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§ 154.630 Cargo tank material.

(a) If a material of a cargo tank is not listed in §§ 154.610, 154.615 or § 154.620, the allowable stress of that material must be specially approved by the Commandant (G–MSO).

(b) For cargo tanks of aluminum alloys with welded connections, the minimum tensile strength (σ_B) for the calculations under § 154.440, § 154.447 and § 154.450 must be the minimum tensile strength of the alloy in the annealed condition.

(c) Increased yield strength and tensile strength of a material at low temperature for independent tanks type A, B, and C must be specially approved by the Commandant (G–MSO).

[CGD 74–289, 44 FR 26009, May 3, 1979, as amended by CGD 82–063b, 48 FR 4782, Feb. 3, 1983]

CONSTRUCTION

§ 154.650 Cargo tank and process pressure vessel welding.

(a) Cargo tank and process pressure vessel welding must meet Subpart 54.05 and Part 57 of this chapter.

(b) Welding consumables used in welding cargo tanks must meet § 57.02–4 of this chapter.

(c) Independent tanks must meet the following:

(1) Each welded joint of the shells must be a full penetration butt weld, except dome to shell connections may have full penetration tee welds.

(2) Each nozzle weld must be of the full penetration type, except for small penetrations on domes.

(d) Each welded joint in an independent tank type C or in a process pressure vessel must meet Part 54 of this chapter, except that any backing rings must be removed unless specially approved by the Commandant (G–MSO).

(e) Each welded joint in a membrane tank must meet the quality assurance measures, weld procedure qualification, design details, materials, construction, inspection, and production testing of components developed during the prototype testing program that are specially approved by the Commandant (G–MSO) under this part.

(f) Each welded joint in a semi-membrane tank must meet paragraph (c) or (e) of this section.

[CGD 74–289, 44 FR 26009, May 3, 1979, as amended by CGD 82–063b, 48 FR 4782, Feb. 3, 1983]

§ 154.655 Stress relief for independent tanks type C.

For a design temperature colder than −10°C (14°F), an independent tank type C of:

(a) Carbon and carbon-manganese steel must be stress relieved by post-weld heat treatment under § 54.25–7 of this chapter or by mechanical stress relief under Subpart 54.30 of this chapter; or

(b) Materials other than carbon and carbon manganese steel must be stress relieved as required under Part 54 of this chapter. The procedure for stress relieving must be specially approved by the Commandant (G–MSO).

§ 154.660 Pipe welding.

(a) Pipe welding must meet Part 57 of this chapter.

(b) Longitudinal butt welds, in piping that does not meet a standard or specification under § 56.60–1 of this chapter, and girth butt welds must meet the following:

(1) Butt welds of pipes made from carbon, carbon manganese, or low alloy steels must meet § 56.50–105 of this chapter, including the requirements for post-weld heat treatment.

(2) Except for piping inside an independent cargo tank type A, B, or C, butt welds must be 100% radiographically tested if the design temperature is lower than −10°C (14°F), and:

(i) The wall thickness is greater than 10 mm (0.394 in.); or

(ii) The nominal pipe diameter is greater than 100 mm (nominal 4 in.).

(3) If Table 4 references this section, butt welds for deck cargo piping exceeding 75 mm (3 in.) in diameter must be 100% radiographically tested.

(4) Butt welds of pipes not meeting paragraph (b)(2) or (b)(3) of this section must meet the non-destructive testing requirements under Subpart 56.95 of this chapter.

§154.665 Welding procedures.

Welding procedure tests for cargo tanks for a design temperature colder than 0°C (32°F), process pressure vessels, and piping must meet §54.05–15 and Subpart 57.03 of this chapter.

CARGO PRESSURE AND TEMPERATURE CONTROL

§154.701 Cargo pressure and temperature control: General.

Except as allowed under §154.703, cargo tanks must:

(a) Have their safety relief valves set at a pressure equal to or greater than the vapor pressure of the cargo at 45°C (113°F) but not greater than the MARVS under §154.405; or

(b) Be refrigerated by a system meeting §154.702, and each refrigerated incompatible cargo refrigerated by a separate system.

§154.702 Refrigerated carriage.

(a) Each refrigeration system must:

(1) Have enough capacity to maintain the cargo vapor pressure in each cargo tank served by the system below the set pressure of the relief valves under ambient temperatures of 45°C (113°F) still air and 32°C (89.6°F) still water with the largest unit in the system inoperative; or

(2) Have a standby unit with a capacity at least equal to the capacity of the largest refrigeration unit in the system.

(b) For the purpose of this section, a ''refrigeration unit'' includes a compressor and its motors and controls.

(c) Each refrigeration system must:

(1) Have a heat exchanger with an excess capacity of 25 percent of the required capacity; or

(2) A standby heat exchanger.

(d) Where cooling water is used in a refrigeration system:

(1) The cooling water pump or pumps must be used exclusively for the system;

(2) Each pump must have suction lines from sea chests on the port and starboard sides of the vessel; and

(3) There must be a standby pump, that may be used for:

(i) Non-essential purposes on the vessel; or

(ii) Essential purposes on the vessel, if the pump is sized to simultaneously provide for the capacity requirements for the essential purposes and the refrigeration cooling water.

(e) Each refrigeration system must use refrigerants that are compatible with the cargo and, for cascade units, with each other.

(f) The pressure of the heat transfer fluid in each cooling coil in a tank must be greater than the pressure of the cargo.

§154.703 Methane (LNG).

Unless a cargo tank carrying methane (LNG) can withstand the pressure build up due to boil-off for 21 days, the pressure in the cargo tank must be maintained below the set pressure of the safety relief valve for at least 21 days by:

(a) A refrigeration system that meets §154.702;

(b) A waste heat or catalytic furnace that burns boil-off gas, and:

(1) Maintains the stack exhaust temperature below 535°C (995°F);

(2) Exhibits no visible flame; and

(3) Is specially approved by the Commandant (G–MSO);

(c) Boilers, inert gas generators, and combustion engines in the main propelling machinery space that use boil-off gas as fuel; or

(d) Equipment for services, other than those under paragraph (c) of this section, that use boil-off gas as fuel and that are located:

(1) In the main propelling machinery space; or

(2) a space specially approved by the Commandant (G–MSO).

[CGD 74–289, 44 FR 26009, May 3, 1979, as amended by CGD 82–063b, 48 FR 4782, Feb. 3, 1983]

§154.705 Cargo boil-off as fuel: General.

(a) Each cargo boil-off fuel system under §154.703(c) must meet §§154.706 through 154.709.

(b) The piping in the cargo boil-off fuel system must have a connection for introducing inert gas and for gas freeing the piping in the machinery space.

(c) A gas fired main propulsion boiler or combustion engine must have a fuel oil fired pilot that maintains fuel flow