

ASME B16.20-2012
(Revision of ASME B16.20-2007)

Metallic Gaskets for Pipe Flanges

**Ring-Joint, Spiral-Wound,
and Jacketed**

AN AMERICAN NATIONAL STANDARD



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Mechanical Engineers**

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FOREWORD

Ring-joint gaskets and grooves probably originated in the boiler field, where they were used in various forms for manhole covers, autoclaves, and other closures; however, it was in the oil industry (both in the production and refining of oil) that they received the greatest recognition and were developed into their present form. Their use expanded steadily as temperatures and pressures were increased in steam plants. Tests examining their application in flanges and valves were conducted as early as 1928.

In June 1936, the American Petroleum Institute (API) issued Tentative Standard 5-G-3 on Ring-Joints for Steel Flanges and Flange Unions for use with API Tubular Goods. This standard was known as API Specification 6B, Ring-Joint Flanges. Following the acceptance of ring-joints for flanges and valves by API and the issuance of their standard, ASA B16e on Steel Pipe Flanges and Flanged Fittings was revised to include them, and the 1939 edition included standard dimensions for a full line of ring-joint flanges based on the API standard. Development work continued, and API formulated Standard 6E, Specification for Wellhead Equipment, which included ring-joints not covered in ASA B16e-1939.

In 1949, the American Standards Association (ASA), Sectional Committee B16, Subcommittee 3, Steel Flanges and Flanged Fittings, assembled the available information on ring-joint gaskets into a single standard. ASA approval was granted on April 30, 1952, with the designation ASA B16.20-1952.

An updated version was submitted, and ASA approval was granted on April 4, 1955, with the designation ASA B16.20-1955. Ring gaskets for Class 900 (900 lb at that time) in sizes NPS 26 through 36 were added, and ASA approval was granted on April 2, 1956. The standard was reviewed in 1962, and approval was granted by the ASA on April 25, 1963.

The standard was again reviewed and approval was granted by the American National Standards Institute (ANSI) on April 25, 1973, with the designation of an American National Standard.

API requested that ASME convert their gasket standard, API 601, into an ASME American National Standard. As a result of that request, the standard was expanded to include requirements for spiral-wound and jacketed gaskets that were formerly listed in API 601, 7th edition, 1988. Also, ring-joint groove dimensions were not included, because they were included in ASME/ANSI B16.5-1988, Pipe Flanges and Flanged Fittings, and ASME B16.47-1990, Large Diameter Steel Flanges.

The 1993 edition was approved by the B16 Standards Committee, and, following approval by ASME, approval by ANSI was given on January 22, 1993, with the designation ASME B16.20-1993.

In the 1998 edition of ASME B16.20, reference standards were updated, a quality system program annex was added, inner ring inside diameters for spiral-wound gaskets were revised, and several editorial revisions were made. Following approval by ASME B16 Subcommittee G and the B16 Main Committee, ANSI approved this American National Standard on November 20, 1998.

In 2007, the Standard adopted metric dimensions as an independent standard to the U.S. Customary units, and Mandatory Appendix I was added to cover dimensional tables in U.S. Customary units.

In 2012, the Standard introduced minor revisions to the material requirements for spiral-wound gaskets, along with the tables and figures. A new chapter has been included for Grooved Metal Gaskets With Covering Layers, and Mandatory Appendix II has also been updated to ensure relevancy.

Following approval by B16 Subcommittee G, the Standards Committee, and ASME, ANSI approved this American National Standard on October 22, 2012.



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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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As an alternative, inquiries may be submitted via email to: SecretaryB16@asme.org.

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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.

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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 that 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.

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IMPORTANT INFORMATION CONCERNING USE OF ASBESTOS OR ALTERNATIVE MATERIALS

Asbestos is referenced for use as a filler material in metallic gaskets. It has served as a universal sealing material, compatible with most fluid services. It has been of extreme usefulness in minimizing fire hazards.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration, U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite, Anthophyllite, and Actinolite, 29 Code of Federal Regulations Section 1910.1001; the U.S. Environmental Protection Agency National Emission Standard for Asbestos, 40 Code of Federal Regulations Sections 61.140 through 61.156; and the proposed rule by the U.S. Environmental Protection Agency proposing labeling requirements and phased banning of asbestos products, published at 51 Federal Register 3738-3759 (January 29, 1986).

There are currently in use and under development a number of substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

Information concerning safety and health risks and proper precautions with respect to particular materials and conditions should be obtained from one's employer, the manufacturer or supplier of that material, or the Material Safety Data Sheet.



ASME B16.20-2012 SUMMARY OF CHANGES

Following approval by the B16 Committee and ASME, and after public review, ASME B16.20-2012 was approved by the American National Standards Institute on October 22, 2012.

ASME B16.20-2012 consists of editorial changes, revisions, and corrections identified by a margin note, (12), placed next to the affected area.

<i>Page</i>	<i>Location</i>	<i>Change</i>
1	1.1	Revised
3	4.4	Revised in its entirety
	5	Added
5	Fig. 1	Added
	Fig. 2	Added
6	Fig. 3	Added
7	Fig. 4	Added
18	Table 9	(1) General Note (b) revised (2) Notes (1) and (2) transposed
19	Table 10	(1) Illustration removed (2) General Note (b) revised
20	Table 11	(1) Illustration removed (2) General Note (b) revised
28	Table 19	Revised
30	Table 21	General Note (b) added
31	Table 22	(1) Illustration removed (2) General Note (b) added
32	Table 23	(1) Illustration removed (2) General Note (b) added
34	Table 26	Added
35	Table 27	Added
36	Table 28	Added
37	Table 29	Added
38	Table 30	Added
39	Fig. I-1	Added
40	Fig. I-2	Added
47	Table I-4	(1) General Note (b) revised (2) Notes (1) and (2) transposed
48	Table I-5	(1) Illustration removed (2) General Note (b) revised
49	Table I-6	(1) Illustration removed (2) General Note (b) revised



<i>Page</i>	<i>Location</i>	<i>Change</i>
55	Table I-12	(1) Illustration removed (2) General Note (b) added
56	Table I-13	(1) Illustration removed (2) General Note (b) added
57	Table I-14	(1) Illustration removed (2) General Note (b) added
58	Table I-15	Added
59	Table I-16	Added
60	Table I-17	Added
61	Mandatory Appendix II	Updated



METALLIC GASKETS FOR PIPE FLANGES

Ring-Joint, Spiral-Wound, and Jacketed

1 SCOPE

(12) 1.1 General

This Standard covers materials, dimensions, tolerances, and markings for metal ring-joint gaskets, spiral-wound metal gaskets, metal-jacketed gaskets, and grooved metal gaskets with covering layers. These gaskets are dimensionally suitable for use with flanges described in reference flange standards ASME B16.5, ASME B16.47, API Specification 6A, and ISO 10423.

1.2 Quality Systems

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

1.3 References

Standards and specifications adopted by reference in this Standard are shown in Mandatory Appendix II, which is part of this Standard.

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. Within the text, the U.S. Customary units are shown in parentheses or in separate tables that appear in Mandatory Appendix I. 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.

2 RING-JOINT GASKETS

2.1 Types

Ring-joint gaskets shall be either octagonal or oval in cross section.

2.2 Size

Ring-joint gaskets shall be identified by an R, RX, or BX number that relates to flange size (NPS), pressure class, and the appropriate flange standards (ASME B16.5, ASME B16.47, API Specification 6A, or ISO 10423).

Table 1 Maximum Hardness for Ring Gaskets

Ring Gasket Material	Maximum Hardness	
	Brinell	Rockwell "B" Scale
Soft iron [Note (1)]	90	56
Low-carbon steel	120	68
4–6 chrome ½Mo	130	72
Type 410	170	86
Type 304	160	83
Type 316	160	83
Type 347	160	83

NOTE:

(1) May be low-carbon steel, not to exceed maximum hardness of 90 Brinell — 56 Rockwell "B."

2.3 Materials

2.3.1 General. Ring-joint gasket materials, some of which are listed in Table 1, shall be selected by the user based on suitability for the service conditions.

It is recommended that ring-joint gaskets be of a lesser hardness than that of the mating flanges.

2.3.2 Hardness. Ring-joint gaskets of materials listed in Table 1 shall have a hardness equal to or less than that shown in Table 1.

2.4 Marking

The outer surface of each gasket shall carry the manufacturer's name or identification trademark and gasket number prefixed by the letters R, RX, or BX, followed by the gasket material identification. Materials shall be identified as shown in Table 2. The gasket shall also be marked with an ASME B16.20 designation. The marking shall be applied so as not to harmfully distort the gasket or affect the integrity of the seal.

2.5 Dimensions and Tolerances

Dimensions and tolerances for ring-joint gaskets shall be as shown in Tables 3 through 8 (Tables I-1, I-2, and I-3 of Mandatory Appendix I).

2.6 Surface Finish

Types R and RX gaskets shall have a surface finish not rougher than 1.6 μm (63 μin.) roughness. Type BX

