user to the cargo and its vapors. Examples of this type are gauge hatch, ullage hole.

(b) *Restricted.* A gauging device which penetrates the cargo tank and which, in operation, causes or permits the release to the atmosphere of small quantities of cargo vapor or liquid. The amount of cargo released is controlled by the small diameter of the tank penetration opening and by a locally operated valve or similar closure device in that opening. When not in use, this type gauging device is closed to maintain the complete integrity of cargo containment. Examples of this type are rotary tube, fixed tube, slip tube, sounding tube. (See §§ 151.03–49 and 151.15–10(g).)

(c) *Closed.* A gauging device which penetrates the cargo tank, but which is part of a closed system maintaining the complete integrity of cargo containment. This device is designed and installed so as not to release cargo liquid or vapor in any amount to the atmosphere. Examples of this type are automatic float, continuous tape (magnetic coupled), sight glass (protected), electronic probe, magnetic, differential pressure cell.

(d) *Isolated or indirect.* A gauging method or device which is isolated from the tank (no penetration of the tank shell) and which may employ an indirect measurement to obtain the desired quantity. Examples of this type are weighing of cargo, sonic depth gauge (without penetration of tank shell), pipe flow meter.

(e) All gauging devices and related fixtures which form a part of the cargo containment barrier shall be of suitable material and shall be designed for the pressure and temperature of the cargo in accordance with the requirements of Subchapter F of this chapter.

(f) *Use of restricted gauging devices.* (1) When required in Table 151.05, cargoes carried under pressure shall have restricted gauging devices designed so that the maximum bleed valve opening is not larger than 0.055;inch; diameter, unless provided with an excess flow valve. Sounding tubes are prohibited for use with cargoes having a vapor pressure in excess of 14.7 p.s.i.a. at 115 °F, if carried in an uninsulated tank, or at 105 °F, if carried in an insulated tank.

(2) When utilizing a sounding tube, the cargo tank vent system shall be designed to prevent the discharge of cargo through the sounding tube due to pressure build up in the cargo tank vapor space. (See § 151.03–43) When cargoes carried at atmospheric pressure are required to have a restricted gauging device, open gauges may be provided in addition to restricted gauges for this type of cargo. However, open gauges may not be used while cargo transfer operations are actually being performed.

(g) Fixed tube gauges are not acceptable as primary means of gauging. They may be used as a check on the calibration of other gauging devices.

(h) For pressure-vessel type tanks, each automatic float, continuous reading tape or similar type gauge not mounted directly on the tank or dome shall be fitted with a shutoff device located as close to the tank as practicable. When an automatic float gauging device, which gauges the entire height of the tank, is used, a fixed tube gauge set in the range of 85 percent to 90 percent of the water capacity of the tank shall be provided in addition as a means of checking the accuracy of the automatic float gauge, or other alternate means acceptable to the Commandant may be used.

(i) Gauge glasses of the columnar type are prohibited.

(j) Flat sight glasses may be used in the design of automatic float continuous reading tape gauges. However such glasses shall be made of high strength material, suitable for the operating temperatures, of not less than one-half inch in thickness and adequately protected by a metal cover.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by USCG–2005–22329, 70 FR 57183, Sept. 30, 2005]

Subpart 151.20—Cargo Transfer

§ 151.20–1 Piping—general.

(a) Cargo piping systems shall be arranged and fabricated in accordance with this section and Subchapter F. The class of piping system required for a specific cargo shall be as listed in Table 151.05 as a minimum; however, a

higher class may be required when the actual service temperature or pressure so dictates. See Table 56.04–2 of this chapter.

(b) Piping system components shall be suitable for use with the cargoes for which the barge is certificated, and shall be of materials listed in Subchapter F of this chapter, or such other material as the Commandant may specifically approve. All piping materials shall be tested in accordance with the requirements of Subchapter F of this chapter. The valve seat material, packing, gaskets, and all other material which comes into contact with the cargo shall be resistant to the chemical action of the cargoes for which the barge is certificated.

(c) Cargo piping systems, when subject to corrosive attack of the cargo, and when serving cargo tanks which are required by this subchapter to be lined or coated, shall be constructed of, lined or coated with corrosion-resistant material. Vent systems shall be similarly constructed, lined, or coated up to and including the vent control device.

(d) All piping systems components shall have a pressure rating at operating temperature (according to the applicable American National Standards Institute, Inc., pressure/temperature relations) not less than the maximum pressure to which the system may be subjected. Piping which is not protected by a relief valve, or which can be isolated from its relief valve, shall be designed for the greatest of:

(1) The cargo vapor pressure at 115 °F.

(2) The maximum allowable working pressure of the cargo tank.

(3) The pressure of the associated pump or compressor relief valve.

(4) The total discharge head of the associated pump or compressor where a discharge relief valve is not used.

The escape from cargo piping system relief valves shall be run to venting system or to a suitable recovery system. Provisions shall be made for pressure relief of all piping, valves, fittings, etc., in which excessive pressure build-up may occur because of an increase in product temperature.

(e) Provisions shall be made by the use of offsets, loops, bends, expansion joints, etc., to protect the piping and tank from excessive stress due to thermal movement and/or movements of the tank and hull structure. Expansion joints shall be held to a minimum and where used shall be subject to individual approval by the Commandant.

(f) Low temperature piping shall be isolated from the hull structure. Where necessary, arrangements to provide for the protection of the hull structure from leaks in low temperature systems in way of pumps, flanges, etc., shall be provided.

(g) Connections to tanks shall be protected against mechanical damage and tampering. Underdeck cargo piping shall not be installed between the outboard side of cargo containment spaces and the skin of the barge, unless provision is made to maintain the minimum inspection and collision protection clearances (where required) between the piping and the skin. Cargo piping which is external to tanks, and is installed below the weather deck shall be joined by welding, except for flanged connections to shutoff valves and expansion joints.

(h) Piping shall enter independent cargo tanks above the weatherdeck, either through or as close to the tank dome as possible.

(i) Horizontal runs of cargo piping on integral tank barges may be run above or below the weatherdeck. When run below the weatherdeck, the following are applicable:

(1) Horizontal runs located entirely within integral cargo tanks shall be fitted with a stop valve, located inside the tank that is being serviced and operable from the weatherdeck. There shall be cargo compatibility in the event of a piping failure.

(2) Horizontal runs of cargo piping installed in pipe tunnels may penetrate gravity type tanks below the weatherdeck: *Provided*, That each penetration is fitted with a stop valve operable from the weatherdeck. If the tunnel is directly accessible from the weatherdeck without penetrating the cargo tank, the stop valve shall be located on the tunnel side. If the tunnel is not accessible from the weatherdeck, the valve shall be located on the tank side of the penetration.

(3) The tunnel shall comply with all tank requirements for construction, location, ventilation, and electrical hazard. There shall be cargo compatibility in the event of a piping failure.

(4) The tunnel shall have no other openings except to the weatherdeck or a cargo pumproom.

§ 151.20–5 Cargo system valving requirements.

For the purpose of adequately controlling the cargo, both under normal operating and casualty conditions, every cargo piping system shall be provided with one of the following sets of control valves and meet the requirements listed below. Cargo tanks, whether gravity or pressure vessel type, for cargoes having a saturated vapor pressure of 10 pounds per square inch gauge or less at 115 °F (105 °F if the tank is insulated) shall be provided with a valving system designated as Gravity–1. Cargo tanks, whether gravity or pressure vessel type, for cargoes which are carried below ambient temperature and whose vapor pressure is maintained at 10 pounds per square inch gauge or below shall be provided with a valving system designated as Gravity–2. Cargo tanks for cargoes which have vapor pressures above 10 p.s.i.g. at 115 °F (105 °F if tank is insulated) shall be provided with a valving system designated as Pressure–1. Cargo tanks for cargoes which have vapor pressures above 10 pounds per square inch gauge at 115 °F (105 °F if tank is insulated) and which require greater protection due to their hazardous characteristics shall be provided with a valving system designated as Pressure–2. The requirements of paragraphs (a) through (d) of this section for stop valves or excess flow valves to be fitted at tank penetrations are not applicable to nozzles at which pressure vacuum or safety relief valves are fitted.

(a) *Gravity–1 (G–1).* (1) One manually operated stop valve shall be installed on each tank filling and discharge line, located near the tank penetration.

(2) One stop valve or blind flange shall be installed at each cargo hose connection. When a cargo hose connection is in use, it shall be provided with a stop valve; which may be part of the vessel's equipment or may be part of the shore facility and attached to the barge end of the loading hose. When a cargo hose connection is not in use, it may be secured with a blind flange.

(3) If individual deepwell pumps are used to discharge the contents of each cargo tank, and the pumps are provided with a remote shutdown device, a stop valve at the tank is not required on the tank discharge line.

(b) *Gravity–2 (G–2).* (1) One manually operated stop valve shall be installed on each tank penetration, located as close as possible to the tank.

(2) One remote operated, quick closing shut-off valve shall be installed at each cargo hose connection.

(3) A remote shutdown device shall be installed for all cargo handling machinery.

(c) *Pressure–1 (P–1).* (1) One manually operated stop valve and one excess flow valve shall be installed on each tank penetration, located as close as possible to the tank.

(2) One manually operated stop valve shall be installed at each cargo hose connection, when in use.

(d) *Pressure–2 (P–2).* (1) One manually operated stop valve and one excess flow valve shall be installed at each tank penetration, located as close as possible to the tank.

(2) One remote operated quick closing shutoff valve shall be installed at each cargo hose connection when in use.

(3) No tank penetration shall be less than 1 inch diameter.

(e) Cargo tank penetrations which are connections for gauging or measuring devices need not be equipped with excess flow or remote operated quick closing valves provided that the opening is constructed so that the outward flow of tank contents shall not exceed 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