ASME B16.9-2024
(Revision of ASME B16.9-2018)

Factory-Made Wrought Buttwelding Fittings

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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FOREWORD

In 1921, the American Engineering Standards Committee, later the American Standards Association (ASA), organized Sectional Committee B16 to unify and further develop national standards for pipe flanges and fittings (and later, for valves, gaskets, and valve actuators). Cosponsors of the B16 Committee were The American Society of Mechanical Engineers (ASME), the Heating and Piping Contractors National Association [now the Mechanical Contractors Association of America (MCAA)], and the Manufacturers Standardization Society of the Valve and Fittings Industry (MSS). Cosponsors were later designated as cosecretariat organizations.

Standardization of welding fittings was initiated in 1937 by a subgroup (designated Subgroup 6) of Subcommittee 3. After consideration of several drafts, a standard was approved by the committee, cosponsors, and ASA and published with the designation ASA B16.9-1940.

Revisions were made in 1950 and 1955 to add sizes up to NPS 24 and to complete coverage of fittings in some sizes. These revisions were approved and published as ASA B16.9-1951 and ASA B16.9-1958. With the subgroup now designated Subcommittee 6 (later Subcommittee F), further revisions were begun to clarify the intent of the Standard, to add angularity tolerances, and to include fittings of different types (long radius reducing elbows and crosses) and smaller sizes (NPS ¼ and NPS ½). This revision was published as ASA B16.9-1964 after ASA approval.

After reorganization of ASA, first as the United States of America Standards Institute (USASI), then as the American National Standards Institute (ANSI), with the Sectional Committee being redesignated as an American National Standards Committee, another revision increasing the size range to NPS 48 and revising the text for clarity was approved and published as ANSI B16.9-1971.

In 1975, Subcommittee F began a major revision to bring the standard up to date with current practice and usage. Common fractions were expressed as decimals (but without intending higher precision) and metric dimensional equivalents were added. Provisions for step-wise change of radius for NPS ¾ long radius elbows and 180-deg returns were introduced. Following Standards Committee, cosecretariat, and ANSI approval, the revision was published as ANSI B16.9-1978. It was updated by a corrective addendum, B16.9a-1982, issued in February 1982.

In 1982, American National Standards Committee B16 was reorganized as an ASME committee operating under procedures accredited by ANSI. In ASME/ANSI B16.9-1986, the text was revised and inch dimensions were established as the standard.

In 1991, the subcommittee reviewed the Standard and made a number of revisions that were included in ASME B16.9-1993. Dimensions for short pattern lap joint stubs were also added.

In ASME B16.9-2001, short radius elbows and returns were added, which included all dimensions and tolerances of ASME B16.28-1994. Metric units were provided as an independent but parallel alternative standard to U.S. Customary units. U.S. Customary units were moved into parentheses or separate tables in Mandatory Appendix I. In addition, a Quality System Program appendix was added.

In 2003, the subcommittee reviewed the Standard and made a number of revisions. The scope of the Standard was changed to permit fabricated lap joint stub ends employing circumferential or intersection welds.

In 2006, the subcommittee reviewed the Standard and made a number of additions and revisions. Segmental elbow requirements were added, and were 3D radius elbow dimensions. Reference documents were updated.

In 2012, the subcommittee reviewed the Standard and made numerous revisions to the design proof test in section 9 and updated the references in Mandatory Appendix II.

The 2018 edition added more specific descriptions of acceptable design methods, revised the requirements for the design proof test, and updated the references. In addition, the U.S. Customary tables in Mandatory Appendix I were merged with the metric tables and all tables were redesignated. Following the approval of the ASME B16 Standards Committee, ANSI approved ASME B16.9-2018 as an American National Standard on September 25, 2018.

In 2024, the subcommittee reviewed the Standard and made a number of revisions. This edition adds sample reports for pressure testing and defines minimum requirements for determining design thickness for design proof testing. In addition, Tables 6.1-10 and 11.2-1 have been revised, and options for marking nominal wall thickness have been added. Material grade, material group, and method of manufacture have been added as required content for new proof test reports, and the requirements for proof test reports prepared under previous editions have been revised. Following approval by the ASME B16 Standards Committee, ASME B16.9-2024 was approved by ANSI on September 5, 2024.

ASME B16 COMMITTEE
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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Revisions and Errata. The committee processes revisions to this Standard on a continuous basis 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 in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

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(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. Upon request, the committee will issue an interpretation of any requirement of this Standard. An interpretation can be issued only in response to a request submitted through the online Inquiry Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

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Committee Meetings. The B16 Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/B16committee.

ASME B16.9-2024
SUMMARY OF CHANGES

Following approval by the ASME B16.9 Standards Committee and ASME, and after public review, ASME B16.9-2024 was approved by the American National Standards Institute on September 5, 2024.

ASME B16.9-2024 includes the following changes identified by a margin note, **(24)**. 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 (Record Number)*
2	4.1	Subparagraph (c) and footnote 1 revised *(22-678)*
3	4.4.2	Subparagraph (a) revised and subparagraph (b) deleted; subsequent paragraph redesignated *(22-678)*
3	6.2	Title revised *(22-678)*
3	6.2.4	In last paragraph, first sentence revised *(22-678)*
5	9.3.7	Last two paragraphs added *(18-811)*
5	9.5	Revised *(22-623)*
5	9.6	Subparagraph (a) revised; last two paragraphs added *(18-811, 18-812, and 22-678)*
6	11	Revised in its entirety *(18-811)*
21	Table 6.1-10	Revised in its entirety *(18-813)*
28	Table 11.2-1	(1) Former Table 11-1 editorially redesignated as Table 11.2-1 (2) Notes (2) and (5) revised *(17-503, 18-811)*
32	Nonmandatory Appendix B	Added *(18-812)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
17-503	Revised Note (5) in Table 11.2-1.
18-811	Clarified establishment of “design thickness” in case of design proof testing by defining minimum requirements for its determination.
18-812	Added sample reports for pressure testing.
18-813	Revised Table 6.1-10, Dimensions of Caps.
22-623	Added material grade and material group as well as the method of manufacture to the required content of new proof test reports and added requirements for proof test reports prepared under previous editions.
22-678	Added options of marking nominal wall thickness in para. 4.1; updated marking of special fittings in para 4.4.2; and revised para. 6.2 to avoid confusion with special fittings as per para. 4.4.2.

FACTORY-MADE WROUGHT BUTTWELDING FITTINGS

1 SCOPE

1.1 General

This Standard covers overall dimensions, tolerances, ratings, testing, and markings for factory-made wrought buttwelding fittings in sizes NPS ½ through NPS 48 (DN 15 through DN 1200).

1.2 Special Fittings

Fittings may be made to special dimensions, sizes, shapes, and tolerances by agreement between the manufacturer and the purchaser.

1.3 Fabricated Fittings

Fabricated laterals and other fittings employing circumferential or intersection welds are considered pipe fabrication and are not within the scope of this Standard.

Fabricated lap joint stub ends are exempt from the above restrictions, provided they meet all the requirements of the applicable ASTM material specification listed in section 5.

1.4 Relevant Units

This Standard states values in both SI (metric) and U.S. Customary units. These systems of units are to be regarded separately as standard. In this Standard, the U.S. Customary units are shown in parentheses. 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 nonconformance with the Standard.

The designation for size is NPS for both metric- and Customary-dimensioned fittings. Fitting pressure rating is associated with the connecting wall thickness of pipe of equivalent size and material.

1.5 References

1.5.1 Referenced Standards. Standards and specifications adopted by reference in this Standard are shown in Mandatory Appendix I. It is not considered practical to identify the specific edition of each standard and specification in the individual references. Instead, the specific edition reference is identified in Mandatory Appendix I. A product made in conformance with a prior edition of referenced standards and in all other respects conforming to this Standard will be considered to be in conformance.

1.5.2 Codes and Regulations. A fitting used under the jurisdiction of the ASME Boiler and Pressure Vessel Code (BPVC), the ASME Code for Pressure Piping, or a governmental regulation is subject to any limitation of that code or regulation. This includes any maximum temperature limitation or rule governing the use of a material at low temperature.

1.6 Service Conditions

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

1.7 Welding

Installation welding requirements are outside the scope of this Standard.

1.8 Quality Systems

Nonmandatory requirements relating to the fitting manufacturer's Quality System Program are described in Nonmandatory Appendix A.

1.9 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 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.

1.10 Pressure Rating Designation

Class followed by a dimensionless number is the designation for pressure–temperature ratings. Standardized designations for flanges per ASME B16.5 referenced in this Standard are Classes 150, 300, 600, 900, 1500, and 2500.