



Exploration & Production

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 312

Design and fabrication of low pressure metallic vertical storage tanks

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1. Scope

This standard specification covers the definition of vertical cylindrical metallic storage tanks for hydrocarbons, assembled by welding on site. It applies to tanks whose working pressure in the gaseous phase remains close to atmospheric pressure, the pressure limit depending on the codes used.

This document shall be used in conjunction either with the **CODRES** code, or with **API STD 650**. The choice between code or Standard shall be defined in the job specification and/or in the data sheet, and shall then become the reference to be applied to the word "code".

The minimum rules and requirements to be met with respect to the choice of material, design, fabrication, Manufacturer quality control, inspection, as well as pressure relief devices, are those stated in the code and standard in use. All these rules and requirements are applicable, only requirements in addition to the code are detailed in this specification.

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
ASTM B 633	Standard Specification for Electro Deposited Coatings of Zinc on Iron and Steel
ASTM F 1941M	Standard Specification for Electrodeposited Coatings on Threaded Fasteners (Metric)

Professional Documents

Reference	Title
API STD 650 ⁽¹⁾	Welded Steel Tanks for Oil Storage
API STD 2000	Venting atmospheric and low-pressure storage tanks: non refrigerated and refrigerated

Regulations

Reference	Title
Not applicable	

(1) API STD 650 shall be used for all points not covered by CODRES code, and vice versa.

Codes

Reference	Title
CODRES ⁽¹⁾ DTU P 22-701 or EUROCODE	French code for construction of metallic vertical cylindrical tanks Design rules for steel construction

Other documents

Reference	Title
WRC 107 ⁽²⁾	Bulletin No. 107: Local stresses in spherical and cylindrical shells due to external loading
WRC 297 ⁽²⁾	Bulletin No. 297: Local stresses in cylindrical shells due to external loadings on nozzles, supplement to WRC Bulletin No. 107

Total General Specifications

Reference	Title
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP COR 352	Internal protection of equipment by painting
GS EP COR 356	Corrosion Protection of Fasteners for Subsea and Topsides applications
GS EP COR 560	Physical and chemical treatment of hydrostatic test water
GS EP INS 101	Instrumentation engineering, supply and construction general requirements
GS EP PVV 411	Shell and tube heat exchangers
GS EP SAF 341	Location and protection of onshore hydrocarbon storage

3. Materials

3.1 General

The materials used shall be selected from those allowed by the code, under the responsibility of the Manufacturer on the basis of the tank operating conditions supplied. However, in certain cases of special service (corrosive environment for instance), supplementary requirements may be added by the Company.

(2) Published by the "Welding Research Council" (New York).

3.2 Bolting

Carbon steel bolting shall be protected against corrosion as stated in [GS EP COR 356](#).

4. Design conditions

4.1 Overloads

With respect to fixed roofs, the uniform live load value to be applied shall not be less than 12.2 hPa.

4.2 Product specific gravity

When the SG of the stored product is greater than 1, the actual SG of the reference product at the minimum storage temperature shall be adopted.

4.3 Corrosion

The corrosion allowance, where applicable, shall be that indicated in the job specification. Any corrosion allowance must be added to the minimum thickness calculated on all surfaces of non-detachable internals.

4.4 Calculation of shell plates

4.4.1 According to [CODRES](#)

The acceptable design stress values shall be those indicated below.

Steel A 42	Steel A 52	Other materials
0.425 UTS for the lower shell course 0.46 UTS for all other shell courses	The smallest of the following values: 0.425 UTS or 2/3 YS for the lower shell course 0.5 UTS or 2/3 YS for all other shell courses	Duty cycle areas defined by the CODE according to material For alloys or stainless steel, this minimum thickness is 3 mm

- Where UTS is the ultimate tensile strength (min. of the standard)
- And YS is the yield strength (min. of the standard).

4.4.2 According to [API STD 650](#)

The acceptable design stress values shall be those indicated by [API STD 650](#).

4.5 Tank fastening

For fixed-roof tanks subjected to internal pressure, an inspection shall be made to ensure that the specific weights of the shell course and the roof are sufficient to prevent the shell course from being lifted off by the pressure load exerted under the roof (empty tank). If this is not the case, anchor bolts shall be provided around the shell (see [API STD 650](#) Appendix F7). The Manufacturer shall indicate the stress acting on those anchor bolts.