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(c) Vessels certificated to carry only nonflammable cargo in cargo containment systems with secondary barriers must:

(1) Meet paragraph (a) of this section; or

(2) Have air drying systems that reduce the dewpoint of air admitted to hold or interbarrier spaces below the temperature of any surface in those spaces or −45° C (−49°F), whichever is warmer.

(d) Vessels with refrigerated independent tanks type C must have inert gas or air drying systems that reduce the dewpoint of any inert gas or air admitted to the hold spaces below the temperature of any surface in those spaces or −45°C (−49°F), whichever is warmer.

§ 154.903 Inert gas systems: General.

(a) Inert gas carried or generated to meet §§ 154.901, 154.902, and 154.1848 must be non-flammable and non-reactive with the cargoes that the vessel is certificated to carry and the materials of construction of the cargo tanks, hold and interbarrier spaces, and insulation.

(b) The boiling point and dewpoint at atmospheric pressure of the inert gas must be below the temperature of any surface in those spaces or −45°C (−49°F), whichever is warmer.

(c) For the temperatures and pressures at which the gas is stored and used, storage vessels and inert gas piping must meet §§ 154.450 and 154.500 respectively.

§ 154.904 Inert gas system: Controls.

The inert gas system must have:

(a) At least one check valve in the cargo area to prevent the back flow of cargo vapor into the inert gas system, or another means specially approved by the Commandant (G–MSO);

(b) If the inert gas system is in the machinery space or another space outside the cargo area, a second check valve in the cargo area meeting paragraph (a) of this section;

(c) Automatic and manual inert gas pressure controls; and

(d) Valves to isolate each inerted space.

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

§ 154.906 Inert gas generators.

The inert gas generator must:

(a) Produce an inert gas containing less than 5% oxygen by volume;

(b) Have a device to continuously sample the discharge of the generator for oxygen content; and

(c) Have an audible and visual alarm in the cargo control station that alarms when the inert gas contains 5% or more oxygen by volume.

§ 154.908 Inert gas generator: Location.

(a) Except as allowed in paragraph (b) of this section, an inert gas generator must be located in the main machinery space or a space that is not in the cargo area and does not have direct access to any accommodation, service, or control space.

(b) An inert gas generator that does not use flame burning equipment may be located in the cargo area if 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]

§ 154.910 Inert gas piping: Location.

Inert gas piping must not pass through or terminate in an accommodation, service, or control space.

§ 154.912 Inerted spaces: Relief devices.

Inerted spaces must be fitted with relief valves, rupture discs, or other devices specially approved by the Commandant (G–MSO).

[CGD 74–289, 44 FR 26009, May 3, 1979; CGD 82–063b, 48 FR 39629, Sept. 1, 1983]

ELECTRICAL

§ 154.1000 Applicability.

Sections 154.1005 through 154.1020 apply to flammable cargo and ammonia carriers.

§ 154.1002 Definition.

For the purposes of §§ 154.1005 through 154.1020, ''gas-dangerous'' does not include the weather deck of an ammonia carrier.

§ 154.1005 Equipment approval.

(a) Electrical equipment that is required to be intrinsically safe or explosion proof under § 154.1010 must be specially approved by the Commandant or listed as intrinsically safe or explosion proof by an independent laboratory that is specially approved by the Commandant (G–MSO), for Class I Division I locations and the Group that is specified in Table 4 for the cargo carried.

(b) Each submerged cargo pump motor installation must be specially approved by the Commandant (G–MSO).

(c) Electrical equipment that must be intrinsically safe to meet § 154.1010 must meet the definition in § 110.15–100(i) of this chapter.

(d) Electrical equipment that must be explosion proof to meet § 154.1010 must meet § 110.15–65(e) of this chapter.

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

§ 154.1010 Electrical equipment in gas-dangerous space or zone.

(a) Except as allowed in this section, electrical equipment must not be installed in a gas-dangerous space or zone.

(b) Intrinsically safe electrical equipment and wiring may be in a gas-dangerous space or zone.

(c) A submerged cargo pump motor may be in a cargo tank if:

(1) Low liquid level, motor current, or pump discharge pressure automatically shuts down power to the pump motor if the pump loses suction;

(2) There is an audible and visual alarm at the cargo control station that actuates if the motor shuts down under the requirements of paragraph (c)(1) of this section; and

(3) There is a lockable circuit breaker or lockable switch that disconnects the power to the motor.

(d) A supply cable for a submerged cargo pump motor may be in a hold space.

(e) A hold space that has a tank that is not required to have a secondary barrier under § 154.459 may only have:

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gas-tight enclosures;

(4) Log devices in gas-tight enclosures; and

(5) Impressed current cathodic protection system electrodes in gas-tight enclosures.

(f) A space that is separated by a gas-tight steel boundary from a hold space that has a cargo tank that must have a secondary barrier, under the requirements of § 154.459, may only have:

(1) Through runs of cable;

(2) Explosion-proof lighting fixtures;

(3) Depth sounding devices in gas-tight enclosures;

(4) Log devices in gastight enclosures;

(5) Impressed current cathodic protection system electrodes in gastight enclosures;

(6) Explosion-proof motors that operate cargo system valves or ballast system valves; and

(7) Explosion-proof bells for general alarm systems.

(g) A cargo handling room may only have:

(1) Explosion-proof lighting fixtures; and

(2) Explosion-proof bells for general alarm systems.

(h) A space for cargo hose storage may only have:

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(i) A space that has cargo piping may only have:

(1) Explosion-proof lighting fixtures; and

(2) Through runs of cable.

(j) A gas-dangerous zone on the weather deck may only have:

(1) Explosion-proof equipment that is for the operation of the vessel; and

(2) Through runs of cable.

(k) A space, except those under paragraphs (e) through (j) of this section, that has a direct opening to a gas-dangerous space or zone may only have the electrical equipment allowed in the gas-dangerous space or zone.

§154.1015 Lighting in gas-dangerous space.

(a) Each gas-dangerous space that has lighting fixtures must have at least two branch circuits for lighting.

(b) Each switch and each overcurrent protective device for any lighting circuit that is in a gas-dangerous space must open each conductor of the circuit simultaneously.

(c) Each switch and each overcurrent protective device for lighting in a gas-dangerous space must be in a gas-safe space.

§154.1020 Emergency power.

The emergency generator must be designed to allow operation at the final angle of heel under §154.230(a).

FIREFIGHTING

Firefighting System: Exterior Water Spray

§154.1105 Exterior water spray system: General.

Each liquefied flammable gas vessel and each liquefied toxic gas vessel must have an exterior water spray system that meets §§154.1110 through 154.1135.

§154.1110 Areas protected by system.

Each water spray system must protect:

(a) All cargo tank surfaces that are not covered by the vessel's hull structure or a steel cover;

(b) Each cargo tank dome;

(c) Each on-deck storage vessel for flammable or toxic liquefied gases;

(d) Each cargo discharge and loading manifold;

(e) Each quick-closing valve under §§154.530, 154.532, and 154.538, and other control valves essential to cargo flow;

(f) Each boundary facing the cargo area of each superstructure that contains accommodation, service, or control spaces;

(g) Each boundary facing the cargo area of each deckhouse that contains accommodation, service, or control spaces; and

(h) Each boundary of each deckhouse that is within the cargo area and that is manned during navigation of the vessel or during cargo transfer operations, except the deckhouse roof if it is 2.4 m (8 ft.) or higher above the cargo containing structure.

[CGD 74–289, 44 FR 26009, May 3, 1979; 44 FR 59234, Oct. 15, 1979]

§154.1115 Discharge.

(a) The discharge density of each water spray system must be at least:

(1) 10000 $cm^3/m^2/min.$ (0.25 $gpm/ft.^2$) over each horizontal surface; and

(2) 4000 $cm^3/m^2/min.$ (0.10 $gpm/ft.^2$) against vertical surface, including the water rundown.

(b) The water spray protection under §154.1110 (d) and (e) must cover an area in a horizontal plane extending at least 0.5 m (19 in.) in each direction from the pipes, fittings, and valves, or the area of the drip tray, whichever is greater.

§154.1120 Nozzles.

(a) Nozzles for the water spray system must be spaced to provide the minimum discharge density under §154.1115 in each part of the protected area.

(b) The vertical distance between water spray nozzles for the protection of vertical surfaces must be 3.7 m (12 ft.) or less.

§154.1125 Pipes, fittings, and valves.

(a) Each pipe, fitting, and valve for each water spray system must meet Part 56 of this chapter.

(b) Each water spray main that protects more than one area listed in §154.1110 must have at least one isolation valve at each branch connection and at least one isolation valve downstream of each branch connection to isolate damaged sections.

(c) Each valved cross-connection from the water spray system to the fire main must be outside of the cargo area.

(d) Each pipe, fitting, and valve for the water spray system must be made of fire resistant and corrosion resistant materials, such as galvanized steel or galvanized iron pipe.

(e) Each water spray system must have a means of drainage to prevent corrosion of the system and freezing of accumulated water in subfreezing temperatures.

(f) Each water spray system must have a dirt strainer that is located at the water spray system manifold or pump.