APPENDIX D: TANK CONSTRUCTION SPECIFICATIONS APPROVED BY THE CHIEF INSPECTOR OF DANGEROUS GOODS

Steel Tanks

AS 1692

Tanks for flammable and combustible liquids.

Category 4 — Horizontal cylindrical tanks up to 150 m^3 capacity, for underground or above ground use, intended principally for industrial or service station use.

NZS 7521

Specification for underground steel storage tanks and their fittings, for the petroleum industry. Non-pressurised, horizontal, cylindrical, flat-ended.

BS 2594

Carbon steel welded horizontal cylindrical storage tanks

Maximum working pressure 40 kPa.

Maximum internal vacuum 10 kPa.

Temperature range —10°C to 150°C.

Above ground with saddle supports and underground tanks, dished ends.

Fibreglass Tanks

ASTM D4021-81

Glass fibre reinforced polyester underground petroleum storage tanks.

NS 1545 — (Norwegian Standard under NVS)

Horizontal cylindrical glass fibre reinforced polyester (GRP) petroleum storage tanks 1.2 to 50 m^3.

APPENDIX E: RECOMMENDED PRESSURE TESTS FOR NEW TANKS PRIOR TO INSTALLATION

Testing of Single Wall Steel or Glass Fibre Reinforced Polyester Underground Storage Tanks

The tank is to be thoroughly checked visually for mechanical damage which may have occurred. Any mechanical damage shall be repaired by the tank manufacturer or his authorised agent, to the same approved construction specification, before the tank is pressure tested.

The tank shall be subjected to a pneumatic test pressure of 35 kPa above ground without special support, using calibrated pressure gauges graduated in 2 kPa increments or less. A pressure relief valve set to 37 kPa is to be incorporated in the test manifold to prevent inadvertent over-pressurisation of the tanks during pneumatic testing. When air for testing is taken from a source of supply having a pressure greater than 35 kPa, pressure shall be reduced by means of a pressure reducing device.

The pressure relief valve shall be capable of discharging the maximum delivery of the pressure reducing device without pressure rising to more than 110% of the test pressure.

The relief pressure setting should be set to 37 kPa and calibrated on a regular basis.

While holding at the required pressure level, the entire tank is to be soaped with a liquid composed of water and leak test fluid or detergent.

After soaping, the entire tank is to be visually checked for leaks, giving special attention to tank openings.

Note: The pressure may drop in this test as the tank makes a temperature adjustment. Do not start the leakage test until the pressure settles and the tank holds the pressure. Make adjustments to the tank pressure to maintain the required pressure during this settling period.

Testing of Double-Walled Tanks

To prevent damage from over-pressurisation of the interstitial space (space between inner tank outer wall and outer shell inner wall), the following procedure should be followed:

1. Vent the interstitial space to the open air.
2. Pressurise the inner tank to 35 kPa.
3. Seal the inner tank and disconnect the external air supply.
4. Monitor the pressure for a period of at least 1 hour. While air

tests are generally inconclusive without soaping and careful inspection for bubbles, this step is recommended to detect a very large leak in the inner tank and to prepare for the next step.

5. Pressurise the interstitial space with air from the inner tank. Use a second gauge for measuring this interstitial space pressure.
6. Soap the exterior of the tank and inspect for bubbles whilst continuing to monitor the gauges to detect any pressure drop.
7. When the test is complete, first release pressure in the interstitial space and then release pressure on the primary tank.

WARNING: Pressurisation of the interstitial space directly from an outside air source is dangerous and is strictly prohibited. Never enter the tank whilst the interstitial space is under pressure.

Comments

(a) The capacity of the interstitial space is very small in relation to the primary tank capacity. Compressors commonly used for testing can over-pressurise the space in seconds, causing serious damage to the tank.

(b) A slight decrease in pressure in the inner tank may occur when the interstitial space is pressurised. A pressure drop of 2 kPa (0.3 psig) or less is typical.

(c) The space between the inner and outer tank walls is variously referred to as the "annular space", "annulus", "interstitial space" and "interstices.

The primary containment vessel is referred as as the "inner tank" and the exterior shell of the tank as the "outer tank".

Diagrams

Figures 1 and 2 attached show the recommended arrangements of test connections, pressure gauges and pressure relief valve.

Fig. 1 Air Testing Double Walled Tanks

Pressurizing the interstice with air pressure from the inner tank, after disconnecting the outside air source, prevents over-pressurization. The manifold illustrated is a useful method for accomplishing this.

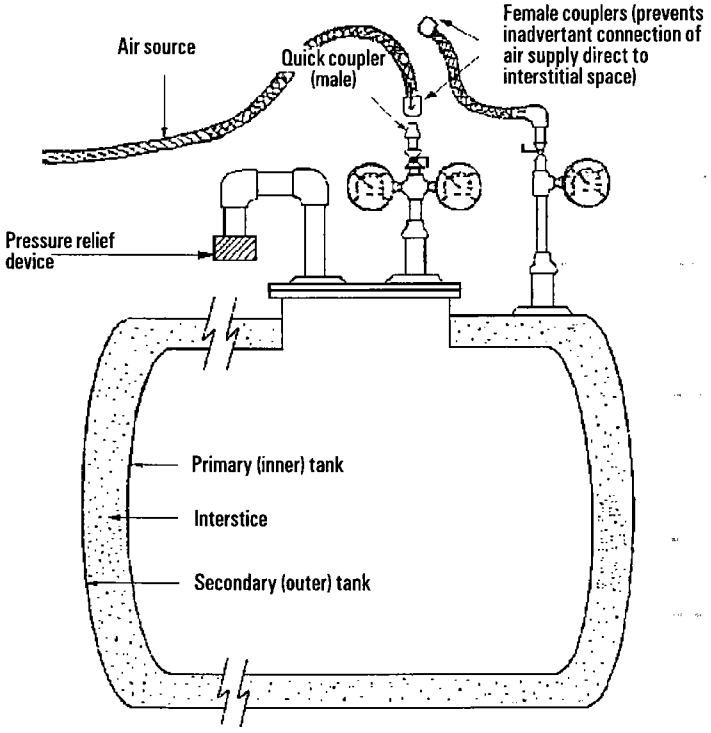
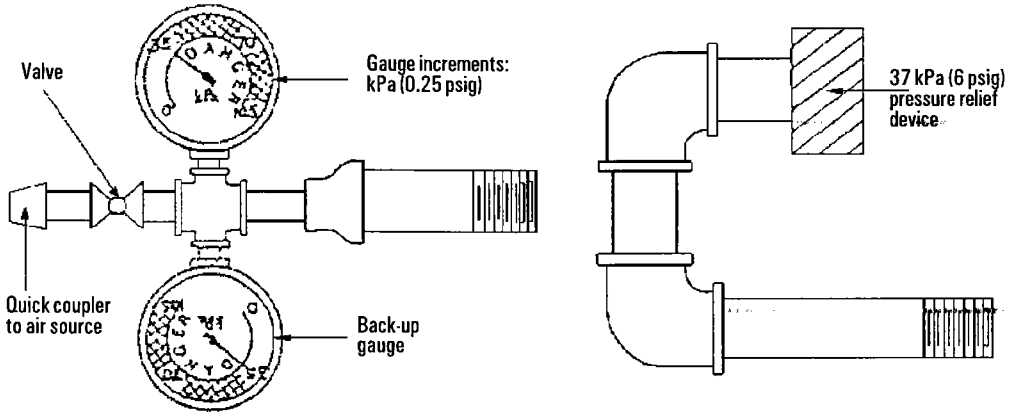


Fig. 2 Pressure Gauges and Relief Device

Note: Pressure relief devices shall be capable of discharging the maximum delivery of the pressure reducing device without a rise in pressure to beyond 110% of the test pressure.



APPENDIX F: GLASS REINFORCED POLYESTER UNDERGROUND PETROLEUM STORAGE TANKS

Manufacturers wishing to produce glass fibre reinforced polyester underground petroleum storage tanks must first obtain approval of their manufacturing works from the Chief Inspector of Dangerous Goods.

In order to submit for approval, it will be necessary for the manufacturer to submit full QA/QC manuals nominating the approved design specification.

The QA/QC manuals are to address the following:

1. Prototype testing in accordance with the design specification.
2. Complete inventory of equipment used in manufacture.
3. List of laboratory equipment with calibration certificates and proposed quality control tests citing the relevant standards to which the tests will be carried out.

Note: The following design specifications are applicable to the testing of glass fibre reinforced polyester resins:

ASTM D2393-96	Standard test method for viscosity of epoxy resins and related components.
ASTMD638-87a	Standard test method for tensile properties of plastics.
ANSI/ASTM D2587-68	(Reapproved 1979) — Standard test method acetone extraction and ignition of glass fibre strands yarns and roving for reinforced plastics.
ASTM D584-68	(Reapproved 1979) — Standard test method for ignition loss of cured reinforced resins.
ASTM D790-86	Standard test method for flexural properties of unreinforced and reinforced plastics and electrical insulating materials.
ASTM C581-87	Standard practice for determining chemical resistance of thermosetting resins used in glass fibre reinforced structures intended for liquid service.
ASTM D2563-70	(Reapproved 1987) - Standard practice for classifying visual defects in glass reinforced plastic laminate parts.

4. A history of the Company should be provided showing management structure and the numbers of staff employed stating years of relevant experience and qualifications held. A current annual report should be provided to back up the application for approval. This report should show the annual turnover of: the company in addition to listing the major projects carried out.

   It is strongly advised that the company obtain accreditation to the ISO 9000 series Quality Systems.