Proposed Revision of:

Orifice Flanges

Draft Date 06/2020

TENTATIVE
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ASME Codes and Standards
1 SCOPE

This Standard covers pressure-temperature ratings, materials, dimensions, tolerances, testing, and making of 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.

2 GENERAL

2.1 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.

2.2 Quality Systems

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

2.3 Relevant Units

This Standard states values in both SI (Metric) and U.S. Customary units. As an exception, diameter of bolts and flange bolt holes are expressed in inch units only. These systems of units are to be regarded separately as standard. Within the text, the U.S. Customary units are shown in parentheses or in separate tables. The values stated in each system are not exact equivalents; therefore, it is required that each system of units be used independently of the other. Except for diameter of bolts and flange bolt holes, combining values from the two systems constitutes nonconformance with the Standard. 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 flanges; however, Mandatory Appendix II does contain requirements for this class, expressed in U.S. Customary units only.

2.4 Convention

For determining conformance with this Standard, the convention for fixing significant digits where limits (maximum and minimum values) are specified, shall be as defined in ASTM E29. This requires that an observed or calculated value 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 measurement.

2.5 Denotation

2.5.1 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.

2.5.2 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:

<table>
<thead>
<tr>
<th>NPS</th>
<th>DN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>1½</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>2½</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td>4</td>
<td>100</td>
</tr>
</tbody>
</table>

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

2.6 Service Conditions

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

3 PRESSURE-TEMPERATURE RATING

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

4 MATERIAL

4.1 General

(a) Flange materials shall be in accordance with the requirements of ASME B16.5. Flanges shall be manufactured as one piece in accordance with the applicable materials specification. Assembly of multiple pieces into the finished product by welding or other means is not permitted by this Standard.
For materials manufactured to editions of the material specification other than those listed in Mandatory Appendix III of ASME B16.5, refer to para. 4.3.

4.2 Bolting

Bolting material recommendations are given in ASME B16.5. For materials manufactured to editions of the material specification other than those listed in Mandatory Appendix III of ASME B16.5, refer to para. 4.3.

4.3 Materials Manufactured to Other Editions

Materials may meet the requirements of material specification editions other than those listed in Mandatory Appendix III of ASME B16.5, provided

(a) the materials are the same specification, e.g., grade, type, class, or alloy, and heat-treated conditions, as applicable

(b) the flange manufacturer certifies that the requirements of the edition of the specification listed in Mandatory Appendix III of ASME B16.5 have been met

4.4 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.

5 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.

6 MARKING

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

7 FLANGE FACING FINISH

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

8 GASKETS FOR RAISED FACE FLANGES

8.1 Gasket Thickness

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

8.2 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 through 5 or those listed in Tables I-2 through 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.

9 PRESSURE TAPS

9.1 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 1 1/2 and smaller if space permits. See Fig. 1.

For ring joint flanges listed in Tables 2 through 5, Tables I-2 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.

9.2 Location

9.2.1 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.

9.2.2 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.

9.3 Pipe Connection

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

10 JACK SCREW PROVISION

10.1 Location

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

10.2 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...
9 PRESSURE TAPS

9.1 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-2 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.

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Figure 4: Weld Attachment of NPS 3/4 Nipple to Flange
MANDATORY APPENDIX III
REFERENCES

The following is a list of publications referenced in this Standard. The latest editions of ASME publications are to be used.

ASME B1.20.1, Pipe Threaded, General Purpose (Inch)
ASME B16.5, Pipe Flanges and Flanged Fittings
ASME B16.11, Forged Fittings, Socket-Welding and Threaded
ASME B16.21, Nonmetallic Gaskets for Pipe Flanges
ASME Boiler and Pressure Vessel Code: Section I, Power Boilers; Section II, Materials; Section III, Nuclear Power Plant Components; Section VIII, Divisions 1 and 2, Pressure Vessels

*Insert New*
ASME B36.10M, Welded and Seamless Wrought Steel Pipe
ASME B31.1, Power Piping
ASME B31.3, Process Piping

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (www.asme.org)
ISO 9000:2005, Quality management systems — Fundamentals and vocabulary
ISO 9001:2008, Quality management systems — Requirements
ISO 9004:2000, Quality management systems — Guidelines for performance improvements
Publisher: International Organization for Standardization (ISO), 1 ch. de la Voie-Creuse, Case postale 56, CH-1211 Genève 20, Switzerland/Suisse (www.iso.org)