)* (2) Below table Notes, negative Tolerance for *E* revised
123	Table 6	In Example (1), flange dimensions revised *(19-520)*
124	Table 6C	(1) In Note (1), "(see Example B)" corrected by errata to "(see Example 2)" *(19-520)* (2) In Example (1), flange dimensions revised *(19-917)*
125	Table 7	Revised *(19-520)*
127	Table 8	(1) Threaded illustration updated (errata) *(19-1957)* (2) Table revised *(19-520)*
130	Table 8C	(1) Former Table II-8, threaded illustration updated (errata) *(19-1957)* (2) Table revised *(19-520)*
134	Table 9	Revised *(19-520)*
140	Table 9C	Former Table II-9, revised *(19-1957)*

Page	*Location*	*Change*
143	Table 10	Revised *(19-520)*
145	Table 11	Revised *(19-520)*
152	Table 12	Revised *(19-520)*
156	Table 12C	Former Table II-12, revised *(19-1957)*
159	Table 13	Revised *(19-520)*
161	Table 14	Revised *(19-520)*
165	Table 15	Revised *(19-520)*
167	Table 16	Revised *(19-520)*
171	Table 17	Revised *(19-520)*
173	Table 18	Revised *(19-520)*
177	Table 19	Revised *(19-520)*
179	Table 20	Revised *(19-520)*
183	Table 21	Revised *(19-520)*
185	Table 22	Revised *(19-520)*
191	Mandatory Appendix II	Former Mandatory Appendix III redesignated and reference list updated *(20-983)*
231	Nonmandatory Appendix F	Added *(18-2734)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
11-539	Revised para. 2.8.3 to clarify “B” dimension.
11-540	Revised Table 1.1-1 (former Table 1A); added materials to Tables 2-3.1, 2-3.6, 2-3.10, 2-3.12, and 2-3.15.
14-2169	Revised reference in para. 5.3.4 to include Nonmandatory Appendix B.
14-2172	Deleted the 1:3 max. slope and the 45-deg max. angle; set a maximum limit for the straight turn; revised values between SI and U.S. Customary units; added a taper (0 deg to 7 deg) for the straight turn; revised General Note (e) for Figures 7 and 8.
18-578	Added a column in Tables 3 and 3C (former Table II-3) to clarify the requirements between maximum depth and maximum radial projection.
18-808	Added paras. 1.10 and 4.2.9 to describe B16 Cases and their uses; revised titles of section 1 and para. 1.1.
18-2734	Added Nonmandatory Appendix F; revised para. 1.6 to reference Nonmandatory Appendix F.
18-2777	Revised Tables 1.1-1 (former Table 1-A), 2-3.11, and 2-3.11C (former Table II-2-3.11), and Mandatory Appendix II (former Mandatory Appendix III).
19-520	Revised paras. 6.4, 6.4.3.2, 7.2, 7.3, 7.4, 7.5, 7.5.2, 7.6, 7.7.1, and 7.7.2; Figures 6, 11, and 13; and Tables 3 through 22 to align metric dimension with the published U.S. Customary dimension in former Mandatory Appendix II.
19-917	Revised Tables 5C, 6C, 9C, and 12C (former Tables II-5, II-6, II-9, and II-12).
19-918	Revised paras. 6.7, 6.7.1, 6.7.2, and 6.7.3 to clarify text references to Figures 7 and 8; revised titles of Figures 7 and 8.
19-1820	Revised references in para. 6.9.1.
19-2978	Added para. 4.2.2(e) to indicate that when a manufacturer marks a product with the ASTM designation, it is certifying that the material meets all the requirements of the specification marked, including heat treatment.
20-887	Revised Tables 1.1-1 (former Table 1A), 2-1.15, and 2-1.15C (former Table II-2-1.15) to include a new ASTM nomenclature material, A182 F91 Type 1, to replace A182 F91.
20-983	Revised Mandatory Appendix II (former Mandatory Appendix III) to include ASTM Specifications A993, B163, B167, and B407.

PIPE FLANGES AND FLANGED FITTINGS NPS ½ THROUGH NPS 24 METRIC/INCH STANDARD

(20) 1 GENERAL

(20) 1.1 Scope

(a) This Standard covers pressure–temperature ratings, materials, dimensions, tolerances, marking, testing, and methods of designating openings for pipe flanges and flanged fittings. Included are

(1) flanges with rating class designations 150, 300, 400, 600, 900, and 1500 in sizes NPS ½ through NPS 24 and flanges with rating class designation 2500 in sizes NPS ½ through NPS 12, with requirements given in both metric and U.S. Customary units with diameter of bolts and flange bolt holes expressed in inch units

(2) flanged fittings with rating class designation 150 and 300 in sizes NPS ½ through NPS 24, with requirements given in both metric and U.S. Customary units with diameter of bolts and flange bolt holes expressed in inch units

(3) flanged fittings with rating class designation 400, 600, 900, and 1500 in sizes NPS ½ through NPS 24 and flanged fittings with rating class designation 2500 in sizes ½ through NPS 12 that are acknowledged in Nonmandatory Appendix E in which only U.S. Customary units are provided

(b) This Standard is limited to

(1) flanges and flanged fittings made from cast or forged materials

(2) blind flanges and certain reducing flanges made from cast, forged, or plate materials (see Tables 1.1-1 through 1.1-3)

Also included in this Standard are requirements and recommendations regarding flange bolting, gaskets, and joints.

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 Time of Purchase, Manufacture, or Installation

The pressure–temperature ratings in this Standard are applicable upon its publication to all flanges and flanged fittings within its scope, which otherwise meet its requirements. For unused flanges or flanged fittings maintained in inventory, the manufacturer of the flange or flanged fittings may certify conformance to this edition, provided that it can be demonstrated that all requirements of this edition have been met. Where such components were installed in accordance with the pressure–temperature ratings of an earlier edition of this Standard, those ratings are applicable except as may be governed by the applicable code or regulation.

1.4 User Accountability

This Standard cites duties and responsibilities that are to be assumed by the flange or flanged fitting user in the areas of, for example, application, installation, system hydrostatic testing, operation, and material selection.

1.5 Quality Systems

Requirements relating to the product manufacturer's Quality System Program are described in Nonmandatory Appendix D.

1.6 Relevant Units (20)

This Standard states values in both SI (Metric) and U.S. Customary units. As an exception, diameter of bolts and flange bolt holes are expressed in inch units only. 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 following the SI 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. Except for diameter of bolts and flange bolt holes, combining values from the two systems constitutes nonconformance with the Standard. Nonmandatory Appendix F describes how the values expressed in SI units were established.

1.7 Selection of Materials

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

1.8 Convention

For determining conformance with this Standard, the convention for fixing significant digits where limits (maximum and minimum values) are specified shall be as defined in ASTM E29. This requires that an observed