

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 147

Gaskets for piping and vessels

06	10/2016	General Review
05	05/2015	Organisation change - January 2015
04	10/2009	Update of reference documents
03	10/2005	Addition of "EP" root to GS identification
00	02/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DSO/TEC	Managing entity: DSO/TEC/PVV
Other Approving entity(ies):	

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1. Scope

This specification comes as a complement to piping material classes and covers the technical requirements for the qualification, fabrication, inspection, and shipment of cut-out flat gaskets, spiral-wound gaskets, and ring joints used in piping systems and flanged connections to rotating machines, pressure vessels, heat exchangers, storage tanks and thermal equipments when indicated in the corresponding data sheet.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
ASME B16.20	Metallic Gaskets for Pipe Flanges - Ring-Joints, Spiral-Wound, and Jacketed
ASME B16.21	Non-metallic Flat Gaskets for Pipe Flanges
ASME B16.5	Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM D3359	Standard Test Methods for Measuring Adhesion by Tape Test
ASTM F104	Standard Classification System for Nonmetallic Gasket Materials
ASTM F152	Standard Test Methods for Tension Testing of Nonmetallic Gasket Materials
ASTM F36	Standard Test Method for Compressibility and Recovery of Gasket Materials
ASTM G14	Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)
DIN 52913	Testing of static gaskets for flange connections - Compression creep testing of gaskets made from sheets
EN 10204	Metallic products - Type of inspection documents
ISO 9001	Quality Management Systems - Requirements

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Reference	Title
GS EP PVV 112	Piping material classes
GS EP PVV 145	Flanges

3. Description of the materials

3.1 General

Asbestos containing gaskets are prohibited.

Graphite flat gaskets shall not be used for any service with Corrosion Resistant Alloy (CRA) in conductive and aerated water (> 50 ppb Oxygen).

3.2 Cut-out flat gaskets

Gaskets shall be in accordance with the standard [ASME B16.21](#).

3.2.1 Synthetic rubber gaskets

The gaskets shall be made from neoprene fabric or equivalent.

3.2.2 Other flat gaskets

Only gaskets that have successfully passed the test protocol detailed in Appendix 2 are considered as qualified. Qualification is valid for 6 years from the laboratory report issuance date.

Gaskets shall be in accordance with [ASME B16.21](#).

For hydrocarbon and lethal applications, mechanical integrity test shall also be carried out on 16" gasket.

In case of reported poor operational performance or quality issues, CPY reserves the right to immediately remove gasket qualification.

Any alternatives gasket material shall be submitted to CPY Technology Division for approval. Only material fulfilling all below preliminary parameters will be considered for potential qualification:

- Only fiber-based materials or flexible graphite materials are acceptable. PTFE or PTFE based materials shall be limited to particular applications and subject to a specific CPY approval process.
- Only 2 or 3 mm thickness gasket as mandated per relevant piping class are accepted.
- Flexible graphite material gaskets or sheets cut to size shall be one piece and without any weld.

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- Flexible graphite or reinforced fiber based materials sheet cutting shall be carried out by water jet or flash cutter only.
- Gasket faces shall have an anti-sticking coating on both sides.
- For non-asbestos fiber gasket type material, [ASTM F104](#) classification to be F 702100 E03 M7.

In addition to the above, manufacturer shall provide the following information for material complete assessment:

- Gasket faces color coding and manufacturer marking
- Graphite material composition and quality
- Flexible graphite or fiber gasket metallic reinforcement material composition and mechanical properties
- Gasket tensile strength in accordance with [ASTM F152](#)
- Gasket compressibility and elastic recovery in accordance with [ASTM F36](#)
- Gasket stress relaxation in accordance with [DIN 52913](#)
- m and Y as per applicable standard.

3.3 Spiral-wound gaskets

Only spiral-wound gaskets that have successfully passed the test protocol detailed in Appendix 3 are considered as qualified. Qualification is valid for 6 years from the laboratory report issuance date.

In case of reported poor operational performance or quality issues, CPY reserves the right to immediately remove qualification.

Gaskets shall be in accordance with the standard [ASME B16.20](#) and their spiral-wound portion shall be made from type 316 stainless steel (or higher material grade if required on the relevant piping material specification) strip.

Prerequisites for qualification shall be as follows:

- PTFE or PTFE based fillers are acceptable
- GRAPHITE based fillers shall incorporate an adequate corrosion inhibitor (which shall itself receive the Technology Division of Company prior approval) in order to prevent potential galvanic corrosion.

Gaskets shall have an external centering ring and an inner ring. The two rings are made of either an epoxy-polyester coated carbon steel or of stainless steel (i.e., made of the same metallic material as for the stainless steel strip spires). In case of epoxy-polyester coating, the painting quality shall satisfy the following criteria:

- The finished thickness shall be between 60 μ and 100 μ
- There shall be one coat only

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- Testing shall be made on one test coupon per batch for the following:
 - Adhesion ([ASTM D3359](#))
 - Impact ([ASTM G14](#))
 - Corrosion (Salt spray test per [ASTM B117](#)).

3.4 Metal ring joints

Requirements listed in this paragraph apply to all solid metallic rings, whether in accordance to a published standard or a proprietary design, for piping flanged connections or connections between piping and pressure vessels. This also includes special metal ring gasket used for local connection leak testing.

For piping flanged connections, the geometrical type (R or RX or BX) is defined in [GS EP PVV 112](#).

Metal ring shall be made out of forging only.

Maximum BRINELL hardness of ring joints shall be as in accordance with the table of Appendix 1.

4. Dimensions

4.1 Cut out flat gaskets

Gasket dimensions shall be in accordance with [ASME B16.21](#) Gasket thickness to be in accordance with relevant piping class but not less than 2 mm.

4.2 Spiral-wound gaskets

The dimensions of spiral-wound gaskets used on raised contact faces shall be in accordance with the standard [ASME B16.20](#).

4.3 Metal ring joints

Ring joints may be either oval or octagonal. Ring joints dimensions shall be in accordance with the standard [ASME B16.20](#), and shall be specified to match with the associated flanges standard.

4.4 Special gaskets

For any other type of gaskets or for gaskets with dimensions greater than the limits defined by the relevant standards, the Manufacturer shall submit a dimensional drawing to Company and to the Engineering Company for approval.

5. Quality control

Inspection and testing are required to confirm that the delivered products fulfill the requirements of the applicable standards, specifications, and requisitions. These controls shall be carried out at the Manufacturer's plant by qualified personnel independent of the production department.

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Products shall be guaranteed by an inspection certificate (conformity, material, etc.) that shall come with the supply. If Manufacturer does not have the necessary facilities to carry out of required testing, these tests may be carried out by an Inspection Agency and at a place approved by Company and the Engineering Company.

It is Engineering Company responsibility to assure that delivered gaskets match qualified product performance. In order to confirm this, Engineering Company shall verify the following parameters on spare gaskets:

For flat gaskets, [ASTM F36 / ASTM F152](#) and [DIN 52913](#) tests described in Appendix 2 shall be carried out. In case of variations with qualified product, Company reserves the right to request a complete test protocol in accordance with Appendix 2.

For metal ring, a hardness check shall be performed by diameter and by heat.

6. Manufacturer's dossier

6.1 Certificate of conformity

Gasket Manufacturer shall provide a certificate of conformity confirming that the delivered product fulfils all the requirements listed in the applicable material requisition.

6.2 Material certificates

Gasket Manufacturer shall submit material certificates in accordance with [EN 10204](#) type 3.1.

7. Preparation for shipment

7.1 Marking

7.1.1 Cut-out flat gaskets

In addition to the marking requirements listed in [ASME B16.21](#), both Manufacturer's name, trademark as well as place of manufacture identification are required on each gasket.

7.1.2 Spiral-wound gaskets

In addition to the marking requirements listed in [ASME B16.20](#), both Manufacturer's name, trademark as well as place of manufacture identification are required on each gasket.

7.1.3 Metal ring joints

In addition to the marking requirements listed in [ASME B16.20](#), the outside surface of each ring shall include the following information which shall be marked by cold stamping:

- The Manufacturer's name and trademark
- The diameter
- Pressure Class
- R, RX or BX number, followed by the identifying reference for the material grade.

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7.1.4 Special Gaskets

For any other type of gaskets or for gaskets with dimensions greater than the limits defined by the relevant standards, gasket shall bear a marking including manufacturer name and gasket series for unique gasket identification.

7.2 Protection

Ring joint gaskets other than those made of CRA material shall be covered by grease-impregnated protecting strips.

Small diameter gaskets shall be grouped in cardboard boxes or plastic pouches. Large-diameter gaskets shall be packed in rigid packing cases.

7.3 Preservation and Storage

It is supplier responsibility to provide along with the gasket the relevant preservation documentation to be followed in order to insure the best use of its product. This documentation shall be included with the product in the gasket packaging.

Gasket storage in vertical position is forbidden.

7.4 Packing

Packing details shall be provided by purchaser based on Manufacturer's preservation procedure. Packing instructions shall take into account shipment, handling and long term storage at place of transit or final delivery.