

GENERAL SPECIFICATION

PIPING VALVES VESSELS

GS EP PVV 315

Design and construction of large LPG storage tanks

05	10/2016	Scope clarification and use PAUT/TOFD in lieu of RT
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Rev.	Date	Purpose of the revision

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1. Scope

This Specification, together with referenced documents, covers the requirements for design, material supply, fabrication, inspection, test and painting of single containment or double-walled metallic, aboveground, vertical, cylindrical, tank systems storing LPG (Liquefied Petroleum Gas) at low pressure. It does not address storage under pressure.

Requirements for civil works (foundations, supporting areas and drainage system) for fire-fighting equipment, for pre commissioning and commissioning procedures, are excluded from this Specification.

Design and materials not specifically covered by this Specification may be proposed by Contractor and shall be submitted to the Company approval.

2. Reference documents

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

The following documents are referred to herein and shall be used in their latest issue at the date of call for bid.

In case of discrepancies between this Specification and one of the contractual reference documents, the Contractor shall inform the Company for decision. It is understood that in such cases the more stringent requirement shall apply, unless otherwise agreed or decided by the Company in writing.

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
API STD 620	Design and Construction of Large, Welded, Low-pressure Storage Tanks
API STD 650	Welded Tanks for Oil Storage
ASME BPVC Section IX	Welding, Brazing, and Fusing Qualifications
ASME BPVC Section V	Non-Destructive Examination
ASME BPVC Section VIII Div 1	Rules for Construction of Pressure Vessels Division 1
BS 7448-1	Fracture Mechanics Toughness Tests - Method for determination of K _{IC} , critical CTOD and critical J values of metallic materials
BS 7910	Guide to methods for assessing the acceptability of flaws in metallic structures
NFPA 59A	Standard for the Production, Storage and Handling of Liquefied Natural Gas (LNG)

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Reference	Title
GS EP PVV 630	TOFD Inspection
GS EP PVV 631	Phased Array Inspection (PAUT)

3. Tank configuration

Tanks shall be of double-walled metallic type secondary containment concept (outer tank shall be able to contain liquid stored in inner tank).

3.1 Outer tank

The outer tank shall be designed to contain the liquid and to contain the vapour phase of the tank at the design pressure. It shall be made of carbon steel and shall consist of:

- Flat bottom
- Cylindrical wall
- Outer dome roof.

3.2 Inner tank and suspended roof

The inner tank shall be designed to contain the stored liquid and shall consist of:

- Flat bottom
- Cylindrical wall
- A flat deck, made of aluminium or carbon steel, suspended from outer dome roof by suitable rods, loosely fit to tank wall to allow vertical and horizontal movement, and designed to support the roof insulation.

3.3 Tank dimensions

They shall be determined by Contractor in compliance with design conditions specified for workable and total stored volume, stress and maximum thickness requirements for inner shell, hydraulic test conditions, bottom insulation and foundation allowable loads, and insulation requirements.

3.4 Tank foundation

Tank foundation shall be designed according to the results of soil investigations.

Tank shall be supported by an above-grade reinforced concrete slab laid on piles; prevention of soil freezing is obtained by natural venting between grade and slab.

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3.5 Anchor bolts

Anchor bolts to prevent up-lift shall be of a type which allow tank radial contraction and expansion without obstruction during service.

3.6 Insulation

Tank insulation shall consist in:

- A bottom insulation installed on outer tank bottom and supporting the loads of the tank and its stored product
- A shell insulation
- A roof insulation laid on the suspended deck.

3.7 Nozzles and appurtenances

Each tank shall be fitted with all nozzles and accessories necessary for normal operation, commissioning and decommissioning procedures and maintenance.

All connections to or from the inner tank shall be installed through outer tank roof and suspended roof, or through the tank bottom.

3.8 Control and safety equipment

Control and safety equipment of tanks shall be designed to allow for remote operation and control.

Control and safety equipment shall be designed and installed in accordance with standards and codes as listed in section 2, and in accordance with the Company Instrument Specifications.

4. Design conditions

The tank shall be designed in accordance with [API STD 620](#) Appendix R.

The Contractor shall insure that each important tank element has proven operating experience in similar sizes and conditions.

4.1 Allowable design stresses

The allowable design stresses shall be taken from table 3.1 of the [API STD 620](#) standard.

The resultant stresses from combination of loads shall not exceed the allowable stresses specified above at any point of the tank.

Maximum allowable design stresses during hydrostatic test shall be limited to 0.80 of the yield strength on which the design stresses have been based.

4.2 Shell thickness

Shell plate thickness shall not exceed 32 mm.

No course shall have a thickness greater than the thickness of the course placed below.