

ASME B16.34-2020
(Revision of ASME B16.34-2017)

Valves — Flanged, Threaded, and Welding End

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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FOREWORD

In December 1969, American National Standards Committee B16 changed its name from Standardization of Pipe Flanges and Fittings to Standardization of Valves, Fittings, and Gaskets, reflecting American National Standards Institute (ANSI) approval of a broadened scope for the B16 Committee. At the same meeting, the committee approved a plan for the organization of a subcommittee to develop a new standard for steel valves with other than flanged ends. Subsequently, B16 Subcommittee 15 was appointed and held its first meeting in December 1970.

Historically, in the development of standards and pressure-temperature ratings for steel valves, the various rating classes for flanges provided an obviously logical basis for valve ratings. Steel valves with flanges of standard dimensions, many also offered in butt welding-end versions, were given the same pressure-temperature ratings as the flanges. In 1949, a new edition of the Standard, then designated B16e-1949, was published, in which a table covering wall thickness requirements for weld end valves had been added. In 1964, the Manufacturer's Standardization Society of the Valve and Fittings Industry developed and published Standard Practice SP-66, covering pressure-temperature ratings of steel butt welding-end valves. MSS SP-66 introduced a new method for establishing ratings by making ratings a function of the mechanical strength properties of the body material at all temperatures. Following the publication of MSS SP-66, B16 activated Subcommittee 4 for the purpose of studying the general subject of pressure-temperature ratings and developing rational criteria for such ratings.

In the B16 charge to Subcommittee 15, it was established that the new Standard would replace MSS SP-66 and also remove the reference to butt welding-end valves from B16.5. Flanged-end valves would continue to be covered in B16.5 but on a fully specified basis, rather than as an add-on.

As the work of the subcommittee got underway, concurrent action was initiated in Subcommittee 3 for revision of B16.5. Subsequent operations of Subcommittees 3 and 15 were closely coordinated to provide assurance that the new Standard and the revised B16.5 would be compatible.

A key and basic issue of mutual concern in this coordination was the matter of pressure-temperature ratings. It was necessary to incorporate the SP-66-type ratings in the new Standard, but at the same time also to provide ratings equivalent to those in B16.5 covering the butt welding equivalents of flanged-end valves. Subcommittee 4 had made definitive recommendations for revisions in the flange ratings and it was obviously desirable to rationalize the two types of ratings as they would appear side-by-side in the new Standard.

The results of these efforts appear herein in the form of pressure-temperature ratings tables. The method of computing the ratings is detailed in Nonmandatory Appendix B. The ratings differ from the pre-1968 B16.5 ratings because they are now calculated as a function of the mechanical properties of the pressure boundary materials, in contrast to the empirical basis used previously. A change in the SP 66-type rating (herein designated Special Class) discontinues the application of a plasticity factor at elevated temperatures which, in the opinion of the committee, could not be justified in dimension-sensitive valves.

Other innovations include the coverage of forged or fabricated body valves and an increase in detailed coverage by pressure-temperature ratings from 17 materials in B16.5 to 24 material groups in the new Standard and in the revised B16.5. Dimensional requirements were refined and augmented to give the designer more latitude and the user more assurance of adequacy. A number of the innovations have had trial use and at least some degree of acceptance, as they have been taken from the section on valve requirements developed and published by the ASME Boiler and Pressure Vessel Code to cover valves used in nuclear power plants. A section on valve testing eliminates uncertainties on such points as seat test requirements and stem seal testing.

Approval for the 1973 edition of the Standard by ANSI was granted in October 1973.

In December 1973, a reorganization of the subcommittee structure for B16 was approved. Subcommittee 15 was redesignated as Subcommittee N and was assigned responsibility for all steel valves. Work began to include coverage for flanged-end valves in ANSI B16.34. The 1977 edition contained flanged-end valve requirements formerly in ANSI B16.5. The rating procedures of B16.5 were adopted and made applicable to Standard Class butt welding-end valves. The method of deriving ratings was revised. Major changes were made in the method for determining ratings for austenitic stainless steel valves and ratings for Class 150 valves for all materials. The pressure-temperature tables and materials groups were rearranged and revised using data from the reference Sections of the ASME Boiler and Pressure Vessel Code through the Summer 1975 Addenda. A number of clarifying and editorial revisions were also made in order to improve the text. It was also resolved that frequent minor changes in pressure-temperature ratings because of revisions to the reference material

strength property tables should be avoided and that, as a general guide, such changes should not be considered unless resulting ratings would be changed by an amount in excess of 10%.

Approval for the 1977 edition of the Standard by ANSI was granted on June 16, 1977.

In 1979, work began on the 1981 edition. Materials coverage was expanded. Nickel alloys and other alloys were added. Bolting rules were revised to accommodate special alloy bolting for the new materials. Revisions were included to clarify requirements for rotary motion valves, e.g., ball valves and butterfly valves. Wafer-type valves were specifically identified. Other clarifying and editorial revisions were made in order to improve the text.

Following approvals by the Standards Committee and Secretariat, approval for the 1981 edition was granted by ANSI on August 14, 1981.

During 1985, revisions were proposed that added requirements for socket welding-end and threaded-end valves. The inclusion of requirements for these valves increased the scope of the Standard. Also, the listings for nickel alloy and other alloy valves materials were expanded. Rules for threaded body joints were added, and wafer-type valve body rules improved.

Following approvals by the Standards Committee and ASME, approval for the 1988 edition was granted by ANSI on February 24, 1988.

During 1993 and carrying over into 1994, revisions offered included multiple material marking and an improved interpolation procedure. New materials were added and the pressure-temperature rating tables were recalculated in accordance with Nonmandatory Appendix B using the latest data available from the reference ASME Boiler and Pressure Vessel Code sources. An appendix was added covering nonmandatory requirements for a quality system program.

Following the approvals of the Standards Committee and ASME, approval for the new edition was granted by ANSI on October 3, 1996.

Work started in 1999 to revise the Standard to include 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 in a future revision. All pressure-temperature ratings have been recalculated using data from the latest edition of the ASME Boiler and Pressure Vessel Code, Section II, Part D. As a result, some materials have been shifted to other material groups and some changes were made to some valve ratings within material groups. Because of diminished interest for flanged end valves conforming to ASME Class 400, they are not specifically listed in this revision. Flanges for Class 400 will continue to be listed in B16 flange standards. Provisions were made to allow Class 400 valves to be furnished as intermediate rated valves. Numerous requirement clarifications and editorial revisions were also made.

Work started in 2007 to revise the Standard. Metric units remained the primary reference units with U.S. Customary units in either parenthetical or separate forms shown as in the earlier edition. Pressure-temperature ratings, in some cases, were revised, and new materials were added, all in keeping with the material properties provided in the latest edition of the ASME Boiler and Pressure Vessel Code, Section II, Part D. A number of requirement clarifications and editorial revisions were also made.

Following the approvals of the Standards Committee and ASME, approval for the 2009 edition was granted by ANSI on June 18, 2009.

Work started in 2009 to correct material listings with the material groups. Additionally, ASME B16.47 was added as a reference, and flanged-end valves coverage was expanded to NPS 50. A number of requirement clarifications and editorial revisions were also made.

Following the approvals of the Standards Committee and ASME, approval for the 2013 edition was granted by ANSI on February 19, 2013.

For 2017, valves up to NPS 60 were covered; a reference was added for materials manufactured to other editions; and changes were made to allowable materials. Pressure-temperature tables were also updated for consistency with the 2017 editions of ASME B16.5 and ASME B16.47. ASME B16.34-2017 was approved by the American National Standards Institute on March 9, 2017.

In ASME B16.34-2020, the U.S. Customary tables in former Mandatory Appendix VII have been relocated to the main text and redesignated with a "C" suffix (e.g., Table VII-2-1.1 is now Table 2-1.1C). Former Mandatory Appendix VII has been deleted and subsequent Mandatory Appendices have been redesignated. Cross-references have been updated accordingly. In addition, this edition includes the following changes:

(a) A new paragraph has been added to alert the users of the Standard to Cases issued by ASME, which can add to or alter the requirements of B16 standards.

(b) Additional operational conditions that can damage or render inoperable double-seated valves with trapped liquid in the center cavity have been identified.

(c) Figures 18 and 19 have been added to show typical casting sections requiring radiographic examination for special class top entry ball valve and swing check valve.

(d) Editorial corrections from inquiries have been included.

Following approval by the ASME B16 Standards Committee, this revision to the 2017 edition was approved by ANSI as an American National Standard on November 13, 2020, with the new designation ASME B16.34-2020.

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

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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 or a case, and attending Committee meetings. Correspondence should be addressed to:

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The American Society of Mechanical Engineers
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New York, NY 10016-5990
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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 may 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.

INTRODUCTION

An American National Standard is intended as a basis for common practice by the manufacturer, the user, and the general public. The existence of an American National Standard does not in itself preclude the manufacture, sale, or use of products not conforming to the standard. Mandatory conformance is established, for example, by reference to the standard in a code, specification, sales contract, or public law.

It should be noted, specifically regarding this Standard, that certain requirements reflecting the general application of valves in a wide variety of services may not be considered to be appropriate for some valves whose application is known and which may incorporate certain features found by successful experience to be satisfactory. A specific case in point is that involving valves developed and used in gas and petroleum product pipelines. Conformance of such valves to the existing API 6D may by itself be sufficient to satisfy requirements of federal rules and regulations established by the Department of Transportation, Office of Pipeline Safety Operations. Another specific case is that involving valves used in instrument systems under an applicable piping code. Conformance of such valves to the requirements of an existing piping code may by itself be sufficient to satisfy jurisdictional rules and regulations.

This edition of ASME B16.34 states values in both Metric and U.S. Customary units of measurement. These systems of units are to be regarded separately. The values stated in each system are not exact equivalents; therefore each system shall be used independently of the other. Combining values from the two systems constitutes nonconformance with this Standard.

ASME B16.34-2020

SUMMARY OF CHANGES

Following approval by the ASME B16 Standards Committee and ASME, and after public review, ASME B16.34-2020 was approved by the American National Standards Institute on November 13, 2020.

In ASME B16.34-2020, the U.S. Customary tables in former Mandatory Appendix VII have been relocated to the main text and redesignated with a "C" suffix (e.g., Table VII-2-1.1 is now Table 2-1.1C). Former Mandatory Appendix VII has been deleted and the subsequent Mandatory Appendices have been redesignated. Cross-references have been updated accordingly. 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.

<i>Page</i>	<i>Location</i>	<i>Change (Record Number)</i>
1	1	Title of section 1 and para. 1.1 revised (18-870)
2	1.8	Added (18-870)
3	2.3	Paragraph 2.3.3 deleted (12-1244)
4	2.7	Revised in its entirety (12-1244)
5	4.2.9	Added (18-870)
12	8.3.1.1	(1) In first paragraph, the first two references to figures updated (12-1123) (2) In subpara. (a)(2), first line revised (12-1123)
23	Figure 18	Added (16-700)
23	Figure 19	Added (16-700)
24	Table 1	For Material Group 1.15, under Forgings, Grade revised to "F91 Type 1" (19-2837)
70	Table 2-1.15	Revised "A182 F91" to "A182 F91 Type 1" and revised working pressure for temperatures 600°C, 625°C, and 650°C for Standard Class and Special Class (19-2837)
72	Table 2-1.15C	Revised "A182 F91" to "A182 F91 Type 1" and revised working pressure for temperatures 1100°F, 1150°F, and 1200°F for Standard Class and Special Class (19-2837)
134	Table 2-3.4	Reference to Note (1) deleted for A494 Gr. M35-1 and A494 Gr. M35-2 (19-604)
135	Table 2-3.4C	Reference to Note (1) deleted for A494 Gr. M35-1 and A494 Gr. M35-2 (19-604)
188	Table I-3	In third column head, reference to ASTM revised (19-610)

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
12-1123	Revised para. 8.3.1.1 to change "bonnet neck" to "body neck."
12-1244	Deleted para. 2.3.3 and redesignated para. 2.7 to para. 2.7.1. Added new para. 2.7.2 on trapped liquids.
16-700	Added new Figures 18 and 19 to show areas of radiographic examination for top entry ball valves and swing check valves for special classes. Revised para. 8.3.1.1 to add references to new Figures 18 and 19.
18-870	Revised titles of section 1 and para. 1.1. Added paras. 1.8 and 4.2.9 to provide clarification and guidance on cases.
19-604	Revised Table 2-3.4 and Table 2-3.4C (formerly Table VII-2-3.4), to delete Note (1) reference for A494 Gr. M35-1 and A494 Gr. M35-2.
19-610	Updated Table I-3 to change "Acceptable Comparative Plate ASTM E186" to "Acceptable Comparative Plate ASTM E280."
19-2837	Revised Tables 1, 2-1.15, and 2-1.15C (formerly Table VII-2-1.15) to include a new ASTM nomenclature material, A182 F91 Type 1, to replace A182 F91. Revised working pressure for temperatures 600°C, 625°C, and 650°C (1100°F, 1150°F, and 1200°F) for Standard Class and Special Class.

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