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that passed by a No. 54 drill size (0.055–inch diameter).

(f) The control system for any required quick closing shutoff valves shall be such that the valves may be operated from at least two remote locations on the vessel; if means of fire protection is required by Table 151.05, the control system shall also be provided with fusible elements designed to melt between 208°F. and 220°F., which will cause the quick closing shutoff valves to close in case of fire. Quick closing shutoff valves shall be of the fail-closed (closed on loss of power) type and be capable of local manual operation. Quick closing shutoff valves shall operate from full open to full closed under all service conditions in not more than 10 seconds, without causing excessive pressure surges.

(g) Excess flow valves, where required, shall close automatically at the rated closing flow of vapor or liquid as tested and specified by the manufacturer. The piping, including fittings, valves, and appurtenances protected by an excess flow valve, shall have a greater capacity than the rated closing flow of the excess flow valve. Excess flow valves may be designed with a bypass not to exceed 0.040–inch diameter opening to allow equalization of pressure, after an operating shutdown.

(h) Suitable means shall be provided to relieve the pressure and remove liquid contents from cargo lines and hoses to the cargo tank or other safe location prior to effecting disconnections.

§ 151.20–10 Cargo system instrumentation.

(a) Each tank operated at other than ambient temperature shall be provided with at least one remote reading temperature sensor located in the liquid phase of the cargo. The temperature gauge shall be located at the cargo handling control station or another approved location.

(b) Where required, each tank equipped with safety relief valves shall be fitted with a pressure gauge which shall be located at the cargo handling control station or at another approved location.

§ 151.20–15 Cargo hose if carried on the barge.

(a) Liquid and vapor line hose used for cargo transfer shall be of suitable material resistant to the action of the cargo. Hose shall be suitable for the temperatures to which it may be subjected and shall be acceptable to the Commandant.

(b) Hose subject to tank pressure, or the discharge pressure of pumps or vapor compressors, shall be designed for a bursting pressure of not less than 5 times the maximum safety relief valve setting of the tank, pump, or compressor, whichever determines the maximum pressure to which the hose may be subjected in service.

(c) Each new type of cargo hose, complete with end fittings, shall be prototype tested to a pressure not less than five times its specified maximum working pressure. The hose temperature during this prototype test shall duplicate the intended extreme service temperature. Thereafter, each new length of cargo hose produced shall be hydrostatically tested at ambient temperature to a pressure not less than twice its maximum working pressure nor more than two-fifths its bursting pressure. The hose shall be marked with its maximum working pressure, and if used in other than ambient temperature service, its maximum or minimum temperature.

§ 151.20–20 Cargo transfer methods.

(a) Cargo transfer may be accomplished by means of gravity, pumping, vapor or gas pressurization, or fluid displacement unless otherwise provided in Subpart 151.50 of this part.

(b) Vapor or gas pressurization may be used only in transferring cargo from pressure vessel type cargo tanks. The pressurizing vapor or gas lines shall be provided with safety relief device in the lines set to open at a pressure no greater than 90 percent of the set pressure of the cargo tank safety relief valve. The pressurizing line shall be fitted with a stop valve at the tank, and a check valve to prevent the accidental release of cargo through the pressure line.

(c) Fluid displacement is permitted with either gravity or pressure vessel type cargo tanks. The displacing fluid

shall enter the tank under low relative pressure. The fluid entry line shall be fitted with a safety relief valve set to lift at a pressure no higher than 80 percent of the cargo tank safety relief valve setting.

(d) When cargo vapors are flammable, combustible or toxic, cargo filling lines entering the top of the tank shall lead to a point at or near the bottom. Spray filling lines, discharging near the top of the tank, may be fitted in lieu of, or in addition to, the above cargo filling lines.

Subpart 151.25—Environmental Control

§ 151.25–1 Cargo tank.

When carrying certain commodities regulated by this subchapter, one of the following types of cargo protection may be required, within the main cargo tank, and in some cases, in the space between the primary and secondary barriers.

(a) *Inerted.* All vapor spaces within the cargo tank are filled and maintained with a gas or vapor which will not support combustion and which will not react with the cargo.

(b) *Padded.* All vapor spaces within the cargo tanks are filled and maintained with a liquid, gas (other than air), or vapor which will not react with the cargo.

(c) *Ventilated (forced).* Vapor space above the liquid surface in the tank is continuously swept with air by means of blowers or other mechanical devices requiring power.

(d) *Ventilated (natural).* Vapor space above the liquid surface in the tank is continuously swept with atmospheric air without the use of blowers or other mechanical devices requiring power (e.g., ''chimney-effect'' ventilation).

(e) *Dry.* All vapor space within the cargo tank is filled and maintained with a gas or vapor containing no more than 100 ppm water.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§ 151.25–2 Cargo handling space.

Pump rooms, compressor rooms, refrigeration rooms, heating rooms, instrument rooms or other closed spaces regularly entered by operating personnel, in which work is performed on the cargo or in which the cargo movement is locally controlled, may be required to be fitted with one of the following types of ventilation:

(a) *Forced ventilation.* The forced ventilation system shall be designed to insure sufficient air movement through these spaces to avoid the accumulation of toxic or flammable vapors and to insure sufficient oxygen to support life, and, in any event, the ventilation system shall have a minimum capacity sufficient to permit a change of air every 3 minutes.

(b) *Natural ventilation.* The natural ventilation system shall be designed to insure sufficient air movement to avoid the accumulation of toxic or flammable vapors and to insure sufficient oxygen to support life.

Subpart 151.30—Portable Fire Extinguishers

§ 151.30–1 Type.

When required by Table 151.05, approved portable fire extinguishers shall be installed in accordance with Subpart 34.50 of this chapter. The fire extinguishing media shall be dry chemical or other suitable agent for all locations.

Subpart 151.40—Temperature or Pressure Control Installations

§ 151.40–1 Definitions.

This section defines the various methods by which the cargo may be heated or cooled.

(a) *Boiloff.* Cargo pressure and temperatures are maintained by permitting the cargo to boil naturally and the cargo vapor thus generated removed from the tank by venting.

(b) *External cargo cooling*—(1) *Cargo vapor compression.* A refrigeration system in which the cargo vapors generated within the tank are withdrawn, compressed, and the lower energy vapor or its condensate returned to the tank.

(2) *External heat exchange.* A refrigeration system in which the cargo vapor or liquid is cooled outside the