

(6) Areas in the vicinity of any cargo high-velocity vent outlet during cargo loading and discharging of storage tanks, within a vertical cylinder of unlimited height, of 0.5 meters radius centered upon the vent outlet, and within a hemisphere of 0.5 meters radius below the vent outlet.

(c) The following are Class I Division 1 (Zone 1) locations:

(1) Areas on an open deck, or a semi-enclosed space on an open deck, that are 2.5 meters beyond the Class I Special Division 1 (Zone 0) areas cited in paragraphs (b)(3) and (4) of this section.

(2) Areas on an open deck, or a semi-enclosed space on an open deck, that are within 3 meters of any cargo manifold valve, cargo valve, cargo pipe flange, cargo tank hatch, sight port, tank cleaning opening, and opening into cofferdams or other Zone 1 spaces.

(3) Regardless of the level of natural ventilation, areas on an open deck above the tank top of each cargo tank extending out 3 meters beyond the tank top boundaries of each cargo tank, up to a height of 2.4 meters above the deck.

(4) Areas on an open deck within spillage coamings surrounding cargo manifold valves extending 3 meters beyond the boundaries of the spillage coamings, up to a height of 2.4 meters.

(5) A void space or an enclosed space immediately above, below or adjacent to an integral cargo storage tank, including cofferdams and permanent (for example, segregated) ballast tanks adjacent to integral cargo storage tanks.

(6) A hold space containing an independent cargo storage tank.

(7) Compartments for cargo transfer hoses.

(8) Enclosed or semi-enclosed spaces in which pipes containing cargoes are located.

(9) Areas 7.5 meters beyond the cylinder and 7.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 0) hazardous locations cited in paragraph (b)(5) of this section.

(10) Areas 5.5 meters beyond the cylinder and 5.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 0) hazardous locations cited in paragraph (b)(6) of this section.

(d) The following are Class I Division 2 (Zone 2) locations:

(1) Areas on an open deck, or a semi-enclosed space on an open deck, that are 1.5 meters beyond the Class I Division 1 (Zone 1) areas cited in paragraphs (c)(1) through (4) of this section.

(2) Areas 1.5 meters beyond the cylinder and 1.5 meters beyond the hemisphere of the Class I Special Division 1 (Zone 1) hazardous locations cited in paragraph (c)(9) of this section.

(3) Areas 4 meters beyond the cylinder and 4 meters beyond the hemisphere of the Class I Division 1 (Zone 1) hazardous locations cited in paragraph (c)(10) of this section.

(4) Enclosed spaces beyond the open deck areas cited in paragraph (c)(3) of this section that are below the level of the main deck and have an opening onto the main deck or at a level less than 0.5 meters above the main deck, unless—

(i) The entrances to such spaces, including ventilation inlets and outlets, are situated at least 5 meters from the closest integral cargo tank bulkhead and at least 10 meters measured horizontally from any integral cargo tank outlet or gas or vapor outlet; and

(ii) The spaces are mechanically ventilated.

**§ 111.106-11 Classification of storage and handling locations of heated combustible liquid cargoes.**

(a) This section applies to locations surrounding the storage and handling of combustible liquid cargoes with closed-cup flashpoints exceeding 60 °C (140 °F).

(b) The interiors of independent storage tanks and integral tanks containing cargoes with closed-cup flashpoints of 60 °C (140 °F) or higher and heated to within 15 °C of their flashpoint are considered Class I Special Division 1 (Zone 0). The hazardous locations in § 111.106-9 of this subpart apply.

**§ 111.106-13 Cargo handling devices or cargo pump rooms handling flammable or combustible cargoes.**

(a) This section is applicable to enclosed areas containing devices handling flammable or combustible liquid cargoes with closed-cup flashpoints not exceeding 60 °C (140 °F).

(b) Enclosed hazardous locations containing devices that handle cargoes must comply with Clauses 6.3.1.2 of API RP 500 and 6.6.1.2 of API RP 505 (incorporated by reference, see §110.10-1). Ventilation must not be used to reduce the classification of such areas.

(c) Cargo pump rooms must be isolated from all sources of vapor ignition by gastight bulkheads. The gastight bulkhead between the pump room and the pump-motor compartment may be pierced by fixed lights, drive shafts, and pump-engine control rods, provided that the shafts and rods are fitted with fixed oil reservoir gland seals, or pressure grease seals where they pass through the gastight bulkheads. Other types of positive pressure seals must be specially approved by the Commandant (CG-ENG). Access to a cargo handling enclosed area or room must be from the open deck.

(d) Fixed lights in cargo pump rooms or enclosed cargo handling areas must meet the arrangement and construction requirements in §111.105-31(g) of this part.

(e) A cargo handling area or pump room that precludes the lighting arrangement of paragraph (d) of this section, or where the lighting arrangement of paragraph (d) of this section does not give the required illumination level, must have explosion-proof, flameproof (Ex “d”) or flameproof-increased safety (Ex “de”) lighting fixtures.

#### § 111.106-15 Ventilation of hazardous locations.

(a) The ventilation design principles must comply with Clauses 8.1.3, 8.2, and 8.3 of IEC 60092-502 (incorporated by reference, see §110.10-1).

Note to §111.106-15(a): The word “mechanical,” as used in this section, is interchangeable with the word “artificial” used in IEC 60092-502.

(b) A ventilation system must—

- (1) Be positioned so as not to recycle vapors from ventilation discharges;
- (2) Have its operational controls outside the ventilated space, if the system is mechanical; and
- (3) Have a protective metal screen of not more than 13 mm (0.512 in.) square mesh on each ventilation intake and exhaust opening.

(c) The mechanical ventilation of enclosed flammable or combustible liquid cargo handling or cargo pump rooms must be sufficient to effect a minimum complete 30 air changes per hour based on the volume of the pump room and associated trunks up to the deck at which access from the weather is provided. The power ventilation system must be designed to remove vapors from the bottom of the space at points where concentrations of vapors may be expected.

(d) The following spaces must have a supply-type mechanical ventilation system capable of providing at least 8 air changes per hour:

- (1) Each space that contains electric motors for cargo handling equipment.
- (2) Each cargo control station.

#### § 111.106-17 Piping: electrical bonding.

(a) Tanks or piping systems 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;
- (2) Two or more bolts that give metal-to-metal contact between the bolts and the parts to be bonded; or
- (3) Other metal-to-metal contact between adjacent parts under designed operating conditions.

### Subpart 111.107—Industrial Systems

#### § 111.107-1 Industrial systems.

(a) For the purpose of this subpart, an industrial system is a system that—

- (1) Is not a ship’s service load, as defined in §111.10-1;
- (2) Is used only for the industrial function of the vessel;