

ASME B16.36-2006
(Revision of ASME B16.36-1996)

Orifice Flanges

AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

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Three Park Avenue • New York, NY 10016

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FOREWORD

August of 1956 marked the first recorded correspondence noting the lack of standardization for orifice flanges. There were, and still are, several codes for the performance and calibration of orifice flanges, but there had been no standardization of the flanges themselves. Over the ensuing 3 years, correspondence continued among the Instrument Society of America, American Gas Association, and the B16 Standards Committee.

On December 3, 1959, Subcommittee 3 (now Subcommittee C) of B16 authorized the appointment of a Task Force to undertake drafting of a standard. Although the initial work progressed smoothly, a controversy developed over the standard size of taps to be specified for the flanges. This required many years to resolve. It was finally achieved in 1973 with the issuance of a draft from the Task Force. Comments and objections to this draft from members of Subcommittee C were resolved, and a redraft was approved by the Subcommittee late in 1974. The B16 Standards Committee was balloted in the spring of 1975 and approval was gained. Comments from B16 members from the gas industry requested that the Class 400 orifice flange be included, and the B16 Subcommittee C agreed to consider this for a possible addendum. The Standard was approved by ANSI on August 15, 1975.

On April 30, 1979, an addenda was issued, which added Class 400 flanges and Mandatory Appendix II covering reference documents and organizations.

In 1982, American National Standards Committee B16 was reorganized as an ASME Committee operating under procedures accredited by ANSI. In the 1988 edition, figures were added to illustrate jack bolts and corner taps, metric units have been omitted, and references to other standards have been updated. Following approval by the B16 Main Committee and the ASME Supervisory Board, the Standard was approved as an American National Standard by ANSI on February 18, 1988.

In 1996, several revisions were made, including the addition of angular meter taps for ring joint flanges in sizes not previously covered. Following approval by the B16 Main Committee and the ASME Supervisory Board, the Standard was approved as an American National Standard by ANSI on November 6, 1996.

This 2006 edition includes metric units as the primary reference units while maintaining U.S. Customary units in either parenthetical or separate forms. Changes to dimensions and nomenclature follow that contained within the 2003 edition of ASME B16.5. This includes the change of minimum flange thickness from C to t_f and corrections for Y_1 and Y_2 . Class 400 remains in U.S. Customary tables in Mandatory Appendix II but is not given in the metric dimensional tables. There are numerous requirement clarifications and editorial revisions.

Requests for interpretations or suggestions for revisions should be sent to the Secretary, B16 Committee, Three Park Avenue, New York, NY 10016-5990.

This revision was approved by the American National Standards Institute on November 6, 2006.

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, 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

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

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.

ORIFICE FLANGES

1 SCOPE

1.1 General

This Standard covers flanges (similar to those covered in ASME B16.5) that have orifice pressure differential connections. Coverage is limited to the following:

- (a) welding neck flanges Classes 300, 600, 900, 1500, and 2500. U.S. Customary units are presented in Mandatory Appendix I.
- (b) slip-on and threaded Class 300.
- (c) welding neck flanges Class 400 in U.S. Customary units in Mandatory Appendix II.

1.2 References

Codes, standards, and specifications containing provisions to the extent referenced herein constitute requirements of this Standard. These reference documents are listed in Mandatory Appendix III.

1.3 Quality Systems

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

1.4 Relevant Units

This Standard states values in both 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. Except for Class 400 the values in U.S. Customary units are in Mandatory Appendix I. The main text of this Standard does not contain requirements for Class 400 welding neck flange; however, Mandatory Appendix II does contain requirements for this class, expressed in U.S. Customary units only.

1.5 Convention

For the purposes of determining conformance with this Standard, the convention for fixing significant digits where limits and maximum and minimum values are specified, shall be rounded as defined in ASTM Practice

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 tolerances do not imply a particular method of measurements.

1.6 Denotation

1.6.1 Pressure Rating Designation

(a) Class, followed by a dimensionless number, is the designation for pressure–temperature ratings as follows: Classes 300 600 900 1500 2500.

(b) Class 400 is retained in the U.S. Customary tables.

1.6.2 Sizes.

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

NPS	DN
1	25
1½	40
2	50
2½	65
3	80
4	100

GENERAL NOTE: For NPS ϵ 4, the related DN_{p25} (NPS).

1.7 Service Conditions

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

2 PRESSURE–TEMPERATURE RATINGS

The pressure–temperature ratings, including all use recommendations and limitations, and the method of rating given in ASME B16.5 apply to these flanges.

3 MATERIAL

3.1 General

Flange materials shall be in accordance with the requirements of ASME B16.5.

3.2 Bolting

Bolting material recommendations are given in ASME B16.5.

3.3 Plugs

Pressure retaining plugs shall conform to ASME B16.11, unless otherwise agreed between purchaser and manufacturer. Plug material shall be at least as corrosion resistant as the corresponding flange material.

4 SIZE

Orifice flange sizes are indicated by the nominal pipe size to which they are attached. Only those listed in Tables 1 through 5; Tables I-1 through I-5, and Mandatory Appendix II are considered standard.

5 MARKING

Flanges shall be marked as required in ASME B16.5. For welding neck flanges only, the bore diameter shall be marked.

6 FLANGE FACING FINISH

The finish of contact faces shall conform to the requirements of ASME B16.5.

7 GASKETS FOR RAISED FACE FLANGES

7.1 Gasket Thickness

Flange dimensions are based on the use of 1.5 mm (0.06 in.) thick gaskets.

7.2 Flange Gaskets Requiring Dimensional Changes

When the location of the pressure tap with respect to the orifice plate is critical to the service and metering conditions, its location may be altered to accommodate other than 1.5 mm (0.06 in.) thick gaskets or ring type joint gaskets whose thickness may vary from that listed in Tables 2, 3, 4, and 5 or those listed in Tables I-2, I-3, I-4, and I-5 or Mandatory Appendix II.

The alteration of location may also be accomplished by the removal of 2 mm (0.06 in.) from the raised face of the flange. If an original 2 mm (0.06 in.) high raised face is removed, the user is cautioned to limit the outside diameter of the gasket or orifice plate to the tabulated R dimension.

8 PRESSURE TAPS

8.1 General

Each orifice flange shall be provided with two pressure tap holes extending radially from the outside diameter of the flange to the inside diameter of the flange. Corner taps may be used on NPS 1½ and smaller if space permits. See Fig. 1.

For ring joint flanges listed in Tables 2 through 5, Tables I-1 through I-5, and Mandatory Appendix II

where radial taps will interfere with the ring groove, angular meter taps, as illustrated in Fig. 2, will be required. Each pressure tap hole shall be equipped with a pipe plug.

8.2 Location

8.2.1 Measurement. The 24 mm (0.94 in.) dimension for raised face and 19 mm (0.75 in.) for ring joint shall be measured at the bore.

8.2.2 Identification. For ring joint flanges requiring alteration of pressure tap location due to interference with the ring groove other than methods provided in this Standard, such alteration shall be identified per agreement between purchaser and manufacturer.

8.3 Pipe Connection

Unless otherwise specified, pressure tap holes may be either tapped $\frac{1}{2}$ NPT in accordance with ASME B1.20.1 or $\frac{1}{2}$ NPS socket connection in accordance with ASME B16.11.

9 JACK SCREW PROVISION

9.1 Location

Each flange shall have a machine bolt mounted in a hole drilled on the flange bolt circle center line at 90 deg from the pressure taps, for use as a jack screw. Machine bolt shall be regular with one heavy hex nut. See Fig. 3.

9.2 Slot for Nut

A slot shall be provided in the flange 2 mm (0.06 in.) wider than the width across flats of the nut. The depth of the slot shall admit the nut so that there is no interference with the joining of the flanges when bolted together without orifice plate.

9.3 Tapped Hole

As an alternative to para. 9.2, a tapped hole may be provided and the hex nut omitted when agreed on between the purchaser and the manufacturer.

10 FLANGE DIMENSIONS

Dimensions are listed in Tables 1, 2, 3, 4, and 5, for metric, and Tables I-1, I-2, I-3, I-4, and I-5, and Mandatory Appendix II for U.S. Customary.

11 FLANGE THREADS

Threaded flanges shall have an American National Standard taper pipe thread conforming to ASME B1.20.1.

(a) The thread shall be concentric with the axis of the flange. Variations in alignment shall not exceed 5 mm/M (0.06 in./ft).

(b) The flanges are made with counterbores at the back of the flange and the threads shall be chamfered to the diameter of the counterbore at an angle of approximately 45 deg with the axis of the thread to afford easy entrance in making a joint. The counterbore and chamfer shall be concentric with the thread.

(c) In order to permit the pipe to be inserted to the face of the flange, the threads should have full root diameters through to the face of the flange, or shall have a counterbore at the face of the flange.

(d) The gaging notch of the working gage shall come flush with the bottom of the chamfer in all threaded flanges and shall be considered as being the intersection of the chamfer cone and the pitch cone of the thread. This depth of chamfer is approximately equal to one-half the pitch of the thread.

(e) The maximum allowable thread variation is one turn large or small from the gaging notch.

12 TOLERANCES

Tolerances on all dimensions shall be as shown in ASME B16.5 except for those shown below.

12.1 Pressure Tap Location

Tolerance on location of center of pressure tap hole¹ from flange face shall be

- (a) ± 0.5 mm (± 0.02 in.) for flanges smaller than NPS 4
- (b) ± 0.8 mm (± 0.03 in.) for flanges NPS 4 and larger

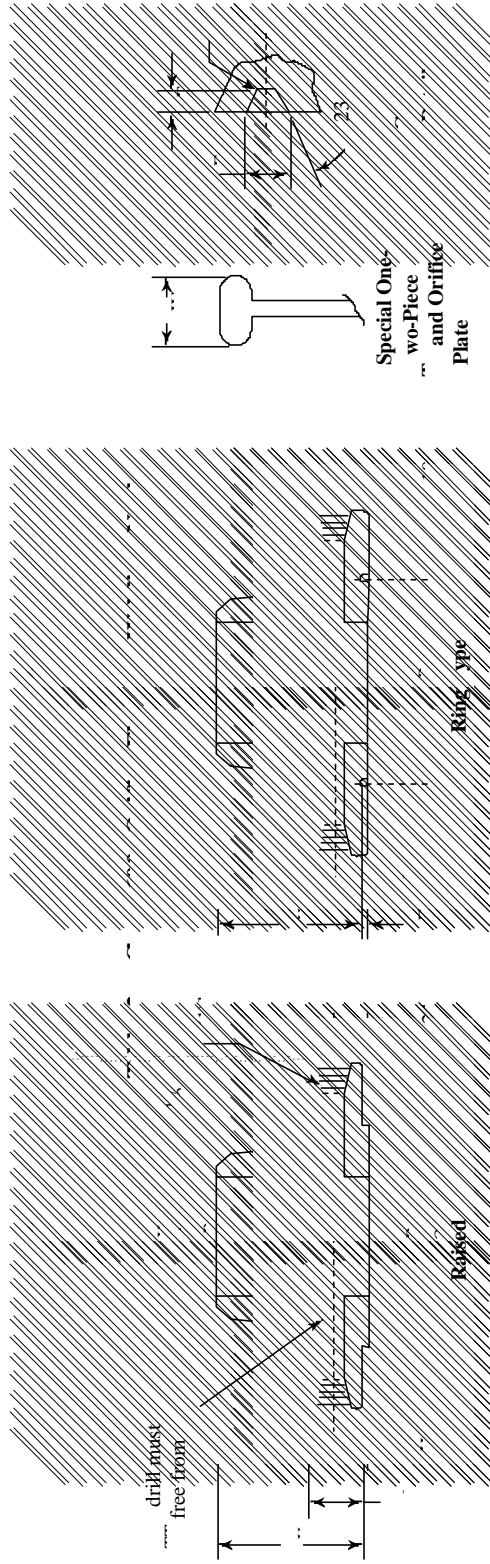
12.2 Bore Diameter

Bore diameter tolerance (welding neck flanges only) is $\pm 0.5\%$ of nominal value.

¹ See para. 8.2.

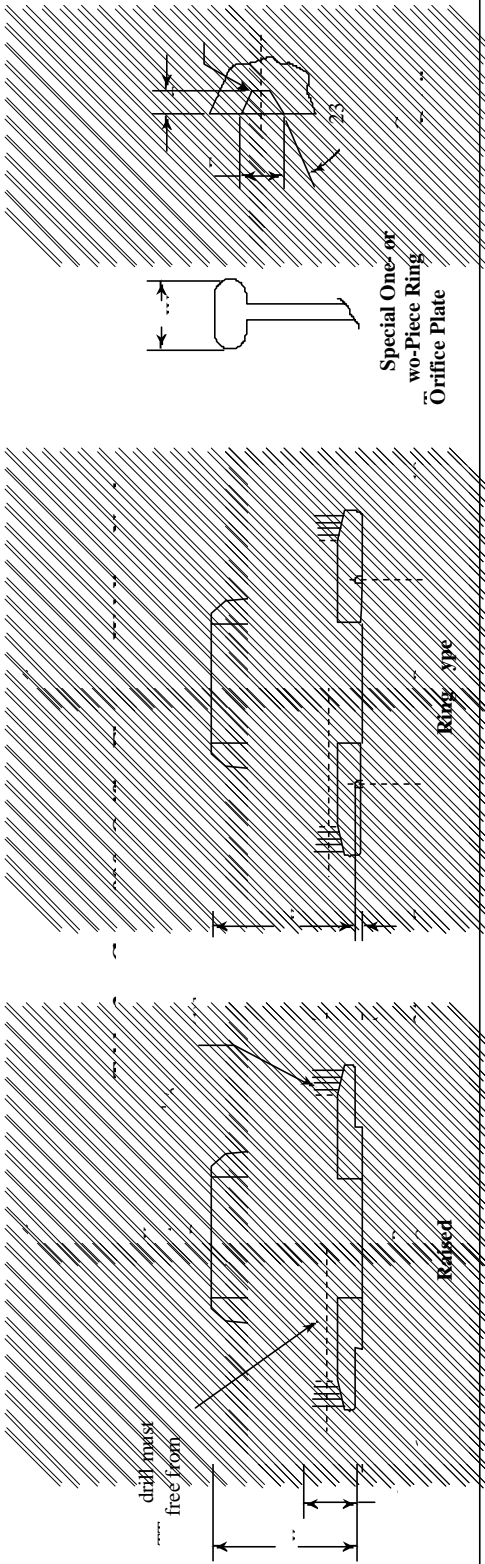
Slip- Diameter	Slip- Diameter	Slip- Diameter	Through		Diameter		Diameter		Diameter		Diameter		Templ. Diameter	Diameter	Diameter
			Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter	Slip- Diameter			
1	20.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1.5	30.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
2	40.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
3	50.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
4	60.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
5	70.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
6	80.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
8	100.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
10	120.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
15	150.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0
20	200.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
25	250.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0	125.0
30	300.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
35	350.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0	175.0
40	400.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0	200.0
45	450.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0
50	500.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0	250.0
55	550.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0	275.0
60	600.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
65	650.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0	325.0
70	700.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0	350.0
75	750.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0	375.0
80	800.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
85	850.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0	425.0
90	900.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0	450.0
95	950.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0	475.0
100	1000.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0

(5). See Note



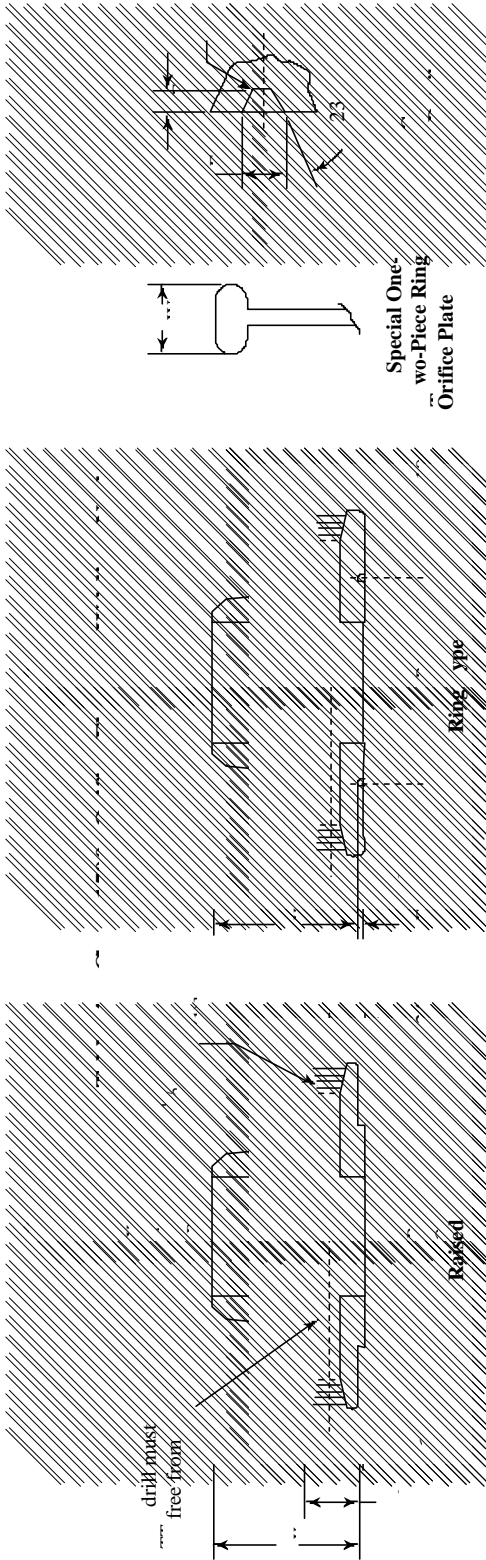
Nominal Diameter	Raised				Ring type				Special One-Piece and Orifice Plate			
	Depth	Bottom	Through	Diameter	Depth	Bottom	Through	Diameter	Depth	Bottom	Through	Diameter
1.5	0.01	0.00	0.01	1.50	0.01	0.00	0.01	1.50	0.01	0.00	0.01	1.50
2.0	0.01	0.00	0.01	2.00	0.01	0.00	0.01	2.00	0.01	0.00	0.01	2.00
2.5	0.01	0.00	0.01	2.50	0.01	0.00	0.01	2.50	0.01	0.00	0.01	2.50
3.0	0.01	0.00	0.01	3.00	0.01	0.00	0.01	3.00	0.01	0.00	0.01	3.00
4.0	0.01	0.00	0.01	4.00	0.01	0.00	0.01	4.00	0.01	0.00	0.01	4.00
5.0	0.01	0.00	0.01	5.00	0.01	0.00	0.01	5.00	0.01	0.00	0.01	5.00
6.0	0.01	0.00	0.01	6.00	0.01	0.00	0.01	6.00	0.01	0.00	0.01	6.00
8.0	0.01	0.00	0.01	8.00	0.01	0.00	0.01	8.00	0.01	0.00	0.01	8.00
10.0	0.01	0.00	0.01	10.00	0.01	0.00	0.01	10.00	0.01	0.00	0.01	10.00
15.0	0.01	0.00	0.01	15.00	0.01	0.00	0.01	15.00	0.01	0.00	0.01	15.00
20.0	0.01	0.00	0.01	20.00	0.01	0.00	0.01	20.00	0.01	0.00	0.01	20.00
25.0	0.01	0.00	0.01	25.00	0.01	0.00	0.01	25.00	0.01	0.00	0.01	25.00
30.0	0.01	0.00	0.01	30.00	0.01	0.00	0.01	30.00	0.01	0.00	0.01	30.00
40.0	0.01	0.00	0.01	40.00	0.01	0.00	0.01	40.00	0.01	0.00	0.01	40.00
50.0	0.01	0.00	0.01	50.00	0.01	0.00	0.01	50.00	0.01	0.00	0.01	50.00
60.0	0.01	0.00	0.01	60.00	0.01	0.00	0.01	60.00	0.01	0.00	0.01	60.00
80.0	0.01	0.00	0.01	80.00	0.01	0.00	0.01	80.00	0.01	0.00	0.01	80.00
100.0	0.01	0.00	0.01	100.00	0.01	0.00	0.01	100.00	0.01	0.00	0.01	100.00
150.0	0.01	0.00	0.01	150.00	0.01	0.00	0.01	150.00	0.01	0.00	0.01	150.00
200.0	0.01	0.00	0.01	200.00	0.01	0.00	0.01	200.00	0.01	0.00	0.01	200.00
250.0	0.01	0.00	0.01	250.00	0.01	0.00	0.01	250.00	0.01	0.00	0.01	250.00
300.0	0.01	0.00	0.01	300.00	0.01	0.00	0.01	300.00	0.01	0.00	0.01	300.00
400.0	0.01	0.00	0.01	400.00	0.01	0.00	0.01	400.00	0.01	0.00	0.01	400.00
500.0	0.01	0.00	0.01	500.00	0.01	0.00	0.01	500.00	0.01	0.00	0.01	500.00
600.0	0.01	0.00	0.01	600.00	0.01	0.00	0.01	600.00	0.01	0.00	0.01	600.00
800.0	0.01	0.00	0.01	800.00	0.01	0.00	0.01	800.00	0.01	0.00	0.01	800.00
1000.0	0.01	0.00	0.01	1000.00	0.01	0.00	0.01	1000.00	0.01	0.00	0.01	1000.00

(4). See Note



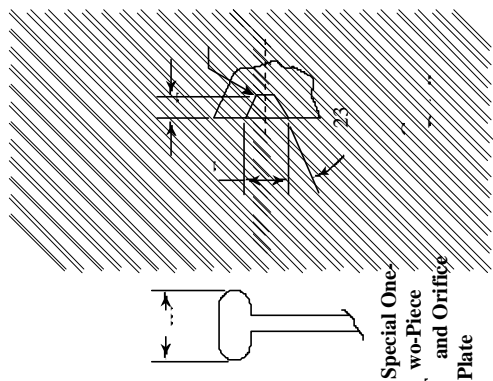
Nominal Pipe Size, NPS	Raised			Ring type			Special One-Piece or Two-Piece Ring Orifice Plate		
	Diameter	Through	Depth	Diameter	Through	Depth	Diameter	Through	Depth
1/4	107.0	107.0	7.00	107.0	107.0	7.00	107.0	107.0	7.00
3/8	149.23	149.23	7.00	149.23	149.23	7.00	149.23	149.23	7.00
1/2	211.12	211.12	7.00	211.12	211.12	7.00	211.12	211.12	7.00
3/4	269.88	269.88	7.00	269.88	269.88	7.00	269.88	269.88	7.00
1.0	323.85	323.85	7.00	323.85	323.85	7.00	323.85	323.85	7.00
1.5	419.10	419.10	7.00	419.10	419.10	7.00	419.10	419.10	7.00
2.0	469.90	469.90	7.00	469.90	469.90	7.00	469.90	469.90	7.00
2.5	533.40	533.40	7.00	533.40	533.40	7.00	533.40	533.40	7.00
3.0	584.20	584.20	7.00	584.20	584.20	7.00	584.20	584.20	7.00
3.5	692.15	692.15	7.00	692.15	692.15	7.00	692.15	692.15	7.00

(4). See Note

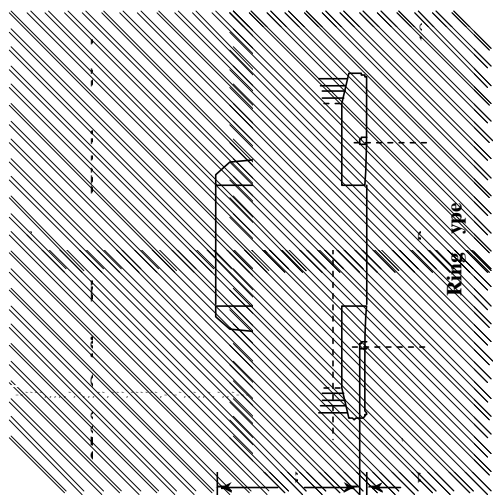


Nominal Diameter, inches (mm)	Actual Diameter, inches (mm)	Thickness, inches (mm)	Type		Depth			Diameter		Temp., °F (°C)	Pressure, psi (bar)
			Through	Bottom	Max.	Min.	Max.	Min.			
1	1.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0
1.4	1.40	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4
2	2.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0
2.5	2.50	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5
3	3.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.0
4	4.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0	4.0
5	5.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.0
6	6.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	6.0
8	8.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	8.0
10	10.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	10.0
12	12.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	12.0	12.0
14	14.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.0	14.0
16	16.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	16.0
18	18.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.0	18.0
20	20.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0
24	24.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	24.0
28	28.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.0	28.0
32	32.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.0	32.0
36	36.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.0	36.0
40	40.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	40.0
44	44.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.0	44.0
48	48.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.0	48.0
52	52.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	52.0	52.0
56	56.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.0	56.0
60	60.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	60.0
64	64.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	64.0	64.0
68	68.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.0	68.0
72	72.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	72.0	72.0
76	76.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.0	76.0
80	80.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.0	80.0
84	84.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	84.0	84.0
88	88.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.0	88.0
92	92.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.0	92.0
96	96.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	96.0	96.0
100	100.00	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0

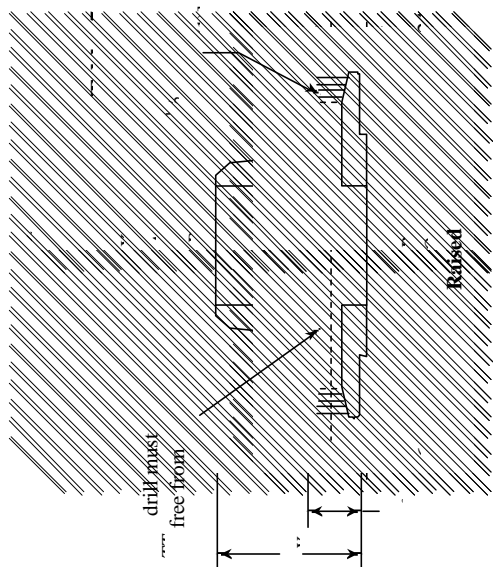
(4). See Note



Special One-Piece No-Piece and Orifice Plate



Ring type



Raised

Plate Coefficient	Diameter of Orifice		Type		Depth		Bottom		Diameter		Temp.		Yield Stress	Tensile Strength
	Plate	Coef.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.		
1	50.0	1.50	20.0	10.0	0.75	0.75	0.0	0.4	57	30.5	1	7.6	150	150
1.5	75.0	2.25	30.0	15.0	1.00	1.00	0.0	0.6	70	40.7	1.5	11.4	100	100
2	100.0	3.00	40.0	20.0	1.25	1.25	0.0	0.8	83	50.9	2	15.2	100	100
3	150.0	4.50	60.0	30.0	1.50	1.50	0.0	1.0	96	61.1	3	19.0	100	100
4	200.0	6.00	80.0	40.0	1.75	1.75	0.0	1.2	109	71.3	4	22.8	100	100
5	250.0	7.50	100.0	50.0	2.00	2.00	0.0	1.4	122	81.5	5	26.6	100	100
6	300.0	9.00	120.0	60.0	2.25	2.25	0.0	1.6	135	91.7	6	30.4	100	100
7	350.0	10.50	140.0	70.0	2.50	2.50	0.0	1.8	148	101.9	7	34.2	100	100
8	400.0	12.00	160.0	80.0	2.75	2.75	0.0	2.0	161	112.1	8	38.0	100	100
9	450.0	13.50	180.0	90.0	3.00	3.00	0.0	2.2	174	122.3	9	41.8	100	100
10	500.0	15.00	200.0	100.0	3.25	3.25	0.0	2.4	187	132.5	10	45.6	100	100
11	550.0	16.50	220.0	110.0	3.50	3.50	0.0	2.6	200	142.7	11	49.4	100	100

(4). See Note

Fig. 1 Corner Taps

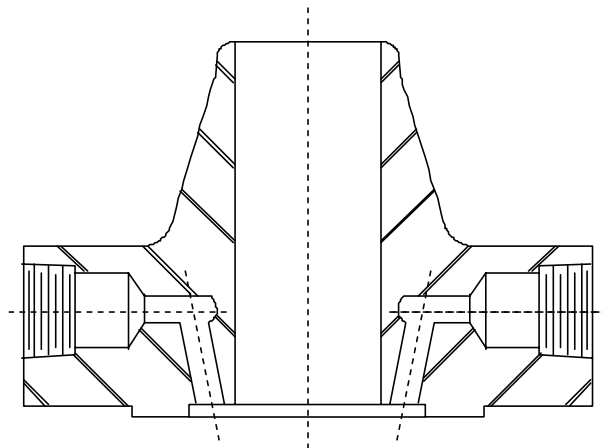


Fig. 2 Angular Meter Tap for RTJ Flanges

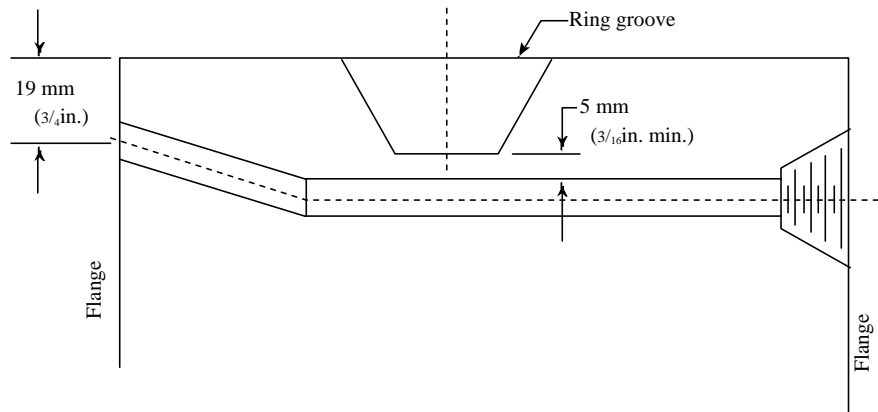
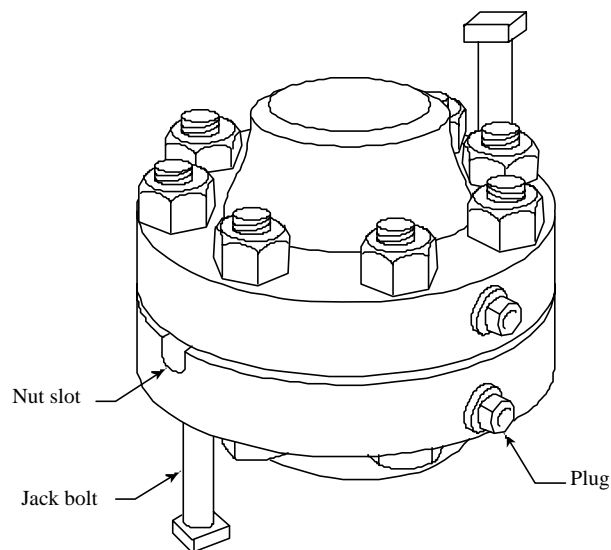


Fig. 3 Jack Bolts



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MANDATORY APPENDIX I

DIMENSIONAL DATA FOR CLASSES 300, 600, 900, 1500, AND 2500 FLANGES IN U.S. CUSTOMARY UNITS

This Appendix is an integral part of ASME B16.36-2006, and it is placed after the main text for convenience. Tables I-1 through I-5, included in this

Appendix, provide dimensional data in U.S. Customary units for the following: Classes 300, 600, 900, 1500, and 2500 flanges.

Nominal Diameter (in)	Through		Slip		Diameter		Diameter		Diameter		Diameter		Diameter		Diameter	
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.5	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50
2	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
2.5	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
4	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
5	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
6	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00
8	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
10	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
12	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
14	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
16	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00	16.00
18	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00
20	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00
24	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00	24.00
30	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
36	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
42	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00	42.00
48	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00	48.00
60	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
72	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00	72.00
84	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00	84.00
96	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00	96.00
108	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00	108.00
120	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00	120.00

(5). See Note

14-

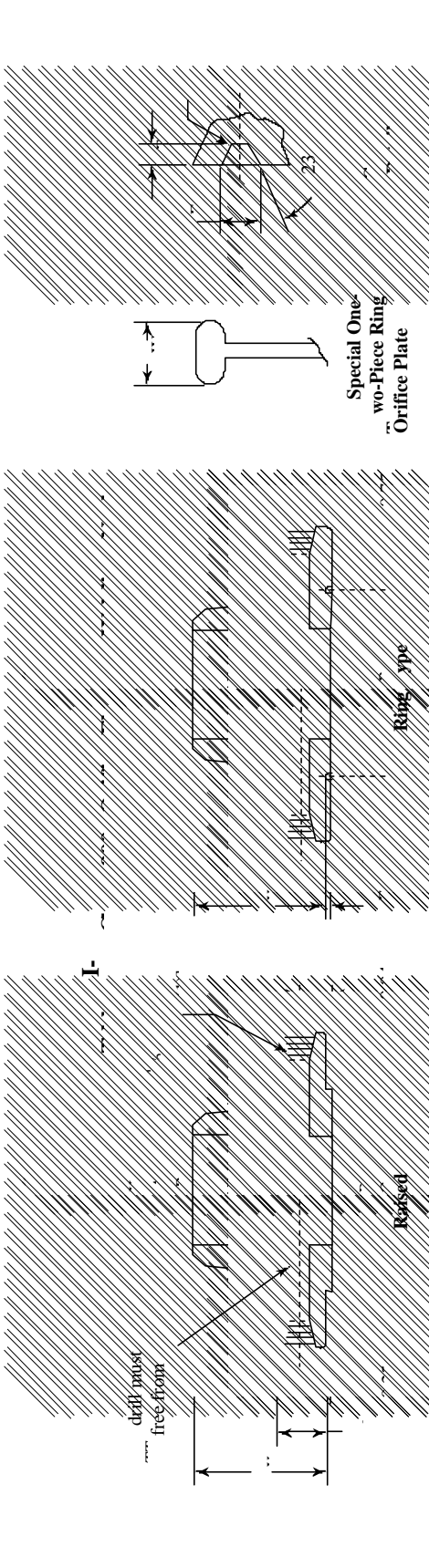


Plate No.	Raised		Ring type		Special One-Piece Ring Orifice Plate	
	Diameter of Plate	Depth	Diameter of Plate	Depth	Diameter of Plate	Depth
1	6.00	0.10	6.00	0.10	6.00	0.10
2	10.00	0.10	10.00	0.10	10.00	0.10
3	15.00	0.10	15.00	0.10	15.00	0.10
4	20.00	0.10	20.00	0.10	20.00	0.10
5	25.00	0.10	25.00	0.10	25.00	0.10
6	30.00	0.10	30.00	0.10	30.00	0.10
7	35.00	0.10	35.00	0.10	35.00	0.10
8	40.00	0.10	40.00	0.10	40.00	0.10
9	45.00	0.10	45.00	0.10	45.00	0.10
10	50.00	0.10	50.00	0.10	50.00	0.10
11	55.00	0.10	55.00	0.10	55.00	0.10
12	60.00	0.10	60.00	0.10	60.00	0.10
13	65.00	0.10	65.00	0.10	65.00	0.10
14	70.00	0.10	70.00	0.10	70.00	0.10
15	75.00	0.10	75.00	0.10	75.00	0.10
16	80.00	0.10	80.00	0.10	80.00	0.10
17	85.00	0.10	85.00	0.10	85.00	0.10
18	90.00	0.10	90.00	0.10	90.00	0.10
19	95.00	0.10	95.00	0.10	95.00	0.10
20	100.00	0.10	100.00	0.10	100.00	0.10
21	105.00	0.10	105.00	0.10	105.00	0.10
22	110.00	0.10	110.00	0.10	110.00	0.10
23	115.00	0.10	115.00	0.10	115.00	0.10
24	120.00	0.10	120.00	0.10	120.00	0.10
25	125.00	0.10	125.00	0.10	125.00	0.10
26	130.00	0.10	130.00	0.10	130.00	0.10
27	135.00	0.10	135.00	0.10	135.00	0.10
28	140.00	0.10	140.00	0.10	140.00	0.10
29	145.00	0.10	145.00	0.10	145.00	0.10
30	150.00	0.10	150.00	0.10	150.00	0.10
31	155.00	0.10	155.00	0.10	155.00	0.10
32	160.00	0.10	160.00	0.10	160.00	0.10
33	165.00	0.10	165.00	0.10	165.00	0.10
34	170.00	0.10	170.00	0.10	170.00	0.10
35	175.00	0.10	175.00	0.10	175.00	0.10
36	180.00	0.10	180.00	0.10	180.00	0.10
37	185.00	0.10	185.00	0.10	185.00	0.10
38	190.00	0.10	190.00	0.10	190.00	0.10
39	195.00	0.10	195.00	0.10	195.00	0.10
40	200.00	0.10	200.00	0.10	200.00	0.10
41	205.00	0.10	205.00	0.10	205.00	0.10
42	210.00	0.10	210.00	0.10	210.00	0.10
43	215.00	0.10	215.00	0.10	215.00	0.10
44	220.00	0.10	220.00	0.10	220.00	0.10
45	225.00	0.10	225.00	0.10	225.00	0.10
46	230.00	0.10	230.00	0.10	230.00	0.10
47	235.00	0.10	235.00	0.10	235.00	0.10
48	240.00	0.10	240.00	0.10	240.00	0.10
49	245.00	0.10	245.00	0.10	245.00	0.10
50	250.00	0.10	250.00	0.10	250.00	0.10

(4). See Note

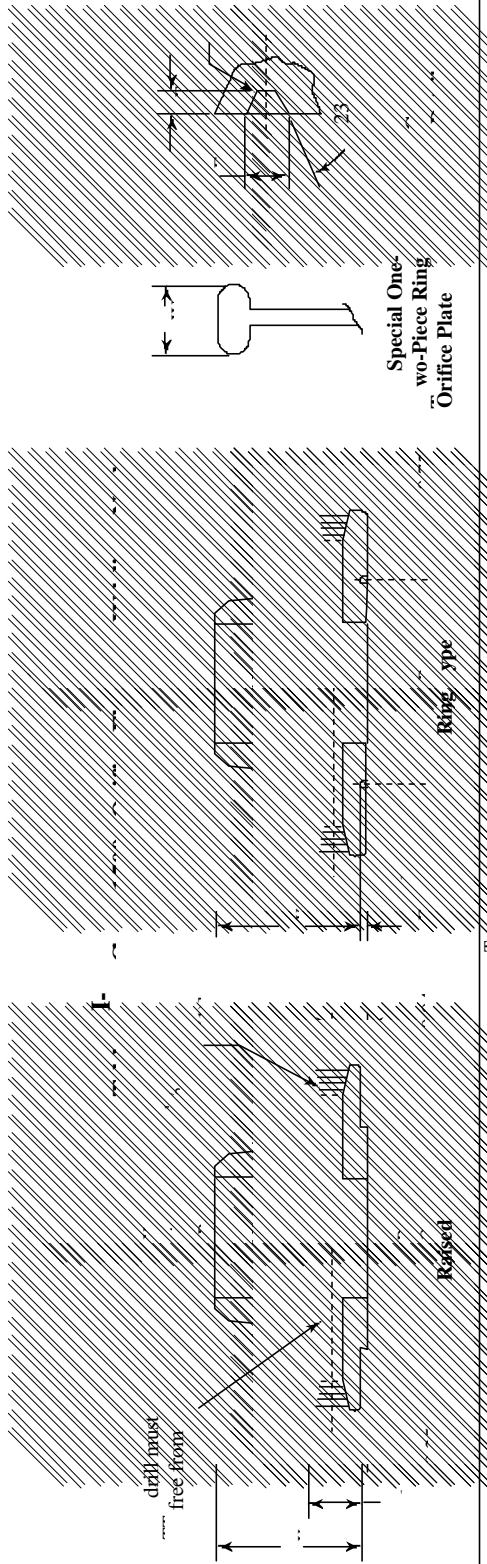
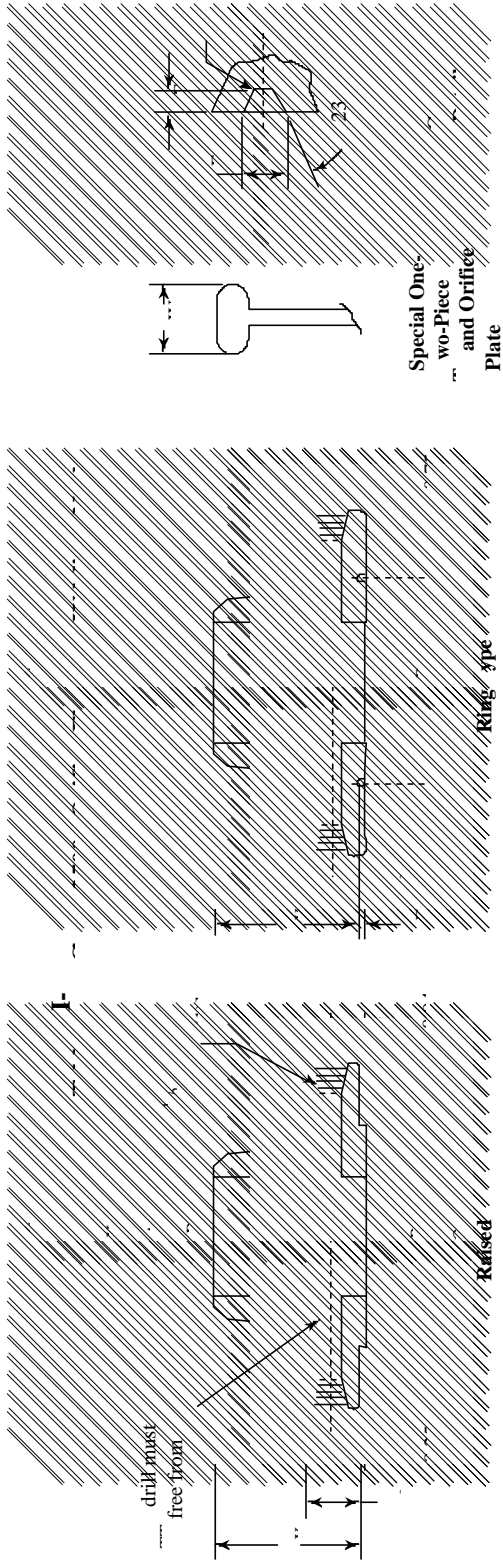


Plate Size	Nominal Diameter of Orifice	Actual Diameter of Orifice	Thickness	Through		Depth	Weight	Bottom	Ring type		Diameter	Temp.	Yield Stress
				HT	LT				HT	LT			
1	2.00	2.00	1.50	3.00	3.00	0.050	0.344	0.00	1.00	0.00	1.00	1.00	1.00
1.5	3.00	3.00	2.00	3.50	3.50	0.050	0.514	0.00	1.00	0.00	1.00	1.00	1.00
2	4.00	4.00	2.50	4.00	4.00	0.050	0.684	0.00	1.00	0.00	1.00	1.00	1.00
2.5	5.00	5.00	3.00	4.50	4.50	0.050	0.854	0.00	1.00	0.00	1.00	1.00	1.00
3	6.00	6.00	3.50	5.00	5.00	0.050	1.024	0.00	1.00	0.00	1.00	1.00	1.00
3.5	7.00	7.00	4.00	5.50	5.50	0.050	1.194	0.00	1.00	0.00	1.00	1.00	1.00
4	8.00	8.00	4.50	6.00	6.00	0.050	1.364	0.00	1.00	0.00	1.00	1.00	1.00
5	10.00	10.00	5.50	7.00	7.00	0.050	1.874	0.00	1.00	0.00	1.00	1.00	1.00
6	12.00	12.00	6.50	8.00	8.00	0.050	2.384	0.00	1.00	0.00	1.00	1.00	1.00
8	16.00	16.00	8.50	10.00	10.00	0.050	3.394	0.00	1.00	0.00	1.00	1.00	1.00
10	20.00	20.00	11.00	12.00	12.00	0.050	4.404	0.00	1.00	0.00	1.00	1.00	1.00
12	24.00	24.00	13.50	14.00	14.00	0.050	5.414	0.00	1.00	0.00	1.00	1.00	1.00
14	28.00	28.00	16.00	16.00	16.00	0.050	6.424	0.00	1.00	0.00	1.00	1.00	1.00
16	32.00	32.00	18.50	18.00	18.00	0.050	7.434	0.00	1.00	0.00	1.00	1.00	1.00
18	36.00	36.00	21.00	20.00	20.00	0.050	8.444	0.00	1.00	0.00	1.00	1.00	1.00
20	40.00	40.00	23.50	22.00	22.00	0.050	9.454	0.00	1.00	0.00	1.00	1.00	1.00
24	48.00	48.00	28.50	27.00	27.00	0.050	11.464	0.00	1.00	0.00	1.00	1.00	1.00

(4). See Note



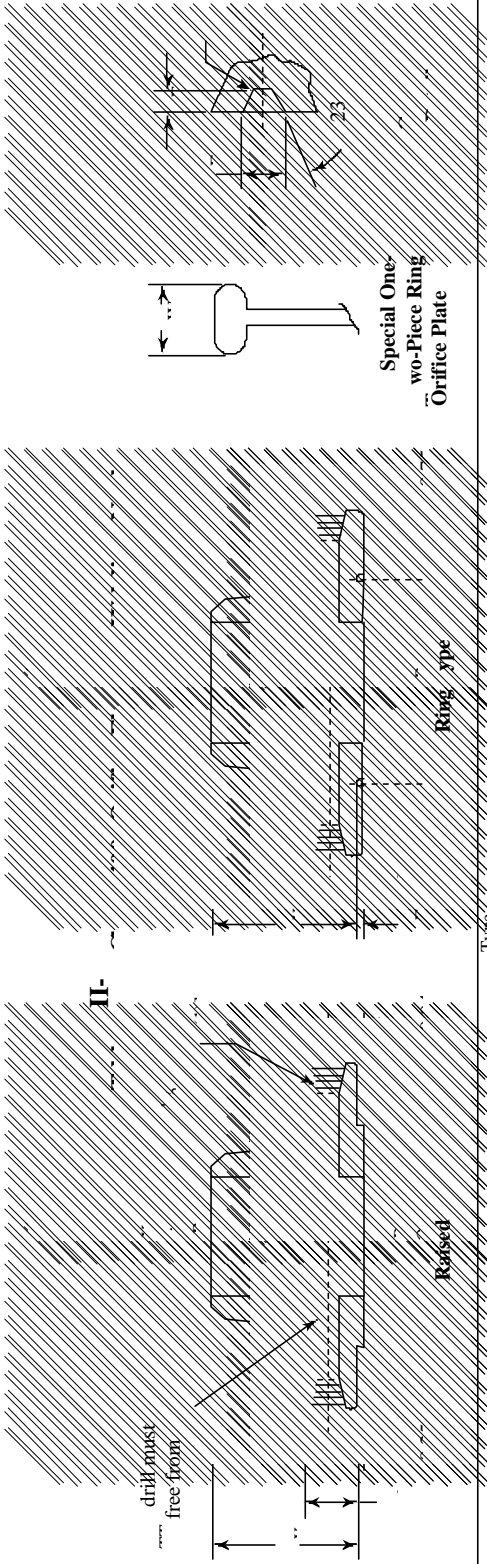
Nominal Size, in.	Nominal Size, mm	Type		Through		Bottom		Diameter		Temp.	
		Depth, in.	Depth, mm	Bottom, in.	Bottom, mm	Through, in.	Through, mm	Bottom, in.	Bottom, mm	Temp., °F	Temp., °C
1/2	12.7	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
3/4	19.0	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
1	25.4	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
1 1/2	38.1	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
2	50.8	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
2 1/2	63.5	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
3	76.2	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
3 1/2	88.9	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
4	101.6	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
5	127.0	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
6	152.4	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
8	203.2	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
10	254.0	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6
12	304.8	0.020	0.508	0.000	0.000	0.000	0.000	0.000	0.000	1.000	7.6

(4). See Note

MANDATORY APPENDIX II

DIMENSIONAL DATA FOR CLASS 400 FLANGES IN U.S. CUSTOMARY UNITS

This Appendix is an integral part of ASME B16.36-2006, and it is placed after the main text for convenience. Table II-1, included in this Appendix, provides dimensional data in U.S. Customary units for Class 400 flanges.



Type	Diameter	Through	Depth	Bottom	Ring type	Templ	
						Templ	Templ
II-	10.000	3.00	0.120	0.00	0.120	1.00	1.00
	12.500	4.00	0.120	0.00	0.120	1.00	1.00
	15.000	4.00	0.120	0.00	0.120	1.00	1.00
	17.500	4.00	0.120	0.00	0.120	1.00	1.00
	20.000	5.00	0.120	0.00	0.120	1.00	1.00
	22.500	5.00	0.120	0.00	0.120	1.00	1.00
	25.000	6.00	0.120	0.00	0.120	1.00	1.00
	27.500	6.00	0.120	0.00	0.120	1.00	1.00
	30.000	7.00	0.120	0.00	0.120	1.00	1.00
	32.500	7.00	0.120	0.00	0.120	1.00	1.00
III-	10.000	3.00	0.120	0.00	0.120	1.00	1.00
	12.500	4.00	0.120	0.00	0.120	1.00	1.00
	15.000	4.00	0.120	0.00	0.120	1.00	1.00
	17.500	4.00	0.120	0.00	0.120	1.00	1.00
	20.000	5.00	0.120	0.00	0.120	1.00	1.00
	22.500	5.00	0.120	0.00	0.120	1.00	1.00
	25.000	6.00	0.120	0.00	0.120	1.00	1.00
	27.500	6.00	0.120	0.00	0.120	1.00	1.00
	30.000	7.00	0.120	0.00	0.120	1.00	1.00
	32.500	7.00	0.120	0.00	0.120	1.00	1.00

(4). See Note

14-

4-

12-

4-

MANDATORY APPENDIX III

REFERENCES

The following is a list of publications referenced in this Standard.

ASME B1.20.1-1983 (R2001), Pipe Threaded, General Purpose (Inch)¹

ASME B16.5-2003, Pipe Flanges and Flanged Fittings¹

ASME B16.11-2001, Forged Fittings, Socket-Welding and Threaded¹

ASME B16.21-1992, Nonmetallic Gaskets for Pipe Flanges¹

ASME Boiler and Pressure Vessel Code, 2004 Edition: Section I, Power Boilers; Section II, Materials; Section

III, Nuclear Power Plant Components; Section VIII, Divisions 1 and 2, Pressure Vessels¹

Publisher: The American Society of Mechanical Engineers (ASME), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, P.O. Box 2300, Fairfield, NJ 07007-2300

ISO 9000: 2000, Quality Management Systems — Fundamentals and Vocabulary¹

ISO 9001: 2000, Quality Management Systems — Requirements¹

ISO 9004: 2000, Quality Management Systems — Guidelines for Performance Improvements¹

Publisher: International Organization for Standardization (ISO), 1 ch. de la Voie-Creuse, Case postale 56, CH-1211 Genève 20, Switzerland/Suisse

¹ May also be obtained from the American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036

NONMANDATORY APPENDIX A

QUALITY SYSTEM PROGRAM

The products manufactured in accordance with this Standard shall be produced under a quality system program following the principles of an appropriate standard from the ISO 9000 series.¹ A determination of the need for registration and/or certification of the product

¹ The series is also available from the American National Standards Institute (ANSI) and the American Society for Quality (ASQ) as American National Standards that are identified by a prefix "Q" replacing the prefix "ISO." Each standard of the series is listed under Mandatory Appendix III.

manufacturer's quality system program by an independent organization shall be the responsibility of the manufacturer. The detailed documentation demonstrating program compliance shall be available to the purchaser at the manufacturer's facility. A written summary description of the program utilized by the product manufacturer shall be available to the purchaser upon request. The product manufacturer is defined as the entity whose name or trademark appears on the product in accordance with the marking or identification requirements of this Standard.

B16 AMERICAN NATIONAL STANDARDS FOR PIPING, PIPE FLANGES, FITTINGS, AND VALVES

Scheme for the Identification of Piping Systems	A13.1-1996 (R2002)
Pipe Threads, General Purpose (Inch)	B1.20.1-1983 (R2001)
Dryseal Pipe Threads (Inch)	B1.20.3-1976 (R2003)
Gray Iron Pipe Flanges and Flanged Fittings (Classes 25, 125, and 250)	B16.1-2005
Malleable Iron Threaded Fittings: Classes 150 and 300	B16.3-1998
Gray Iron Threaded Fittings: Classes 125 and 250	B16.4-2006
Pipe Flanges and Flanged Fittings NPS/Through NPS 24 Metric/Inch Standard	B16.5-2003
Factory-Made Wrought Butt welding Fittings	B16.9-2003
Face-to-Face and End-to-End Dimensions of Valves	B16.10-2000 (R2003)
Forged Fittings, Socket-Welding and Threaded	B16.11-2005
Cast Iron Threaded Drainage Fittings	B16.12-1998
Ferrous Pipe Plugs, Bushings, and Locknuts with Pipe Threads	B16.14-1991
Cast Copper Alloy Threaded Fittings	B16.15-2006
Cast Copper Alloy Solder Joint Pressure Fittings	B16.18-2001
Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed	B16.20-1998 (R2004)
Nonmetallic Flat Gaskets for Pipe Flanges	B16.21-2005
Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	B16.22-2001
Cast Copper Alloy Solder Joint Drainage Fittings: DWV	B16.23-2002
Cast Copper Alloy Pipe Flanges and Flanged Fittings: Classes 150, 300, 600, 900, 1500, and 2500	B16.24-2006
Butt welding Ends	B16.25-2003
Cast Copper Alloy Fittings for Flared Copper Tubes	B16.26-2006
Wrought Steel Butt welding Short Radius Elbows and Returns	B16.28-1994
Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings — DWV	B16.29-2001
Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 PSI (Sizes NPS $\frac{1}{2}$ Through NPS 2)	B16.33-2002
Valves — Flanged, Threaded, and Welding End	B16.34-2004
Orifice Flanges	B16.36-2006
Large Metallic Valves for Gas Distribution (Manually Operated, NPS $\frac{2}{3}$ to 12, 125 psig Maximum)	B16.38-1985 (R2005)
Malleable Iron Threaded Pipe Unions: Classes 150, 250, and 300	B16.39-1998
Manually Operated Thermoplastic Gas Shutoffs and Valves in Gas Distribution Systems	B16.40-2002
Functional Qualification Requirements for Power Operated Active Valve Assemblies for Nuclear Power Plants	B16.41-1983 (R1989)
Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300	B16.42-1998
Manually Operated Metallic Gas Valves for Use in Aboveground Piping Systems Up To 5 PSI	B16.44-2002
Cast Iron Fittings for Solvent Drainage Systems	B16.45-1998
Large Diameter Steel Flanges NPS 26 Through NPS 60 Metric/Inch Standard	B16.47-2006
Line Blanks	B16.48-2005
Factory-Made Wrought Steel Butt welding Induction Bends for Transportation and Distribution Systems	B16.49-2000
Wrought Copper and Copper Alloy Braze-Joint Pressure Fittings	B16.50-2001
Power Piping	B31.1-2004
Fuel Gas Piping	B31.2-1968
Process Piping	B31.3-2004
Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids	B31.4-2002
Refrigeration Piping and Heat Transfer Components	B31.5-2001
Gas Transmission and Distribution Piping Systems	B31.8-2003
Building Services Piping	B31.9-2004
Slurry Transportation Piping Systems	B31.11-2002
Manual for Determining the Remaining Strength of Corroded Pipelines	B31G-1991 (R2004)
Welded and Seamless Wrought Steel Pipe	B36.10M-2004
Stainless Steel Pipe	B36.19M-2004
Self-Operated and Power-Operated Safety-Related Valves Functional Specification Standard	N278.1-1975 (R1992)

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