

but that may be altered to meet another specification by changing relief device, closures, lading discharge devices, and other lading retention devices.

Void means the space between tank heads or bulkheads and a connecting structure.

Welded flange means a flange attached to the tank by a weld joining the tank shell to the cylindrical outer surface of the flange, or by a fillet weld joining the tank shell to a flange shaped to fit the shell contour.

(b) * * * (1) Each cargo tank or cargo tank motor vehicle design type and each accident damage protection device design must be certified to be in conformance with the specification requirements by a Design Certifying Engineer who is registered in accordance with subpart F of part 107 of this title.

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■ 20. In § 178.337–3, paragraphs (b), (e) and (g) are revised to read as follows:

§ 178.337–3 Structural integrity.

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(b) *Static design and construction.* (1) The static design and construction of each cargo tank must be in accordance with Section VIII, Division 1 of the ASME Code (incorporated by reference; see § 171.7 of this subchapter). The cargo tank design must include calculation of stresses generated by design pressure, the weight of lading, the weight of structure supported by the cargo tank wall, and the effect of temperature gradients resulting from lading and ambient temperature extremes. When dissimilar materials are used, their thermal coefficients must be used in calculation of thermal stresses.

(2) Stress concentrations in tension, bending, and torsion that occur at pads, cradles, or supports must be considered in accordance with Appendix G of Section VIII, Division 1 of the ASME Code.

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(e) The minimum metal thickness for the shell and heads on tanks with a design pressure of 100 psig or more must be 4.75 mm (0.187 inch) for steel and 6.86 mm (0.270 inch) for aluminum, except for chlorine and sulfur dioxide tanks. In all cases, the minimum thickness of the tank shell and head shall be determined using structural design requirements in Section VIII of the ASME Code or 25% of the tensile strength of the material used. For a cargo tank used in chlorine or sulfur dioxide service, the cargo tank must be made of steel. A corrosion allowance of 20 percent or 2.54 mm (0.10 inch), whichever is less, must be added to the

thickness otherwise required for sulfur dioxide and chlorine tank material. In chlorine cargo tanks, the wall thickness must be at least 1.59 cm (0.625 inch), including corrosion allowance.

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(g) The design, construction, and installation of an attachment, appurtenance to the cargo tank, structural support member between the cargo tank and the vehicle or suspension component, or accident protection device must conform to the following requirements:

(1) Structural members, the suspension sub-frame, accident protection structures, and external circumferential reinforcement devices must be used as sites for attachment of appurtenances and other accessories to the cargo tank, when practicable.

(2) A lightweight attachment to the cargo tank wall such as a conduit clip, brake line clip, skirting structure, lamp mounting bracket, or placard holder must be of a construction having lesser strength than the cargo tank wall materials and may not be more than 72 percent of the thickness of the material to which it is attached. The lightweight attachment may be secured directly to the cargo tank wall if the device is designed and installed in such a manner that, if damaged, it will not affect the lading retention integrity of the tank. A lightweight attachment must be secured to the cargo tank shell or head by a continuous weld or in such a manner as to preclude formation of pockets which may become sites for corrosion. Attachments meeting the requirements of this paragraph are not authorized for cargo tanks constructed under part UHT, Section VIII, Division 1 of the ASME Code.

(3) Except as prescribed in paragraphs (g)(1) and (g)(2) of this section, the welding of any appurtenance to the cargo tank wall must be made by attachment of a mounting pad so that there will be no adverse effect upon the lading retention integrity of the cargo tank if any force less than that prescribed in paragraph (b)(1) of this section is applied from any direction. The thickness of the mounting pad may not be less than that of the shell wall or head wall to which it is attached, and not more than 1.5 times the shell or head thickness. However, a pad with a minimum thickness of 0.25 inch may be used when the shell or head thickness is over 0.25 inch. If weep holes or tell-tale holes are used, the pad must be drilled or punched at the lowest point before it is welded to the tank. Each pad must—

(i) Be fabricated from material determined to be suitable for welding to

both the cargo tank material and the material of the appurtenance or structural support member; a Design Certifying Engineer must make this determination considering chemical and physical properties of the materials and must specify filler material conforming to the requirements of the ASME Code (incorporated by reference; see § 171.7 of this subchapter).

(ii) Be preformed to an inside radius no greater than the outside radius of the cargo tank at the attachment location.

(iii) Extend at least 2 inches in each direction from any point of attachment of an appurtenance or structural support member. This dimension may be measured from the center of the attached structural member.

(iv) Have rounded corners, or otherwise be shaped in a manner to minimize stress concentrations on the shell or head.

(v) Be attached by continuous fillet welding. Any fillet weld discontinuity may only be for the purpose of preventing an intersection between the fillet weld and a tank or jacket seam weld.

21. In § 178.337–8, paragraph (a)(5)(iii) is revised to read as follows:

§ 178.337–8 Openings, inlets, and outlets.

(a) * * *

(5) * * *

(iii) A cargo tank motor vehicle used to transport refrigerated liquids such as argon, carbon dioxide, helium, krypton, neon, nitrogen, and xenon, or mixtures thereof.

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■ 22. In § 178.337–9, (b)(2) is revised and paragraph (b)(5) is removed and reserved, to read as follows:

§ 178.337–9 Pressure relief devices, piping, valves, hoses, and fittings.

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(b) * * *

(2) Pipe joints must be threaded, welded, or flanged. If threaded pipe is used, the pipe and fittings must be Schedule 80 weight or heavier. Except for sacrificial devices, malleable steel, stainless steel, or ductile iron must be used in the construction of primary valves and fittings used in liquid filling or vapor equalization; however, stainless steel may not be used for internal components such as shutoff discs and springs. Where copper tubing is permitted, joints must be brazed or be of equally strong metal union type. The melting point of the brazing material may not be lower than 538 °C (1000 °F). The method of joining tubing may not reduce the strength of the tubing.

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