



Exploration & Production

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 612

**Piping and Equipment subject to severe sour service
Metallurgical**

04	10/06	NACEMR0175 replaced by NACEMR0175 / ISO15156
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1. Scope

This General Specification covers the specific requirements applicable to equipment such as pressure vessels or heat exchangers, and to piping materials, which are intended to be used in Severe Sour Service Conditions as defined in General Specification [GS EP COR 170](#).

The present General Specification makes major reference to the [NACE MR0175 / ISO15156](#). It states additional requirements with respect to Hydrogen Induced Cracking (HIC) and to Sulfide Stress Cracking (SSC) where the [NACE MR0175 / ISO15156](#) document is insufficient.

Transmission pipelines are outside the scope of this specification.

Valve materials shall comply with both this specification (for cast or forged materials, including weldments if applicable), and the COMPANY General Specification [GS EP PVV 613](#).

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.

Since this specification brings additional requirements dealing with a specific application (i.e. H₂S service), it is deemed to overrule any less stringent requirements appearing in any of the other contractual Reference Documents.

Any divergence between any of the contractual Reference Documents and this specification must be reported to the COMPANY for decision. In such a case, and unless otherwise agreed or decided by the COMPANY, it is understood that the more stringent requirement shall apply.

Exceptions to, or deviations from this specification are not permitted unless previously accepted in writing by the COMPANY. For this purpose, Manufacturer's requests for substitution or change of any kind shall be complete with all pertinent information required for the COMPANY assessment. In case of approval, such approval shall be valid only for a specific case and shall not be construed as having general validity for other applications

Standards

Reference	Title
NACE MR0175 / ISO15156	Materials for use in H ₂ S-containing environments in oil and gas production
EN 10204	Steel and Steel Products – Inspection Documents
EN 10160	Ultrasonic testing of steel flat products of thickness equal or greater than 6 mm
ASTM E 45	Standard Test Methods for Determining the Inclusion Content of Steel
ASTM A 578	Standard Specification for Straight-Beam Ultrasonic Examination of Plain and Clad Steel Plates for Special Applications
ASTM A 770	Standard Specification for Through-Thickness Tension Testing of Steel Plates for Special Applications

Reference	Title
ASTM A 106	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
ASTM A 333	Standard Specification for Seamless and Welded Steel Pipe for Low-Temperature Service
ASTM E 92	Standard Test Method for Vickers Hardness of Metallic Materials
ASTM A 307	Carbon Steel Bolts and Studs, 60 000 Psi Tensile Strength
ASTM A 193	Alloy-Steel and Stainless Steel Bolting Materials for High-temperature Service
ASTM A 320	Alloy-Steel Bolting Materials for Low-temperature Service
ASTM A 194	Carbon and Alloy-Steel Nuts for Bolts for High-pressure and High-temperature Service

Professional Documents

Reference	Title
API 5L	Specification for Linepipe
API RP 945	Avoiding Environmental Cracking in Amine Units

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP COR 170	Materials for sour service (upstream applications) Specification for design
GS EP PLR 000	General Specification catalogue
GS EP PVV 611	Welding of pressure containing piping and equipment
GS EP PVV 613	Valves materials requirements for use in sour service

3. General

3.1 Use of Stainless steel

Stainless steel can be used for some parts of equipment. If so, the following requirements and restrictions shall be applied:

- 13% Cr Stainless steel shall be heat-treated and have a hardness complying with [NACE MR0175 / ISO15156](#)
- Austenitic or austenitic-ferritic stainless steel shall be in the solution annealed condition
- If welding and/or post-weld heat-treatment is required on austenitic stainless steel, this steel shall be low carbon or titanium-stabilised steels
- If welding repairs are required to the bodies of cast equipment in type 304 or 316 stainless steel, the procedure shall be subject to approval
- Parts of austenitic stainless steel cold-formed by rolling, bending or stamping shall be quench-annealed a second time if the permanent deformation exceeds 15%
- In all cases, limits of use of stainless steel and the suitability of alternative material for specific applications shall be sought from the COMPANY
- Any equipment or process pipework made of austenitic or austenitic-ferritic stainless steel or nickel base alloys shall comply with [NACE MR0175 / ISO15156](#) requirements with respect to hardness level and heat treatment (if any) unless otherwise approved by the COMPANY.

3.2 Metallic overlay

Explosively clad, roll bonded or fusion-bonded corrosion resistant overlay such as austenitic or austenitic-ferritic stainless steel or nickel alloy are considered to be effective barriers to the sulphide environment when they are within their safe limit of use. Where such overlays are employed the backing material need not to conform to this Specification.

4. Pressure vessels and heat exchangers

4.1 Carbon steel plates (including plates for heads)

The following requirements shall apply to pressure vessels and heat exchangers fabricated of unalloyed carbon steel.