ASME B16.21-2016
(Revision of ASME B16.21-2011)

Nonmetallic Flat Gaskets for Pipe Flanges

AN AMERICAN NATIONAL STANDARD

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Two Park Avenue • New York, NY • 10016 USA

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The next edition of this Standard is scheduled for publication in 2021.

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 Web site under the Committee Pages at http://cstools.asme.org/ as they are issued.

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The American Society of Mechanical Engineers
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FOREWORD

Before this Standard was issued, the individual sizes of gaskets were made to many different sets of dimensions, based on different concepts of adaptation and functional use on the part of consumers as well as manufacturers. In some cases, dimensions were shown in American Standards. To standardize gasket sizes, the Standards and Specifications Committee of the Mechanical Packing Association (MPA) started work on a standard for nonmetallic or cut gaskets for bronze, iron, and steel pipe flanges.

Dimensions of gaskets being used were collected, and a basic design philosophy for sizing was formulated by the Committee. This was the result of extensive field research experience and accepted standard user requirements. The procedure that followed was to dimension the gasket for each type and size of flange so as to prevent the gasket from projecting into the line of flow. Dimensional tolerances of standard pipe flanges and fittings as to I.D., O.D., and bolting were all considered.

Suggested dimensional standards were tabulated and distributed for industry comment. After several revisions, a final draft, dated September 15, 1948, was approved by the MPA for submission as an American Standard.

Sectional Committee (B16) on the Standardization of Pipe Flanges and Fittings was organized in 1921 under the procedure of the American Standards Association (ASA), with the Heating, Piping, and Air Conditioning Contractors' National Association [now Mechanical Contractors Association of America (MCAA)], Manufacturers' Standardization Society of the Valve and Fittings Industry (MSS), and The American Society of Mechanical Engineers (ASME) as joint sponsors.

Sectional Committee B16 received the proposal on May 9, 1949, and assigned it to a joint group of Subcommittees 1 and 3. The MSS was also consulted as the proposal included gaskets for bronze flanges made to their Standard Practice SP-2. This joint group offered a revision of the original design concept for sizing, which was acceptable to the MPA's Committee [now the Fluid Sealing Association (FSA)]. The Standard was approved as an American Standard on December 5, 1951, with the designation ASA B16.21-1951.

In 1961, the Standard was reviewed by the members of Subcommittee No. 7 on Gaskets and proposals for revision and updating the Standard were agreed upon. The ASA granted approval of the revision on March 20, 1962.

In the mid-1960s, work had begun on a revision. The revision became a complete rewrite and included gaskets for API Std 605, MSS SP-44 and SP-51, as well as complete metric equivalents for all dimensions. The American National Standards Institute (ANSI) approved the revised standard as an American National Standard on May 2, 1978.

In 1982, American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI.

In 1989, general revisions had begun to reflect the current size ranges covered by the corresponding flange standard. Gasket dimensions for tongue and groove, male and female rating classes above 900 were deleted because a survey indicated these nonmetallic gaskets were almost never used for these joints. Tolerances to the dimensions were added. ANSI approved the edition as an American National Standard, with the new designation ASME B16.21-1992, on March 16, 1992.

In 2005, the Standard adopted metric (SI) dimensions. ANSI approved this American National Standard on March 16, 2005.

The 2011 edition included revisions to paragraph numbering and adjustments of appendices. ANSI approved it as an American National Standard on January 13, 2011.

In this 2016 edition, Table 9 was expanded to include values greater than NPS 12. The ASME B16 Standards Committee operates under procedures accredited by ANSI. Following approval by the ASME B16 Standards Committee, ANSI approved this edition as an American National Standard, with the designation ASME B16.21-2016, on October 11, 2016.

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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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:

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.

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 B16.21-2016
SUMMARY OF CHANGES

Following approval by the ASME B16 Committee and ASME, and after public review, ASME B16.21-2016 was approved by the American National Standards Institute on October 11, 2016.

ASME B16.21-2016 includes the following changes identified by a margin note, **(16)**. The Record Number listed below is explained in more detail in the "List of Changes in Record Number Order" following this Summary of Changes.

Page	*Location*	*Change (Record Number)*
4	Table 4	Hole Diameter entry for NPS 24 corrected to $1\frac{3}{8}$ *(15-2574)*
7	Table 9	NPS 14 through NPS 24 added *(15-2574)*
10	Table I-4	Gasket I.D. entry for NPS 8 corrected to 8.62 *(15-2574)*
11	Table I-7	(1) Class 400 entries for NPS 38 and NPS 40 corrected to 42.25 and 44.38, respectively *(15-2574)* (2) Class 600 entry for NPS 46 corrected to 52.25 *(15-2574)*
12	Table I-8	Class 300 entry for NPS 54 corrected to 60.25 *(15-2574)*
12	Table I-9	(1) In NPS column, $\frac{1}{8}$ corrected to $\frac{3}{8}$ *(15-2574)* (2) Gasket O.D. entry for NPS 8 corrected to 13.50 *(15-2574)*

LIST OF CHANGES IN RECORD NUMBER ORDER

Record Number	Change
15–2574	Updated Table I-9 to match Table 9 to cover full face gasket dimensions for cast and flanged fittings up to NPS 24. In Table I-9, identified NPS "$\frac{1}{8}$" as an error and corrected it to NPS "$\frac{3}{8}$." Corrected typographical errors in Tables I-4, I-7, I-8, and I-9.

NONMETALLIC FLAT GASKETS FOR PIPE FLANGES

1 SCOPE

This Standard covers types, sizes, materials, dimensions, tolerances, and markings for nonmetallic flat gaskets. These gaskets are dimensionally suitable for use with flanges described in the referenced flange standards.

2 GENERAL

2.1 Relevant Units

This Standard states values both in 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. 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.

2.2 Quality Systems

Requirements relating to the product manufacturers' quality system programs are described in Nonmandatory Appendix A.

2.3 References

Standards and specifications adopted by reference in this Standard are shown in Mandatory Appendix II.

2.4 Flanged Joints

A flanged joint is composed of separate and independent, although interrelated, components: the flanges, gasket, and bolting, which are assembled by another influence, the assembler. Proper controls must be exercised in the selection and application for all these elements to attain a joint that has acceptable leak tightness. Additional guidelines for flange assembly can be found in ASME PCC-1 (see Nonmandatory Appendix B).

2.5 Types

Dimensions are provided for the following types of gaskets, which are suitable for use with the flange faces indicated:

Gasket Type	Flange Facing
Full face	Flat face
Flat ring	Raised face

2.6 Size

NPS, followed by a dimensionless number, is the designation for nominal pipe size, as described in ASME B36.10M and is related to the reference nominal diameter, DN, used in international standards. The relationship is as follows:

NPS	DN
½	15
¾	20
1	25
1¼	32
1½	40
2	50
2½	65
3	80
3½	90
4	100

GENERAL NOTE: For NPS ≥ 4, the related DN = 25 × NPS.

2.7 Pressure Class Designation

Class, followed by a dimensionless number, is the designation for common flange pressure–temperature ratings as given by the referenced flange standards.

3 MATERIALS

3.1 Composition

Gaskets shall be made of resilient or pliable materials. Metal or nonmetal composites may be incorporated as reinforcement or filler material.

3.2 Service Requirements

Selection of a material suitable for a given service application is the responsibility of the user subject to the requirements of any applicable code or government regulation. The material selected shall be compatible with the fluid and suitable for the pressure–temperature conditions of the service.

4 DIMENSIONS AND TOLERANCES

4.1 Dimensions

Gasket dimensions shall be in accordance with Tables 1 through 9 (Tables I-1 through I-9 of Mandatory Appendix I) for the flanges' standards, sizes, and classes indicated. Selection of gasket thickness is the responsibility of the