



Exploration & Production

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 147

Gaskets for piping and vessels

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1. Scope

This specification completes the description shown on individual piping material classes and covers the technical requirements for the fabrication, inspection, and shipment of cut-out flat gaskets, spiral-wound gaskets, and ring joints used for valves and piping flanges.

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
ASME B16.5	Pipe Flanges and Flanged Fittings (NPS ½ through NPS 24)
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 B16.47	Large Diameter Steel Flanges (NPS 26 through NPS 60)
ASTM B 117	Standard Specification for Practice for Operating Salt Spray (Fog) Apparatus
ASTM D 3359	Standard Specification for Test Method for Measuring Adhesion by Tape Test
ASTM F 36	Standard Specification for Test Method for Compressibility and Recovery of Gasket Materials
ASTM F 104	Standard Specification for Classification Systems for Nonmetallic Gasket Materials
ASTM F 152	Standard Specification for Test Method for Tension Testing of Nonmetallic Gasket Materials
ASTM G 14	Standard Specification for Test Method for Impact Resistance of Pipeline Coatings
DIN 3535	Determination of tensile strength
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

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
ASME B31.3	Process Piping

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP PVV 112	Piping material classes

3. Description of the materials

3.1 General

Asbestos containing gaskets are prohibited.

Graphite impregnated flat gasket shall not be used with CRA (Corrosion Resistant Alloy) material (when in contact with a medium containing salty water) to avoid potential risk of crevice corrosion.

3.2 Cut-out flat gaskets

3.2.1 Synthetic rubber gaskets

The gaskets shall be made from neoprene fabric or equivalent.

3.2.2 Other flat gaskets

Flat gaskets are subject to the COMPANY Technology Division prior approval. The approval is based on the following requirements:

- PTFE or PTFE based materials are not acceptable.
- Only fiber-based materials or flexible graphite materials will be considered for the qualification. The qualification procedure is described in Appendix 1.
- The qualification will remain valid for six years except adverse findings are identified meanwhile on the same material through testing performed by the COMPANY on actual

supply. In such case the authorization for the use of the material will be immediately suspended.

- d) Material data sheet shall be submitted prior to starting the qualification test. It shall include the following:
- The colour coding of the two faces and the MANUFACTURER marking of the two faces of the product that identify plainly and durably the product. In case such colour coding or MANUFACTURER marking of a product can vary for any reason from a production unit to another, then only products identical to the one qualified will be allowed for further use.
 - All information relating to the graphite quality, impurities and maximum contents of these for flexible graphite materials.
 - Characteristics of inserts in flexible graphite materials or characteristics of metallic reinforcement in fiber based materials if any.
- e) The material data sheet shall also include the following mechanical characteristics for the two reference thickness 2 mm and 3 mm.
- The tensile strength (according to [ASTM F 152](#)) of the gasket material shall be at least 16 N/mm².
 - The compressibility of the gasket material measured according to [ASTM F 36A](#) shall be at least 8%.
 - The elastic recovery of the gasket material according to [ASTM F 36A](#) shall be at least 55%.
 - The relaxation stress (according to [DIN 52913](#), short term test) of the gasket material shall be at least 30 N/mm² (ideally, a minimum of 36 N/mm²), and the thickness decrease shall not exceed 15% under a constant compression stress of 50 N/mm² @ 300°C.
 - The thickness increase under immersion test in ASTM oil no. 3 @ 150°C for 5 hours shall not exceed 15%. Additionally, the thickness increase under immersion test in fuel ASTM A @ 20°C for 5 hours shall not exceed 3%, and the thickness increase under immersion test in fuel ASTM B @ 20°C for 5 hours shall not exceed 8%.
 - m and Y evaluation as per applicable standard.
- f) The inserts in flexible graphite materials, gaskets or sheets to be cut to size, must be in one piece without any weld.
- g) Cutting of flexible graphite sheets or reinforced fiber based materials shall be carried out by water jet means followed by an adequate heat treatment or by mechanical tools and procedure specially developed or approved by the gasket MANUFACTURER; other mechanical tools are prohibited.
- h) The thickness of the gasket material shall be strictly identical to the thickness of the equivalent CAF gasket as shown on the relevant COMPANY piping material classes (i.e., 2 or 3 mm, depending on diameter).
- i) Gas permeability (according to [DIN 3535](#)): ≤ 0.5 ml/mn.
- j) Gasket faces shall receive an anti-sticking coating on both sides which shall receive the prior agreement of the COMPANY (Technology Division).

If reference is made to the [ASTM F 104](#) for a proposed gasket material, the classification shall be: F 702100 E03 M7 together with the additional requirements listed in paragraphs above of this section (which are not covered in the standard [ASTM F 104](#)).

Gaskets having successfully passed the qualification tests:

- Klinger Sil C4430
- SIEM Supranite NGR.

3.3 Spiral-wound gaskets

The 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 grade, depending on the relevant piping material specification) strip.

The prior approval by the COMPANY (Technology Division) shall be based on the following:

The requisitions shall indicate the nature of the packing of the filling.

- PTFE or PTFE based materials 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 from possible galvanic corrosion.

The 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
- Testing shall be made on one test coupon per batch for the following:
 - Adhesion ([ASTM D 3359](#))
 - Impact ([ASTM G 14](#))
 - Corrosion (Salt spray test per [ASTM B 117](#)).

3.4 Metal ring joints

Gaskets shall have to following maximum Brinell hardness:

- Soft Iron: 90
- Alloy steel: 130
- 18/8 Stainless Steel: 135

4. Dimensions

4.1 Cut out flat gaskets

4.1.1 Synthetic rubber gaskets

The gaskets shall be 3 mm thick for diameters up to 6" and 5 mm thick for diameters 8" and over.

4.1.2 Other flat gaskets

Materials (approved by the COMPANY Technology Division), shall have dimensions (including the gaskets thickness) identical to those of the CAF gaskets which they are intended to replace.

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. The dimensions of ring joints shall be in accordance with the standard [ASME B16.20](#), and shall be specified to match with the relevant flanges standard.

4.4 Special gaskets

For all other types of gasket, or gaskets of dimensions greater than the limits defined by the reference standards, the MANUFACTURER shall submit a dimensioned document to the COMPANY and/or the Engineering COMPANY for prior approval.

5. Quality control

The inspection and tests necessary to confirm that the products meet the requirements of the standards, specifications, and requisitions, shall be carried out in the MANUFACTURER's plant by personnel of the plant. This specially qualified personnel shall be independent of the production department of the plant.

Products shall be guaranteed by an inspection certificate (conformity, material, etc.) that must accompany the supply. If the MANUFACTURER does not have the necessary means of examination, these tests may be carried out by an Inspection Agency and at a place approved by the COMPANY or the Engineering COMPANY.

6. MANUFACTURER's dossier

6.1 Certificate of conformity

The MANUFACTURER shall submit certificates of conformity to the standards specified by the requisitions for cut-out gaskets, spiral-wound gaskets, and metal ring joints.