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§ 154.460 Design criteria.

At static angles of heel up through 30°, a secondary barrier must

(a) If a complete secondary barrier is required in § 154.459, hold all of the liquid cargo in the cargo tank for at least 15 days under the dynamic loads in § 154.409(e);

(b) If a partial secondary barrier is permitted in § 154.459, hold any leakage of liquid cargo corresponding to the extent of failure under § 154.448(a) after initial detection or primary barrier leak for at least 15 days under the dynamic loads in § 154.409(e);

(c) If the primary barrier fails, prevent the temperature of the vessel's structure from falling below the minimum allowable service temperature of the steel; and

(d) Be designed so that a cargo tank failure does not cause a failure in the secondary barrier.

INSULATION

§ 154.465 General.

If the design temperature is below −10°C (14°F), the cargo tank insulation must prevent the temperature of the vessel's hull from cooling below the minimum temperature allowed under § 154.172.

§ 154.466 Design criteria.

(a) The insulation for a cargo tank without a secondary barrier must be designed for the cargo tank at the design temperature, and for a vessel operating in:

(1) Any waters in the world, except Alaskan waters, for the ambient cold condition of:

(i) Five knots air at −18°C (0°F); and

(ii) Still sea water at 0°C (32°F); or

(2) Alaskan waters for the ambient cold condition of:

(i) Five knots air at −29°C (20°F); and

(ii) Still sea water at −2°C (28°F).

(b) The insulation for a cargo tank with a secondary barrier must be designed for the secondary barrier at the design temperature, and the ambient cold conditions listed under paragraph (a)(1) or paragraph (a)(2) of this section.

(c) The insulation material must be designed for any loads transmitted from adjacent hull structure.

(d) Insulation for cargo tank and piping must meet § 38.05–20 of this chapter.

(e) Powder or granulated insulation must:

(1) Not compact from vibrations of the vessel;

(2) Maintain the thermal conductivity listed under § 154.467; and

(3) Not exert a static pressure greater than the external design pressure of the cargo tank under § 154.408.

§ 154.467 Submission of insulation information.

The following insulation information must be submitted for special approval by the Commandant (G–MSO):

(a) Compatibility with the cargo.

(b) Solubility in the cargo.

(c) Absorption of the cargo.

(d) Shrinkage.

(e) Aging.

(f) Closed cell content.

(g) Density.

(h) Mechanical properties.

(i) Thermal expansion.

(j) Abrasion.

(k) Cohesion.

(l) Thermal conductivity.

(m) Resistance to vibrations.

(n) Resistance to fire and flame spread.

(o) The manufacturing and installation details of the insulation including:

(1) Fabrication;

(2) Storage;

(3) Handling;

(4) Erection; and

(5) Quality control.

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

SUPPORT SYSTEM

§ 154.470 General.

(a) A cargo tank must have a support system that:

(1) prevents movement of the cargo tank under the static and dynamic loads in § 154.406; and

(2) allows the cargo tank to contract and expand from temperature variation and hull deflection without exceeding the design stress of the cargo tank and the hull.

(b) The cargo tank support system must have a key that prevents rotation of the cargo tank.

(c) An independent tank must have supports with an antiflotation system that withstands the upward force of the tank without causing plastic deformation that endangers the hull structure when the tank is:
(1) Empty; and
(2) In a hold space flooded to the summer load draft of the vessel.

§ 154.471 Design criteria.

(a) The cargo tank support system must be designed:
(1) For the loads in § 154.406(a);
(2) To not exceed the allowable stress under this part at a static angle of heel of 30°;
(3) To withstand a collision force equal to at least one-half the weight of the cargo tank and cargo from forward and one-quarter the weight of the cargo tank and cargo from aft; and
(4) For the largest resulting acceleration in Figure 1, including rotational and translation effects.
(b) The cargo tank support design loads in paragraph (a) of this section may be analyzed separately.

§ 154.476 Cargo transfer devices and means.

(a) If a cargo pump in a cargo tank is not accessible for repair when the cargo tank is in use, the cargo tank must have an additional means of cargo transfer, such as another pump or gas pressurization.
(b) If cargo is transferred by gas pressurization, the pressurizing line must have a safety relief valve that is set at less than 90 percent of the tank relief valve setting.

CARGO AND PROCESS PIPING SYSTEMS

§ 154.500 Cargo and process piping standards.

The cargo liquid and vapor piping and process piping systems must meet the requirements in §§ 154.503 through 154.562, Subparts 56.01 through 56.35, §§ 56.50–20 and 56.50–105, and Subparts 56.60 through 56.97 of this chapter.

§ 154.503 Piping and piping system components: Protection from movement.

Where thermal movement and movements of the cargo tank and the hull structure may cause stresses that exceed the design stresses, the piping and piping system components and cargo tanks must be protected from movement by:
(a) Offsets;
(b) Loops;
(c) Bends;
(d) Mechanical expansion joints including:
(1) Bellows;
(2) Slip joints;
(3) Ball joints; or
(e) Other means 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]

§ 154.506 Mechanical expansion joint: Limits in a piping system.

Mechanical expansion joints in a piping system outside of a cargo tank:
(a) May be installed only if offsets, loops or bends cannot be installed due to limited space or piping arrangement;
(b) Must be a bellows type; and
(c) Must not have insulation or a cover unless necessary to prevent damage.

§ 154.512 Piping: Thermal isolation.

Low temperature piping must be thermally isolated from any adjacent hull structure to prevent the temperature of that structure from dropping below the minimum temperature for the hull material under § 154.170.

§ 154.514 Piping: Electrical bonding.

(a) Cargo tanks or piping that are separated from the hull structure by thermal isolation must be electrically bonded to the hull structure by a method under paragraph (c) of this section.
(b) A pipe joint or a hose connection fitting that has a gasket must be electrically bonded by a method under paragraph (c) of this section that bonds:
(1) Both sides of the connection to the hull structure; or
(2) Each side of the connection to the other side.
(c) An electrical bond must be made by at least one of the following methods:
(1) A metal bonding strap attached by welding or bolting.