Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)

API STANDARD 601
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FOREWORD

This standard is a purchase specification for metallic gaskets for circular raised-face pipe flanges and flanged connections. The standard currently covers double-jacketed corrugated and spiral-wound gaskets. Other types of metallic gaskets may be added in the future if the need arises.

Insofar as possible, the gasket dimensions in this standard are suitable for raised-face flanges as described in ANSI B16.5, API Standard 605, and MSS SP-44 without having the gasket extend into the flange bore (see notes to Tables B-1–B-3 for exceptions).

This standard is based on the knowledge and experience of petroleum refiners and has been developed with the assistance of gasket manufacturers.

This standard requires the purchaser to specify certain details and features. Although it is recognized that the purchaser may desire to modify, delete, or amplify sections of the standard, it is strongly recommended that such modifications, deletions, and amplifications be made by supplementing this standard rather than by rewriting or incorporating sections of this standard into another complete standard.

Suggested revisions are invited and should be submitted to the director of the Refining Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

IMPORTANT INFORMATION CONCERNING USE OF ASBESTOS OR ALTERNATIVE MATERIALS

Asbestos is specified or referenced for certain components of the equipment described in some API standards. It has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. It has also served as a universal sealing material, compatible with most refining fluid services.

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 the employer, the manufacturer or supplier of that material, or the Material Safety Data Sheet.

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NOTES TO PURCHASER

1. If the purchaser needs a gasket that deviates from the requirements stated in this standard, such deviations shall be stated specifically in the purchase order.

2. If no exception is to be taken to this standard, the purchase order shall specify the following:

   a. Quantity.
   b. Flange size (NPS) (see 1.3).
   c. Class (see 1.3).
   d. Flange standard (that is, whether gaskets are for API Standard 605, ANSI B16.5, or MSS SP-44 flanges).
   e. Type (double-jacketed corrugated or spiral-wound).
   f. Material, if other than standard (see 2.3.1 and 3.3.1 for standard materials):
      1. For double-jacketed corrugated gaskets, special jacket and/or filler material may be specified.
      2. For spiral-wound gaskets, special winding material, filler material, and/or centering and inner-ring material may be specified.
   g. API Standard 601.

3. For a double-jacketed gasket, the dimensions listed in this standard are suitable for any jacket and filler material in Gasket Group 1 of ANSI B16.5. Double-jacketed corrugated stainless steel gaskets are also suitable for API Standard 605 flanges of Classes 150 and 300 (see 2.3.2).

4. For a spiral-wound gasket, the dimensions listed in this standard are suitable for any metal winding and filler material if the gasket is designed so that a uniform bolt stress (on the nominal root diameter) of 30,000 pounds per square inch (206.82 megapascals) in the flanged joint will compress the gasket to a thickness of 0.130 ± 0.005 inch (3.3 ± 0.1 millimeter). If low-yield metal is employed for either flanges or bolts, special gasket construction may be necessary, and the gasket manufacturer should be consulted.

5. To prevent overcompression damage to high-pressure spiral-wound gaskets caused by high available bolt loading, this standard requires both inner rings and centering rings for spiral-wound gaskets of NPS 24 and larger in Class 900, NPS 12 and larger in Class 1500, and NPS 4 and larger in Class 2500. These inner rings may extend into the bore a maximum of 0.06 inch (1.5 millimeters) under the worst combination of maximum flange bore, eccentric installation, and additive tolerances. Inner rings that are not mandatory must be specified if they are desired by the purchaser.

6. The use of metric bolts with spiral-wound gaskets that conform to this standard may result in interference between bolt threads and the outside diameter of the centering ring.

7. Spiral-wound gaskets for lap-joint flanges are considered special. The purchaser and the manufacturer must agree on the dimensions.

Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)

SECTION 1—GENERAL

1.1 Scope

1.1.1 This standard is a purchase specification for metallic, flat, ring-shaped gaskets for use in circular, raised-face, flanged pipe joints as described in ANSI B16.5, API Standard 605, and MSS SP-44. Two types of gaskets are covered: double-jacketed corrugated gaskets and spiral-wound gaskets. Nominal sizes correspond to the nominal pipe sizes (NPS) in ASME B36.10M and to the pipe outside diameter (OD), in inches, when NPS is beyond the scope of ASME B36.10M. Certain sizes of these gaskets cannot be used with all flange types or flange bores (see 1.2.1 and Appendix B).

1.1.2 This standard provides dimensions for double-jacketed corrugated and spiral-wound gaskets for use with all sizes and classes of raised-face steel pipe flanges conforming to ANSI B16.5, API Standard 605, and MSS SP-44 (see Appendix A), except the following:

a. Class 75, all sizes.
b. NPS 3½, all classes.

1.2 Flange Facing and Bore

1.2.1 GENERAL

Gaskets of some sizes cannot be used with all types of flanges or with flanges that have unusually large bores because the gaskets will extend into the flange bore (see Tables B-1–B-3 for limitations).

1.2.2 ANSI B16.5 FLANGES

Gaskets of the sizes and classes listed in Table 1 are suitable for slip-on, threaded, welding-neck, or other raised-face flanges of any bore covered by ANSI B16.5, subject to the limitations listed in Table 1 and Appendix B. The sizes and classes listed in Table 1 are also suitable for raised-face flanged nozzles (long welding necks) that have the facing dimensions of ANSI B16.5 flanges. Spiral-wound gaskets of the dimensions listed in this standard are not suitable for NPS ½, NPS ¾, and NPS 1 slip-on and threaded flanges because they will extend into the bore. Spiral-wound gaskets of other sizes and classes are subject to the limitations on the bore of flanges noted in Table B-1. (See Note 5, Notes to Purchaser.)

Table 1—Gaskets

Class	Flange Size (NPS)	Gasket Type
150–1500	½–24	Double jacketed
2500	½–12	Double jacketed
150–1500	1¼–24	Spiral wound
2500	1–12	Spiral wound

1.2.3 API STANDARD 605 FLANGES

Gaskets manufactured to this standard are suitable for raised-face flanges of any bore described in API Standard 605 for Classes 150–900 (see Table B-2). Dimensions are not provided for either double-jacketed or spiral-wound gaskets for Class 75 flanges because Class 75 flanges do not have sufficient bolting strength; gaskets that conform to ANSI B16.21 should be used. (See Note 5, Notes to Purchaser.)

1.2.4 MSS SP-44 FLANGES

Gaskets manufactured to this standard are suitable only for raised-face, welding-neck flanges described in MSS SP-44, whose bore does not exceed the limits of Table B-3. These gaskets are not suitable for use with slip-on flanges. (See Note 5, Notes to Purchaser.)

1.3 Size and Class

1.3.1 A gasket shall be designated by NPS, class, and the dimensional specification of the flange with which it is to be used. Flange sizes and classes are specified in API Standard 605, ANSI B16.5, and MSS SP-44.

1.3.2 A gasket shall be suitable for the same pressure-temperature conditions as the corresponding flange unless otherwise agreed upon by the purchaser and the manufacturer.

1.4 Referenced Publications

The latest edition or revision of the following standards or specifications shall, to the extent specified, form a part of this standard:

ANSI[1]
- B16.5 *Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys*
- B16.21 *Nonmetallic Flat Gaskets for Pipe Flanges*

API
- Std 605 *Large-Diameter Carbon Steel Flanges*

ASME[2]
- B36.10M *Welded and Seamless Wrought Steel Pipe*
- B36.19M *Stainless Steel Pipe*

MSS[3]
- SP-44 *Steel Pipe Line Flanges*

SECTION 2—DOUBLE-JACKETED GASKETS

2.1 Design

2.1.1 Double-jacketed gaskets shall be made with a filler completely enclosed in a corrugated metal jacket (see illustrations in Tables A-1, A-2, and A-3).

2.1.2 For gaskets NPS 8 and larger, the corrugation pitch shall be a minimum of 0.13 inch (3.2 millimeters) and a maximum of 0.25 inch (6.4 millimeters). For gaskets NPS 6 and smaller, the pitch shall not exceed 0.16 inch (4.0 millimeters).

2.1.3 The jacket metal thickness shall be a minimum of 0.015 inch (0.4 millimeter).

2.1.4 The filler shall be a minimum of 0.06 inch (1.5 millimeter) thick.

2.1.5 Other details of design, including the density of the filler, shall be the manufacturer's standard.

2.2 Dimensions

The inside and outside diameters and the thickness of a double-jacketed gasket (including tolerances) shall conform to Tables A-1, A-2, and A-3 for the NPS, class, and flange standard specified in the purchase order.

2.3 Standard Material

2.3.1 The standard materials shall be a soft carbon steel jacket and a filler of asbestos that has a suitable binder.

2.3.2 A jacket and/or filler of other materials may be specified by the purchaser. All jacket and filler materials are suitable for the dimensions listed in Table A-1. Only the jacket and filler materials of ANSI B16.5, Gasket Group I, are suitable for the dimensions listed in Tables A-2 and A-3, except that the materials of ANSI B16.5, Gasket Group II, are also suitable for Classes 150 and 300 flanges listed in Table A-2. For other materials, the purchaser shall verify the suitability of the gasket.

2.4 Marking

2.4.1 Double-jacketed gaskets shall be tagged or, if the gasket size permits, marked with waterproof ink, using symbols approximately 0.25 inch (6.4 millimeters) high, as follows (see Figure 1):

a. Flange size (NPS).
b. Class.
c. Jacket material identification abbreviation/number, if the material is other than soft carbon steel (see Table 2).
d. Filler material identification, if the material is other than asbestos (see Table 2).
e. Identification (API 601).
f. Manufacturer's identification (trademark or name).
g. API 605, for gaskets to be used with flanges conforming to API Standard 605; or SP-44, for gaskets to be used with flanges conforming to MSS SP-44. Gaskets to be used with ANSI B16.5 flanges do not require identification to that standard.

2.4.2 If a gasket is suitable for more than one pressure class, the marking shall include all applicable classes.

2.4.3 The jacket material identification for nonstandard materials shall use the material abbreviations/numbers listed in Table 2 or shall spell out the entire name.

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[1]American National Standards Institute, 1430 Broadway, New York, New York 10018.

[2]American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017.

[3]Manufacturers Standardization Society of the Valve and Fittings Industry, 127 Park Street, N.E., Vienna, Virginia 22180.

Typical marking:

2½-150-304
API 601
(Manufacturer's Mark)

Typical marking for carbon-steel-jacketed gasket suitable for more than one class:

2½-300/600
API 601
(Manufacturer's Mark)

Figure 1—Typical Markings for Double-Jacketed Gaskets

Table 2—Acceptable Abbreviations for Identifying Materials for Double-Jacketed and Spiral-Wound Gaskets

Material	Abbreviation
Metals	
Stainless steels	3-digit AISI number[a]
Inconel 600	INC 600
Inconel 625	INC 625
Incoloy 800	IN 800
Monel	MON
Titanium	TI
Nickel	NI
Inconel X750	INX
Copper	CU
Zirconium	ZIRC
Tantalum	TANT
Hastelloy B	HAST B
Hastelloy C	HAST C
Carbon steel	CS
Fillers	
Polytetrafluoroethylene	PTFE
Flexible graphite	GRAPH
Ceramic	CER

[a]American Iron and Steel Institute, 1000 16th Street, N.W., Washington, D.C. 20036.

SECTION 3—SPIRAL-WOUND GASKETS

3.1 Design

3.1.1 Spiral-wound gaskets shall be made of alternate plies of preformed metal winding and filler that are tightly wound spirally (see illustrations in Tables A-4, A-5, and A-6). The filler shall be essentially flush with, but not below, the metal winding on both contact faces of the gasket. The metal strip in the winding shall be from 0.006 inch to 0.009 inch (from 0.15 to 0.23 millimeter) thick.

3.1.2 Spiral-wound gaskets shall be wound beginning with no less than three initial plies of metal without filler added and ending with no less than three plies without filler added.

3.1.3 The metal winding around the entire inside circumference of the gasket shall be spot welded at equally spaced points no more than 3 inches (76.2 millimeters) apart, with a minimum of three welds.

3.1.4 The metal winding at the outside of the gasket shall be welded with three welds, one of which is the terminal weld, within a space of approximately 1.50 inches (38.1 millimeters). Up to four additional loose wraps of the metal winding beyond the terminal weld may be used to ensure the proper fit in the centering ring. These additional loose wraps shall not be included when the outside diameter of the gasket is determined.

3.1.5 Each gasket shall have an attached centering ring (see illustrations in Tables A-4, A-5, and A-6) unless specifically deleted by the purchaser. The inside diameter of the ring shall be suitably grooved to retain the gasket by engaging the gasket's bead.

3.1.6 To prevent overcompression damage to high-pressure spiral-wound gaskets caused by high available bolt loading, both inner rings and centering rings are required for spiral-wound gaskets of NPS 24 and larger in Class 900, NPS 12 and larger in Class 1500, and NPS 4 and larger in Class 2500. These inner rings may extend into the bore a maximum of 0.06 inch (1.5 millimeters) under the worst combination of maximum flange bore, eccentric installation, and additive tolerances. (See Tables A-7, A-9, and A-10 for inner-ring dimensions.)

3.1.7 The spiral-wound gasket shall be designed so that a uniform bolt stress (on the nominal root diameter) of 25,000 pounds per square inch (172.35 megapascals) in the flanged joint will compress the gasket to a thickness of 0.130 ± 0.005 inch (3.3 ± 0.1 millimeters) for NPS ½, NPS ¾, and NPS 1 in Classes 150, 300, and 600; and a uniform bolt stress of 30,000 pounds per square inch (206.82 megapascals) will compress the gasket to a thickness of 0.130 ± 0.005 inch (3.3 ± 0.1 millimeters) for all other sizes and classes.

3.1.8 The inner rings required by 3.1.6 are for protection against overcompression or crushing of the gaskets. When specified by the purchaser, spiral-wound gaskets of other sizes shall be provided with an inner ring that conforms to Tables A-7, A-9, or A-10, in addition to the centering ring. Inner rings are limited to use with socket-weld or welding-neck flanges.

3.2 Dimensions

For spiral-wound gaskets, the dimensions of the gasket proper and the centering ring (including tolerances) shall be in accordance with those listed in Tables A-4–A-6 for the gasket size and class specified in the purchase order. Inner-ring dimensions shall conform to Tables A-7, A-9, or A-10.

3.3 Standard Material

3.3.1 The standard materials shall be an 18Cr-8Ni stainless steel, AISI Type 304 metal winding, with a filler made of a chrysotile asbestos[4] strip containing a suitable binder. The centering ring shall be carbon steel painted, plated, or otherwise coated to resist atmospheric corrosion. The standard material for inner rings shall be AISI Type 304 stainless steel.

3.3.2 Other materials for the metal winding, filler material, and/or centering ring and inner ring may be specified by the purchaser.

3.4 Marking

3.4.1 The centering ring of each spiral-wound gasket shall be steel stamped with symbols approximately 0.13 inch (3.2 millimeters) high or larger, with the following markings (see Figure 2):

a. Flange size (NPS).
b. Class.

[4]Chrysotile asbestos is commonly called Canadian asbestos.

Typical marking for gaskets with Type 304 winding and asbestos filler and suitable for more than one class:

3-300/600
API 601
(Manufacturer's Mark)

Typical marking for gaskets with Type 304 winding and asbestos filler for use with flanges that conform to API Standard 605 or MSS SP-44:

36-300
API 601/605 (or SP-44)
(Manufacturer's Mark)

Typical marking for gaskets with special materials, Inconel winding, PTFE filler, and Inconel inner ring:

12-1500 INC 600-PTFE
API 601
INC 600 I.R.
(Manufacturer's Mark)

Figure 2—Typical Markings for Spiral-Wound Gaskets

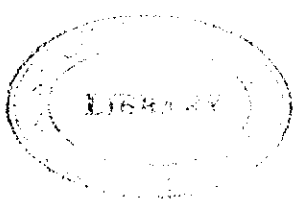
c. Winding material identification (number, name, or abbreviation), if the material is other than AISI Type 304 (see Table 2).
d. Filler material identification, if the material is other than chrysotile asbestos (see Table 2).
e. Inner-ring and centering-ring material identification, if the material is other than standard (see Table 2).
f. Identification (API 601).
g. Manufacturer's identification (trademark or name).
h. API 605, for gaskets to be used with flanges conforming to API Standard 605; or SP-44, for gaskets designed for flanges conforming to MSS SP-44. Gaskets for ANSI B16.5 flanges do not require identification to that standard.

3.4.2 If the gasket is suitable for more than one class, the marking shall include all applicable classes.

3.4.3 By agreement between the purchaser and the manufacturer, spiral-wound gaskets may be color-coded on the centering ring to identify the winding and filler material. The color identifying the metal winding shall be continuous around the outer edge of the centering ring. The color identifying the filler material shall be intermittent stripes with a minimum of four stripes spaced approximately equally on the outer edge of the centering ring. When spiral-wound gaskets are color coded, the colors shall conform to those listed in Table 3.

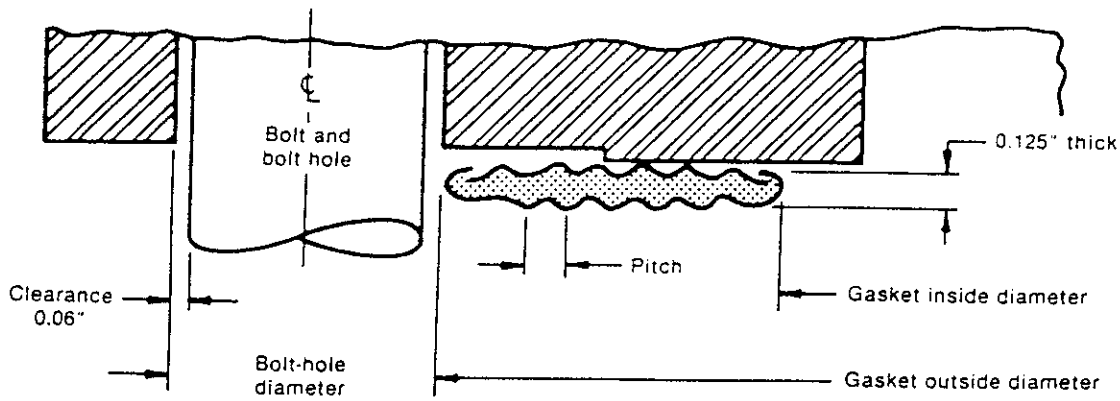
Table 3—Color Coding to Identify Winding and Filler Material for Spiral-Wound Gaskets

Metal	Color	Filler Material	Color of Stripe
Type 304 stainless steel	Yellow	Chrysotile asbestos	No stripe
Type 316 stainless steel	Green	Blue African asbestos	Light blue
Type 347 stainless steel	Blue	Polytetrafluoroethylene (PTFE)	White
Type 321 stainless steel	Turquoise	Ceramic	Light green
Monel	Orange	Flexible graphite	Gray
Nickel	Red		
Titanium	Purple		
Alloy 20	Black		
Carbon steel	Silver		
Hastelloy B	Brown		
Hastelloy C	Beige		
Inconel	Gold		



APPENDIX A—DIMENSIONAL TABLES IN CUSTOMARY UNITS

Table A-1—Double-Jacketed Gasket Dimensions for ANSI B16.5 Flanges (Inches)



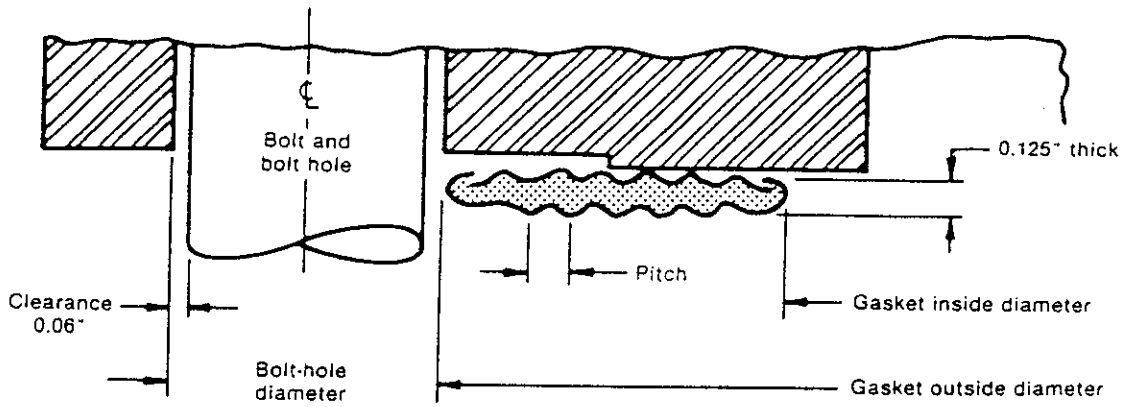
Flange Size (NPS)	Gasket Inside Diameter[a]	Gasket Outside Diameter[a] by Class						
		150	300	400	600	900	1500	2500
½	0.88	1.75	2.00	[b]	2.00	[b]	2.38	2.63
¾	1.13	2.13	2.50	[b]	2.50	[b]	2.63	2.88
1	1.50	2.50	2.75	[b]	2.75	[b]	3.00	3.25
1¼	1.88	2.88	3.13	[b]	3.13	[b]	3.38	4.00
1½	2.13	3.25	3.63	[b]	3.63	[b]	3.75	4.50
2	2.88	4.00	4.25	[b]	4.25	[b]	5.50	5.63
2½	3.38	4.75	5.00	[b]	5.00	[b]	6.38	6.50
3	4.25	5.25	5.75	[b]	5.75	6.50	6.75	7.63
4	5.19	6.75	7.00	6.88	7.50	8.00	8.13	9.13
5	6.00	7.63	8.38	8.25	9.38	9.63	9.88	10.88
6	7.50	8.63	9.75	9.63	10.38	11.25	11.00	12.38
8	9.38	10.88	12.00	11.88	12.50	14.00	13.75	15.13
10	11.25	13.25	14.13	14.00	15.63	17.00	17.00	18.63
12	13.50	16.00	16.50	16.38	17.88	19.50	20.38	21.50
14	14.75	17.63	19.00	18.88	19.25	20.38	22.63	[b]
16	16.75	20.13	21.13	21.00	22.13	22.50	25.13	[b]
18	19.25	21.50	23.38	23.25	24.00	25.00	27.63	[b]
20	21.00	23.75	25.63	25.38	26.75	27.38	29.63	[b]
24	25.25	28.13	30.38	30.13	31.00	32.88	35.38	[b]

Note: The gasket-thickness tolerance is +0.03 inch, -0.000 inch.

[a]For gaskets NPS ½ through NPS 24, the outside-diameter tolerance is +0.06 inch, -0.000 inch; the inside-diameter tolerance is +0.06 inch, -0.000 inch.

[b]There are no Class 400 flanges NPS ½ through NPS 3 (use Class 600), Class 900 flanges NPS ½ through NPS 2½ (use Class 1500), or Class 2500 flanges NPS 14 and larger.

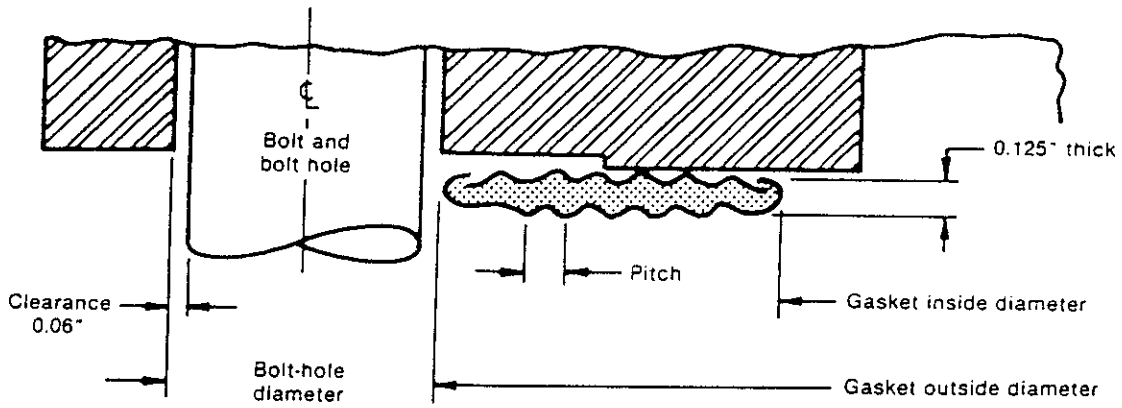
Table A-2—Double-Jacketed Gasket Dimensions for API Standard 605 Flanges (Inches)



Flange Size (NPS)	Gasket Inside Diameter[a]	Gasket Outside Diameter[a] by Class				
		150	300	400	600	900
26	26.50	28.44	30.25	29.25	30.00	32.88
28	28.50	30.44	32.38	31.38	32.13	35.38
30	30.50	32.44	34.75	33.63	34.50	37.63
32	32.50	34.56	36.88	35.75	36.63	39.88
34	34.50	36.69	39.00	37.75	39.13	42.13
36	36.50	38.75	41.13	40.13	41.13	44.13
38	38.50	41.00	43.13	42.13	43.38	47.13
40	40.50	43.00	45.13	44.25	45.38	49.13
42	42.50	45.00	47.13	46.25	47.88	51.13
44	44.50	47.00	49.13	48.38	49.88	53.75
46	46.50	49.31	51.75	50.63	52.13	56.38
48	48.50	51.31	53.75	52.88	54.63	58.38
50	50.50	53.31	55.75	55.13	56.88	[b]
52	52.50	55.31	57.75	57.13	58.88	[b]
54	54.50	57.50	60.13	59.63	61.13	[b]
56	56.50	59.50	62.63	61.63	63.13	[b]
58	58.50	62.06	65.06	63.63	65.38	[b]
60	60.50	64.06	67.06	66.13	68.13	[b]

Note: The gasket-thickness tolerance is +0.03 inch, -0.000 inch.
[a]For gaskets NPS 26 through NPS 60, the outside-diameter tolerance is +0.13 inch, -0.000 inch; the inside-diameter tolerance is +0.13 inch, -0.000 inch.
[b]There are no Class 900 flanges NPS 50 and larger.

Table A-3—Double-Jacketed Gasket Dimensions for MSS SP-44 Flanges (Inches)



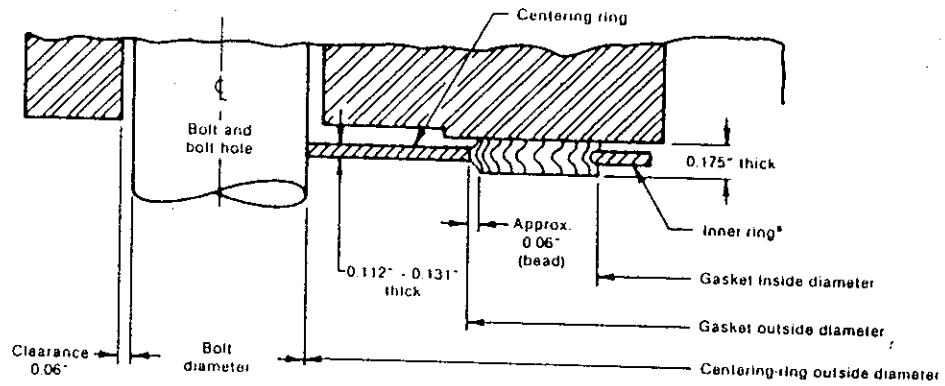
Flange Size (NPS)	Gasket Inside Diameter[a]	Gasket Outside Diameter[a] by Class				
		150	300	400	600	900
26	26.50	30.38	32.75	32.63	34.00	34.63
28	28.50	32.63	35.25	35.00	35.88	37.13
30	30.50	34.63	37.38	37.13	38.13	39.63
32	32.50	36.88	39.50	39.38	40.13	42.13
34	34.50	38.88	41.50	41.38	42.13	44.63
36	36.50	41.13	43.38	43.38	44.38	47.13
38	38.50	43.63	41.38	42.13	43.38	47.13
40	40.50	45.63	43.75	44.25	45.38	49.13
42	42.50	47.88	45.75	46.25	47.88	51.13
44	44.50	50.13	47.88	48.38	49.88	53.75
46	46.50	52.13	50.00	50.63	52.13	56.38
48	48.50	54.38	52.00	52.88	54.63	58.38
50	50.50	56.38	54.13	55.13	56.88	[b]
52	52.50	58.63	56.13	57.13	58.88	[b]
54	54.50	60.88	58.63	59.63	61.13	[b]
56	56.50	63.13	60.63	61.63	63.13	[b]
58	58.50	65.38	62.63	63.63	65.38	[b]
60	60.50	67.38	64.63	66.13	68.13	[b]

Note: The gasket-thickness tolerance is +0.03 inch, -0.000 inch. For MSS SP-44 flanges NPS 12 through NPS 24, use the gaskets listed in Table A-1. MSS SP-44 flanges in NPS 12 through NPS 24 have the same raised-face dimensions as ANSI B16.5 flanges.

[a]For gaskets NPS 26 through NPS 60, the outside-diameter tolerance is +0.13 inch, -0.000 inch; the inside-diameter tolerance is +0.13 inch, -0.000 inch.

[b]There are no Class 900 flanges NPS 50 and larger.

Table A-4—Spiral-Wound Gasket Dimensions for ANSI B16.5 Flanges (Inches)



Flange Size (NPS)	Outside Diameter[b] of Gasket		Inside Diameter[c] of Gasket by Class							Outside Diameter[d] of Centering Ring by Class						
	Classes 150, 300, 400, 600	Classes 900, 1500, 2500	150	300	400	600	900	1500	2500	150	300	400	600	900	1500	2500
½	1.25	1.25	0.75	0.75	[e]	0.75	[e]	0.75	0.75	1.88	2.13	[e]	2.13	[e]	2.50	2.75
¾	1.56	1.56	1.00	1.00	[e]	1.00	[e]	1.00	1.00	2.25	2.63	[e]	2.63	[e]	2.75	3.00
1	1.88	1.88	1.25	1.25	[e]	1.25	[e]	1.25	1.25	2.63	2.88	[e]	2.88	[e]	3.13	3.38
1¼	2.38	2.38	1.88	1.88	[e]	1.88	[e]	1.56	1.56	3.00	3.25	[e]	3.25	[e]	3.50	4.13
1½	2.75	2.75	2.13	2.13	[e]	2.13	[e]	1.88	1.88	3.38	3.75	[e]	3.75	[e]	3.88	4.63
2	3.38	3.38	2.75	2.75	[e]	2.75	[e]	2.31	2.31	4.13	4.38	[e]	4.38	[e]	5.63	5.75
2½	3.88	3.88	3.25	3.25	[e]	3.25	[e]	2.75	2.75	4.88	5.13	[e]	5.13	[e]	6.50	6.63
3	4.75	4.75	4.00	4.00	[e]	4.00	3.75	3.63	3.63	5.38	5.88	[e]	5.88	6.63	6.88	7.75
4	5.88	5.88	5.00	5.00	4.75	4.75	4.75	4.63	4.63[a]	6.88	7.13	7.00	7.63	8.13	8.25	9.25
5	7.00	7.00	6.13	6.13	5.81	5.81	5.81	5.63	5.63[a]	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	8.25	8.25	7.19	7.19	6.88	6.88	6.88	6.75	6.75[a]	8.75	9.88	9.75	10.50	11.38	11.13	12.50
8	10.38	10.13	9.19	9.19	8.88	8.88	8.75	8.50	8.50[a]	11.00	12.13	12.00	12.63	14.13	13.88	15.25
10	12.50	12.25	11.31	11.31	10.81	10.81	10.88	10.50	10.63[a]	13.38	14.25	14.13	15.75	17.13	17.13	18.75
12	14.75	14.50	13.38	13.38	12.88	12.88	12.75	12.75[a]	12.50[a]	16.13	16.63	16.50	18.00	19.63	20.50	21.63
14	16.00	15.75	14.63	14.63	[e]	14.25	14.00	14.25[a]	[e]	17.75	19.13	19.00	19.38	20.50	22.75	[e]
16	18.25	18.00	16.63	16.63	[e]	16.25	16.25	16.00[a]	[e]	20.25	21.25	21.13	22.25	22.63	25.25	[e]
18	20.75	20.50	18.69	18.69	[e]	18.50	18.50	18.25[a]	[e]	21.63	23.50	23.38	24.13	25.13	27.75	[e]
20	22.75	22.50	20.69	20.69	[e]	20.50	20.50	20.25[a]	[e]	23.88	25.75	25.50	26.88	27.50	29.75	[e]
24	27.00	26.75	24.75	24.75	[e]	24.75	24.75	24.25[a]	[e]	28.25	30.50	30.25	31.13	33.00	35.50	[e]

Note: The gasket-thickness tolerance is +0.010 inch, -0.000 inch. For limitations on the maximum flange bore for use with these spiral-wound gaskets, see Table B-1.

[a] Inner rings are required for Class 900 gaskets, NPS 24; Class 1500 gaskets, NPS 12 through NPS 24; and Class 2500 gaskets, NPS 4 through NPS 12 (see 3.1.6 and Table A-7).

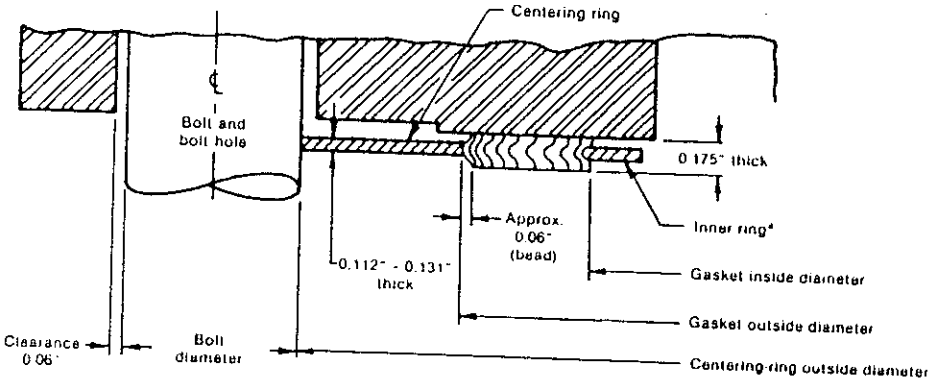
[b] The gasket outside-diameter tolerance for NPS ½ through NPS 8 is ±0.03 inch; for NPS 10 through NPS 24, +0.06 inch, -0.03 inch.

[c] The gasket inside-diameter tolerance for NPS ½ through NPS 8 is ±0.016 inch; for NPS 10 through NPS 24, ±0.03 inch.

[d] The centering ring outside-diameter tolerance is ±0.03 inch.

[e] There are no Class 400 flanges in NPS ½ through NPS 3 (use Class 600), Class 900 flanges in NPS ½ through NPS 2½ (use Class 1500), or Class 2500 flanges NPS 14 and larger.

Table A-5—Spiral-Wound Gasket Dimensions for API Standard 605 Flanges (Inches)



Flange Size (NPS)	Class 150 Gasket Inside Diameter[b]	Class 150 Gasket Outside Diameter[c]	Class 150 Centering-Ring Outside Diameter[d]	Class 300 Gasket Inside Diameter[b]	Class 300 Gasket Outside Diameter[c]	Class 300 Centering-Ring Outside Diameter[d]	Class 400 Gasket Inside Diameter[b]	Class 400 Gasket Outside Diameter[c]	Class 400 Centering-Ring Outside Diameter[d]	Class 600 Gasket Inside Diameter[b]	Class 600 Gasket Outside Diameter[c]	Class 600 Centering-Ring Outside Diameter[d]	Class 900[a] Gasket Inside Diameter[b]	Class 900[a] Gasket Outside Diameter[c]	Class 900[a] Centering-Ring Outside Diameter[d]
26	26.50	27.50	28.56	26.50	28.00	30.38	26.25	27.50	29.38	26.13	28.13	30.13	27.25	29.50	33.00
28	28.50	29.50	30.56	28.50	30.00	32.50	28.13	29.50	31.50	27.75	29.75	32.25	29.25	31.50	35.50
30	30.50	31.50	32.56	30.50	32.00	34.88	30.13	31.75	33.75	30.63	32.63	34.63	31.75	33.75	37.75
32	32.50	33.50	34.69	32.50	34.00	37.00	32.00	33.88	35.88	32.75	34.75	36.75	34.00	36.00	40.00
34	34.50	35.75	36.81	34.50	36.00	39.13	34.13	35.88	37.88	35.00	37.00	39.25	36.25	38.25	42.25
36	36.50	37.75	38.88	36.50	38.00	41.25	36.13	38.00	40.25	37.00	39.00	41.25	37.25	39.25	44.25
38	38.37	39.75	41.13	39.75	41.25	43.25	38.25	40.25	42.25	39.00	41.00	43.50	40.75	42.75	47.25
40	40.25	41.88	43.13	41.75	43.25	45.25	40.38	42.38	44.38	41.25	43.25	45.50	43.25	45.25	49.25
42	42.50	43.88	45.13	42.50	44.00	47.25	42.38	44.38	46.38	43.50	45.50	48.00	45.25	47.25	51.25
44	44.25	45.88	47.13	45.75	47.25	49.25	44.50	46.50	48.50	45.75	47.75	50.00	47.50	49.50	53.88
46	46.50	48.19	49.44	47.88	49.38	51.88	47.00	49.00	50.75	47.75	49.75	52.25	50.00	52.00	56.50
48	48.50	50.00	51.44	48.50	50.00	53.88	49.00	51.00	53.00	50.00	52.00	54.75	52.00	54.00	58.50
50	50.50	52.19	53.44	51.88	53.38	55.88	51.00	53.00	55.25	52.00	54.00	57.00	[e]	[e]	[e]
52	52.50	54.19	55.44	53.88	55.38	57.88	53.00	55.00	57.25	54.00	56.00	59.00	[e]	[e]	[e]
54	54.50	56.00	57.63	54.50	56.00	60.25	55.25	57.25	59.75	56.25	58.25	61.25	[e]	[e]	[e]
56	56.50	57.88	59.63	58.25	60.00	62.75	57.25	59.25	61.75	58.25	60.25	63.50	[e]	[e]	[e]
58	58.50	59.94	62.19	60.44	61.94	65.19	59.25	61.25	63.75	60.50	62.50	65.50	[e]	[e]	[e]
60	60.50	61.94	64.19	60.50	62.00	67.19	61.75	63.75	66.25	62.75	64.75	68.25	[e]	[e]	[e]

Note: The gasket-thickness tolerance is +0.010 inch, −0.000 inch. For limitations on the maximum flange bore for use with these spiral-wound gaskets, see Table B-2.

[a] Inner rings are required for Class 900 gaskets, NPS 26 through NPS 48 (see 3.1.6 and Table A-9).

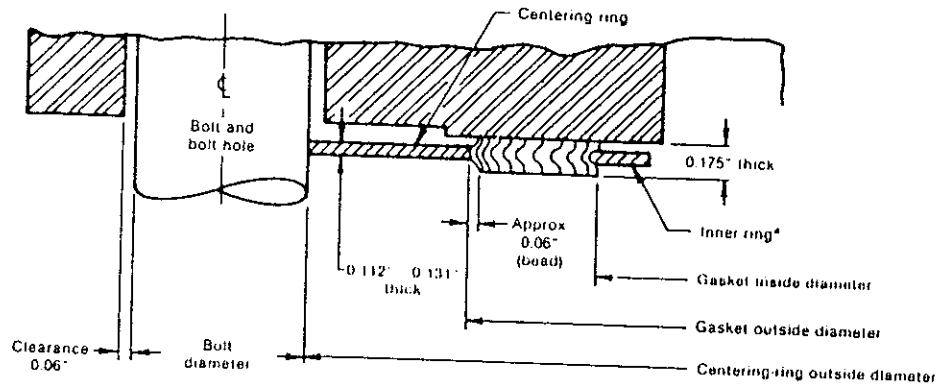
[b] The gasket inside-diameter tolerance for NPS 26 through NPS 34 is ±0.03 inch, and the tolerance for NPS 36 through NPS 60 is ±0.05 inch.

[c] The gasket outside-diameter tolerance for NPS 26 through NPS 60 is ±0.06 inch.

[d] The centering-ring outside-diameter tolerance is ±0.03 inch.

[e] There are no Class 900 flanges NPS 50 and larger.

Table A-6—Spiral-Wound Gasket Dimensions for MSS SP-44 Flanges (Inches)



Flange Size (NPS)	Class 150			Class 300			Class 400			Class 600			Class 900[a]		
	Gasket		Centering-Ring Outside Diameter[d]	Gasket		Centering-Ring Outside Diameter[d]	Gasket		Centering-Ring Outside Diameter[d]	Gasket		Centering-Ring Outside Diameter[d]	Gasket		Centering-Ring Outside Diameter[d]
	Inside Diameter[b]	Outside Diameter[c]		Inside Diameter[b]	Outside Diameter[c]		Inside Diameter[b]	Outside Diameter[c]		Inside Diameter[b]	Outside Diameter[c]		Inside Diameter[b]	Outside Diameter[c]	
26	26.50	27.75	30.50	27.00	29.00	32.88	27.00	29.00	32.75	27.00	29.00	34.13	27.00	29.00	34.75
28	28.50	29.75	32.75	29.00	31.00	35.38	29.00	31.00	35.13	29.00	31.00	36.00	29.00	31.00	37.25
30	30.50	31.75	34.75	31.25	33.25	37.50	31.25	33.25	37.25	31.25	33.25	38.25	31.25	33.25	39.75
32	32.50	33.88	37.00	33.50	35.50	39.63	33.50	35.50	39.50	33.50	35.50	40.25	33.50	35.50	42.25
34	34.50	35.88	39.00	35.50	37.50	41.63	35.50	37.50	41.50	35.50	37.50	42.25	35.50	37.50	44.75
36	36.50	38.13	41.25	37.63	39.63	44.00	37.63	39.63	44.00	37.63	39.63	44.50	37.75	39.75	47.25
38	38.50	40.13	43.75	38.50	40.00	41.50	38.25	40.25	42.25	39.00	41.00	43.50	40.75	42.75	47.25
40	40.50	42.13	45.75	40.25	42.13	43.88	40.38	42.38	44.38	41.25	43.25	45.50	43.25	45.25	49.25
42	42.50	44.25	48.00	42.25	44.13	45.88	42.38	44.38	46.38	43.50	45.50	48.00	45.25	47.25	51.25
44	44.50	46.38	50.25	44.50	46.50	48.00	44.50	46.50	48.50	45.75	47.75	50.00	47.50	49.50	53.88
46	46.50	48.38	52.25	46.38	48.38	50.13	47.00	49.00	50.75	47.75	49.75	52.25	50.00	52.00	56.50
48	48.50	50.38	54.50	48.63	50.63	52.13	49.00	51.00	53.00	50.00	52.00	54.75	52.00	54.00	58.50
50	50.50	52.50	56.50	51.00	53.00	54.25	51.00	53.00	55.25	52.00	54.00	57.00	[e]	[e]	[e]
52	52.50	54.50	58.75	53.00	55.00	56.25	53.00	55.00	57.25	54.00	56.00	59.00	[e]	[e]	[e]
54	54.50	56.50	61.00	55.25	57.25	58.75	55.25	57.25	59.75	56.25	58.25	61.25	[e]	[e]	[e]
56	56.50	58.50	63.25	57.25	59.25	60.75	57.25	59.25	61.75	58.25	60.25	63.50	[e]	[e]	[e]
58	58.50	60.50	65.50	59.50	61.50	62.75	59.25	61.25	63.75	60.50	62.50	65.50	[e]	[e]	[e]
60	60.50	62.50	67.50	61.50	63.50	64.75	61.75	63.75	66.25	62.75	64.75	68.25	[e]	[e]	[e]

Note: The gasket-thickness tolerance is +0.010 inch, -0.000 inch. For limitations on the maximum flange bore for use with these spiral-wound gaskets, see Table B-3. For MSS SP-44 flanges NPS 12 through NPS 24, use the gaskets listed in Table A-4. MSS SP-44 flanges NPS 12 through NPS 24 have the same raised-faced dimensions as ANSI B16.5 flanges.

[a]Inner rings are required for Class 900 gaskets, NPS 26 through NPS 48 (see 3.1.6 and Table A-10).

[b]The gasket inside-diameter tolerance for NPS 10 through NPS 34 is ±0.03 inch, and the tolerance for NPS 36 through NPS 60 is ±0.05 inch.

[c]The gasket outside-diameter tolerance for NPS 26 through NPS 60 is ±0.06 inch.

[d]The centering-ring outside-diameter tolerance is ±0.03 inch.

[e]There are no Class 900 flanges NPS 50 and larger.

Table A-7—Standard Inner-Ring Inside Diameters for Spiral-Wound Gaskets (Inches)

Flange Size (NPS)	Pressure Class						
	150	300	400	600	900	1500	2500
½	0.56	0.56	[a]	0.56	[a]	0.56	0.56
¾	0.81	0.81	[a]	0.81	[a]	0.81	0.81
1	1.06	1.06	[a]	1.06	[a]	1.06	1.06
1¼	1.50	1.50	[a]	1.50	[a]	1.31[b]	1.31[b]
1½	1.75	1.75	[a]	1.75	[a]	1.63[b]	1.63[b]
2	2.19	2.19	[a]	2.19	[a]	2.06[b]	2.06[b]
2½	2.62	2.62	[a]	2.62	[a]	2.50[b]	2.50[b]
3	3.19	3.19	[a]	3.19	3.19	3.19	3.19
4	4.19	4.19	4.19	4.19	4.19	4.19	4.19[c]
5	5.19	5.19	5.19	5.19	5.19	5.19	5.19[c]
6	6.19	6.19	6.19	6.19	6.19	6.19	6.19[c]
8	8.50	8.50	8.25	8.25	8.25	8.12	7.88[c]
10	10.56	10.56	10.25	10.25	10.25	10.15	9.75[c]
12	12.50	12.50	12.50	12.50	12.38	12.38[c]	11.50[c]
14	13.75	13.75	13.75	13.75	13.50	13.38[c]	[a]
16	15.75	15.75	15.75	15.75	15.50	15.25[c]	[a]
18	17.69	17.69	17.69	17.69	17.50	17.25[c]	[a]
20	19.69	19.69	19.69	19.69	19.50	19.25[c]	[a]
24	23.75	23.75	23.75	23.75	23.75[c]	22.75[c]	[a]

Note: The inner-ring thickness shall be 0.112-1.31 inches. For sizes NPS 1¼ through NPS 3, the inside-diameter tolerance is ±0.03 inch; for larger sizes the inside-diameter tolerance is ±0.06 inch. See Table A-8 for minimum pipe wall thicknesses that are suitable for use with standard inner rings.

[a]There are no Class 400 flanges NPS ½ through NPS 3 (use Class 600), Class 900 flanges NPS ½ through NPS 2½ (use Class 1500), or Class 2500 flanges NPS 14 and larger.

[b]The inner-ring inside diameters shown for NPS 1¼ through NPS 2½ in Classes 1500 and 2500 will produce inner-ring widths of 0.12 inch, a practical minimum for production purposes.

[c]Inner rings are required for Class 900, NPS 24 gaskets; Class 1500, NPS 12 through NPS 24 gaskets; and Class 2500, NPS 4 through NPS 12 gaskets.

Table A-8—Minimum Pipe Wall Thicknesses Suitable for Use With Standard Inner Rings for ANSI B16.5 Flanges

Flange Size (NPS)	Pressure Class						
	150	300	400	600	900	1500	2500
½	Schedule 80						
¾							
1							
1¼							
1½							
2							
2½	Schedule 40						
3							
4							
5							
6							
8	Schedule 10S			Schedule 30		Schedule 80	
10				Standard weight			
12					Schedule 30		
14							
16							
18					Standard weight	Schedule 40	
20							
24							

Table A-9—Standard Inner-Ring Inside Diameters for Spiral-Wound Gaskets Used Between API Standard 605 Flanges (Inches)

Flange Size (NPS)	Pressure Class				
	150	300	400	600	900
26	25.75	25.75	25.75	25.38	26.50[a]
28	27.75	27.75	27.63	27.25	28.50[a]
30	29.75	29.75	29.63	29.63	31.00[a]
32	31.75	31.75	31.50	31.25	33.00[a]
34	33.75	33.75	33.50	33.50	35.25[a]
36	35.75	35.75	35.38	35.50	36.50[a]
38	37.75	38.25	37.50	37.50	39.75[a]
40	39.75	40.25	39.38	39.75	41.75[a]
42	41.75	41.50	41.38	42.00	43.75[a]
44	43.75	44.25	43.50	43.75	45.50[a]
46	45.75	46.38	46.00	45.75	48.00[a]
48	47.75	47.25	47.50	48.00	50.00[a]
50	49.75	49.88	49.50	50.00	[b]
52	51.75	51.88	51.50	52.00	[b]
54	53.75	53.00	53.25	54.25	[b]
56	55.62	56.25	55.25	56.25	[b]
58	57.62	58.44	57.25	58.00	[b]
60	59.62	59.25	59.75	60.25	[b]

Note: The inner-ring thickness shall be 0.112–0.131 inch. The inside-diameter tolerance is ±0.12 inch. These inner rings are suitable for use with pipe walls 0.38 inch or thicker.
[a]Inner rings are required for Class 900 gaskets.
[b]There are no Class 900 flanges NPS 50 and larger.

Table A-10—Standard Inner-Ring Inside Diameters for Spiral-Wound Gaskets Used Between MSS SP-44 Flanges (Inches)

Flange Size (NPS)	Pressure Class				
	150	300	400	600	900
26	25.75	25.75	26.00	25.50	26.25[a]
28	27.75	27.75	28.00	27.50	28.00[a]
30	29.75	29.75	29.75	29.75	30.50[a]
32	31.75	31.75	32.00	32.00	32.00[a]
34	33.75	33.75	34.00	34.00	34.00[a]
36	35.75	35.75	36.13	36.13	36.25[a]
38	37.75	37.50	37.50	37.50	39.75[a]
40	39.75	39.50	39.38	39.75	41.75[a]
42	41.75	41.50	41.38	42.00	43.75[a]
44	43.75	43.50	43.50	43.75	45.50[a]
46	45.75	45.38	46.00	45.75	48.00[a]
48	47.75	47.63	47.50	48.00	50.00[a]
50	49.75	49.00	49.50	50.00	[b]
52	51.75	52.00	51.50	52.00	[b]
54	53.50	53.25	53.25	54.25	[b]
56	55.50	55.25	55.25	56.25	[b]
58	57.50	57.00	57.25	58.00	[b]
60	59.50	60.00	59.75	60.25	[b]

Note: The inner-ring thickness shall be 0.112–0.131 inch. The inside-diameter tolerance is ±0.12 inch. These inner rings are suitable for use with pipe walls 0.38 inch or thicker.
[a]Inner rings are required for Class 900 gaskets.
[b]There are no Class 900 flanges NPS 50 and larger.

APPENDIX B—USAGE TABLES FOR SPIRAL-WOUND GASKETS

Table B-1—Maximum Bore of ANSI B16.5 Flanges for Use With Spiral-Wound Gaskets

This table shows the maximum bore of flanges for which the spiral-wound gasket dimensions shown in Table A-4 are recommended considering the tolerances involved, possible eccentric installation, and the possibility that the gasket may extend into the assembled flange bore.

Flange Size (NPS)	Pressure Class							
	75	150	300	400	600	900[a]	1500[a]	2500[a]
½	No flanges	WN flange only[b]		No flanges Use Class 600	WN flange only[b]	No flanges Use Class 1500	WN flange only[b]	
¾								
1								
1¼		SO flange[c] WN flange[b]			SO flange[c] WN flange[b]			
1½								
2		SO flange[c] WN flange, any bore			SO flange[c] WN flange, any bore			
2½								
3		SO flange WN flange, any bore			SO flange[c] WN flange, any bore			
4				WN flange with Schedule 10S bore described in ASME B36.19M (includes nozzle[d] but excludes SO flange)			WN flange with SW bore (includes nozzle[d] but excludes SO flange)	WN flange with Schedule 60 bore
6								
8								
10								WN flange with Schedule 80 bore
12								
14				WN flange with Schedule 10 bore described in ASME B36.10M (excludes nozzle[d] and SO flange)[e]			WN flange with SW bore (excludes nozzle and SO flange)	No flanges
16								
18								
20								
24							WN flange with Schedule 40 bore	

Note: SO = slip-on and threaded; WN = welding neck; SW = standard wall. For maximum permissible flange bores for nonmandatory inner rings, see Table A-8.

[a]Inner rings are required for Class 900 gaskets, NPS 24; Class 1500 gaskets, NPS 12 through NPS 24; and Class 2500 gaskets, NPS 4 through NPS 12 (see 3.1.6). These inner rings may extend into the pipe bore a maximum of 0.06 inch (1.5 millimeters) under the worst combination of maximum bore, eccentric installation, and additive tolerances.

[b]In these sizes the gasket is suitable for a welding-neck flange with a standard-wall bore, if the gasket and the flanges are assembled concentrically. This also applies to a nozzle. It is the user's responsibility to determine if the gasket is satisfactory for a flange of any larger bore.

[c]Gaskets in these sizes are suitable for slip-on flanges only if the gaskets and flanges are assembled concentrically.

[d]A *nozzle* is a long welding neck; the bore equals the flange NPS.

[e]An NPS 24 gasket is suitable for nozzles.

Table B-2—Maximum Bore of API Standard 605 Flanges for Use With Spiral-Wound Gaskets

This table and Standard 605 show the maximum bore of flanges for which the spiral-wound gasket dimensions shown in Table A-5 are recommended, considering the tolerances involved, the possibility of eccentric installation, and the possibility that the gasket may extend into the assembled flange bore.

Flange Size (NPS)	Pressure Class				
	150	300	400	600	900[a]
26	Welding-neck and integral flanges having maximum inside diameters as described in API Standard 605				
28					
30					
32					
34					
36					
38					
40					
44					
46					
48					
50					[b]
52					[b]
54					[b]
56					[b]
58					[b]
60					[b]

[a]Inner rings are required for Class 900 gaskets, NPS 26 through NPS 48 (see 3.1.6).
[b]There are no Class 900 flanges NPS 50 and larger.

Table B-3—Maximum Bore of MSS SP-44 Flanges for Use With Spiral-Wound Gaskets

This table shows the maximum bore of flanges for which the spiral-wound gasket dimensions shown in Table A-6 are recommended, considering the tolerances involved, the possibility of eccentric installation, and the possibility that the gasket may extend into the assembled flange bore.

Flange Size (NPS)	Pressure Class				
	150	300	400	600	900[a]
26	[b]	[c]	[c]	[c]	[c]
28	[b]	[c]	[c]	[c]	[c]
30	[b]	[c]	[c]	[c]	[c]
32	[b]	[c]	[c]	[c]	[c]
34	[b]	[c]	[c]	[c]	[c]
36	[b]	[c]	[c]	[c]	[c]
38	[b]	[c]	[c]	[c]	[c]
40	[b]	[c]	[c]	[c]	[c]
42	[b]	[c]	[c]	[c]	[c]
44	[b]	[c]	[c]	[c]	[c]
46	[b]	[c]	[c]	[c]	[c]
48	[b]	[c]	[c]	[c]	[c]
50	[b]	[c]	[c]	[c]	[d]
52	[b]	[c]	[c]	[c]	[d]
56	[b]	[c]	[c]	[c]	[d]
58	[b]	[c]	[c]	[c]	[d]
60	[b]	[c]	[c]	[c]	[d]

[a]Inner rings are required for Class 900 gaskets, NPS 26 through NPS 48 (see 3.1.6).
[b]Only welding-neck flanges with a bore not larger than the inside diameter of 0.187-inch (4.8-millimeter) wall pipe. Larger bores must be checked individually.
[c]Only welding-neck flanges with a bore not larger than the inside diameter of 0.25-inch (6.4-millimeter) wall pipe, except that NPS 38, Class 300, is not suitable for bore larger than the inside diameter of 0.30-inch (7.9-millimeter) wall pipe. Larger bores must be checked individually.
[d]There are no Class 900 flanges in NPS 50 through 60.