



Exploration & Production

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS PVV 147

Gaskets for piping and vessels

02	12/03	General review - Change of Group name and logo
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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 B 16.5	Pipe Flanges and Flanged Fittings (NPS ½ through NPS 24)
ASME B 16.47	Large Diameter Steel Flanges (NPS 26 through NPS 60)
ASME B 16.20	Metallic Gaskets for Pipe Flanges - Ring-Joints, Spiral-Wound, and Jacketed
ASME B 16.21	Non-metallic Flat Gaskets for Pipe Flanges
ASTM B 117	Practice for Operating Salt Spray (Fog) Apparatus
ASTM D 3359	Test Method for Measuring Adhesion by Tape Test
ASTM F 36	Test Method for Compressibility and Recovery of Gasket Materials
ASTM F 104	Classification Systems for Nonmetallic Gasket Materials
ASTM F 152	Test Method for Tension Testing of Nonmetallic Gasket Materials
ASTM G 14	Test Method for Impact Resistance of Pipeline Coatings
DIN 3535	Determination of tensile strength
DIN 52913	Chemical resistance of sheet gasket materials
EN 10204	Metallic products - Type of inspection documents

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

**Codes**

Reference	Title
ASME B 31.3	Process Piping

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS 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.
- Material data sheet shall be submitted prior to starting the qualification test. It shall include the following:
 - The color 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 color 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 B 16.20](#) 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 B 16.20](#).

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 B 16.20](#), 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.

6.2 Material certificates

The MANUFACTURER shall submit material certificates in accordance with the requirements of the reference codes and standards. For non-asbestos gaskets (i.e., either flat gaskets or spiral wound gaskets), certificates shall be in accordance with [EN 10204 type 3.1.B](#).

7. Preparation for shipment

7.1 Marking

7.1.1 Cut-out flat gaskets

A label grouping several gaskets of the same type shall indicate:

- The MANUFACTURER's name and trademark
- The diameter



- The rating
- The quality reference.

7.1.2 Spiral-wound gaskets

In addition to the marking required by the standard [ASME B 16.20](#), the following information shall be marked by cold stamping on the centering ring of each spiral-wound gasket:

- The MANUFACTURER's name and trademark
- The diameter
- The rating.

7.1.3 Metal ring joints

In addition to the marking required by the standard [ASME B 16.20](#), the outside surface of each ring shall include the following information which shall be marked by cold stamping: T

- The MANUFACTURER's name and trademark
- The diameter
- The rating
- The ring number, followed by the identifying reference of the material.

7.2 Protection

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

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

7.3 Packing

The gaskets must be packed in sea-packing, which must be tight and meet the requirements of all stages of transport (rail, road, air, etc.).



Appendix 1 Qualification of Non asbestos Flat Gaskets - Type Testing Procedure

1. Scope

This procedure defines the tests required for the qualification of non-asbestos flat gaskets usually used by the COMPANY in piping systems of pressure class 150 and 300. The purpose of this qualification procedure is to evaluate the mechanical properties of the gaskets together with their sealing behavior in flange assembly.

Some applications can need additional tests to confirm that these gaskets are fit for use.

2. Gaskets, material and characteristics

The gaskets are of fiber type or flexible graphite compound. The gaskets must conform to [ASME B 16.21](#) for their dimensions. The gaskets used for testing are delivered in two sizes: 8" in 2 mm and 16" in 3 mm.

3. Testing equipment

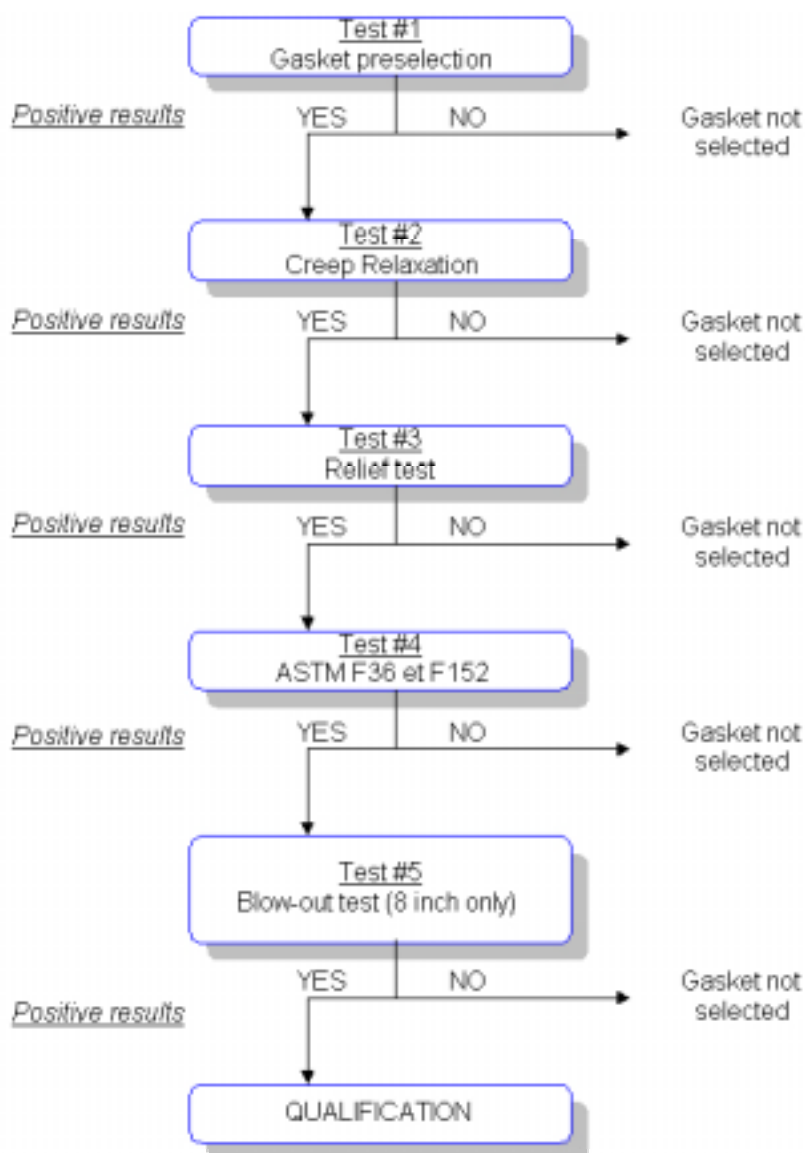
All tests shall be performed in testing laboratories approved by the COMPANY Technology Division. These laboratories must be qualified under quality control system ISO 9001. All tests shall be performed inside closed premises. The qualification procedure relating to one material shall be performed entirely in the same laboratory.

The testing premises shall be equipped with the following main equipment:

- Press (10 kN, 500 kN, 2000 kN and 5500 kN)
- Helium mass spectrometer (10^{-9} to 10 atm.cm³/s)
- Pressure controller (up to 100 bar)
- Testing platens, with plain faces or raised faces. The finish of contact faces of the testing platens, plain faces or raised faces, shall correspond to a "stock finish" surface condition: Ra value between 6.3 µm and 12.5 µm and Rt value of 30 µm
- 8" and 16" pressure class 300 flanges as per [ASME B 16.5](#) with raised faced finish
- Instrumented Rods in size M33
- Hydraulic bolt tensioners
- All time scaled tests shall be data-logged throughout.

4. Test sequence

All tests are performed three times and sequentially as shown on the diagram below, first with the 8" gaskets, then with the 16" gaskets. The blow-out test, test # 5, relates to the 8" gaskets only. Flange and platen facing shall be checked with appropriate device and the profile characteristics shall be reported at the beginning and at the end of the test sequence.



5. Test # 1: Gasket preselection

5.1. Purpose of the tests

This test aims to quickly determine whether the gaskets can suit requirements of the COMPANY Technology Division.

5.2. Testing equipment

The apparatus will permit the test of the three gaskets of the same material simultaneously and can allow for two material to be tested together, i.e. six gaskets at the same time. The gaskets are inserted between steel platens with surface condition as defined in paragraph 3 of this addendum.

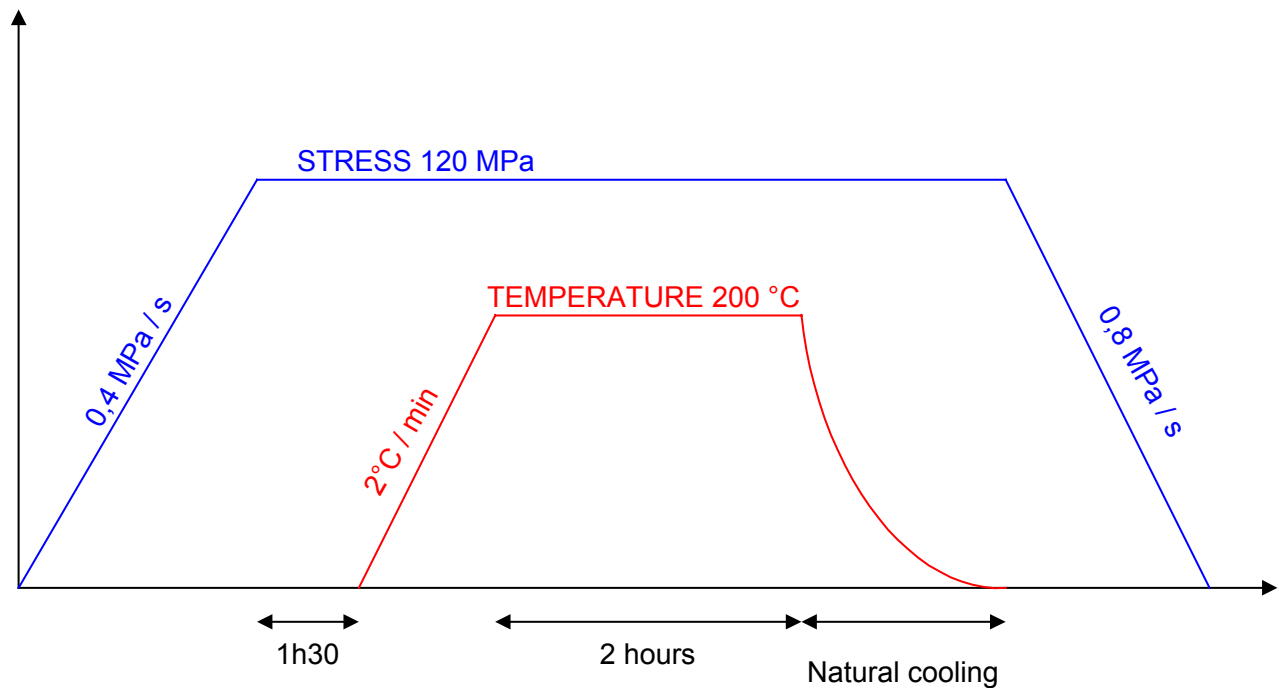
5.3. Stress applied

The gaskets are tightened at a stress of 120 MPa. The stress corresponds to a load of 4360 kN for 8" gaskets and 4980 kN for 16" gaskets.

5.4. Test procedure

As shown on the diagram the procedure consists of:

- Application of a stress of 120 MPa on the assembly
- Stabilization of the stress during one hour and a half
- Then start heating at a rate of 2°C/min up to 200°C
- Holding the temperature during two hours
- Cooling down in calm air
- Then release the stress exerted on the gasket down to 0 MPa

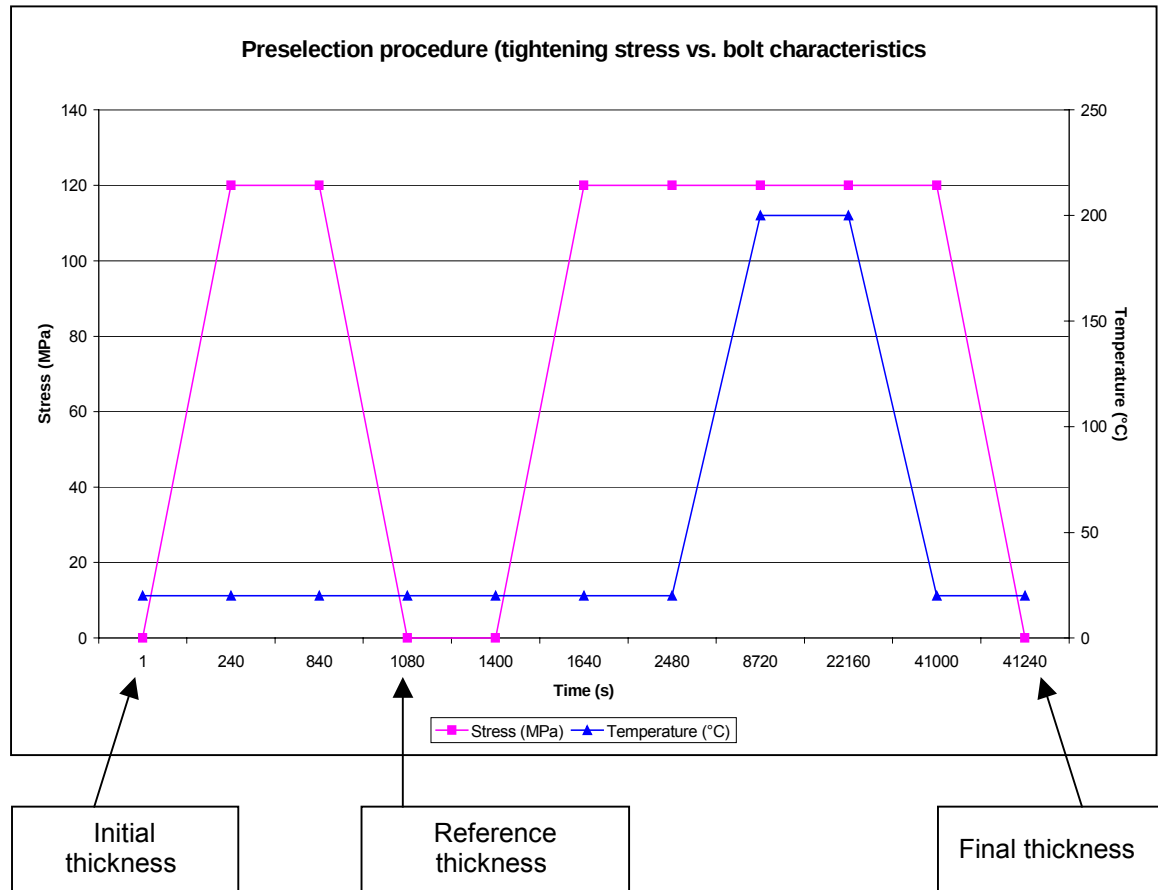


5.5. Measurements

The following measurements shall be made and reported:

- Gasket thickness before testing, after application of a pre-stress load, and after testing
- Inside and outside diameter before and after testing.

5.6. Test results



Variation of wall thickness noted $\Delta e/e$ and variation of the surface noted $\Delta s/s$ of the gasket are calculated after testing.

- $\Delta e/e = [\text{Reference thickness} - \text{Final thickness}] / [\text{Reference thickness}] * 100\%$.
- $\Delta s/s = [\text{Final surface} - \text{Initial surface}] / [\text{Initial surface}] * 100\%$.

The gasket-to-flange adhesion is recorded: Mark 1 corresponds to “non-sticking situation”, mark 3 to “full adherence”, mark 2 for intermediate situation.

The aspect of the gasket is recorded similarly: Mark 1 for “non damaged gasket”, mark 3 for “highly damaged gasket”, mark 2 for intermediate situation.

5.7. Selection criteria

The average value of $\Delta e/e$ must be lower than 20% and the average value of $\Delta s/s$ lower than 25%.

Also the marks for adhesion and the aspect shall be equal to 1. However a mark 2 can be considered on a case by case basis.



Test results (adherence)			Passed (Y/N)
Test 1	Test 2	Test 3	
1	1	1	Y
1	1	2	Y
1	2	2	N

Note:

Evaluation of marks for gasket adhesion and gasket aspect is compared to a collection of 27 various gaskets already in record obtained in the same testing conditions.

6. Test # 2: Mechanical test to DIN 52913 (Creeping - Stress relief)**6.1. Purpose of the test**

The test is to verify the mechanical properties of the material and to complete the information available from other tests.

6.2. Testing equipment

The testing equipment consists of two flat, polished compression platens. They are heated and thermally insulated on the outside.

6.3. Test procedure

- Insert the gaskets (powdered with talc or graphite-coated).
- Apply a pressure of 50 MPa
- After 4 minutes, compensate for the pressure drop by re-tightening the joint
- Make the temperature rise up to 300°C in 1 hour
- Stabilization of the temperature during 16 hours
- Release the pressure
- Stop heating.

6.4. Measurements

Measurements to be made:

- Gasket thickness before and after testing
- Inside and outside diameter before and after testing
- Value read on the comparator
- Force applied on the gasket.

6.5. Test results

The tensile stress and the creep strength under compression must be recorded.

6.6. Selection Criteria

The tensile stress of the gasket must be greater than 36 N/mm² and the variation in diameter shall be less than 15%.

7. Test # 3: Relief tests during heating

7.1. Purpose of the tests

The relief tests aim to measure the gasket sealing behavior during an increase in temperature and in pressure and during the pressure relief.

7.2. Testing equipment

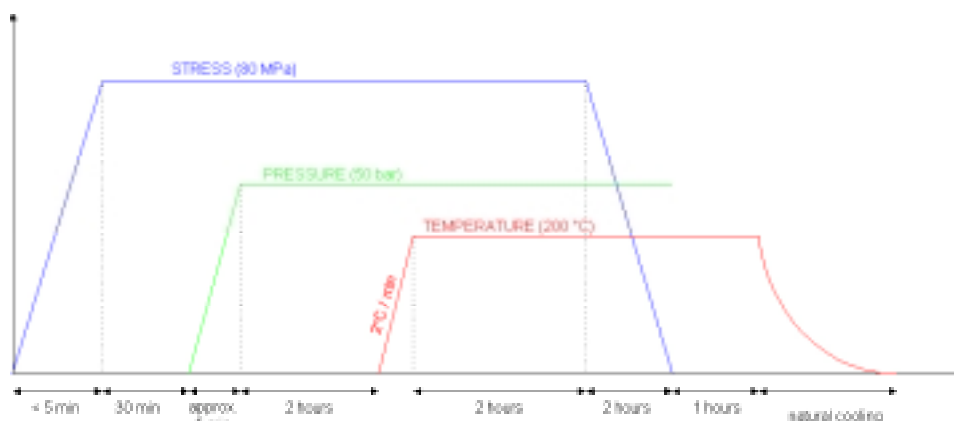
The gasket is installed between two raised faced rigid platens that are representative of standard flanges using a compression press piloted under load. The surface condition of the plate flanges is "stock finish" as defined in paragraph 3 above.

7.3. Loading

The gasket is tightened under a stress of 80 MPa. The stress corresponds to a load of 1560 kN for 8" gaskets, and of 3317 kN for 16" gaskets.

7.4. Test procedure

- The gasket is compressed at a rate of 0.4 MPa/s up to a stress of 80 MPa.
- 30-minute stabilization under stress
- Put under pressure up to 50 bar under helium in about 5 minutes
- Stabilization of the pressure during two hours
- Increase in temperature up to 200°C at a rate of 2°C/min
- Stabilization of the temperature for two hours
- Relief of the pressure exerted on the gasket at a rate of 0.011 MPa/s until it is no longer tight
- Natural cooling of the apparatus



7.5. Measurements

The following parameters are continuously recorded throughout the test:

- Leak
- Stress
- Pressure
- Temperature.

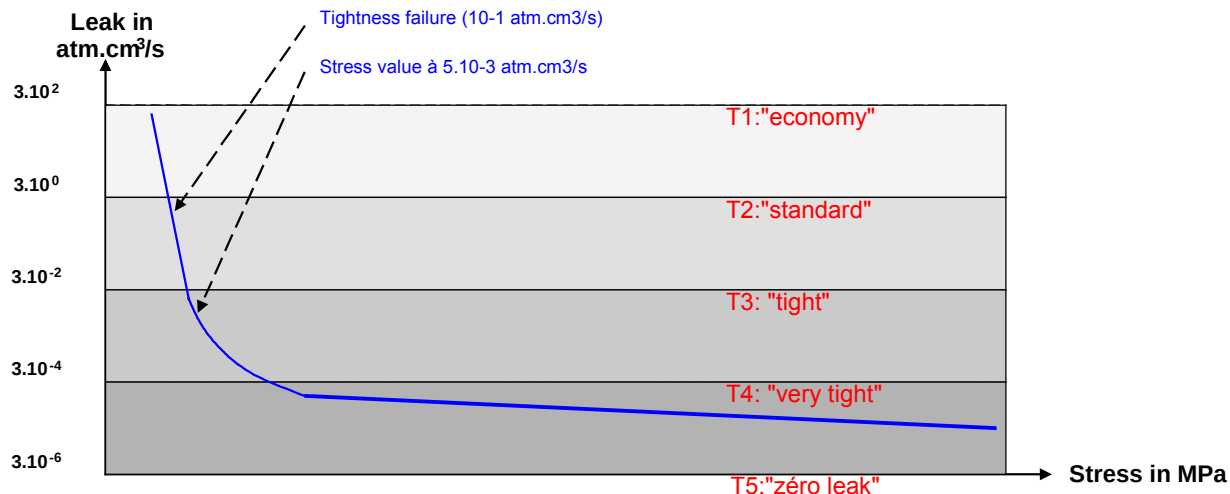
7.6. Test results

The main results are:

- The leak variations during testing; graph "leak versus time"
- The leak variations versus the temperature during the two hours stabilization stress/pressure/temperature; graph "leak versus temperature"
- The leak variations versus the stress during the relief of the gasket; graph "leak versus stress applied".

Readings of the stress under $5 \cdot 10^{-3}$ atm.cm³/s and of the stress under 10^{-1} atm.cm³/s (tightness failure), are made and recorded on the "leak vs. stress" curve.

The tightness criterion (T1 to T5) is also recorded (according to the "Clean Air Act" standard).



7.7. Selection criteria

Dimensions	Tightness	A leak = $5 \cdot 10^{-3}$ Stress applied on the gaskets < = (MPa)	Stress applied on the gaskets up to tightness failure < = (MPa)
8"	T3	15	12
16"	½ (T2-T3)	25	20

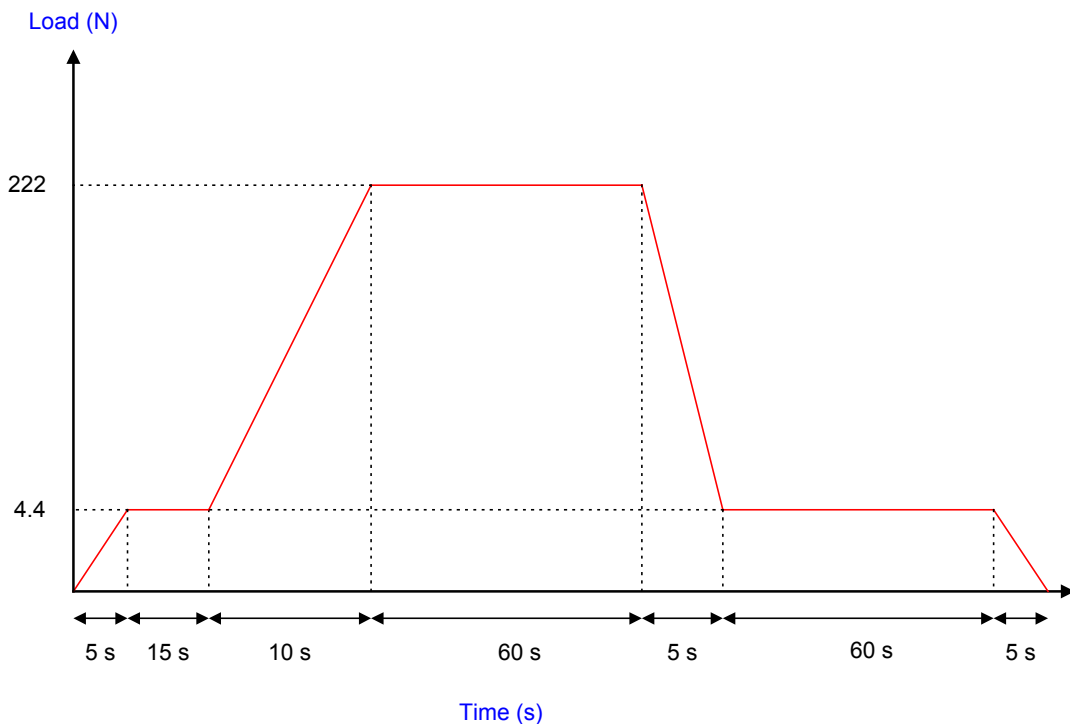
In addition, the leak must be as stable as possible throughout the whole test.

8. Test # 4: Mechanical tests to [ASTM F 36](#)

8.1. Purpose of the tests

The test is to verify the mechanical properties of the material and to complete the information available from other tests.

8.2. Testing equipment



The tests are made under a computer-controlled compression machine.

A piece of gasket (about 4 cm²) is compressed at room temperature under a punch of 6.4 mm in diameter.

8.3. Loading

The maximum load applied on the gasket is 222 N. Two plateaus of 4.4 N are made before and after application of the load of 222 N as shown on the graph above.

8.4. Test procedure

Each test is performed three times on 2 mm thick specimens so as to meet the standard criteria.

8.5. Measurements

Continuous measurements to be made:

- Load applied on the gasket
- Gasket thickness.

8.6. Interpretation of the results

Elastic recovery (%) and compressibility (%) of the gasket are evaluated:

- Compressibility: $C = [(P-M)/P]*100$
- Secondary compressibility $C_s = [(R-M)/R]*100$
- Elastic recovery to [ASTM F 36](#): $E = [(R-M)/(P-M)]*100$
- Maximum crushing under load: $E_m = [(P-R)/P]*100$

where: P is the gasket thickness under the pre-load (4.4 N)

M is the gasket thickness under the full load (222 N)

R the thickness after testing.

8.7. Selection criteria

The following criteria are considered for the selection of the gasket:

- The compressibility must be greater than 8%
- The elastic recovery must be greater than 55%.

Indices C_s and E_m are noted for information only.

9. Test # 4: Mechanical tests to [ASTM F 152](#)

9.1. Aim of the tests

The test is to verify the mechanical properties of the material and to complete the information available from other tests.

9.2. Testing means

The tests are made under a computer-controlled tension machine. The deformation is measured using an extensometer fastened on the gasket.

9.3. Test procedure

A dumb-bell shaped test piece is placed between two jaws. A tensile force is applied on the test piece until breaking of the gasket. The force cell is class 0.5 10-kN type.

9.4. Measurements

Measurements made:

- Force applied on the gasket
- Gasket elongation (mm).

9.5. Interpretation of the results

The breaking load (N) and the breaking stress (MPa) are noted for each test.

A great magnification binocular analysis is made on fiber gaskets in some cases to determine the fiber direction. Two tests are then made:

- In a direction parallel to the fiber length
- In a crosswise direction.

9.6. Selection criteria

Criteria to be satisfied:

- Graphite gaskets with a metal insert : the breaking load must be greater than 400 N
- Fiber gaskets in the direction of the calendar : the breaking stress must be greater than 16 MPa.

10. Test # 5: Blow-out tests under standard flanges (8" only)

10.1. Aim of the tests

The tests aim to verify the mechanical and sealing behavior of a gasket becoming loosened while exposed to an internal gas pressure.

10.2. Testing means

The gasket is mounted on a standard flange assembly. Tightening is checked using hydraulic tensioners (8 inch.) together with calibrated deformation gauges mounted on all bolts.

10.3. Loading

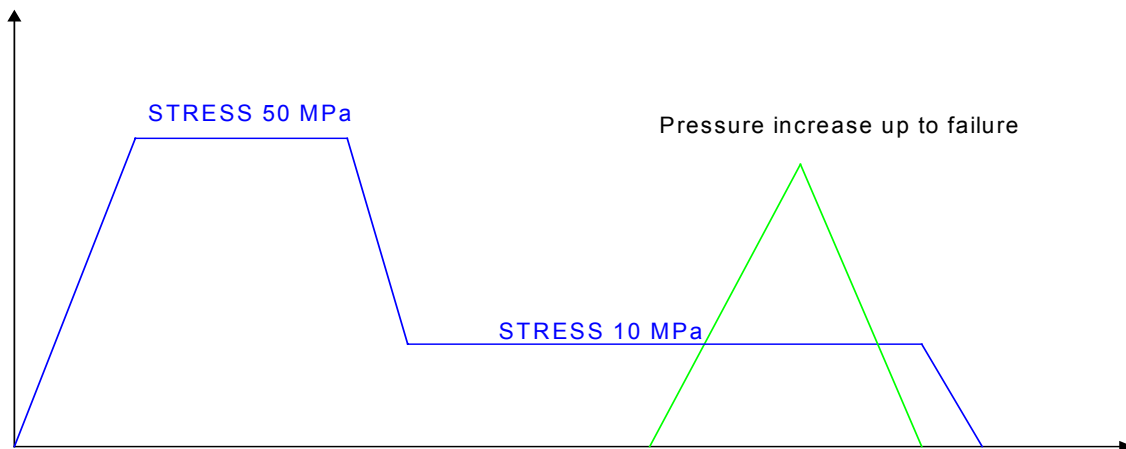
The gasket is first tightened at 50 MPa and then relieved down to 10 MPa, which corresponds to loads of 980 kN and 196 kN respectively.

See sketch below.

10.4. Test procedure

The sequence is the following:

- Gasket tightening up to 50 MPa in about 5 minutes
- Stabilization of the stress for 10 minutes
- Relief of the pressure exerted on the gasket down to 10 MPa in about 5 minutes
- Stabilization of the stress for 10 minutes
- Increase of helium pressure at a rate of 1 bar/s until sealing failure occurs (10^{-1} atm.cm³/s) or gasket bursts out
- Relief of the pressure exerted on the gasket down to 0 MPa.



10.5. Measurements

Leak and internal pressure are continuously recorded throughout the whole test.

10.6. Interpretation of the results

The maximum pressure reached and the tightness failure pressure are measured for each gasket tested (10^{-1} atm.cm³/s).

After the sealing failure, it is important to check whether the pressure has dropped suddenly or if it is slowly decreasing.

10.7. Selection criteria

Two criteria are considered:

- The gasket does not burst
- The tightness loss **shall be better than 55 MPa**.

11. Test report

The following documentation shall be submitted by the testing laboratory to the COMPANY Technology Division for approval. The report shall be made available in hard copy and electronic file, and it shall include:

The test report, see table 1 attached, signed, dated, and stamped by the testing laboratory in charge.

The MANUFACTURER data sheet with all information as listed in paragraph 4.1.2 of the present specification.

The color print of the two faces of the three gaskets after test # 1. Each print to show one complete face of the gasket; the size of print shall not be less than 50 mm x 70 mm.

The three different graphs relating to test # 3 as listed above.

The color prints of the 8" gaskets after test # 5. Same size of prints as above.

Chart records of "load versus thickness variation" relating to test # 4, [ASTM F 36](#), with the three curves on the same graph, and color prints of the specimen after test [ASTM F 152](#).



Exploration & Production

General Specification

GS PVV 147

Date: 12/03

Rev: 02

Appendix 1

Table 1 - Flat gaskets for piping - Test results

Gasket MANUFACTURER:

Production site:

Retailer/SUPPLIER:

Commercial reference:

Gasket actual dimensions:

Internal Diam. 8":
External Diam. 8":
Thickness 8": 2 mm ±

Internal Diam. 16":
External Diam. 16":
Thickness 16": 3 mm ±

Test	Validation criteria	Results 8"				Results 16"				mark	Passed (Y/N)
		Test 1	Test 2	Test 3	Average	Test 1	Test 2	Test 3	Average		
Test # 1 Preselection	$\Delta e / e : < 20\%$	%	%	%	%	%	%	%	%		
	$\Delta s / s : < 25\%$	%	%	%	%	%	%	%	%		
	Adhesion: 1 (2 can be acceptable)										
	Aspect: 1 (2 can be acceptable)										
Test # 2 Creep relaxation	Tensile stress: > 36 N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²	$\tau =$ N/mm ²		
Test # 3 Relief test	Tightness criterion: < T2 for 8" & < 1/2 (T2-T3) for 16"	Tx	Tx	Tx	Tx	Tx	Tx	Tx	Tx		
	Stress at 5.10 ⁻³ atm.cm ³ /s: < 15 MPa for 8" & < 25 MPa for 16"	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa		
	Stress at tightness failure: < 12 MPa for 8" & < 20 MPa for 16"	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa		
Test # 4 to ASTM F36	compressibility: > 8%	C = %	C = %	C = %	C = %	C = %	C = %	C = %	C = %		
	elastic recovery: > 55%	E = %	E = %	E = %	E = %	E = %	E = %	E = %	E = %		
Test # 4 to ASTM F152	Breaking force: > 400 N (graphite gasket with metal insert)	F = N	F = N	F = N	F = N	F = N	F = N	F = N	F = N		
	Breaking stress: > 16 Mpa (fiber-base gasket)	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa	$\tau =$ MPa		
Test 5 Blow-out-Test (8"only)	The gasket does not burst out	Burst out (Y/N)	Burst out (Y/N)	Burst out (Y/N)	Burst out (Y/N)						

m and Y verification:

Yes

No

Gasket passed

Gasket rejected

Testing Laboratory:

date:

Signature:

Table 2 - Test criteria

8" Gasket				
Test type	Measure	Criterion mark 1	Criterion mark 2	Criterion mark 3
Test # 1 Preselection	$\Delta e / e$ $\Delta s / s$ Adhesion	< 20% < 25% 1	between 20% and 30% between 25% and 30% 2	> 30% > 30% 3
Test # 2 Creep relaxation	Stress at traction	> 36 MPa	between 30 and 36 MPa	< 30 MPa
Test # 3 Relief test	Tightness criterion stress at 5.10^{-3} atm.cm ³ /s stress at tightness failure	> T3 < 15 MPa < 12 MPa	< T3 > 15 MPa > 12 MPa	- - -
Test # 4 to ASTM F 36	Compressibility elastic recovery	> 8% > 55%	between 5 and 8% between 40 and 55 %	< 5% < 40%
Test # 4 to ASTM F 152	Breaking stress (graphite) Breaking force (fiber)	> 400 N > 16 MPa	between 250 and 400 N between 10 and 16 MPa	< 250 N < 10 MPa
Test # 5 Blow out Test	The gasket does not burst out	-	-	-

16" Gasket				
Test type	Measure	Criterion mark 1	Criterion mark 2	Criterion mark 3
Test # 1 Preselection	$\Delta e / e$ $\Delta s / s$ Adhesion	< 20% < 25% 1	between 20% and 30% between 25% and 30% 2	> 30% > 30% 3
Test # 2 Creep relaxation	Stress at traction	> 36 MPa	between 30 and 36 MPa	< 30 MPa
Test # 3 Relief test	Tightness criterion stress at 5.10^{-3} atm.cm ³ /s stress at tightness failure	> $\frac{1}{2}$ (T2-T3) < 25 MPa < 20 MPa	< $\frac{1}{2}$ (T2-T3) > 25 MPa > 20 MPa	- - -
Test # 4 to ASTM F 36	Compressibility elastic recovery	> 8% > 55%	between 5 and 8% between 40 and 55%	< 5% < 40%
Test # 4 to ASTM F 152	Breaking stress (graphite) Breaking force (fiber)	> 400 N > 16 MPa	between 250 and 400 N between 10 and 16 MPa	< 250 N < 10 MPa