

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 150

Valves in cryogenic service

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1. Scope

This specification covers the special requirements for the design, manufacture, and testing of valves (other than control or relief valves) for cryogenic Services for offshore or onshore facilities.

Cryogenic Service is defined as valves service with design temperature ranging from minus 46°C to minus 196°C and continuous operating service temperature below minus 41°C.

2. Reference documents

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

Any conflicting requirements between this specification and any other relevant documents shall be reported to the Managing Entity for arbitration. In any case, and notwithstanding the final decision of the Company, the most stringent requirement is always first meant to govern.

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 B16.34	Valves - Flanged, Threaded and Welding End
ISO 15848-1	Industrial valves - Measurement, test and qualification procedures for fugitive emissions - Part 1: Classification system and qualification procedures for type testing of valves
ISO 28921-1	Industrial valves - Isolating valves for low-temperature applications - Part 1: Design, manufacturing and production testing
ISO 9712	Non-destructive testing - Qualification and certification of NDT personnel

Total General Specifications

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

Reference	Title
GS EP COR 170	Materials for upstream sour service application - Specification for selection and design
GS EP PVV 154	Ball Valves
GS EP PVV 155	Gate, Globe and Check Valves
GS EP PVV 157	Butterfly Valves

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3. Terms and definitions

With the exception of the definition for test gas, terms and definitions of [ISO 28921-1](#) shall be followed.

For the purpose of this document, the following definition apply:

Inspection Agency: The body in charge of the inspection of the products on behalf of the purchaser at the manufacturer premises or at any subcontractor's premises as needed by contract.

4. Design

Valve design shall be in full compliance with [GS EP PVV 154](#), [GS EP PVV 155](#) and [GS EP PVV 157](#). Additional applicable requirements pertaining to cryogenic service are included in this paragraph.

4.1 Bonnets/Glands

Valves shall be supplied with extended bonnet/glands. The length of the extension shall be sufficient to maintain the stem packing at a temperature within the normal temperature range of the packing material.

Unless otherwise agreed with company, extension length shall comply with [ISO 28921-1](#).

Valves specified to be in gas service shall be capable of operation with the valve stem at or above the horizontal plan.

Valves specified to be in liquid service other than cold box applications shall be capable of operation with the valve stem at or above 45° above the horizontal plan.

Valves specified to be in liquid service in cold box applications shall be capable of operation with the valve stem at or above 15° above the horizontal plan.

This extension shall be designed in such a way that the stem/plug alignment is kept straight, without torsion and flexion, under the maximum operated torque, from ambient to the lowest design temperature. For this purpose, particular attention shall be paid to the inside stem guiding devices.

Valve bonnets: extended glands shall be bolted type for valve sizes 8 inches and above. Welded or bolted types may be used for valve sizes up to and including 6 inches. Screwed or union bonnets are not permitted.

The Manufacturer shall supply heat transfer calculations for the gland design with its quotation.

Fabricated bonnet/gland extensions shall be constructed from a simple length of seamless tube and shall be inserted into the valve bonnet and fillet or butt welded.

The clearance between the valve stem and bonnet/gland extension bore shall be designed to minimize convection temperature transfer. The cross sectional area of the extension wall shall be minimized, compatible with the rating of the valve and the mechanical strength requirements, in order to reduce conduction temperature transfer.

Material for the extended bonnet/gland shall be suitable for the minimum design temperature of the valve.

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Insulation thickness shall be clearly indicated on supplier's cross-sectional and general arrangement drawings.

4.2 Stems

Valve stems shall be of one piece construction. All rising stem valves shall have a back seating provided in the gland area.

Rising stems shall have a surface rolled finish.

Material for valve stems shall be suitable for the minimum design temperature of the valve and to withstand the operator weight.

Quarter turn valve stem shall be of anti-extrusion type as defined in [GS EP PVV 154](#) and [GS EP PVV 157](#).

4.3 Gland/stem packing

Gland design incorporating lantern, rings and/or screwed plugs in the gland body shall not be used, unless specifically requested by the Purchaser.

Packing glands shall be concentric and parallel to the centerline of the stem.

The surface finish on the packing gland bore shall not exceed 80 R.M.S micro inch.

For rising stem valves, the Manufacturer shall at least quote for both of the following stem packing materials (an evaluation will be made by the Purchaser before commitment):

- Polytetrafluoroethylene (PTFE) chevron style or cup and cone style packing rings, "John Crane" C-VH, KEL'F' or equal
- Fire Safe graphite, "Union Carbide Grafoil" or Engineering Company approved equal. (Alternates may also be proposed by the Manufacturer).

The valve manufacturer shall provide with his quotation the following information from the packing Manufacturer:

- Recommendations for use under the operating conditions
- Previous experience for application under operating conditions
- Method to prevent extrusion, if necessary.

4.4 Seals

In case of lip-seal design for dynamic sealing, lip-seal calculation shall be provided for operating and testing loading cases considering temperature and leakage requirements. Lip-seal design shall be optimized to minimize seat relief pressure values.

4.5 Wedges, discs, seats, etc.

Gate valves shall be solid wedge type.

Globe valves shall have plug type discs; flat seated discs are not permitted.

Balls shall be solid; fabricated or hollow thin shell balls are not permitted.