ASME B16.1-2005
(Revision of ASME B16.1-1998)

Gray Iron Pipe Flanges and Flanged Fittings

(Classes 25, 125, and 250)

AN AMERICAN NATIONAL STANDARD

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Three Park Avenue • New York, NY 10016

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The next edition of this Standard is scheduled for publication in 2010. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

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

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FOREWORD

In 1894, the American Society of Mechanical Engineers (ASME) adopted a standard flange template ("ASME Standard") for low-pressure service. A "Manufacturers Standard" for pressures up to 250 psi followed in 1901. Around 1910, a group of fittings manufacturers formed an organization that was the forerunner of the present Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) and undertook the design of a line of flanged fittings. A document covering this work was published in 1912.

During the years 1912–1914, a Joint Committee of the ASME and the Manufacturers Committee formulated compromise standard dimensions for pipe flanges and flanged fittings for use under saturated steam pressures of 125 psi and 250 psi pressure ranges. The Joint Committee's report was accepted at a conference attended by representatives of ASME, the Manufacturers Committee, the U.S. government, and the National Association of Master Steam and Hot Water Fitters. ASME published this report as the "American Standard for Pipe Flanges, Fittings and Their Bolting" in 1914. In 1918, work was started on standards for 50 lb steam flanges and for 800 lb, 1,200 lb, and 3,000 lb hydraulic flanges, which were subsequently approved by this group.

In 1921, the American Engineering Standards Committee, later known as the American Standards Association (ASA), United States of America Standards Institute (USAS), and more recently, the American National Standards Institute (ANSI), organized Sectional Committee B16 to unify and further develop national standards for pipe flanges and fittings (and later for valves and gaskets). Cosponsors of the B16 Committee were ASME, MSS, and the Heating and Piping Contractors Association [now the Mechanical Contractors Association of America (MCAA)]. Work already in progress on flanges and flanged fittings was assigned to Subcommittee 1 (now Subcommittee A). Following approval by the Subcommittee, the B16 Committee, the cosponsors, and ASA, the standards were published in 1928.

In later work, Subcommittee 1 developed the 25 lb Flange and Flanged Fitting Standard (approved in 1931 as ASA B16b2), which replaced the 50 lb standard that had been originally approved in 1918. Work on the 800 lb Hydraulic Flange Standard was published as ASA B16b1 in 1931. Revision of thicknesses, tolerances, and service pressure ratings of the 125 lb and 250 lb flanges and flanged fittings led to approval and publication of ASA B16a-1939.

An American war standard entitled "Pressure Ratings for Cast Iron Flanges and Flanged Fittings, 125 lb" (ASA B16a1) was published in 1943. A complete review of the 125 lb and 250 lb standards resulted in new editions of each: ASA B16.1-1948 and ASA B16.2-1948. In 1960, editions of B16.1 and B16.2 were issued in which ratings were presented in graphic form and special requirements were added for testing flanges.

A review of all gray iron flange and flanged fittings standards initiated in 1962 resulted in the withdrawal of B16.16, "300 lb Refrigerant Flanges and Flanged Fittings" and the combining of the remaining standard into a single document, with B16.1 and B16.2 coming together as USAS B16.1-1967. In this edition, the presentation of ratings was restored to tabular form.

The increasing use of higher grades of gray iron necessitated the establishment of a second set of ratings for the smaller sizes. A revised edition published as ANSI B16.1-1975 incorporated these new ratings along with metric (SI) equivalents for dimensions and minor corrections to the 1967 edition text.

In 1982, American National Standards Committee B16 was recognized as an ASME Committee operating under procedures accredited by ANSI. Following approval by the ASME B16 Subcommittee A and B16 Committee, ANSI approved ASME/ANSI B16.1-1989 on March 8, 1989. Changes included revised marking requirements, revised bolt length increments ($\frac{1}{2}$ in. rather than $\frac{1}{4}$ in.), elimination of metric equivalents, a correction of the Class 800 flange raised-face height to 0.25 in. from the 0.06 in. shown previously, and editorial changes to the text.

In the 1998 edition of ASME B16.1, Reference Standards have been updated, a Quality System Program Annex has been added, Class 800 has been deleted, and several editorial revisions have

been made. Following approval by ASME B16 Subcommittee B and B16 Main Committee, ANSI approved this American National Standard on November 20, 1998.

Work was 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 when the standard is next issued. Following approval of the Standard Committee and ASME, approval as an American National Standard was given by ANSI on July 8, 2005, with the new designation ASME B16.1-2005.

All requests for interpretation or suggestions for revision should be sent to the Administrative Secretary B16. The American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME B16 COMMITTEE
Standardization of Valves, Flanges, Fittings, Gaskets, and Valve Actuators

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

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CORRESPONDENCE WITH THE B16 COMMITTEE

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.

GRAY IRON PIPE FLANGES AND FLANGED FITTINGS
Classes 25, 125, and 250

1 SCOPE

1.1 General

This Standard covers Classes 25, 125, and 250 Gray Iron Pipe Flanges and Flanged Fittings. It includes:

(a) pressure-temperature ratings;

(b) sizes and method of designating openings of reducing fittings;

(c) marking;

(d) materials;

(e) dimensions and tolerances;

(f) bolting and gaskets;

(g) pressure testing.

1.2 References

Standards and specifications adopted by reference in this Standard are shown in Appendix II, which is part of this Standard. It is not considered practical to identify the specific edition of each referenced standard and specification in the text, when referenced. Instead, the specific editions of the referenced standards and specifications are listed in Appendix II.

1.3 Quality Systems

Requirements relating to the product manufacturer's Quality System Programs are described in Appendix A.

1.4 Relevant Units

This Standard states values in both SI 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. Within the text, the U.S. Customary units are shown in parenthesis or in separate tables. The values stated in each table 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.

1.5 Service Conditions

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

1.6 Convention

For the purpose of determining conformance with this Standard, the convention for fixing significant digits where limits, maximum and minimum values are specified, shall be rounded as defined in ASTM E 29. This requires that an observed or calculated value shall be rounded off to the nearest unit in the last right hand digit used for expressing the limit. Decimal values and tolerance do not imply a particular method of measurement.

1.7 Denotation

1.7.1 Pressure Rating Designation. Class, followed by a dimensionless number, is the designation for pressure-temperature ratings as follows:

Class	25	125	250

1.7.2 Size. NPS, followed by a dimensionless number, is the designation for nominal flange or flange fitting size. NPS is related to the reference nominal diameter, DN, used in international standards. The relationship is, typically, as follows:

NPS	DN
1	25
1¼	32
1½	40
2	50
2½	65
3	80
3½	...
4	100

For NPS ≥ 4, the related DN is: DN = 25 × (NPS)

2 PRESSURE–TEMPERATURE RATINGS

2.1 General

Pressure–temperature ratings are maximum allowable working pressures in bar units at the temperature in degrees Celsius shown in Table 1 for the applicable material and class designation. Table I-1 of Appendix I lists pressure–temperature ratings using psi units for pressure at the temperature in degrees Fahrenheit. For intermediate temperatures, linear interpolation is permitted. Interpolation between class designations is not permitted.

2.2 Flanged Joints

A flanged joint is composed of independent interrelated components; the flanges, the gasket, and the bolting, that are assembled manually. Proper controls must be exercised in the selection and application for these