

(ii) Termination of the approval is necessary to adequately protect against risks to life and property; or

(iii) The approval was not issued by the approval agency in good faith; or

(iv) The portable tank does not meet the specification.

(2) Before an approval is terminated, the Associate Administrator gives the interested party(ies):

(i) Written notice of the facts or conduct believed to warrant the termination;

(ii) Opportunity to submit oral and written evidence; and

(iii) Opportunity to demonstrate or achieve compliance with the applicable requirements.

(3) If the Associate Administrator determines that a certificate of approval must be terminated to preclude a significant and imminent adverse affect on public safety, he may terminate the certificate immediately. In such circumstances, the opportunities of paragraphs (f)(2) (ii) and (iii) of this section need not be provided prior to termination of the approval, but shall be provided as soon as practicable thereafter.

[66 FR 33439, June 21, 2001, as amended at 67 FR 61016, Sept. 27, 2002; 68 FR 75748, 75751, Dec. 31, 2003; 72 FR 55695, Oct. 1, 2007]

§ 178.274 Specifications for UN portable tanks.

(a) *General.* (1) Each UN portable tank must meet the requirements of this section. In addition to the requirements of this section, requirements specific to UN portable tanks used for liquid and solid hazardous materials, non-refrigerated liquefied gases and refrigerated liquefied gases are provided in §§178.275, 178.276 and 178.277, respectively. Requirements for approval, maintenance, inspection, testing and use are provided in §178.273 and part 180, subpart G, of this subchapter. Any portable tank which meets the definition of a “container” within the terms of the International Convention for Safe Containers (CSC) must meet the requirements of the CSC as amended and 49 CFR parts 450 through 453 and must have a CSC safety approval plate.

(2) In recognition of scientific and technological advances, the technical requirements applicable to UN portable

tanks may be varied if approved by the Associate Administrator and the portable tank is shown to provide a level of safety equal to or exceeding the requirements of this subchapter. Portable tanks approved to alternative technical requirements must be marked “Alternative Arrangement” as specified in paragraph (i) of this section.

(3) *Definitions.* The following definitions apply for the purposes of design and construction of UN portable tanks under this subpart:

Alternate Arrangement portable tank means a UN portable tank that has been approved to alternative technical requirements or testing methods other than those specified for UN portable tanks in part 178 or part 180 of this subchapter.

Approval agency means the designated approval agency authorized to approve the portable tank in accordance with the procedures in subpart E of part 107 of this subchapter.

Design pressure is defined according to the hazardous materials intended to be transported in the portable tank. See §§178.275, 178.276 and 178.277, as applicable.

Design type means a portable tank or series of portable tanks made of materials of the same material specifications and thicknesses, manufactured by a single manufacturer, using the same fabrication techniques (for example, welding procedures) and made with equivalent structural equipment, closures, and service equipment.

Fine grain steel means steel that has a ferritic grain size of 6 or finer when determined in accordance with ASTM E 112–96 (IBR, see §171.7 of this subchapter).

Fusible element means a non-reclosing pressure relief device that is thermally activated and that provides protection against excessive pressure buildup in the portable tank developed by exposure to heat, such as from a fire (see §178.275(g)).

Jacket means the outer insulation cover or cladding which may be part of the insulation system.

Leakage test means a test using gas to subject the shell and its service equipment to an internal pressure.

Maximum allowable working pressure (MAWP) is defined according to the hazardous materials intended to be transported in the portable tank. See §§ 178.275, 178.276 and 178.277, as applicable.

Maximum permissible gross mass (MPGM) means the sum of the tare mass of the portable tank and the heaviest hazardous material authorized for transportation.

Mild steel means a steel with a guaranteed minimum tensile strength of 360 N/mm² to 440 N/mm² and a guaranteed minimum elongation at fracture as specified in paragraph (c)(10) of this section.

Offshore portable tank means a portable tank specially designed for repeated use in the transportation of hazardous materials to, from and between offshore facilities. An offshore portable tank is designed and constructed in accordance with the Guidelines for the Approval of Containers Handled in Open Seas specified in the IMDG Code (IBR, see § 171.7 of this subchapter).

Reference steel means a steel with a tensile strength of 370 N/mm² and an elongation at fracture of 27%.

Service equipment means measuring instruments and filling, discharge, venting, safety, heating, cooling and insulating devices.

Shell means the part of the portable tank which retains the hazardous materials intended for transportation, including openings and closures, but does not include service equipment or external structural equipment.

Structural equipment means the reinforcing, fastening, protective and stabilizing members external to the shell.

Test pressure means the maximum gauge pressure at the top of the shell during the hydraulic pressure test equal to not less than 1.5 times the design pressure for liquids and 1.3 for liquefied compressed gases and refrigerated liquefied gases. In some instances a pneumatic test is authorized as an alternative to the hydraulic test. The minimum test pressures for portable tanks intended for specific liquid and solid hazardous materials are specified in the applicable portable tank T codes (such as T1-T23) assigned to these hazardous materials in the § 172.101 Table of this subchapter.

(b) *General design and construction requirements.* (1) The design temperature range for the shell must be -40 °C to 50 °C (-40 °F to 122 °F) for hazardous materials transported under normal conditions of transportation, except for portable tanks used for refrigerated liquefied gases where the minimum design temperature must not be higher than the lowest (coldest) temperature (for example, service temperature) of the contents during filling, discharge or transportation. For hazardous materials handled under elevated temperature conditions, the design temperature must not be less than the maximum temperature of the hazardous material during filling, discharge or transportation. More severe design temperatures must be considered for portable tanks subjected to severe climatic conditions (for example, portable tanks transported in arctic regions). Shells must be designed and constructed in accordance with the requirements in Section VIII of the ASME Code (IBR, see § 171.7 of this subchapter), except as limited or modified in this subchapter. For portable tanks used for liquid or solid hazardous materials, a design code other than the ASME Code may be used if approved by the Associate Administrator. Portable tanks must have an ASME certification and U stamp when used for Hazard Zone A or B toxic by inhalation liquids, or when used for non-refrigerated or refrigerated liquefied compressed gases. Shells must be made of metallic materials suitable for forming. Non-metallic materials may be used for the attachments and supports between the shell and jacket, provided their material properties at the minimum and maximum design temperatures are proven to be sufficient. For welded shells, only a material whose weldability has been fully demonstrated may be used. Welds must be of high quality and conform to a level of integrity at least equivalent to the welding requirements specified in Section VIII of the ASME Code for the welding of pressure vessels. When the manufacturing process or the materials make it necessary, the shells must be suitably heat-treated to guarantee adequate toughness in the weld and in the heat-affected zones. In choosing the

material, the design temperature range must be taken into account with respect to risk of brittle fracture, stress corrosion cracking, resistance to impact, and suitability for the hazardous materials intended for transportation in the portable tank. When fine grain steel is used, the guaranteed value of the yield strength must be not more than 460 N/mm² and the guaranteed value of the upper limit of the tensile strength must be not more than 725 N/mm² according to the material specification. Aluminum may not be used as a construction material for the shells of portable tanks intended for the transport of non-refrigerated liquefied gases. For portable tanks intended for the transport of liquid or solid hazardous materials, aluminum may only be used as a construction material for portable tank shells if approved by the Associate Administrator. Portable tank materials must be suitable for the external environment where they will be transported, taking into account the determined design temperature range. Portable tanks shall be designed to withstand, without loss of contents, at least the internal pressure due to the contents and the static, dynamic and thermal loads during normal conditions of handling and transportation. The design must take into account the effects of fatigue, caused by repeated application of these loads through the expected life of the portable tank.

(2) Portable tank shells, fittings, and pipework shall be constructed from materials that are:

(i) Compatible with the hazardous materials intended to be transported; or

(ii) Properly passivated or neutralized by chemical reaction, if applicable; or

(iii) For portable tanks used for liquid and solid materials, lined with corrosion-resistant material directly bonded to the shell or attached by equivalent means.

(3) Gaskets and seals shall be made of materials that are compatible with the hazardous materials intended to be transported.

(4) When shells are lined, the lining must be compatible with the hazardous materials intended to be transported, homogeneous, non-porous, free from

perforations, sufficiently elastic and compatible with the thermal expansion characteristics of the shell. The lining of every shell, shell fittings and piping must be continuous and must extend around the face of any flange. Where external fittings are welded to the tank, the lining must be continuous through the fitting and around the face of external flanges. Joints and seams in the lining must be made by fusing the material together or by other equally effective means.

(5) Contact between dissimilar metals which could result in damage by galvanic action must be prevented by appropriate measures.

(6) The construction materials of the portable tank, including any devices, gaskets, linings and accessories, must not adversely affect or react with the hazardous materials intended to be transported in the portable tank.

(7) Portable tanks must be designed and constructed with supports that provide a secure base during transportation and with suitable lifting and tie-down attachments.

(c) *Design criteria.* (1) Portable tanks and their fastenings must, under the maximum permissible loads and maximum permissible working pressures, be capable of absorbing the following separately applied static forces (for calculation purposes, acceleration due to gravity (g) = 9.81m/s²):

(i) In the direction of travel: 2g (twice the MPGM multiplied by the acceleration due to gravity);

(ii) Horizontally at right angles to the direction of travel: 1g (the MPGM multiplied by the acceleration due to gravity);

(iii) Vertically upwards: 1g (the MPGM multiplied by the acceleration due to gravity); and

(iv) Vertically downwards: 2g (twice the MPGM multiplied by the acceleration due to gravity).

(2) Under each of the forces specified in paragraph (c)(1) of this section, the safety factor must be as follows:

(i) For metals having a clearly defined yield point, a design margin of 1.5 in relation to the guaranteed yield strength; or

(ii) For metals with no clearly defined yield point, a design margin of 1.5 in relation to the guaranteed 0.2%

proof strength and, for austenitic steels, the 1% proof strength.

(3) The values of yield strength or proof strength must be the values according to recognized material standards. When austenitic steels are used, the specified minimum values of yield strength or proof strength according to the material standards may be increased by up to 15% for portable tanks used for liquid and solid hazardous materials, other than toxic by inhalation liquids meeting the criteria of Hazard Zone A or Hazard Zone B (see §173.133 of this subchapter), when these greater values are attested in the material inspection certificate.

(4) Portable tanks must be capable of being electrically grounded to prevent dangerous electrostatic discharge when they are used for Class 2 flammable gases or Class 3 flammable liquids, including elevated temperature materials transported at or above their flash point.

(5) For shells of portable tanks used for liquefied compressed gases, the shell must consist of a circular cross section. Shells must be of a design capable of being stress-analyzed mathematically or experimentally by resistance strain gauges as specified in UG-101 of Section VIII of the ASME Code, or other methods approved by the Associate Administrator.

(6) Shells must be designed and constructed to withstand a hydraulic test pressure of not less than 1.5 times the design pressure for portable tanks used for liquids and 1.3 times the design pressure for portable tanks used for liquefied compressed gases. Specific requirements are provided for each hazardous material in the applicable T Code or portable tank special provision specified in the §172.101 Table of this subchapter. The minimum shell thickness requirements must also be taken into account.

(7) For metals exhibiting a clearly defined yield point or characterized by a guaranteed proof strength (0.2% proof strength, generally, or 1% proof strength for austenitic steels), the primary membrane stress σ (sigma) in the shell must not exceed 0.75 Re or 0.50 Rm, whichever is lower, at the test pressure, where:

Re = yield strength in N/mm², or 0.2% proof strength or, for austenitic steels, 1% proof strength;

Rm = minimum tensile strength in N/mm².

(8) The values of Re and Rm to be used must be the specified minimum values according to recognized material standards. When austenitic steels are used, the specified minimum values for Re and Rm according to the material standards may be increased by up to 15% when greater values are attested in the material inspection certificate.

(9) Steels which have a Re/Rm ratio of more than 0.85 are not allowed for the construction of welded shells. The values of Re and Rm to be used in determining this ratio must be the values specified in the material inspection certificate.

(10) Steels used in the construction of shells must have an elongation at fracture, in percentage, of not less than 10,000/Rm with an absolute minimum of 16% for fine grain steels and 20% for other steels.

(11) For the purpose of determining actual values for materials for sheet metal, the axis of the tensile test specimen must be at right angles (transversely) to the direction of rolling. The permanent elongation at fracture must be measured on test specimens of rectangular cross sections in accordance with ISO 6892 (IBR, see §171.7 of this subchapter), using a 50 mm gauge length.

(d) *Minimum shell thickness.* (1) The minimum shell thickness must be the greatest thickness of the following:

(i) the minimum thickness determined in accordance with the requirements of paragraphs (d)(2) through (d)(7) of this section;

(ii) the minimum thickness determined in accordance with Section VIII of the ASME Code or other approved pressure vessel code; or

(iii) the minimum thickness specified in the applicable T code or portable tank special provision indicated for each hazardous material in the §172.101 Table of this subchapter.

(2) Shells (cylindrical portions, heads and manhole covers) not more than 1.80 m in diameter may not be less than 5 mm thick in the reference steel or of

equivalent thickness in the metal to be used. Shells more than 1.80 m in diameter may not be less than 6 mm (0.2 inches) thick in the reference steel or of equivalent thickness in the metal to be used. For portable tanks used only for the transportation of powdered or granular solid hazardous materials of Packing Group II or III, the minimum thickness requirement may be reduced to 5 mm in the reference steel or of equivalent thickness in the metal to be used regardless of the shell diameter. For vacuum-insulated tanks, the aggregate thickness of the jacket and the shell must correspond to the minimum thickness prescribed in this paragraph, with the thickness of the shell itself not less than the minimum thickness prescribed in paragraph (d)(3) of this section.

(3) When additional protection against shell damage is provided in the case of portable tanks used for liquid and solid hazardous materials requiring test pressures less than 2.65 bar (265.0 kPa), subject to certain limitations specified in the UN Recommendations (IBR, see §171.7 of this subchapter), the Associate Administrator may approve a reduced minimum shell thickness.

(4) The cylindrical portions, heads and manhole covers of all shells must not be less than 3 mm (0.1 inch) thick regardless of the material of construction, except for portable tanks used for liquefied compressed gases where the cylindrical portions, ends (heads) and manhole covers of all shells must not be less than 4 mm (0.2 inch) thick regardless of the material of construction.

(5) When steel is used, that has characteristics other than that of reference steel, the equivalent thickness of the shell and heads must be determined according to the following formula:

$$e_1 = \frac{21.4e_0d_1}{1.8m \sqrt[3]{Rm_1 \times A_1}}$$

Where:

e_1 = required equivalent thickness (in mm) of the metal to be used;

e_0 = minimum thickness (in mm) of the reference steel specified in the applicable T code or portable tank special provision indicated for each material in the §172.101 Table of this subchapter;

d_1 = 1.8m, unless the formula is used to determine the equivalent minimum thickness for a portable tank shell that is required to have a minimum thickness of 8mm or 10mm according to the applicable T code indicated in the §172.101 Table of this subchapter. When reference steel thicknesses of 8mm or 10mm are specified, d_1 is equal to the actual diameter of the shell but not less than 1.8m;

Rm_1 = guaranteed minimum tensile strength (in N/mm²) of the metal to be used;

A_1 = guaranteed minimum elongation at fracture (in %) of the metal to be used according to recognized material standards.

(6) The wall and all parts of the shell may not have a thickness less than that prescribed in paragraphs (d)(2), (d)(3) and (d)(4) of this section. This thickness must be exclusive of any corrosion allowance.

(7) There must be no sudden change of plate thickness at the attachment of the heads to the cylindrical portion of the shell.

(e) *Service equipment.* (1) Service equipment must be arranged so that it is protected against the risk of mechanical damage by external forces during handling and transportation. When the connections between the frame and the shell allow relative movement between the sub-assemblies, the equipment must be fastened to allow such movement without risk of damage to any working part. The external discharge fittings (pipe sockets, shut-off devices) and the internal stop-valve and its seating must be protected against mechanical damage by external forces (for example, by using shear sections). Each internal self-closing stop-valve must be protected by a shear section or sacrificial device located outboard of the valve. The shear section or sacrificial device must break at no more than 70% of the load that would cause failure of the internal self-closing stop valve. The filling and discharge devices (including flanges or threaded plugs) and any protective caps must be capable of being secured against unintended opening.

(2) Each filling or discharge opening of a portable tank must be clearly marked to indicate its function.

(3) Each stop-valve or other means of closure must be designed and constructed to a rated pressure not less than the MAWP of the shell taking

into account the temperatures expected during transport. All stop-valves with screwed spindles must close by a clockwise motion of the handwheel. For other stop-valves, the position (open and closed) and direction of closure must be clearly indicated. All stop-valves must be designed to prevent unintentional opening.

(4) Piping must be designed, constructed and installed to avoid the risk of damage due to thermal expansion and contraction, mechanical shock and vibration. All piping must be of a suitable metallic material. Welded pipe joints must be used wherever possible.

(5) Joints in copper tubing must be brazed or have an equally strong metal union. The melting point of brazing materials must be no lower than 525 °C (977 °F). The joints must not decrease the strength of the tubing, such as may happen when cutting threads. Brazed joints are not authorized for portable tanks intended for refrigerated liquefied gases.

(6) The burst pressure of all piping and pipe fittings must be greater than the highest of four times the MAWP of the shell or four times the pressure to which it may be subjected in service by the action of a pump or other device (except pressure relief devices).

(7) Ductile metals must be used in the construction of valves and accessories.

(f) *Pressure relief devices*—(1) *Marking of pressure relief devices*. Every pressure relief device must be clearly and permanently marked with the following:

(i) the pressure (in bar or kPa) or temperature for fusible elements (in °C) at which it is set to discharge;

(ii) the allowable tolerance at the discharge pressure for reclosing devices;

(iii) the reference temperature corresponding to the rated pressure for frangible discs;

(iv) the allowable temperature tolerance for fusible elements;

(v) The rated flow capacity of the spring loaded pressure relief devices, frangible disc or fusible elements in standard cubic meters of air per second (m³/s). For spring loaded pressure relief devices, the rated flow capacity must be determined according to ISO 4126-1 (including Technical Corrigendum 1)

and ISO 4126-7 (IBR, see § 171.7 of this subchapter); and

(vi) The cross sectional flow areas of the spring loaded pressure relief devices, frangible discs, and fusible elements in mm²; and

(vii) When practicable, the device must show the manufacturer's name and product number.

(2) *Connections to pressure relief devices*. Connections to pressure relief devices must be of sufficient size to enable the required discharge to pass unrestricted to the safety device. No stop-valve may be installed between the shell and the pressure relief devices except where duplicate devices are provided for maintenance or other reasons and the stop-valves serving the devices actually in use are locked open or the stop-valves are interlocked so that at least one of the devices is always in use. There must be no obstruction in an opening leading to a vent or pressure relief device which might restrict or cut-off the flow from the shell to that device. Vents or pipes from the pressure relief device outlets, when used, must deliver the relieved vapor or liquid to the atmosphere in conditions of minimum back-pressure on the relieving devices.

(3) *Location of pressure relief devices*.

(i) Each pressure relief device inlet must be situated on top of the shell in a position as near the longitudinal and transverse center of the shell as reasonably practicable. All pressure relief device inlets must, under maximum filling conditions, be situated in the vapor space of the shell and the devices must be so arranged as to ensure that any escaping vapor is not restricted in any manner. For flammable hazardous materials, the escaping vapor must be directed away from the shell in such a manner that it cannot impinge upon the shell. For refrigerated liquefied gases, the escaping vapor must be directed away from the tank and in such a manner that it cannot impinge upon the tank. Protective devices which deflect the flow of vapor are permissible provided the required relief-device capacity is not reduced.

(ii) Provisions must be implemented to prevent unauthorized persons from access to the pressure relief devices and to protect the devices from damage

caused by the portable tank overturning.

(g) *Gauging devices.* Unless a portable tank is intended to be filled by weight, it must be equipped with one or more gauging devices. Glass level-gauges and gauges made of other fragile material, which are in direct communication with the contents of the tank are prohibited. A connection for a vacuum gauge must be provided in the jacket of a vacuum-insulated portable tank.

(h) *Portable tank supports, frameworks, lifting and tie-down attachments.* (1) Portable tanks must be designed and constructed with a support structure to provide a secure base during transport. The forces and safety factors specified in paragraphs (c)(1) and (c)(2) of this section, respectively, must be taken into account in this aspect of the design. Skids, frameworks, cradles or other similar structures are acceptable.

(2) The combined stresses caused by portable tank mountings (for example, cradles, framework, etc.) and portable tank lifting and tie-down attachments must not cause stress that would damage the shell in a manner that would compromise its lading retention capability. Permanent lifting and tie-down attachments must be fitted to all portable tanks. Preferably they should be fitted to the portable tank supports but may be secured to reinforcing plates located on the shell at the points of support. Each portable tank must be designed so that the center of gravity of the filled tank is approximately centered within the points of attachment for lifting devices.

(3) In the design of supports and frameworks, the effects of environmental corrosion must be taken into account.

(4) Forklift pockets must be capable of being closed off. The means of closing forklift pockets must be a permanent part of the framework or permanently attached to the framework. Single compartment portable tanks with a length less than 3.65 m (12 ft.) need not have forklift pockets that are capable of being closed off provided that:

(i) The shell, including all the fittings, are well protected from being hit by the forklift blades; and

(ii) The distance between forklift pockets (measured from the center of each pocket) is at least half of the maximum length of the portable tank.

(5) During transport, portable tanks must be adequately protected against damage to the shell, and service equipment resulting from lateral and longitudinal impact and overturning, or the shell and service equipment must be constructed to withstand the forces resulting from impact or overturning. External fittings must be protected so as to preclude the release of the shell contents upon impact or overturning of the portable tank on its fittings. Examples of protection include:

(i) Protection against lateral impact which may consist of longitudinal bars protecting the shell on both sides at the level of the median line;

(ii) Protection of the portable tank against overturning which may consist of reinforcement rings or bars fixed across the frame;

(iii) Protection against rear impact which may consist of a bumper or frame;

(iv) Protection of the shell against damage from impact or overturning by use of an ISO frame in accordance with ISO 1496-3 (IBR, see §171.7 of this subchapter); and

(v) Protection of the portable tank from impact or damage that may result from overturning by an insulation jacket.

(i) *Marking.* (1) Every portable tank must be fitted with a corrosion resistant metal plate permanently attached to the portable tank in a conspicuous place and readily accessible for inspection. When the plate cannot be permanently attached to the shell, the shell must be marked with at least the information required by Section VIII of the ASME Code. At a minimum, the following information must be marked on the plate by stamping or by any other equivalent method:

Country of manufacture
U N
Approval Country
Approval Number
Alternative Arrangements (see §178.274(a)(2))
“AA”
Manufacturer's name or mark
Manufacturer's serial number
Approval Agency (Authorized body for the design approval)

Owner's registration number
 Year of manufacture
 Pressure vessel code to which the shell is designed
 Test pressure _____ bar gauge.
 MAWP _____ bar gauge.
 External design pressure (not required for portable tanks used for refrigerated liquefied gases) _____ bar gauge.
 Design temperature range _____ °C to _____ °C. (For portable tanks used for refrigerated liquefied gases, the minimum design temperature must be marked.)
 Water capacity at 20 °C/_____ liters.
 Water capacity of each compartment at 20 °C _____ liters.
 Initial pressure test date and witness identification.
 MAWP for heating/cooling system _____ bar gauge.
 Shell material(s) and material standard reference(s).
 Equivalent thickness in reference steel _____ mm.
 Lining material (when applicable).
 Date and type of most recent periodic test(s).
 Month _____ Year _____ Test pressure _____ bar gauge.
 Stamp of approval agency that performed or witnessed the most recent test.
 For portable tanks used for refrigerated liquefied gases:
 Either "thermally insulated" or "vacuum insulated" _____.
 Effectiveness of the insulation system (heat influx) _____ Watts (W).
 Reference holding time _____ days or hours and initial pressure _____ bar/kPa gauge and degree of filling _____ in kg for each refrigerated liquefied gas permitted for transportation.

(2) The following information must be marked either on the portable tank itself or on a metal plate firmly secured to the portable tank:

Name of the operator.
 Name of hazardous materials being transported and maximum mean bulk temperature (except for refrigerated liquefied gases, the name and temperature are only required when the maximum mean bulk temperature is higher than 50 °C).
 Maximum permissible gross mass (MPGM) _____ kg.
 Unladen (tare) mass _____ kg.

NOTE TO PARAGRAPH (i)(2): For the identification of the hazardous materials being transported refer to part 172 of this subchapter.

(3) If a portable tank is designed and approved for open seas operations, such as offshore oil exploration, in accordance with the IMDG Code, the words

"OFFSHORE PORTABLE TANK" must be marked on the identification plate.

(j) *Initial inspection and test.* The initial inspection and test of a portable tank must include the following:

(1) A check of the design characteristics.

(2) An internal and external examination of the portable tank and its fittings, taking into account the hazardous materials to be transported. For UN portable tanks used for refrigerated liquefied gases, a pressure test using an inert gas may be conducted instead of a hydrostatic test. An internal inspection is not required for a portable tank used for the dedicated transportation of refrigerated liquefied gases that are not filled with an inspection opening.

(3) A pressure test as specified in paragraph (i) of this section.

(4) A leakage test.

(5) A test of the satisfactory operation of all service equipment including pressure relief devices must also be performed. When the shell and its fittings have been pressure-tested separately, they must be subjected to a leakage test after reassembly. All welds, subject to full stress level in the shell, must be inspected during the initial test by radiographic, ultrasonic, or another suitable non-destructive test method. This does not apply to the jacket.

(6) Effective January 1, 2008, each new UN portable tank design type meeting the definition of "container" in the Convention for Safe Containers (CSC) (see 49 CFR 450.3(a)(2)) must be subjected to the dynamic longitudinal impact test prescribed in Part IV, Section 40 of the UN Manual of Tests and Criteria (see IBR, §171.7 of this subchapter). A UN portable tank design type impact-tested prior to January 1, 2008, in accordance with the requirements of this section in effect on October 1, 2005, need not be retested. UN portable tanks used for the dedicated transportation of "Helium, refrigerated liquid," UN1963, and "Hydrogen, refrigerated liquid," UN1966, that are marked "NOT FOR RAIL TRANSPORT" in letters of a minimum height of 10 cm (4 inches) on at least two sides of the portable tank are excepted from the dynamic longitudinal impact test.

(7) The following tests must be completed on a portable tank or a series of portable tanks designed and constructed to a single design type that is also a CSC container without leakage or deformation that would render the portable tank unsafe for transportation and use:

(i) *Longitudinal inertia.* The portable tank loaded to its maximum gross weight must be positioned with its longitudinal axis vertical. It shall be held in this position for five minutes by support at the lower end of the base structure providing vertical and lateral restraint and by support at the upper end of the base structure providing lateral restraint only.

(ii) *Lateral inertia.* The portable tank loaded to its maximum gross weight must be positioned for five minutes with its transverse axis vertical. It shall be held in this position for five minutes by support at the lower side of the base structure providing vertical and lateral restraint and by support at the upper side of the base structure providing lateral restraint only.

[66 FR 33440, June 21, 2001, as amended at 67 FR 15744, Apr. 3, 2002; 68 FR 45041, July 31, 2003; 68 FR 57633, Oct. 6, 2003; 68 FR 75751, Dec. 31, 2003; 69 FR 76185, Dec. 20, 2004; 70 FR 34399, June 14, 2005; 71 FR 78634, Dec. 29, 2006; 72 FR 55696, Oct. 1, 2007; 73 FR 4719, Jan. 28, 2008; 78 FR 1096, Jan. 7, 2013]

EDITORIAL NOTE: At 68 FR 57633, Oct. 6, 2003, §178.274 was amended in paragraph (b)(1); however, the amendment could not be incorporated due to inaccurate amendatory instruction.

§ 178.275 Specification for UN Portable Tanks intended for the transportation of liquid and solid hazardous materials.

(a) In addition to the requirements of §178.274, this section sets forth definitions and requirements that apply to UN portable tanks intended for the transportation of liquid and solid hazardous materials.

(b) *Definitions and requirements*—(1) *Design pressure* means the pressure to be used in calculations required by the recognized pressure vessel code. The design pressure must not be less than the highest of the following pressures:

(i) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(ii) The sum of—

(A) The absolute vapor pressure (in bar) of the hazardous material at 65 °C, minus 1 bar (149 °F, minus 100 kPa);

(B) The partial pressure (in bar) of air or other gases in the ullage space, resulting from their compression during filling without pressure relief by a maximum ullage temperature of 65 °C (149 °F) and a liquid expansion due to an increase in mean bulk temperature of 35 °C (95 °F); and

(C) A head pressure determined on the basis of the forces specified in §178.274(c) of this subchapter, but not less than 0.35 bar (35 kPa).

(2) *Maximum allowable working pressure (MAWP)* means a pressure that must not be less than the highest of the following pressures measured at the top of the shell while in operating position:

(i) The maximum effective gauge pressure allowed in the shell during filling or discharge; or

(ii) The maximum effective gauge pressure to which the shell is designed which must be not less than the design pressure.

(c) *Service equipment.* (1) In addition to the requirements specified in §178.274, for service equipment, all openings in the shell, intended for filling or discharging the portable tank must be fitted with a manually operated stop-valve located as close to the shell as reasonably practicable. Other openings, except for openings leading to venting or pressure relief devices, must be equipped with either a stop-valve or another suitable means of closure located as close to the shell as reasonably practicable.

(2) All portable tanks must be fitted with a manhole or other inspection openings of a suitable size to allow for internal inspection and adequate access for maintenance and repair of the interior. Compartmented portable tanks must have a manhole or other inspection openings for each compartment.

(3) For insulated portable tanks, top fittings must be surrounded by a spill collection reservoir with suitable drains.

(4) Piping must be designed, constructed and installed to avoid the risk of damage due to thermal expansion