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PART 151—BARGES CARRYING BULK LIQUID HAZARDOUS MATERIAL CARGOES

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AUTHORITY: 33 U.S.C. 1903; 46 U.S.C. 3703; 49 CFR 1.46.

SOURCE: CGFR 70–10, 35 FR 3714, Feb. 25, 1970, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes for part 151 appear at CGD 88–100, 54 FR 40029, Sept. 29, 1989.

Subpart 151.01—General

§ 151.01–1 Applicability.

This part applies to the following:

(a) Oceangoing, as defined in 33 CFR 151.05(j), non-self-propelled United States ships and non-self-propelled foreign ships operating in United States waters that carry a bulk cargo that is—

(1) Listed in Table 151.05;

(2) Not being carried in a portable tank regulated under subpart 98.30 or 98.33 of this chapter; and

(3) Not an NLS or is an NLS cargo that is a Category D listed in §151.12–5 of this part.

(b) All non-self-propelled United States ships that are not oceangoing that carry a bulk cargo that is—

(1) Listed in Table 151.05, and

(2) Not being carried in a portable tank regulated under subpart 98.30 or 98.33 of this chapter.

[CGD 81–101, 52 FR 7776, Mar. 12, 1987, as amended by CGD 84–043, 55 FR 37413, Sept. 11, 1990]

§ 151.01–2 Incorporation by reference.

(a) Certain standards and specifications are incorporated by reference into this part with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a). To enforce any edition other than the ones listed in paragraph (b) of this section, notice of change must be published in the FEDERAL REGISTER and the material made available to the public. All approved material is on file at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC, and is available from the sources indicated in paragraph (b) of this section.

(b) The standards and specifications approved for incorporation by reference in this part and the sections affected, are:

American Society for Nondestructive Testing (ASNT)

4153 Arlingate Road, Caller num;28518, Columbus, OH 43228–0518

ASNT ''Recommended Practice No. SNT–TC–1A (1988), Personnel Qualification and Certification in Nondestructive Testing'' .....151.04–7(c)(2)

American Society of Mechanical Engineers

United Engineering Center, 345 East 47th Street, New York, NY 10017

ASME Boiler and Pressure Vessel Code Section V, Nondestructive Examination (1986).....151.04–7(a)(1)

[CGD 85–061, 54 FR 50965, Dec. 11, 1989]

§ 151.01–3 [Reserved]

§ 151.01–5 [Reserved]

§ 151.01–10 Application of vessel inspection regulations.

(a) The regulations in this part are requirements which may be in addition to, supplement, or modify requirements in other subchapters in this chapter. When a specific requirement in another part or section in another subchapter in this chapter is in conflict with or contrary to requirement or intent expressed in this part, the regulations in this part shall take precedence.

(b) Every unmanned tank barge which carries or is intended to carry in bulk any liquid or liquefied gas listed in Table 151.05 and has flammability or combustibility characteristics as indicated by a fire protection requirement in Table 151.05 shall be inspected and certificated under the provisions in subchapter D (Tank Vessels) of this chapter and the regulations in this part.

(c) Every unmanned tank barge prior to the carriage in bulk of any liquid or liquefied gas listed in Table 151.05 which does not have the flammability or combustibility characteristics as indicated by the fire protection requirement in Table 151.05 shall be inspected and certificated under the applicable provisions of subchapter D or subchapter I of this chapter, at the option of the barge owner, in addition to the regulations in this part. However, unless the barge owner notifies the Officer in Charge, Marine Inspection of his option to have the barge inspected and certificated under subchapter I at the time he submits the application for inspection (Form CG–3752), the unmanned tank barge shall be inspected and certificated under the provisions of subchapter D of this chapter and the regulations in this part.

(c–1) Each unmanned tank barge constructed on or after September 6, 1977, that carries in bulk a cargo listed in Table 151.05 and that is certificated under subchapter I of this chapter must meet the loading information requirements in § 31.10–32 of this chapter.

(d) The provisions of subchapter D of this chapter shall apply to all unmanned tank barges which carry in bulk any of the liquids or liquefied gases listed in Table 30.25–1 of this chapter. The provisions of this part shall not apply to such barges unless it is also desired to carry one or more of the liquids or liquefied gases listed in Table 151.05.

(e) Manned barges which carry or intend to carry in bulk the cargoes specified in Table 151.05 will be considered individually by the Commandant and may be required to meet the requirements of this subchapter and of subchapter D (Tank Vessels) or I (Cargo and Miscellaneous Vessels) of this chapter as applicable.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970]

EDITORIAL NOTE: For Federal Register citations affecting § 151.01–10, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§ 151.01–15 Dangerous cargoes not specifically named.

(a) Any liquid or liquefied gas, which meets the definitions referred to in § 151.01–1 and is not named in Table 151.05 or Table 30.25–1 of this chapter shall not be transported in bulk in a manned or unmanned tank barge without the prior specific approval of the Commandant.

(b) Mixtures or blends of two or more cargoes, one or more of which appears in Table 151.05, will be treated as though they were new products and specific approval of the Commandant

must be obtained prior to undertaking their transportation.

[CGFR–70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 81–101, 52 FR 7777, Mar. 12, 1987; CGD 81–101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989; CGD 88–100, 54 FR 40029, Sept. 29, 1989]

§ 151.01–20 Use of minimum requirements.

(a) The minimum requirements governing transportation of any liquid or liquefied gas listed in Table 151.05 are set forth in this part when such substances are carried in bulk in unmanned tank barges.

(b) Before any liquid or liquefied gas listed in Table 151.05 may be carried in an unmanned tank barge, the certificate of inspection issued to such barge shall be appropriately endorsed to show approval to transport such cargo.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40029, Sept. 29, 1989]

§ 151.01–25 Existing barges.

(a) Except as provided in paragraph (c) of this section, barges certified for, or used within the previous 2 years prior to the effective date of this regulation, or barges equivalent to such barges, for the transportation of any cargo regulated by this subchapter which do not meet the specific requirements herein, may be continued in service subject to the following conditions:

(1) Venting, gauging, and all operating requirements shall be met within a 1–year period subsequent to the effective date.

(2) All other requirements shall be met within a 2–year period subsequent to the effective date.

(b) If an existing barge, which has been designed to carry or has regularly been carrying one or more of the cargoes regulated by this subchapter, is found to be so arranged, or outfitted that conversion to bring it into compliance with any or all of the requirements of this subchapter is impractical or impossible, the Commandant, upon application, may review the plans of the barge to determine if it is suitable and safe for the cargoes to be transported.

(c) Except for operating and vinyl chloride requirements, barges constructed and certificated for the transportation of any cargo for which specific regulations existed, in parts 36, 38, 39, 40, and 98 of this chapter at the time of their construction or conversion, may continue and will be certificated to operate without the requirement that they comply with the provisions of subchapter O of this chapter.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 74–167k, 40 FR 17026, Apr. 16, 1975]

§ 151.01–30 Effective date.

(a) The regulations in this subchapter are effective on and after June 1, 1970. However, amendments, revisions, or additions shall become effective ninety (90) days after the date of publication in the FEDERAL REGISTER unless the Commandant shall fix a different time.

(b) The regulations in this subchapter are not retroactive in effect unless specifically made so at the time the regulations are issued. Changes in specification requirements of articles of equipment, or materials used in construction of tank barges, shall not apply to such items which have been passed as satisfactory until replacement shall become necessary, unless a specific finding is made that such equipment or materials used is unsafe or hazardous and has to be removed from tank barges.

§ 151.01–35 Right of appeal.

Any person directly affected by a decision or action taken under this part, by or on behalf of the Coast Guard, may appeal therefrom in accordance with subpart 1.03 of this chapter.

[CGD 88–033, 54 FR 50381, Dec. 6, 1989]

Subpart 151.02—Equivalents

§ 151.02–1 Conditions under which equivalents may be used.

(a) Where in this part it is provided that a particular fitting, material, appliance, apparatus, or equipment, or type thereof, shall be fitted or carried in a vessel, or that any particular provision shall be made or arrangement including cargo segregation shall be

adopted, the Commandant may accept in substitution therefor any other fitting, material, apparatus or equipment, or type thereof, or any other provision or arrangement. However, the Commandant shall be satisfied by suitable evidence that the fitting, material, appliance, apparatus, or equipment, or the type thereof, or the provision or arrangement shall be at least as effective as that specified in this part.

(b) In any case where it is shown to the satisfaction of the Commandant that the use of any particular equipment, apparatus, or arrangement not specifically required by law is unreasonable or impracticable, the Commandant may permit the use of alternate equipment apparatus, or arrangement to such an extent and upon such conditions as will insure, to his satisfaction, a degree of safety consistent with the minimum standards set forth in this part.

§151.02–5 Design of unmanned barges.

(a) In order not to inhibit design and application, the Commandant may approve vessels of novel design, both new and for conversion, after it is shown to his satisfaction that such a vessel is at least as safe as any vessel which meets the standards required by this part.

(b) [Reserved]

Subpart 151.03—Definitions

§151.03–1 Definitions of terms.

Certain terms used in the regulations in this subchapter are defined in this subpart.

§151.03–3 Angle of downflooding.

The angle of heel of the vessel at which any opening in the hull not provided with a water tight closure would be immersed.

§151.03–5 Approved.

This term means approved by the Commandant unless otherwise stated.

§151.03–7 Barge.

This term means any non-self-propelled vessel designed to carry cargo.

§151.03–9 Cargo.

This term means any liquid, gas or solid having one or more of the dangerous properties defined in this subchapter.

§151.03–11 Coastwise.

This designation refers to all vessels normally navigating the waters of any ocean or the Gulf of Mexico 20 nautical miles or less offshore.

§151.03–13 Cofferdam.

This term means a void or empty space separating two or more compartments for the purpose of isolation or to prevent the contents of one compartment from entering another in the event of the failure of the walls of one to retain their tightness.

§151.03–15 Commandant.

This term means Commandant of the U.S. Coast Guard.

§151.03–17 Compatible.

Compatible means that a cargo will not react in an unsafe manner with other cargo or materials used in construction of the barge. The prime considerations are the chemical, physical, or thermal properties of the reaction including heat, pressure, toxicity, stability, and explosive nature of the reaction and its end products.

§151.03–19 Environment.

This term refers to the atmosphere within a cargo tank and the spaces adjacent to the tank or spaces in which cargo is handled.

§151.03–21 Filling density.

The ratio, expressed as a percentage, of the weight of cargo that may be loaded into a tank compared to the weight of water that the tank will hold at 60°F. The weight of a gallon of water at 60°F. in air shall be 8.32828 pounds.

§151.03–23 Flame arrestor.

Any device or assembly of cellular, tubular, pressure or other type used for preventing the passage of flames into enclosed spaces.

§ 151.03–25 Flame screen.

A fitted single screen of corrosion-resistant wire of at least 30 by 30 mesh or two fitted screens, both of corrosion-resistant wire, of at least 20 by 20 mesh spaced not less than one-half inch or more than 1½ inches apart.

§ 151.03–27 Gas free.

Free from dangerous concentrations of flammable or toxic gases.

§ 151.03–29 Great Lakes.

A designation for all vessels in Great Lakes service.

§ 151.03–30 Hazardous material.

In this part *hazardous material* means a liquid material or substance that is—

(a) Flammable or combustible;

(b) Designated a hazardous substance under section 311(b) of the Federal Water Pollution Control Act (33 U.S.C. 1321); or

(c) Designated a hazardous material under 49 U.S.C. 5103.

NOTE: The Environmental Protection Agency designates hazardous substances in 40 CFR Table 116.4A. The Coast Guard designates hazardous materials that are transported as bulk liquids by water in § 153.40.

[CGD 81–101, 52 FR 7777, Mar. 12, 1987, as amended by CGD 95–028, 62 FR 51209, Sept. 30, 1997]

EFFECTIVE DATE NOTE: At 62 FR 51209, Sept. 30, 1997, § 151.03–30(c) was revised by CGD 95–028 (the Note remains unchanged), effective Oct. 30, 1997. For the convenience of the user the superseded text is set forth as follows:

§ 151.03–30 Hazardous material.

* * * * *

(c) Designated a hazardous material under section 104 of the Hazardous Material Transportation Act (HMTA) (49 U.S.C. 1803).

* * * * *

§ 151.03–31 Headquarters.

The Office of the Commandant, U.S. Coast Guard, Washington, DC 20593–0001.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–070, 53 FR 34535, Sept. 7, 1988]

§ 151.03–33 Lakes, bays, and sounds.

A designation for all vessels navigating the waters of any of the lakes, bays, or sounds other than the waters of the Great Lakes.

§ 151.03–35 Limiting draft.

Maximum allowable draft to which a barge may be loaded. Limiting draft is a function of hull type and cargo specific gravity. A barge may be assigned different limiting drafts for different hull types or within one hull type for different specific gravities.

§ 151.03–36 Liquid.

In this part *liquid* includes liquefied and compressed gases.

[CGD 81–101, 52 FR 7777, Mar. 12, 1987]

§ 151.03–37 Maximum allowable working pressure.

The maximum allowable working pressure shall be as defined in section VIII of the ASME Boiler and Pressure Vessel Code.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85–061, 54 FR 50965, Dec. 11, 1989]

§ 151.03–38 Nondestructive testing.

Nondestructive testing includes ultrasonic examination, liquid penetrant examination, magnetic particle examination, radiographic examination, eddy current, and acoustic emission.

[CGD 85–061, 54 FR 50965, Dec. 11, 1989]

§ 151.03–39 Ocean.

A designation for all vessels normally navigating the waters of any ocean or the Gulf of Mexico more than 20 nautical miles offshore.

§ 151.03–41 Officer in Charge, Marine Inspection (OCMI).

This term means any person from the civilian or military branch of the Coast Guard designated as such by the Commandant and who, under the superintendence and direction of the Coast Guard District Commander, is in charge of an inspection zone for the performance of duties with respect to the enforcement and administration of Subtitle II of Title 46, U.S. Code, Title

46 and Title 33 U.S. Code, and regulations issued under these statutes.

[CGD 95–028, 62 FR 51209, Sept. 30, 1997]

EFFECTIVE DATE NOTE: At 62 FR 51209, Sept. 30, 1997, § 151.03–41 was revised by CGD 95–028, effective Oct. 30, 1997. For the convenience of the user, the superseded text is set forth as follows:

§ 151.03–41 Officer in Charge, Marine Inspection.

Any person from the civilian or military branch of the Coast Guard designated as such by the Commandant and who, under the superintendence and direction of the Coast Guard District Commander, is in charge of an inspection zone for the performance of duties with respect to the enforcement and administration of title 52 R.S., acts amendatory thereof or supplemental thereto, and rules and regulations thereunder.

§ 151.03–43 Pressure.

Terminology used in this part are: pounds per square inch gauge (p.s.i.g.) or pounds per square inch absolute (p.s.i.a.). 14.7 p.s.i.a. is equal to 0 p.s.i.g. P.s.i.g. is normally used in reference to design or operating requirements.

§ 151.03–45 Rivers.

A designation for all vessels whose navigation is restricted to rivers and/or canals, exclusively.

§ 151.03–47 Service.

The waters upon which a vessel may be operated as endorsed upon the certificate of inspection.

§ 151.03–49 Sounding tube.

This is an unperforated tube fitted to an ullage hole, secured so as to be vapor tight to the underside of the tank top open at the bottom, and extending to within 18 inches or less of the bottom of the tank.

§ 151.03–51 Tank barge.

A non-self-propelled vessel especially constructed or converted to carry bulk liquid cargo in tanks.

§ 151.03–53 Tankerman.

The following ratings are established in part 13 of this chapter. The terms for the ratings identify persons holding valid merchant mariners' documents for service in the ratings issued under that part:

(a) Tankerman-PIC.

(b) Tankerman-PIC (Barge).

(c) Restricted Tankerman-PIC.

(d) Restricted Tankerman-PIC (Barge).

(e) Tankerman-Assistant.

(f) Tankerman-Engineer.

[CGD 79–116, 60 FR 17157, Apr. 4, 1995]

§ 151.03–55 [Reserved]

Subpart 151.04—Inspection and Certification

§ 151.04–1 Certificate of inspection.

(a) A certificate of inspection is required for every unmanned tank barge subject to the requirements in this subchapter. A certificate of inspection shall be issued to the barge or to its owners by the Officer in Charge, Marine Inspection, if the barge is found to comply with applicable inspection laws and the regulations in this chapter.

(b) The certificate of inspection shall be endorsed with respect to the waters over which the barge may be operated.

(c) The certificate shall be endorsed describing the cargoes by name as given in Table 151.05 or as specifically approved by the Commandant. No other dangerous cargo as defined in Subpart 151.01–1 shall be carried. Certificates shall specify maximum cargo weight (short tons), maximum density (pounds per gallon) and any operating limitations and a limiting draft.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40029, Sept. 29, 1989]

§ 151.04–2 Inspection required.

(a) Every unmanned tank barge subject to the regulations in this subchapter shall be inspected biennially. More frequent inspections may be required, if necessary, by the Officer in Charge, Marine Inspection, to see that the hull, equipment and appliances of the vessel comply with the marine inspection laws, and the regulations of this subchapter and other subchapters where applicable.

(b) [Reserved]

§ 151.04–3 Initial inspection.

(a) The initial inspection which may consist of a series of inspections during the construction of an unmanned barge shall include a complete inspection of the structure, auxiliary machinery, and equipment. The inspection shall be such as to insure that the arrangement, materials, and scantlings of the hull structure, tanks and pressure vessels and their appurtenances comply with applicable regulations of this chapter and with the requirements of this part.

(b) [Reserved]

§ 151.04–5 Inspection for certification.

(a) An inspection for certification is a prerequisite of the reissuance of a Certificate of Inspection as provided for in applicable regulations of this chapter.

(b) Unless otherwise specified in table 151.05, cargo tanks are internally examined as follows:

(1) Where the cargo tank is of the gravity type and the structural framing is on the internal tank surface, the tank shall be inspected internally at the time of inspection for certification.

(2) Where the cargo tank is of the gravity type and the structural framing is on the external tank surface accessible for examination from voids, cofferdams, double bottoms, and other similar spaces, tanks shall be inspected internally at 4–year intervals.

(3) If the tank is a pressure-vessel type cargo tank, an internal inspection of the tank is conducted within—

(i) Ten years after the last internal inspection on an unmanned barge carrying cargo at temperatures of −67°F (−55°C) or warmer; or

(ii) Eight years after the last internal inspection if the tank is a pressure type cargo tank carrying cargo at temperatures colder than −67°F (−55°C).

(4) Internal inspection may be required at more frequent intervals as deemed necessary by the Officer in Charge, Marine Inspection.

(c) An external examination of unlagged tanks and the visible parts of lagged tanks is made at each biennial inspection. If the vessel has single skin construction, the underwater portion of the tank need not be examined unless deemed necessary by the Officer in Charge, Marine Inspection. If an external examination of the tank is not possible because of insulation, the owner shall ensure that—

(1) The amount of insulation deemed necessary by the marine inspector is removed during each cargo tank internal inspection to allow spot external examination of the tanks and insulation; or

(2) The thickness of the tanks is gauged by a nondestructive means accepted by the marine inspector without the removal of insulation.

(d) If required by the Officer in Charge, Marine Inspection the owner shall conduct nondestructive testing of each tank designated by the Officer in Charge, Marine Inspection in accordance with § 151.04–7.

(e) If the Officer in Charge, Marine Inspection considers a hydrostatic test necessary to determine the condition of the tanks, the owner shall perform the test at a pressure of 1½ times the tank's—

(1) Maximum allowable pressure, as determined by the safety relief valve setting; or

(2) Design pressure, when cargo tanks operate at maximum allowable pressures reduced below the design pressure in order to satisfy special mechanical stress relief requirements.

NOTE: See the ASME Code, Section VIII, Appendix 3 for information on design pressure.

(f) Quick closing valves shall be tested by operating the emergency shutoff system from each operating point at the time of each vessel's inspection for certification.

(g) Excess flow valves shall be inspected at the time of inspection for certification. The Officer in Charge, Marine Inspection, shall satisfy himself that the valve is in working condition by visual inspection, and if this is impossible, by one of the following means:

(1) Removing the valve and bench testing ashore; the valve shall close at or below its rated closing flow.

(2) By any other means acceptable to the Officer in Charge, Marine Inspection, which will demonstrate that the valve is operable.

(h) Pressure vaccum relief valves shall be examined to determine that the operating mechanism is free and capable of activation.

(i) Safety relief valves shall be tested by bench testing or other suitable means. The valves shall relieve and reseat within the design tolerances of the set pressure, or it shall be removed and reset prior to being returned to service. This test shall be conducted at the time of the inspection for certification.

(j) Cargo hose stored on board the vessel which is used in transferring cargoes listed in Table 151.05 shall be inspected every 2 years. This inspection shall consist of a visual examination and a hydrostatic test of 1½ times the maximum pressure to which the hose will be subjected in service. The date of the most recent inspection and the test pressure shall be stenciled or otherwise marked on the hose.

(k) Cargo piping shall be inspected and tested at the same time as the cargo tanks.

(l) If the tank is a pressure vessel type cargo tank with an internal inspection interval of 10 years, and is 30 years old or older, determined from the date it was built, the owner shall conduct nondestructive testing of each tank in accordance with § 151.04–7, during each internal inspection.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40029, Sept. 29, 1989; CGD 85–061, 54 FR 50965, Dec. 11, 1989]

§ 151.04–7 Nondestructive testing.

(a) Before nondestructive testing may be conducted to meet § 151.04–5 (d) and (l), the owner shall submit a proposal to the Officer in Charge, Marine Inspection that includes—

(1) The test methods and procedures to be used all of which must meet section V of the ASME Boiler and Pressure Vessel Code (1986);

(2) Each location on the tank to be tested; and

(3) The test method and procedure to be conducted at each location on the tank.

(b) If the Officer in Charge, Marine Inspection rejects the proposal, the Officer in Charge, Marine Inspection informs the owner of the reasons why the proposal is rejected.

(c) If the Officer in Charge, Marine Inspection accepts the proposal, then the owner shall ensure that—

(1) The proposal is followed; and

(2) Nondestructive testing is performed by personnel meeting ASNT ''Recommended Practice No. SNT–TC–1A (1988), Personnel Qualification and Certification in Nondestructive Testing.''

(d) Within 30 days after completing the nondestructive test, the owner shall submit a written report of the results to the Officer in Charge, Marine Inspection.

[CGD 85–061, 54 FR 50966, Dec. 11, 1989]

Subpart 151.05—Summary of Minimum Requirements for Specific Cargoes

§ 151.05–1 Explanation of column headings in Table 151.05.

(a) *Cargo identification/name.* This column identifies cargoes by name. Words in italics are not part of the cargo name but may be used in addition to the cargo name. When one entry references another entry by use of the word ''see'' and both names are in roman type, either name may be used as the cargo name (e.g., ''Diethyl ether *see* Ethyl ether''). However, the referenced entry is preferred.

(b) *Cargo identification/pressure.* This column identifies cargo in terms of pressure within the tank. Terms used are:

(1) *Pressurized.* Cargo carried at a pressure in excess of 10 pounds per square inch gauge as measured at the top of the tank (i.e., exclusive of static head).

(2) *Atmospheric pressure.* Cargo carried at not more than 10 pounds per square inch gauge, exclusive of static head.

(c) *Cargo identification/temperature.* This column identifies the cargo by the temperature of the cargo during transit.

(1) *Ambient temperature.* Cargo which is carried at naturally occurring temperatures.

(2) *Low temperature.* Cargo carried below ambient temperatures when the product temperature is below 0°F.

(3) *Elevated temperature.* Cargo carried above ambient temperatures.

(d) *Hull type.* This column refers to the flotation features of the barge. Terms used are explained and defined in Subpart 151.10 of this part.

(e) *Cargo segregation/tanks.* This column refers to the separation of the cargo from its surroundings. Terms are explained in § 151.13–5 and in footnotes to Table 151.05 of this part.

(f) [Reserved]

(g) *Tanks/type.* This column refers to the design requirements for cargo tanks and their placement within the hull of the vessel. Terms are explained in § 151.15–1.

(h) *Tanks/venting.* This column refers to arrangements for preventing excess pressure or vacuum within the cargo tank. Terms used are explained and defined in § 151.15–5.

(i) *Tanks/gauging devices.* This column refers to arrangements provided for determining the amount of cargo present in cargo tanks. Terms used are explained and defined in § 151.15–10.

(j) *Cargo transfer/piping.* This column refers to the classification of piping in accordance with Subchapter F of this chapter as discussed in § 151.20–1.

(k) *Cargo transfer/control.* This column refers to the valving requirements for the cargo piping system. These requirements are defined in § 151.20–5.

(l) *Environmental control/cargo tanks.* This column refers to control of the composition of the environment within cargo tanks. Definitions and detailed requirements are given in § 151.25–1.

(m) *Environmental control/cargo handling space.* This column refers to control of the environment in the cargo handling spaces. Definitions and detailed requirements are found in § 151.25–2.

(n) *Fire protection.* This column specifies whether portable fire extinguishers are required on barges carrying the cargo named. Requirements for cargoes requiring extinguishers are given in Subpart 151.30 of this part.

(o) *Special requirements.* This column refers to requirements in subparts 151.40, 151.50, 151.55, 151.56, and 151.58 of this part which apply to specific cargoes. The section numbers listed omit the preceding part designation, ''151''.

(p) *Electrical hazard class—group.* This column lists the electrical hazard class and group used for the cargo when determining requirements for electrical equipment under subchapter J (Electrical engineering) of this chapter.

(q) *Temperature control installations.* This column refers to systems which are used to control the temperature of the cargo. Definitions and requirements which are applicable if such systems are used are given in Subpart 151.40 of this part.

(r) *Tank inspection period.* This column refers to the maximum period in years between internal cargo tank inspections. Applicable requirements are given in § 151.04–5.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970; 35 FR 6431, Apr. 22, 1970, as amended by CGD 74–275, 40 FR 21958, May 20, 1975; CGD 88–100, 54 FR 40029, Sept. 29, 19895; CGD 96–041, 61 FR 50731, Sept. 27, 1996]

§ 151.05–2 Compliance with requirements for tank barges carrying benzene and benzene containing cargoes, or butyl acrylate cargoes.

A tank barge certificated to carry benzene and benzene containing cargoes or butyl acrylate cargoes must comply with the gauging requirement of Table 151.05 of this part by August 15, 1998. Until that date, a tank barge certificated to carry benzene and benzene containing cargoes must meet either the gauging requirement of Table 151.05 or the restricted or closed gauging requirements in effect on September 29, 1994; and a tank barge certificated to carry butyl acrylate cargoes must meet either the gauging requirements of Table 151.05 or comply with the open, restricted, or closed gauging requirements in effect on September 29, 1994.

[CGD 95–900, 60 FR 34050, June 29, 1995]

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks				Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Acetaldehyde	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-1	Inerted	Vent F	Yes	.55-1(h)	I-C	NA	G
•Acetic acid	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	**.50-73** .55-1(g)	I-D	NA	G
•Acetic anhydride	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-73** .55-1(g)	I-D	NA	G
Acetone cyanohydrin.	Atmos.	Amb.	I	1ii 2i	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 ... **.50-70(b)**. .50-73 .50-81	**I-D**	NA	G
Acetonitrile	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Acrylic acid	Atmos	Amb	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-73 .50-81 .58-1(a)	I-D	NA	G
Acrylonitrile	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(e) .50-70(a).	I-D	NA	G
Adiponitrile	Atmos.	Amb.	II	1ii 2i	Integral Gravity.	PV	Open	II	G-1	NR	Vent F	Yes	No	**I-D**	NA	G
Alkyl(C7–C9) nitrates.	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G–1	NR	Vent N	Yes	.50–81 .50–86	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Allyl alcohol	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 50-73	I-C	NA	G
Allyl chloride	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 ...	I-D	NA	G
Aluminum sulfate solution.	Atmos	Amb	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.58-1(e)	NA	NA	G
Aminoethyl ethanol amine.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	NA	NA	G
Ammonia, anhydrous.	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR 250 p.s.i.	Restr.	II	P-2	NR	Vent F	No	.50-30 .50-32	I-D	NA	G
Ammonia, anhydrous.	Atmos.	Low	II	1NA 2ii	Ind. Gravity.	PV	Restr.	II-L	G-2	NR	Vent F	No	.50-30 .50-32	I-D	.40-1(b)(1)	8
Ammonium bisulfite solution (70% or less).	Atmos	Amb	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-73 .56-1(a), (b), (c).	NA	NA	G
Ammonium hydroxide (28% or less NH_3.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	.56-1(a), (b), (c), (f), (g).	I-D	NA	G

Aniline	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5, .50-73.	**I-D**	NA	G
Anthracene oil (Coal tar fraction).	Atmos.	Amb. Elev.	II	1ii 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Argon, *liquefied*	Press.	Low	III	1NA 2i	Ind. Pressure.	SR	Restr.	II-L	P-1	NR	Vent F	No	.40-1(a) .50-30 .50-36.	NA	.40-1(a)	G
Benzene	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	**Closed**	II	G-1	NR	Vent F	Yes	.50-60	I-D	NA	G
Benzene hydrocarbon mixtures (containing Acetylenes) *(having 10% Benzene or more).*	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	**Closed**	II	G-1	NR	Vent F	Yes	.56-1(b), (d), (f), (g),.	I-D	NA	G
Benzene hydrocarbon mixtures *(having 10% Benzene or more).*	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	**Closed**	II	G-1	NR	Vent F	Yes	.....	I-D	NA	G
Benzene, Toluene, Xylene mixtures *(having* **10%** *Benzene or more).*	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	**Closed**	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Butadiene	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-2	NR	Vent F	Yes	.50-70(a), .50-73.	I-B	NA	G
Butadiene, Butylene mixtures *(containing Acetylenes).*	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-1	NR	Vent F	Yes	.50-30 .50-70(a), .50-73. .56-1(b), (d), (f), (g).	I-B	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
iso-Butyl acrylate, *see* **Butyl acrylate, (all isomers)**.																
n-Butyl acrylate, *see* **Butyl acrylate, (all isomers)**.																
Butyl acrylate (all isomers).	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	**Restr**	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Butylamine (all isomers).	Atmos.	Amb.	II	1ii 2ii	Ind. Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
•iso-Butyraldehyde, *see* **Butyraldehyde (all isomers)**.																
•n-Butyraldehyde, *see* **Butyraldehyde (all isomers)**.																
Butyl methacrylate ..	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Butyraldehyde (all isomers).	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Open	II	G–1	NR	Vent F	Yes	.55–1(h).	I–C	NA	G

Camphor oil *(light)* ..	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Carbolic oil	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 50-73	NA	NA	G
•Carbon dioxide, *liquefied.*	Press.	Low	III	1 NA 2i	Ind. Pressure.	SR	Restr.	I-L	P-1	NR	Vent F	No	.50-30	NA	.40-1(b)(1)	G
Carbon disulfide	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity.	PV	Restr.	II	G-1	Inert	Vent F	Yes	.50-40 .50-41	I-A	NA	G
Carbon tetrachloride	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Open	II	G-1	NR	Vent N	No	No	NA	NA	G
Caustic potash solution.	Atmos.	Amb. Elev.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	NR	No	.50-73 .55-1(j)	NA	NA	G
Caustic soda solution.	Atmos.	Amb. Elev.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	NR	No	.50-73 .55-1(j)	NA	NA	G
Chlorine	Press.	Amb.	I	1NA 2ii	Ind. Pressure.	SR 300 p.s.i.	Indirect	I	P-2	NR	Vent F	No	.50-30 .50-31	NA	NA	3
Chlorobenzene	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Open	II	G-1	NR	Vent N	Yes	No	I-D	NA	G
Chloroform	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent F	No	No	NA	NA	G
Chlorohydrins *(crude).*	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 ...	I-D	NA	G
Chlorosulfonic acid	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 .50-73	I-B	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
o-Chloronitrobenzene.	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G–1	NR	Vent F	Yes	.50–5 50–73	NA	NA	G
•Coal tar naphtha solvent.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	**.50-73**	I-D	NA	G
•Coal tar pitch (molten).	Atmos.	Elev.	III	1ii 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	**.50-73**	I-D	NA	G
Creosote	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Cresols (all isomers).	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Cresols with less than 5% Phenol, see Cresols (all isomers).																
Cresols with 5% or more Phenol, see Phenol.																
Cresylate spent caustic.	Atmos.	Amb.	III	1ii 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-73 .55-1(b)	NA	NA	G
Cresylic acid, sodium salt solution, *see* Cresylate spent caustic.																

Crotonaldehyde	Atmos.	Amb.	II	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G
Cyclohexanone	Atmos.	Amb.	III	1i 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b).	I-D	NA	G
Cyclohexylamine	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b), (c), (g).	I-D	NA	G
iso-Decyl acrylate ...	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.50-70(a). .50-81(a), (b). .55-1(c)	NA	NA	G
Dichlorobenzene (all isomers).	Atmos.	Amb.	III	1ii 2i	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.56-1(a), (b).	I-D	NA	G
1,1-Dichloroethane	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Dichlorodifluoro-methane.	Press.	Amb.	III	1NA 2i	Ind. Pres-sure.	SR	Restr.	II	P-1	NR	NR	No	No	NA	NA	G
2,2'-Dichloroethyl ether.	Atmos.	Amb.	II	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(f)	**I-C**	NA	G
Dichloromethane	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	No	No	**I-D**	NA	G
2,4-Dichlorophen-oxyacetic acid, diethanolamine salt solution.	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	No	.56-1(a), (b), (c), (g).	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution.	Atmos.	Amb. Elev	III	1i 2i	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	No	.56-1(a), (b), (c), (g).	NA	NA	G
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.56-1(a), (b), (c), (g).	NA	NA	G
1,1-, 1,2-, or 1,3-Dichloropropane, *see individual entries.*																
1,1-Dichloropropane	Atmos.	Amb.	III	1i 2ii	Integral Gravity..	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
1,2-Dichloropropane	Atmos.	Amb.	III	1i 2ii	Integral Gravity..	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
1,3-Dichloropropane	Atmos.	Amb.	III	1i 2ii	Integral Gravity..	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
1,3-Dichloropropene	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Dichloropropene, Dichloropropane mixtures.	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
2,2-Dichloropropionic acid.	Atmos.	Amb.	II	1ii 2i	Integral Gravity.	PV	Restr	II	G-1	Dry	Vent F	Yes	.50-73 .58-1(e)	NA	NA	G

Diethanolamine	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diethylamine	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Diethylenetriamine ..	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diethyl ether, *see* Ethyl ether.																
Diisobutylamine	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Diisopropanolamine	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	NA	NA	G
Diisopropylamine	Atmos.	Amb.	II	1ii 2ii	Integral Grav-ity.	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
N,N-Dimethylacet-amide.	Atmos.	Amb.	III	1ii 2i	Integral Grav-ity.	PV	Restr	II	G-1	NR	Vent F	Yes	.56-1(b)	I-D	NA	G
Dimethylamine	Press.	Amb.	II	1NA 2ii	Ind. Pres-sure.	SR	Restr.	II	P-2	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Dimethylethanol-amine.	Atmos.	Amb.	III	1i 2ii	Integral Grav-ity.	PV	Restr	II	G-1	NR	Vent F	Yes	.56-1(b), (c).	I-C	NA	G
Dimethylformamide	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(e)	I-D	NA	G
1,4-Dioxane	Atmos.	Amb.	II	1ii 2ii	Integral Grav-ity.	PV	Closed	II	G-1	Inerted	Vent F	Yes	No	I-C	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Diphenylmethane diisocyanate.	Atmos.	Elev.	II	1ii 2i	Integral Gravity.	PV	Closed	I	G-1	Inert Dry	Vent F	Yes	.50-5 ... .56-1(a), (b).	NA	Yes	G
Di-n-propylamine	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-C	NA	G
Dodecyldimethylamine, Tetradecyldimethylamine mixture.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G–1	NR	Vent N	Yes	.56–1(b).	NA	NA	G
Epichlorohydrin	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 ...	I-C	NA	G
Ethanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	**I-D**	NA	G
Ethyl acrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Ethylamine solution (72% or less).	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(b)	I-D	NA	G
N-Ethylbutylamine ..	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(b)	I-C	NA	G
Ethyl chloride	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-2	NR	Vent F	Yes	No	I-D	NA	8

N-Ethylcyclohexylamine.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(b)	I-C	NA	G
Ethylene chlorohydrin.	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 50-73	I-D	NA	G
Ethylene cyanohydrin.	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G
Ethylenediamine	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Ethylene dibromide	Atmos.	Amb.	II	1ii 2i	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	No	No	NA	NA	G
Ethylene dichloride	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Ethylene glycol monoalkyl ethers. *Including:* ..... *2-Ethoxyethanol* ..... *Ethylene glycol butyl ether. Ethylene glycol tert-butyl ether. Ethylene glycol ethyl ether. Ethylene glycol methyl ether. Ethylene glycol n-propyl ether. Ethylene glycol iso-propyl ether.*	Atmos.	Amb.	III	1i; 2i	Integral Gravity..	PV	Restr.	II	G–1	NR	Vent F	Yes	No	I–C	NA	G
Ethylene glycol hexyl ether.	Atmos.	Amb.	III	1i; 2i	Integral Gravity..	Open	Open	II	G–1	NR	Vent N	Yes	No	NA	NA	G
Ethylene glycol propyl ether.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	No	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Ethylene oxide	Press.	Amb.	I	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-2	Inert	Vent F	Yes	.50-10 .50-12	I-B	.40-1(c)	4
Ethyl ether	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity.	PV	Closed	II	G-1	Inert	Vent F	Yes	.50-40 .50-42	I-C	NA	G
2-Ethylhexyl acrylate.	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.50-70(a). .50-81(a), (b).	**I-D**	I-D	G
Ethylidene norbornene.	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	.50-5 50-74	**NA**	NA	G
Ethyl methacrylate ..	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	.50-70(a).	I-D	NA	G
2-Ethyl-3-propylacrolein.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	I-C	NA	G
Ferric chloride solutions.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-75	I-B	NA	G
Fluorosilicic acid (30% or less).	Atmos.	Amb.	II	1ii 2ii	Ind. Gravity.	PV	Closed	II	G–1	NR	Vent F	No	.50–20 .50–22 **.50–73 .50–77**	I–B	NA	4
Formaldehyde solution (37% to 50%).	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	.55-1(h)	**I-B**	NA	G

•Formic acid	Atmos.	Amb.	III	1ii 2i	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	**.50-73** .55-1(l)	I-D	NA	G
Furfural	Atmos.	Amb.	III	1ii 2i	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(h)	I-C	NA	G
Glutaraldehyde solution (50% or less).	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	No	No	NA	NA	G
Hexamethylenediamine solution.	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Hexamethylene-imine.	Atmos.	Amb.	II	1ii 2i	Integral Grav-ity.	PV	Restr	II	G-1	NR	Vent F	Yes	.56-1(b), (c).	I-C	NA	G
Hydrochloric acid	Atmos.	Amb.	III	1NA 2ii	Ind. Grav-ity.	Open	Open	II	G-1	NR	Vent F	No	.50-20 .50-22 .50-73	I-B	NA	4
Hydrofluoro silicic acid (25% or less), *see* **Fluorosilicic acid (30% or less)**.																
2-Hydroxyethyl acrylate.	Atmos.	Amb.	I	1ii 2i	Integral Grav-ity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 ... .50-70(a). .50-73 .50-81(a), (b).	NA	NA	G
Isoprene	Atmos.	Amb.	III	1i 2ii	Integral Grav-ity.	PV	Open	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
Kraft pulping liquors (free alkali content 3% or more) *(including: Black, Green, or White liquor).*	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	NR	No	.50-73 .56-1(a), (c), (g).	NA	NA	G
Mesityl oxide	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	No	I-D	NA	G
Methylacetylene, Propadiene mixture.	Press.	Amb.	III	1 NA 2ii	Ind. Pressure.	SR	Restr.	II	P-2	NR	Vent F	Yes	.50-79	I-C	NA	G
Methyl acrylate	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Methylamine solution (42% or less).	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity.	PV	Closed	II	G-1	NR	Vent F	Yes	.56-1(a), (b), (c), (g).	I-D	NA	G
Methyl bromide	Press.	Amb.	I	1NA 2ii	Ind. Pressure.	SR	Closed	I	P-2	NR	Vent F	Yes	.50-5 ...	I-D	NA	2
Methyl chloride	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Restr.	II	P-2	NR	Vent F	Yes	.55-1(c)	I-D	NA	8
Methylcyclopentadiene dimer.	Atmos	Amb	III	1i 2i	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	No	I-B	NA	G

Methyl diethanolamine.	Atmos	Amb	III	1i | 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.56-1(b), (c).	I-C	NA	G
2-Methyl-5-ethylpyridine.	Atmos.	Amb.	III	1i | 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(e)	**I-D**	NA	G
Methyl methacrylate	Atmos.	Amb.	III	1i | 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
2-Methylpyridine	Atmos.	Amb.	III	1i | 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
alpha-Methylstyrene	Atmos.	Amb.	III	1i | 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Monochlorodifluoromethane.	Press.	Amb.	III	1NA | 2i	Ind. Pressure.	SR	Restr.	I	P-1	NR	NR	No	No	NA	NA	G
Morpholine	Atmos.	Amb.	III	1i | 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	I-C	NA	G
Motor fuel antiknock compounds (containing lead alkyls).	Atmos.	Amb.	I	1ii | 2ii	Ind. Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-6 ... **.50-73**	I-D	NA	.50-6
Nitric acid (70% or less).	Atmos.	Amb.	II	1ii | 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	.50-20 .50-73 .50-80	I-B	NA	4
Nitrobenzene	Atmos.	Amb.	I	1ii | 2ii	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 50-73	I-D	NA	G
Nitrogen, *liquefied* ..	Press.	Low	III	1NA | 2i	Ind. Pressure.	SR	Restr	II-L	P-1	NR	Vent F	No	.40-1(a) .50-30 .50-36.,	NA	.40-1(a)	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
o-Nitrotoluene	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G–1	NR	Vent F	Yes	.50–5 50–73	I–D	NA	G
1- or 2-Nitropropane	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-81	I-C	NA	G
•Octyl nitrates (all isomers), *see* **Alkyl(C7–C9) nitrates**.																
Oleum	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 .50-73	I-B	NA	4
Pentachloroethane	Atmos	Amb	III	1ii 2i	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	No	No	NA	NA	G
1,3-Pentadiene	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81	I-D	NA	G
Perchloroethylene ..	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	No	NA	NA	G
Phenol	Atmos.	Amb.	I	1ii 2i	Integral Gravity.	PV	Closed	I	G-1	NR	Vent F	Yes	.50-5 50-73	**I-D**	NA	2
•Phosphoric acid	Atmos.	Amb.	III	1ii 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-23 **.50-73**	I-B	NA	4
•Phosphorus, **white (elemental)**.	Atmos.	Elev.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	Water Pad	Vent F	Yes	.50-50	NA	NA	4-8

Phthalic anhydride (molten).	Atmos.	Elev.	III	1ii 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	No	**I-D**	NA	G
Polyethylene polya-mines.	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(e)	NA	NA	G
Polymethylene poly-phenyl isocyanate.	Atmos.	Amb.	II	1ii 2i	Integral Grav-ity.	PV	Closed	II	G-1	Dry	Vent F	Yes	.55-1(e)	NA	NA	G
Potassium hydrox-ide solution, *see* Caustic potash solution.																
iso-Propanolamine	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	I-D	NA	G
Propanolamine (iso-, n-).	Atmos.	Amb.	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	.56-1(b), (c).	I-D	NA	G
•Propionic acid	Atmos.	Amb.	III	1i 2ii	Integral Grav-ity.	Open	Open	II	G-1	NR	Vent N	Yes	**.50-73** .55-1(g)	I-D	NA	G
iso-Propylamine	Atmos.	Amb.	II	1ii 2ii	Integral Grav-ity.	PV	Closed	II	G-1	NR	Vent F	Yes	.55-1(c)	I-D	NA	G
Propylene oxide	Press.	Amb.	II	1NA 2ii	Ind. Pres-sure.	SR	Restr.	II	P-1	Inerted	Vent F	Yes	.50-10 .50-13	I-B	NA	G
iso-Propyl ether	Atmos.	Amb.	III	1ii 2ii	Integral Grav-ity.	PV	Restr	II	G-1	Inert	Vent F	Yes	.50-70(a).	I-D	NA	G
Pyridine	Atmos.	Amb.	III	1i 2ii	Integral Grav-ity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(e)	I-D	NA	G
•Sodium aluminate solution **(45% or less)**.	Atmos	Amb/ Elev	III	1i 2i	Integral Grav-ity.	Open	Open	II	G-1	NR	NR	No	.50-73 .56-1(a), (b), (c).	NA	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
•Sodium chlorate solution (50% or less).	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	**.50-73**	NA	NA	G
Sodium dichromate solution (70% or less).	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	Open	Closed	II	G-1	NR	Vent N	No	.50-5(d) .50-73 .56-1(b), (c).	NA	NA	G
Sodium hydroxide solution, *see* Caustic soda solution.																
•Sodium hypochlorite solution **(20% or less)**.	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	No	.50-73 .56-1(a), (b).	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S 15ppm or less).	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-73 .55-1(b)	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S greater than 15ppm but less than 200ppm).	Atmos.	Amb.	III	1ii 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	.50-73 .55-1(b)	NA	NA	G
Sodium sulfide, hydrosulfide solutions (H_2S greater than 200ppm).	Atmos.	Amb.	II	1ii 2i	Integral Gravity.	PV	Closed	II	G-1	NR	Vent F	No	.50-73 .55-1(b)	NA	NA	G
Sodium thiocyanate solution (56% or less).	Atmos	Amb	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.58-1(a)	NA	NA	G

Styrene *monomer* ...	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Sulfur (molten)	Atmos.	Elev.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	Vent N	Vent N	Yes	.50-55	I-C	.40-1(f)(1)	G
Sulfur dioxide	Press.	Amb.	I	1NA 2ii	Ind. Pressure.	SR	Closed	.....	P-2	NR	Vent F	No	.50-30 .50-84 .55-1(j)	NA	NA	2
Sulfuric acid	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 .50-73	I-B	NA	4
Sulfuric acid, spent	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	No	.50-20 .50-21 .50-73	I-B	NA	4
1,1,2,2-Tetrachloroethane.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	No	No	NA	NA	G
Tetraethylenepentamine.	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(c)	**I-C**	NA	G
Tetrahydrofuran	Atmos	Amb	III	1i 2ii	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	Yes	.50-70(b).	I-C	NA	G
Toluene diisocyanate.	Atmos.	Amb.	I	1ii 2ii	Integral Gravity.	PV	Closed	I	G-1	Dry N_2	Vent F	Yes	.50-5 ... .55-1(e)	**I-D**	NA	G
1,2,4-Trichlorobenzene.	Atmos.	Amb.	III	1ii 2ii	Integral Gravity.	PV	Restr.	II	G–1	NR	Vent F	Yes	No	I–D	NA	G
1,1,2-Trichloroethane.	Amb	Amb	III	1ii 2i	Integral Gravity.	PV	Restr	II	G-1	NR	Vent F	No	.50-73 .56-1(a)	I-D	NA	G
Trichloroethylene	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	No	I-D	NA	G

TABLE 151.05—SUMMARY OF MINIMUM REQUIREMENTS—Continued

Cargo identification[1]			Hull type	Cargo segregation tank	Tanks			Cargo transfer		Environmental control		Fire protection required	Special requirements (section in 46 CFR part 151)	Electrical hazard class-group	Temp. control install.	Tank internal inspect. period—years
Name	Pressure	Temp.			Type	Vent	Gauging device	Piping class	Control	Cargo tanks	Cargo handling space					
1,2,3-Trichloropropane.	Atmos.	Amb.	II	1ii 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-73 .56-1(a)	**I-D**	NA	G
Triethanolamine	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	**I-C**	NA	G
Triethylamine	Atmos.	Amb.	II	1ii 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.55-1(e)	**I-C**	NA	G
Triethylenetetramine	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	Vent N	Yes	.55-1(b)	**I-C**	NA	G
Triphenylborane (10% or less), Caustic soda solution.	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G–1	NR	NR	No	.56–1(a), (b), (c).	NA	NA	G
Trisodium phosphate solution.	Atmos.	Amb. Elev.	III	1i 2i	Integral Gravity.	Open	Open	II	G–1	NR	NR	No	.50–73 .56–1(a), (c).	NA	NA	G
Urea, Ammonium nitrate solution (containing more than 2% NH_3).	Atmos.	Amb.	III	1i 2i	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	No	.56-1(b)	I-D	NA	G
Valeraldehyde (iso-, n-), *see* **Valeraldehyde (all isomers)**.																
Valeraldehyde (all isomers).	Atmos.	Amb.	III	1i 2ii	Integral Gravity..	PV	Restr.	II	G-1	Inert	Vent F	Yes	No	I-C	NA	G

Vanillan black liquor (free alkali content 3% or more).	Atmos.	Amb.	III	1i 2i	Integral Gravity.	Open	Open	II	G-1	NR	NR	No	.50-73 .56-1(a), (c), (g).	NA	NA	G
Vinyl acetate	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Open	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81(a), (b).	I-D	NA	G
Vinyl chloride	Press.	Amb.	II	1NA 2ii	Ind. Pressure.	SR	Closed	II	P-2	NR	Vent F	Yes	.50-30 .50-34	I-D	NA	8
Vinyl chloride	Atmos.	Low	II	1NA 2ii	Ind. Gravity.	PV	Closed	II-L	G-2	NR	Vent F	Yes	.50-30 .50-34	I-D	.40-1(b)(1)	8
Vinylidene chloride	Atmos.	Amb.	II	1NA 2ii	Ind. Gravity.	PV	Closed	II	P-2	Padded	Vent F	Yes	.55-1(f) .50-70(a). .50-81(a), (b).	I-D	NA	G
Vinyltoluene	Atmos.	Amb.	III	1i 2ii	Integral Gravity.	PV	Restr.	II	G-1	NR	Vent F	Yes	.50-70(a). .50-81 .56-1(a), (b), (c), (g).	I-D	NA	G
For requirements see these sections:.			151.10-1	151.13-5	151.15-1.	151.15-5	151.15-10	151.20-1	151.20-5	151.25-1	151.25-2	151.30		111.105 (Subchapter J)	151.40	151.04-5

See Table 2 of Part 153 for additional cargoes permitted to be carried by tankbarge.

Items with a bullet (•) or in **boldface** are changes since October 1, 1993.

Terms and symbols:
Segregation—Tank—
Line 1—Segregation of cargo from surrounding waters:
i=Skin of vessel (single skin) only required. Cargo tank wall can be vessel's hull.
ii=Double skin required. Cargo tank wall cannot be vessel's hull.
Line 2—Segregation of cargo space from machinery spaces and other spaces which have or could have a source of ignition:
i=Single bulkhead only required. Tank wall can be sole separating medium.
ii=Double bulkhead required. Cofferdam, empty tank, pumproom, tank with Grade E Liquid (if compatible with cargo) is satisfactory.

Internal tank inspection—
G—Indicates cargo is subject to general provisions of 151.04-5(b).
Specific numbers in this column are changes from the general provisions.
Abbreviations used:
Tank type: Ind=Independent.
Vent:
PV=Pressure vacuum valve.
SR=Safety relief.
Gauging device: Restr.=Restricted.
General usage:
NR=No requirement.
NA=Not applicable.
1. The provisions contained in 46 CFR Part 197, subpart C, apply to liquid cargoes contining 0.5% or more benzene by volume.

[CGD 88–100, 54 FR 40029, Sept. 29, 1989, as amended by CGD 85–061, 54 FR 50966, Dec. 11, 1989; CGD 88–100, 55 FR 17277, Apr. 24, 1990; CGD 88–040, 56 FR 52135, Oct. 17, 1991; 56 FR 65006, Dec. 13, 1991; CGD 92–100, 59 FR 17027, Apr. 11, 1994; CGD 94–900, 59 FR 45136, 45137, 45138, Aug. 31, 1994; CGD 94–902, 60 FR 34043, June 29, 1995; CGD 95–900, 60 FR 34050, June 29, 1995]

Subpart 151.10—Barge Hull Construction Requirements

§ 151.10–1 Barge hull classifications.

(a) Each barge constructed or converted in conformance with this subpart shall be assigned a hull type number.

(1) Effective dates for certain requirements:

(i) Barges constructed or converted between July 1, 1964, and June 1, 1970, in accordance with the construction requirements of §§ 32.63 and 98.03 of this chapter are considered to comply with the basic provisions of this subpart and will retain the hull type classification for the service for which they were originally approved. Changes in product endorsement will not be considered a change in service, except when a change to a product of higher specific gravity necessitates a reevaluation of the intact and damage stability requirements in subpart E of part 172 of this chapter.

(2) [Reserved]

(b) For this purpose the barge hull types shall be defined as follows:

(1) *Type I barge hull.* Barge hulls classed as Type I are those designed to carry products which require the maximum preventive measures to preclude the uncontrolled release of the cargo. These barges are required to meet:

(i) Standards of intact stability and a modified two compartment standard of subdivision and damage stability, as specified in subpart E of part 172 of this chapter; and

(ii) Hull structural requirements, including an assumed grounding condition.

(2) *Type I–S (special) barge hulls.* Type I–S (special) barge hulls are those constructed or converted for the carriage of chlorine in bulk prior to July 1, 1964, and modified to higher stability standards prior to July 1, 1968, but not meeting the requirements for full Type I classification.

(3) *Type II barge hull.* Barge hulls classed as Type II are those designed to carry products which require significant preventive measures to preclude the uncontrolled release of the cargo. These barges are required to meet:

(i) Standards of intact stability and a modified one compartment standard of subdivision and damage stability, as specified in subpart E of part 172 of this chapter; and

(ii) Hull structural requirements, including an assumed grounding condition.

(4) *Type III barge hull.* Barge hulls classed as Type III are those designed to carry products of sufficient hazard to require a moderate degree of control. These barges are required to meet:

(i) Standards of intact stability as specified in subpart E of part 172 of this chapter; and

(ii) Hull structural requirements.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 79–023, 48 FR 51008, Nov. 4, 1983; CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§ 151.10–5 Subdivision and stability.

Each barge must meet the applicable requirements in subchapter S of this chapter.

[CGD 70–023, 48 FR 51009, Nov. 4, 1983]

§ 151.10–15 Certificate endorsement.

(a)–(b) [Reserved]

(c) *Certificate endorsement.* The following information shall be submitted, and upon approval of calculations shall form part of the endorsement on the Certificate of Inspection:

(1) Limiting draft for each hull type service for which approval is requested.

(2) Maximum density (lb./gal.) and maximum cargo weight (tons) for each tank for which approval is requested. Their weights will normally reflect uniform loading except that for trim purposes the individual tank cargo weight may exceed the uniform loading tank cargo weight, corresponding to the barge fresh water deadweight at the limiting draft, by 5 percent. Where a greater degree of nonuniform loading

is desired, longitudinal strength calculations shall be submitted.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 79–023, 48 FR 51009, Nov. 4, 1983]

§ 151.10–20 Hull construction.

(a) *Construction features.* (1) Each barge hull shall be constructed with a suitable bow form (length, shape, and height of headlog) to protect against diving at the maximum speed at which the barge is designed to be towed. In any integrated tow, only the lead barge need comply with this requirement.

(2) All ''open hopper'' type barges shall be provided with coamings around the hopper space and a 36–inch minimum height plowshare breakwater on the forward rake. The plowshare breakwater may be omitted, if it is demonstrated to the satisfaction of the Commandant that sufficient protection is achieved without it. Coamings shall have a minimum height of 36 inches forward and may be graduated to a minimum height of 24 inches at midlength and 18 inches thereafter. All hopper barges constructed with a weathertight rain shield over the hopper space are exempt from these requirements, except that they shall be provided with an 18–inch minimum coaming all around the hopper.

(3) All ''open hopper'' type barges modified for the carriage of chlorine in bulk shall be provided with 36–inch minimum height coamings around the hopper.

(4) All barges in ocean or coastwise service shall be provided with a structural deck and hatches in accordance with the applicable provisions of subchapter E of this chapter and the scantling requirements of the American Bureau of Shipping.

(b) *Hull structural requirements.* (1) All Types I, II, and III barges shall comply with the basic structural requirements of the American Bureau of Shipping for barges of the ordinary types and the applicable supplementary requirements of this section.

(2) Types I and II barges in inland service: A grounding condition shall be assumed where the forward rake bulkhead rests upon a pinnacle at the water surface. The maximum hull and tank bending moment and tank saddle reactions (if applicable) shall be determined. The hull bending stress shall not exceed the applicable limits of paragraphs (b)(2) (i), (ii), or (iii) of this section. The maximum tank bending moment and saddle reaction shall be used in the tank design calculations required by § 151.15–2(b)(3).

(i) Independent tanks supported by only two saddles do not contribute to the strength and stiffness of the barge hull. In such case, the hull stress shall not exceed either 50 percent of the minimum ultimate tensile strength of the material or 70 percent of the yield strength when specified, whichever is greater.

(ii) Independent tanks supported by three or more saddles contribute to the strength and stiffness of the hull. In such case, the hull stress shall not exceed the percentage stress values prescribed in § 151.10–20(b)(2)(i), multiplied by the quantity

$$(1.5 - SWT/UTS),$$

where *SWT* is the stress calculated without including the effect of the tanks, and *UTS* is the minimum ultimate tensile strength of the material. The value *SWT*, however, shall in no case be more than 75 percent of *UTS*.

(iii) Integral tanks may be considered as contributing to the strength and stiffness of the barge hull. The hull stresses for integral tank barges shall not exceed the percentage stress values prescribed in paragraph (b)(2)(i), of this section.

(3) Types I and II barges in ocean service:

(i) Independent tank barges with tanks supported by three or more saddles shall be subjected to a $0.6L^{0.6}$ trochoidal wave hogsag analysis to determine the maximum hull and tank bending moments and tank saddle reactions.

(ii) All independent tank barges, regardless of the number of saddle supports shall be subject to a still water bending analysis to determine the hull bending moment. For those barges with independent tanks supported by three or more saddles, this analysis shall consider tank-hull interaction so as to determine tank bending moments and saddle reactions.

(iii) The still water tank bending moments and saddle reactions shall be superimposed upon those obtained by simultaneous application of the following dynamic loadings:

(*a*) Rolling 30° each side (120° full cycle) in 10 seconds.

(*b*) Pitching 6° half amplitude (24° full cycle) in 7 seconds.

(*c*) Heaving *L*/80 half amplitude (*L*/20 full cycle) in 8 seconds.

(iv) The hull structure and saddle support system shall be analyzed, using the maximum hull bending moments and saddle reactions obtained from the foregoing. Bending stress shall not exceed 60 percent of the yield strength or 42 percent of the minimum tensile strength of the material, whichever is less. Critical buckling strength shall be at least 75 percent greater than calculated buckling stresses. The maximum tank bending moments and saddle reactions shall be used in the tank design calculations required by § 151.15–3(b)(8).

Subpart 151.12—Equipment and Operating Requirements for Control of Pollution From Category D NLS Cargoes

SOURCE: CGD 81–101, 52 FR 7777, Mar. 12, 1987, unless otherwise noted.

§ 151.12–5 Equipment for Category D NLS.

The Coast Guard endorses the Certificate of Inspection and for ships making foreign voyages issues the endorsed NLS Certificate required by § 151.12–10 for an oceangoing non-self-propelled ship to carry as bulk cargo the following Category D NLSs if the ship meets the requirements of this part and the requirements applying to ships that carry Category D NLS cargoes in §§ 153.470, 153.486, and 153.490 of this chapter:

Acetic acid
Acrylic acid
Adiponitrile
Aminoethylethanolamine
Ammonium bisulfite solution
Butyl methacrylate
Caustic soda solution
Coal tar pitch
Cyclohexanone
Dichloromethane
2,2-Dichloropropionic acid
Diethylenetriamine
N,N-Dimethylacetamide
Dimethylethanolamine
Dimethylformamide
1,4-Dioxane
Ethanolamine
N-Ethylcyclohexylamine
Ethylene cyanohydrin
Ethylene glycol monoalkyl ethers
Ethyl methacrylate
Formic acid
Glutaraldehyde solution
Hydrochloric acid
Mesityl oxide
Methyl methacrylate
Morpholine
1- or 2-Nitropropane
Phosphoric acid
Polyethylene polyamines
Polymethylene polyphenyl isocyanate
Propionic acid
iso-Propyl ether
Pyridine
Tetraethylenepentamine
Tetrahydrofuran
Triethanolamine
Triethylenetetramine

[CGD 81–101, 52 FR 7777, Mar. 12, 1989, as amended by CGD 88–100, 54 FR 40040, Sept. 29, 1989; CGD 92–100, 59 FR 17028, Apr. 11, 1994; CGD 94–900, 59 FR 45139, Aug. 31, 1994; CGD 94–902, 60 FR 34043, June 29, 1995]

§ 151.12–10 Operation of oceangoing non-self-propelled ships Carrying Category D NLS.

(a) An oceangoing non-self-propelled ship may not carry in a cargo tank a Category D NLS cargo listed under § 151.12–5 unless the ship has on board a Certificate of Inspection and for ships making foreign voyages an NLS Certificate endorsed under that section to allow the cargo tank to carry the NLS cargo.

(b) The person in charge of an oceangoing non-self-propelled ship that carries a Category D NLS listed under § 151.12–5 shall ensure that the ship is operated as prescribed for the operation of oceangoing ships carrying Category D NLSs in §§ 153.901, 153.909, 153.1100, 153.1102, 153.1104, 153.1106, 153.1124, 153.1126, 153.1128, 153.1130 and 153.1132 of this chapter.

[CGD 81–101, 52 FR 7777, Mar. 12, 1987, as amended by CGD 81–101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]

Subpart 151.13—Cargo Segregation

§ 151.13–1 General.

This subpart prescribes the requirements for cargo segregation for cargo tanks. These requirements are based on considerations of cargo reactivity, stability, and contamination of the surroundings and other cargoes.

[CGD 88–100. 54 FR 40029, Sept. 29, 1989, as amended by CGD 96–041, 61 FR 50731, Sept. 27, 1996]

§ 151.13–5 Cargo segregation—tanks.

(a) The configurations listed in this paragraph refer to the separation of the cargo from its surroundings and list the various degrees of segregation required. Paragraphs and (2) of this section explain the symbols used in lines 1 and 2, in order, under the tank segregation column of Table 151.05.

(1) Segregation of cargo from surrounding waters (Line 1 of Table 151.05).

i=Skin of vessel (single skin) only required. Cargo tank wall can be vessel's hull.

ii=Double skin required. Cargo tank wall cannot be vessel's hull.

NA=Nonapplicable for this case. Independent tanks already have such segregation built in through design.

(2) Segregation of cargo space from machinery spaces and other spaces which have or could have a source of ignition (Line 2 of Table 151.05).

i=Single bulkhead only required. Tank wall can be sole separating medium.

ii=Double bulkhead, required. Cofferdam, empty tank, pumproom, tank with Grade E Liquid (if compatible with cargo) is satisfactory.

(b) [Reserved]

(c) If a cofferdam is required for segregation purposes and a secondary barrier is required for low temperature protection by § 151.15–3(d)(4), the void space between the primary and secondary barriers shall not be acceptable in lieu of the required cofferdam.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 75–59, 45 FR 70273, Oct. 23, 19805; CGD 96–041, 61 FR 50731, Sept. 27, 1996]

Subpart 151.15—Tanks

§ 151.15–1 Tank types.

This section lists the definitions of the various tank types required for cargo containment by Table 151.05.

(a) *Integral.* A cargo containment envelope which forms a part of the vessel's hull in which it is built, and may be stressed in the same manner and by the same loads which stress the contiguous hull structure. An integral tank is essential to the structural completeness of its vessel's hull.

(b) *Independent.* A cargo containment envelope which is not a contiguous part of the hull structure. An independent tank is built and installed so as to eliminate, wherever possible (or, in any event, to minimize) its stressing as a result of stressing or motion of the adjacent hull structure. In general, therefore, motion of parts of the tank relative to the adjacent hull structure is possible. An independent tank is not essential to the structural completeness of its carrying vessel's hull.

(c) *Gravity.* Tanks having a design pressure (as described in Part 54 of this chapter) not greater than 10 pounds per square inch gauge and of prismatic shape or other geometry where stress analysis is neither readily nor completely determinate. (Integral tanks are of the gravity type.)

(d) *Pressure.* Independent tanks whose design pressure (as described in Part 54 of this chapter) is above 10 pounds per square inch gauge and fabricated in accordance with part 54, of this chapter. Independent gravity tanks which are of normal pressure vessel configuration (i.e., bodies of revolution, in which the stresses are readily determinate) shall be classed as pressure vessel type tanks even though their maximum allowable working pressure is less than 10 pounds per square inch gauge. Pressure vessel tanks shall be of Classes I, I–L, II, II–L, or III, as defined in subchapter F of this chapter.

§ 151.15–3 Construction.

This section lists the requirements for construction of the types of cargo tanks defined in § 151.15–1.

(a) *Gravity type tanks.* Gravity type cargo tanks vented at a pressure of 4 pounds per square inch gauge or less shall be constructed and tested as required by standards established by the American Bureau of Shipping or other recognized classification society. Gravity type tanks vented at a pressure exceeding 4 but not exceeding 10 pounds per square inch gauge will be given special consideration by the Commandant.

(b) *Pressure vessel type tanks.* Pressure vessel type tanks shall be designed and tested in accordance with the requirements of Part 54 of this chapter.

(1) Uninsulated cargo tanks, where the cargo is transported, at or near ambient temperatures, shall be designed for a pressure not less than the vapor pressure of the cargo at 115°F. The design shall also be based on the minimum internal pressure (maximum vacuum), plus the maximum external static head to which the tank may be subjected.

(2) When cargo tanks, in which the cargo is transported at or near ambient temperature, are insulated with an insulation material of a thickness to provide a thermal conductance of not more than 0.075 B.t.u. per square foot per degree Fahrenheit differential in temperature per hour, the tanks shall be designed for a pressure of not less than the vapor pressure of the cargo at 105°F. The insulation shall also meet the requirements of paragraph (f) of this section.

(3) Cargo tanks in which the temperature is maintained below the normal atmospheric temperature by refrigeration or other acceptable means shall be designed for a pressure of not less than 110 percent of the vapor pressure corresponding to the temperature of the liquid at which the system is maintained, or the pressure corresponding to the greatest dynamic and static loads expected to be encountered in service. For mechanically stressed relieved cargo tanks, additional factors relating design pressure and maximum allowable pressure shall be as specified by the Commandant. The material of the tank shall meet the material requirements specified in part 54 of this chapter for the service temperature, and this temperature shall be permanently marked on the tank as prescribed in § 54.10–20 of this chapter.

(4) The maximum allowable temperature of the cargo is defined as the boiling temperature of the liquid at a pressure equal to the setting of the relief valve.

(5) The service temperature is the minimum temperature of a product at which it may be contained, loaded and/or transported. However, the service temperature shall in no case be taken higher than given by the following formula.

$$t_z = t_w - 0.25(t_w - t_B)$$

where:

t_z = Service temperature.

t_w = Boiling temperature of gas at normal working pressure of container but not higher than +32°F.

t_B = Boiling temperature of gas at atmospheric pressure.

Under normal circumstances, only temperatures due to refrigerated service will be considered in determining the service temperature. Refrigerated service for purposes of this paragraph is defined as service where the temperature is controlled in the process rather than being caused by atmospheric conditions.

(6) Heat transmission studies, where required, shall assume the minimum ambient temperatures of 0°F. still air and 32°F. still water, and maximum ambient temperatures of 115°F. still air and 90°F. still water.

(7) Where applicable, the design of the cargo tanks shall investigate the thermal stresses induced in the tanks at the service temperature.

(8) Calculations showing the stress level in the tanks under dynamic loading conditions for ocean service barges (see § 151.10–20(b)(4)) and grounding conditions for inland service barges (see § 151.10–20–(b)(2)) shall be submitted to the Commandant for approval. These calculations shall take into account the local stresses due to the interaction between the barge hull and the tanks.

(c) *High density cargo.* Cargoes with a specific gravity greater than that for

which the scantlings of the tank are designed may be carried provided that:

(1) The maximum cargo weight (tons) in a specific tank does not exceed the maximum cargo weight (tons) endorsed on the certificate of inspection.

(2) The scantlings of the tank are sufficient to prevent rupture under a full head of the higher density cargo. Scantlings meeting ordinary bulkhead requirements for the full head will satisfy this requirement.

(d) *Arrangements*—(1) *Collision protection.* (i) Tanks containing cargoes which are required to be carried in Type I hulls by Table 151.05 shall be located a minimum of 4 feet inboard from the side shell and box end of the vessel. Tanks containing cargoes which are required to be carried in Type II hulls by Table 151.05 shall be located a minimum of 3 feet inboard from the side shell and box end of the vessel.

(ii) All independent cargo tanks installed on Type I or Type II barge hulls shall be protected with suitable collision chocks or collision straps. A longitudinal collision load of one and one half times the combined weight of the tank and the cargo shall be assumed. All other independent cargo tanks shall be provided with suitable collision chocks or collision straps assuming a longitudinal collision load equal to the combined weight of the tank and the cargo. The design bearing stress shall not exceed 2 times the yield strength or 1.5 times the minimum ultimate strength, whichever is less.

(iii) Tanks containing cargoes, which are required to be carried in Type I or Type II hulls by Table 151.05, shall be located a minimum of 25 feet from the head log at the bow. Box barges and trail barges need not comply with this requirement.

(2) *Inspection clearances.* The distance between tanks or between a tank and the vessel's structure shall be such as to provide adequate access for inspection and maintenance of all tank surfaces and hull structure; but shall not normally be less than 15 inches except in way of web frames or similar major structural members where the minimum clearance shall be equal to the flange or faceplate width.

(3) *Access openings.* Each tank shall be provided with at least a 15″ × 18″ diameter manhole, fitted with a cover located above the maximum liquid level as close as possible to the top of the tank. Where access trunks are fitted to tanks, the diameter of the trunks shall be at least 30 inches.

(4) *Low temperature protection.* (i) When low temperature cargoes are to be carried in gravity type tanks at a temperature lower than that for which the hull steel is adequate, a secondary barrier designed to contain leaked cargo temporarily shall be provided. The design of the cargo containment system shall be such that under normal service conditions, or upon failure of the primary tank, the hull structure shall not be cooled down to a temperature which is unsafe for the materials involved. The secondary barrier and structural components of the hull which may be exposed to low temperatures shall meet the material requirements (i.e., chemistry and physical properties) specified in part 54 of this chapter for the service temperature involved. Heat transmission studies and tests may be required to demonstrate that the structural material temperatures in the hull are acceptable.

(ii) The design shall take into consideration the thermal stresses induced in the cargo tank at the service temperature during loading.

(iii) Where necessary, devices for spray loading or other methods of precooling or cooling during loading shall be included in the design.

(iv) Pressure-vessel type tanks shall be radiographed in accordance with the requirements of part 54 of this chapter. For gravity type tanks, all weld intersections or crossings in joints of primary tank shells shall be radiographed for a distance of 10 thicknesses from the intersection. All other welding in the primary tank and in the secondary barrier, shall be spot radiographed in accordance with the requirements specified in part 54 of this chapter for Class II–L pressure vessels.

(v) For nonpressure vessel type containment systems, access shall be arranged to permit inspection one side each of the primary tank and secondary barrier, under normal shipyard conditions. Containment systems which, because of their peculiar design,

cannot be visually inspected to this degree, may be specially considered provided an equivalent degree of safety is attained.

(e) *Installation of cargo tanks.* (1) Cargo tanks shall be supported on foundations of steel or other suitable material and securely anchored in place to prevent the tanks from shifting when subjected to external forces. Each tank shall be supported so as to prevent the concentration of excessive loads on the supporting portions of the shell or head.

(2) Foundations, and stays where required, shall be designed for support and constraint of the weight of the full tank, and the dynamic loads imposed thereon. Thermal movement shall also be considered.

(3) Foundations and stays shall be suitable for the temperatures they will experience at design conditions.

(4) Cargo tanks may be installed ''on deck,'' ''under deck,'' or with the tanks protruding through the deck. All tanks shall be installed with the manhole openings located in the open above the weather deck. Provided an equivalent degree of safety is attained, the Commandant may approve cargo tanks installed with manhole openings located below the weather deck. Where a portion of the tank extends above the weather deck, provision shall be made to maintain the weathertightness of the deck, except that the weathertightness of the upper deck need not be maintained on:

(i) Vessels operating on restricted routes which are sufficiently protected; or,

(ii) Open hopper type barges of acceptable design.

(5) No welding shall be performed on tanks which require and have been stress relieved unless authorized by the Commandant.

(f) *Materials.* (1) Materials used in the construction of cargo tanks shall be suitable for the intended application and shall be in accordance with the applicable requirements of part 54 of this chapter. For cargoes carried at low temperatures, the tank supports and foundations, and portions of the hull which may be exposed to low temperature, shall also meet the applicable requirements of that part.

(2) When required, cargo tanks shall be lined with rubber or other material acceptable to the Commandant. The interior surfaces of the cargo tanks shall be made smooth, welds chipped or ground smooth, and the surfaces thoroughly cleaned before the lining is applied. The lining material shall be resistive to attack by the cargo, not less elastic than the metal of the tank proper, and nonporous when tested after application. It shall be of substantially uniform thickness. The lining shall be directly bonded to the tank plating, or attached by other satisfactory means acceptable to the Commandant.

(g) *Insulation.* (1) Insulation, when provided, shall be compatible with the cargo and the tank materials.

(2) Insulation in a location exposed to possible high temperature or source of ignition shall be one of the following:

(i) Incombustible, complying with the requirements of Subpart 164.009 of Part 164 of this chapter; or

(ii) Fire retardant, having a flame spread rating of 50 or less as determined by ASTM Specification E–84 (Tunnel Test); or,

(iii) Nonburning or ''self-extinguishing'' as determined by ASTM Specification D–1692, ''Flammability of Plastics'' and covered by a steel jacket having a minimum thickness of 18 gauge (0.0428 inches) (U.S. Standard Gauge) or an equivalent means of protection acceptable to the Commandant.

(3) Insulation in a location protected against high temperature or source of ignition need satisfy no requirement for combustibility.

(4) Insulation shall be impervious to water vapor, or have a vapor-proof coating of a fire-retardant material acceptable to the Commandant. Unless the vapor barrier is inherently weather resistant, tanks exposed to the weather shall be fitted with a removable sheet metal jacket of not less than 18 gauge over the vapor-proof coating and flashed around all openings so as to be weathertight. Insulation which is not exposed to the weather when installed on tanks carrying cargoes above ambient temperatures need not be impervious to water vapor nor be covered with a vapor-proof coating.

(5) Insulation shall be adequately protected in areas of possible mechanical damage.

(h) *Fire exposure protection.* Tanks which are provided with fire exposure protection of one of the following categories may be allowed a reduction in the size of relief valves.

(1) Approved incombustible insulation meeting the requirements of subpart 164.007 of part 164 of this chapter which is secured to the tank with steel bands.

(2) Located in a hold or protected by a self-supporting steel jacket or cover (such as a hopper cover) of at least 10 gauge (0.1345) for insulation.

(i) Tanks not protected against fire exposure as described in this paragraph shall not be permitted a reduction in size of relief valves.

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

§ 151.15–5 Venting.

This section contains definitions and requirements for the various methods of venting specified in Table 151.05. In addition to the requirement that all vents must penetrate into tanks at the top of the vapor space, the following methods of venting and the applicable restrictions are listed:

(a) *Open venting.* A venting system which offers no restriction (except pipe losses and flame screen, where used) to the movement of liquid or vapor to or from the cargo tank (via the vent) under normal operating conditions. The total cross-sectional area of the vents shall not be less than the total cross-sectional area of the filling pipe or pipes. Ullage openings may be counted as part of the required cross-sectional area: *Provided,* That each cargo tank has at least one permanent vent. The minimum size of a cargo tank vent shall be not less than 2½ inches. The outlet end of the vent shall terminate in a gooseneck bend and shall be located at a reasonable height above the weather deck, clear of all obstructions. No shut-off valve or frangible disk shall be fitted in the vent lines except that a float check valve may be installed so as to exclude the entry of water into the tank (i.e., to prevent downflooding). An open venting system may be fitted with a flame screen.

(b) *Pressure-vacuum venting.* A normally closed venting system fitted with a device to automatically limit the pressure or vacuum in the tank to design limits. Pressure-vacuum relief valves shall comply with the requirements of subpart 162.017 of this chapter. The required capacity of the venting system shall be in accordance with part 54 of this chapter.

(c) *Safety relief venting.* A closed venting system fitted with a device to automatically limit the pressure in the tank to below its maximum allowable working pressure. The maximum safety relief valve setting shall not exceed the maximum allowable working pressure of the tank. For cargoes carried at ambient temperatures, the minimum safety relief valve setting shall correspond to the saturated vapor pressure of the cargo at 105°F. if carried in an insulated tank, or 115°F. if carried in an uninsulated tank. For cargoes carried below ambient temperature, the safety relief valve setting shall be selected to provide a suitable margin between normal operating pressure of the tank and the opening pressure of the valve but in no case shall it exceed the maximum allowable working pressure of the tank. The safety relief valves shall be of a type approved under subparts 162.001 or 162.018 of subchapter Q of this chapter. The required capacity of the safety relief valves shall be in accordance with the requirements of part 54 of this chapter.

(d) *Rupture disks.* (1) When required by the nature of the cargo, rupture disks may be installed in lieu of or in addition to other pressure limiting devices in accordance with the requirements of § 54.15–13 of this chapter.

(2) When a pressure-vacuum relief valve or safety relief valve normally protected by a rupture disk or breaking pin device is exposed to the cargo due to breakage of the disk, the valve shall be reinspected before being returned to service.

§ 151.15–6 Venting piping.

(a) The back pressure in the relief valve discharge lines shall be taken into account when determining the flow capacity of the relief valve to be

used. The back pressure in the discharge line shall be limited to 10 percent of the valve operating pressure or a compensating-type valve shall be used. Suitable provision shall be made for draining condensate which may accumulate in the vent piping.

(b) [Reserved]

§151.15–10 Cargo gauging devices.

This section contains definitions and requirements for types of gauging devices specified in Table 151.05.

(a) *Open gauging.* A gauging method which uses an opening in the cargo tank and which may expose the gauge 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 §§151.03–43 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.

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 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

cargo tanks by being passed through a heat exchanger. Refrigeration is not accomplished by direct compression of the cargo.

(c) *Internal heat exchange.* A refrigeration system in which a cooling fluid is passed through heat transfer coils immersed in the cargo tank liquid or vapor phases.

(d) *Tank refrigeration.* A refrigeration system in which the cooling fluid is passed around the cargo tank exterior in order to remove heat from the tank or its surroundings.

(e) *No refrigeration.* A system that allows the liquefied gas to warm up and increase in pressure. The insulation and tank design pressure shall be adequate to provide for a suitable margin for the operating time and temperatures involved.

(f) *Tank heating.* (1) A system in which the cargo is heated by means of steam or other heat transfer fluid running through coils within or around the tank. The cargo itself does not leave the tank.

(2) A recirculating system in which the cargo leaves the tank, is pumped through a heater and then returned to the tank.

§ 151.40–2 Materials.

Materials used in the construction of temperature or pressure control systems shall be suitable for the intended application and meet the requirements of Subchapter F and the Special Requirements section of this subchapter.

§ 151.40–5 Construction.

Construction of machinery or equipment, such as heat exchangers, condensers, piping, etc., associated with temperature or pressure control systems shall meet the requirements of Subchapter F of this chapter. The electrical portions of these installations shall meet the requirements of Subchapter J of this chapter.

§ 151.40–10 Operational requirements.

Control systems, required by Table 151.05 shall be provided with an audible or visual high cargo temperature or high cargo pressure alarm which is discernible at the towboat. The alarm shall operate when either the pressure or the temperature exceeds the operating limits of the system. The alarm may monitor either pressure or temperature, but must be independent of the control system.

§ 151.40–11 Refrigeration systems.

(a) *Boiloff systems.* The venting of cargo boiloff to atmosphere shall not be used as a primary means of temperature or pressure control unless specifically authorized by the Commandant.

(b) Vapor compression, tank refrigeration, and secondary refrigeration systems: The required cooling capacity of refrigeration systems shall be sufficient to maintain the cargo at design operating conditions with ambient temperature of 115°F. still air and 90°F. still water. The number and arrangement of compressors shall be such that the required cooling capacity of the system is maintained with one compressor inoperative. Portions of the system other than the compressors need not have standby capacity.

Subpart 151.45—Operations

§ 151.45–1 General.

(a) Barges certificated as tank barges (Subchapter D of this chapter) or cargo barges (Subchapter I of this chapter) for the carriage of cargoes regulated by this subchapter shall meet all applicable requirements for operations in the appropriate subchapter; in addition, requirements prescribed in this subpart shall apply to either type of certification.

(b) [Reserved]

§ 151.45–2 Special operating requirements.

(a) The requirements of this section shall apply to all barges carrying in bulk any cargoes regulated by this subchapter; however, the provisions of this section are not applicable to such barges when empty and gas-freed.

(b) When it is necessary to operate box or square-end barges as lead barges of tows, the person in charge of the towing vessel shall control the speed to insure protection against diving and swamping of such barges, having due regard to their design and freeboard, and to the operating conditions.

(c) No cargo tank hatch, ullage hole, or tank cleaning openings shall be

opened or remain open except under the supervision of the person in charge, except when the tank is gas free.

(d) Barges, when tendered to the carrier for transportation, shall have all bilges and void spaces (except those used for ballasting) substantially free of water. Periodic inspections and necessary pumping shall be carried out to insure maintenance of such water-free condition in order to minimize the free surface effects, both in longitudinal and transverse directions. Except when otherwise considered necessary for inspection or pumping, all hatch covers and other hull closure devices for void spaces and hull compartments other than cargo spaces shall be closed and secured at all times.

(e) *Cargo signs and cards.* (1) Warning signs shall be displayed on the vessel, port and starboard, facing outboard without obstructions, at all times except when the vessel is gas free. The warning sign shall be rectangular and a minimum of 3 feet wide and 2 feet high. It shall be of sufficient size to accommodate the required alerting information, which shall be shown in black block style letters and numerals (characters) at least 3 inches high on a white background. The minimum spacing between adjacent words and lines of characters shall be 2 inches. The minimum spacing between adjacent characters shall be one-half inch. All characters shall have a minimum stroke width of one-half inch and shall be a minimum of 2 inches wide, except for the letters ''M'' and ''W'', which shall be a minimum of 3 inches wide, and except for the letter ''I'' and the Numeral ''1'', which may be ½–inch wide. The signs shall have a 2–inch minimum white border clear of characters. The signs shall be maintained legible. The alerting information shall include the following:

WARNING

DANGEROUS CARGO

(This sign may be covered or removed when Subchapter *O* commodities are not being carried.)

NO VISITORS

NO SMOKING

(This sign may be removed or covered when the commodity is not flammable or combustible.)

NO OPEN LIGHTS

(This sign may be removed or covered when the commodity is not flammable or combustible.)

(2)(i) Names and locations of all cargoes will be displayed in a readily discernible manner on all barges carrying one or more commodities regulated by this subchapter. This may be an individual sign at or on each tank or by a single sign similar to the following example:

Tank No.	*Cargo*
1P	/xxxx/
1S	/xxxx/
2P	/xxxx/
2S	/xxxx/

These signs may be printed, handwritten, permanent or changeable, but be visible and readable at all times. These signs should be as readable, as those specified in paragraph (e)(1) of this section. Cargoes regulated by other subchapters will be included whenever carried simultaneously with commodities regulated by this subchapter.

(ii) When the dangerous cargo barge is carrying only a single product, the Warning Sign required by paragraph (e)(1) of this section can be considered as meeting the requirements for the cargo location sign. The name of the commodity shall be added to the Warning Sign.

(3) A cargo information card for each cargo regulated by this subchapter shall be carried on the bridge or in the pilot house of the towing vessel, readily available for use by the person in charge of the watch. This information card shall also be carried aboard the barge, mounted near the Warning Sign required by paragraph (e)(1) of this section, in such position as to be easily read by a man standing on the deck of the barge. The minimum card size shall be 7″ × 9½″. The card shall have legible printing on one side only. The card

shall be laminated in clear plastic or otherwise made weatherproof. The following data shall be listed:

(i) *Cargo identification and characteristics.* Identification of the cargo, as listed in Table 151.05, its appearance and odor. A statement of the hazards involved and instructions for the safe handling of the cargo and, as applicable, the need for special cargo environments.

(ii) *Emergency procedures.* Precautions to be observed in the event of spills, leaks, or equipment or machinery breakdown and/or uncontrolled release of the cargo into the waterway or atmosphere. Precautions to be observed in the event of exposure of personnel to toxic cargoes.

(iii) *Firefighting procedures.* Precautions to be observed in the event of a fire occurring on or adjacent to the barge, and enumeration of firefighting media suitable for use in case of a cargo fire.

(f) *Surveillance.* During the time the cargo tanks contain any amount of liquid or gaseous dangerous cargoes requiring Type I or Type II barge hulls, the barge shall be under surveillance, as set forth in this paragraph:

(1) The licensed operator, person in command, and mate of a vessel towing a tank barge that need not be manned, and each of them, shall be responsible for monitoring the security and integrity of the tank barge and for ensuring adherence to proper safety precautions. These responsibilities include, but are not limited to—

(i) Ensuring that every tank barge added to the tow has all tank openings properly secured; has its freeing-ports and scuppers, if any, unobstructed; meets any loadline or freeboard requirements; and neither leaks cargo into the water, voids, or cofferdams nor leaks water into the tanks, voids, or cofferdams;

(ii) Ensuring that every tank barge in the tow is properly secured within the tow;

(iii) Ensuring that periodic checks are made of every tank barge in the tow for leakage of cargo into the water, voids, or cofferdams and for leakage of water into the tanks, voids, or cofferdams;

(iv) Knowing the cargo of every tank barge in the tow, all hazards associated with the cargo, and what to do on discovery of a leak;

(v) Ensuring that the crew of the vessel know the cargo of every tank barge in the tow, all hazards associated with the cargo, and what to do on discovery of a leak;

(vi) Reporting to the Coast Guard any leaks from a tank barge in the tow into the water, as required by 33 CFR 151.15; and

(vii) Ensuring that the crew of the vessel and other personnel in the vicinity of the tank barges in the tow follow the proper safety precautions for tank vessels, and that no activity takes place in the vicinity of the barges that could create a hazard.

(2) A towing vessel engaged in transporting such unmanned barges shall not leave them unattended. When a barge is moored, but not gas free, it shall be under the care of a watchman who may be a member of the complement of the towing vessel, or a terminal employee, or other person. This person shall be responsible for the security of the barge and for keeping unauthorized persons off the barge. Such person shall be provided with, read, and have in his possession for ready reference the information cards required by paragraph (e) of this section.

(g) All cargo hatches shall be closed, dogged down, or otherwise tightly secured.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40040, Sept. 29, 1989; CGD 79–116, 60 FR 17158, Apr. 4, 1995]

§ 151.45–3 Manning.

Except as provided for in this section, barges need not be manned unless in the judgment of the Officer in Charge, Marine Inspection, such manning is necessary for the protection of life and property and for safe operation of the vessel. Vessels requiring manning for safe operation shall be subject to additional requirements as determined by the Commandant. Towing vessels, while towing barges which are not required to be manned, shall be provided with and have on board the information card required by § 151.45–2(e)(3). This card shall be in the possession of the master or person in charge.

§ 151.45–4 Cargo-handling.

(a) On a United States tank barge subject to inspection—

(1) The owner and operator of the vessel, and his or her agent, and each of them, shall ensure that no transfer of liquid cargo in bulk or cleaning of a cargo tank takes place unless under the supervision of a qualified person designated as the person in charge of the transfer or the cleaning under Subpart C of 33 CFR part 155.

(2) The person in charge of the transfer shall ensure that enough qualified personnel are on duty to safely transfer liquid cargo in bulk or to safely clean cargo tanks.

(b) *Closing of sea and ballast valves.* All sea and ballast valves are to be properly aligned and lashed, or sealed in their correct position prior to beginning cargo transfer operations. Under no circumstances shall such valves be secured by locks.

(c) *Connecting for cargo transfer.* (1) Movement of the vessel shall be considered when making the cargo connections to insure safe cargo transfer. Suitable material shall be used in joints and in couplings when making connections to insure that they are tight. Under no circumstances shall less than three bolts be used in a bolted flanged coupling.

(2) When cargo connections are supported by the vessel's tackle, the person in charge of the transfer operations shall inspect the vessel to insure that sufficient tackles are used.

(3) Pans or buckets shall be placed under cargo hose connections.

(4) Cargo transfer operations for any cargo requiring a PV or safety relief venting device in Table 151.05 shall be performed with cargo hatch covers closed.

(d) *Inspection prior to transfer of cargo.* Prior to the transfer of cargo, the person in charge of the transfer operation shall inspect the barge and other cargo equipment to assure himself that the following conditions exist:

(1) The Certificate of Inspection is endorsed for the products to be loaded. Loading restrictions, if any, should be noted.

(2) Warning signs are displayed as required.

(3) Cargo information cards for the product are aboard.

(4) No repair work in way of cargo space is being carried out.

(5) Cargo connections and hatch covers conform with the provisions of paragraph (c) of this section and cargo valves are properly set.

(6) All connections for cargo transfer have been made to the vessel's fixed pipeline system.

(7) In transferring flammable or combustible cargoes, there are no fires or open flames present on the deck, or in any compartment which is located on, facing, open or adjacent to the part of the deck on which cargo connections have been made.

(8) The shore terminal or other tank vessel concerned has reported itself in readiness for transfer of cargo.

(9) All sea valves are properly set and those connected to the cargo piping are closed.

(10) When transferring flammable or combustible cargoes that a determination was made as to whether or not boiler and/or galley fires can be maintained with reasonable safety.

(e) *Duties of the person in charge during transfer operations.* The person in charge of the transfer operations shall control the operations as follows:

(1) Supervise the operation of the cargo system valves.

(2) Start transfer of cargo slowly.

(3) Observe cargo connections and hose for leakage.

(4) Observe operating pressure on cargo systems.

(5) Comply with loading limitations placed on the vessel by the Certificate of Inspection, if, any, for the purpose of not overloading individual tanks or the vessel.

(6) Observe the loading rate for the purpose of avoiding overflow of the tanks.

(f) Cargo transfer operations shall not be started or, if started, shall be discontinued under the following conditions:

(1) During severe electrical storms.

(2) If a fire occurs on the barge, the wharf or in the immediate vicinity.

(3) If potentially dangerous leakage occurs.

(g) No vessel shall come alongside or remain alongside a barge in way of its

cargo tanks while it is transferring cargo unless the conditions then prevailing are mutually acceptable to the persons in charge of cargo handling.

(h) *Auxiliary steam, air, fuel, or electric current.* When discharging cargo from one or more barges, the towing vessel may furnish steam, air, fuel, or electric current for pumps on barges or dock, but in no case shall the cargo pass through or over the towing vessel.

(i) *Termination of transfer operations.* When transfer operations are completed, the valves on cargo connections on the vessel shall be closed. The cargo connections shall be drained of cargo.

(j) *Transfer of other cargo or stores on a barge.* (1) Packaged goods, freight, and ship's stores shall not be loaded or discharged during the loading of flammable cargoes except by permission of the person in charge of the transfer operation. Explosives shall not be loaded or carried on any barge containing products regulated by this subchapter.

(2) Where package and general cargo is carried directly over bulk cargo tanks, it shall be properly dunnaged to prevent chafing of metal parts and securely lashed or stowed.

(k) *Transportation of other cargo or stores on barges.* Barges may be permitted to transport deck cargoes directly over bulk cargo spaces when the nature of such deck cargoes and the methods of loading and unloading same do not create an undue hazard. Such barges shall have their decks properly dunnaged to prevent chafing between the steel parts of the vessel and the deck cargo.

(l) Deck construction must be adequate to support the intended load. Provisions for carrying deck cargo shall be endorsed on the Certificate of Inspection by the Officer in Charge, Marine Inspection.

(m) *Emergencies.* In case of emergencies, nothing in the regulations in this subchapter shall be construed as preventing the person in charge of transfer operations from pursuing the most effective action in his judgment for rectifying the conditions causing the emergency.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970; 35 FR 6431, Apr. 22, 1970, as amended by CGD 75–59, 45 FR 70273, Oct. 23, 1980; CGD 81–059, 54 FR 151, Jan. 4, 1989; CGD 79–116, 60 FR 17158, Apr. 4, 1995]

§ 151.45–5 Open hopper barges.

(a) All open hopper barges not constructed or modified in conformance with the provisions of Subpart 151.10 of this part when carrying in bulk any cargoes regulated by this subchapter shall meet the provisions of this section. However, the provisions of this section are not applicable to such barges when empty (not necessarily cleaned or gas-freed).

(1) Except as otherwise provided in this section, no such open hopper type barge shall be placed as lead barge in any tow. These barges shall be placed in protected positions within the tow so that the danger from diving or swamping will be minimized. Where, due to operating conditions, compliance with this paragraph is impossible, the provisions of paragraph (a)(3) of this section apply. The person in charge of the towing vessel shall be responsible for compliance with this paragraph.

(2) No such open hopper type barge shall be moved from a loading facility unless all void spaces and bilges are substantially free of water. Periodic inspections and necessary pumping shall be carried out to insure the maintenance of such water-free conditions, in order to minimize the free surface effect in both the longitudinal and transverse directions. Except when considered necessary for inspection or pumping, all hatch covers and other hull closure devices for void spaces and hull compartments shall be closed and secured at all times. In the case of unmanned barges, the person in charge of the towing vessel shall be deemed to be in charge of the barge, and all requirements to be carried out on the barge shall be carried out by or under the direction of this person.

(3) When an open hopper type barge is in an exposed position, such that protection from swamping provided by adjoining barges cannot be obtained from the location within the tow, it shall be the responsibility of the person in charge of the towing vessel to control speed so as to insure protection against diving and swamping of the barge, having regard to its design and freeboard, and other operating conditions.

(b) To show that special operating requirements apply to a specific open hopper type barge, additional placards or signs shall be displayed in at least four different locations on the barge when the cargoes subject to this part are carried in any form in the cargo tanks. The placards or signs shall be posted on the barge approximately amidships on each side and near the centerline fore and aft facing outboard. Racks, or other suitable means for mounting such placards or signs, shall be so arranged as to provide clear visibility and shall be protected from becoming readily damaged or obscured. The placards or signs shall be at least equal in dimensions to the DOT standard tank car ''Dangerous'' placard (10¾ inches square or larger) and shall display a circle (10 inches in diameter or larger) with alternating quadrants of white and red, and so mounted that the red quadrants are centered on the vertical axis. The shipper and/or owner of the barge shall be responsible for the installation of the required placards or signs, including maintenance of them while such barge is in temporary storage with cargo aboard. The person in charge of the towing vessel shall be responsible for the continued maintenance of the placards or signs while such barge is in transit.

§ 151.45–6 Maximum amount of cargo.

(a) Tanks carrying liquids or liquefied gases at ambient temperatures regulated by this subchapter shall be limited in the amount of cargo loaded to that which will avoid the tank being liquid full at 105°F. if insulated, or 115°F. if uninsulated. If specific filling densities are designated in Subpart 151.50 of this part, they shall take precedence over that noted above.

(b) Refrigerated and semirefrigerated tanks shall be filled so that there is an outage of at least 2 percent of the volume of the tank at the temperature corresponding to the vapor pressure of the cargo at the safety relief valve setting. A reduction in the required outage may be permitted by the Commandant when warranted by special design considerations. Normally, then, the maximum volume to which a tank may be loaded is:

$$V_L = 0.98 d_r V \div d_L$$

where:

V_L = Maximum volume to which tank may be loaded.
V = Volume of tank.
d_r = Density of cargo at the temperature required for a cargo vapor pressure equal to the relief valve setting.
d_L = Density of cargo at the loading temperature and pressure.

§ 151.45–7 Shipping papers.

Each barge carrying dangerous cargo shall have on board a bill of lading, manifest, or shipping document giving the name of shipper, location of the loading point, and the kind, grade, and approximate quantity by compartment of each cargo in the barge. Such manifest or bills of lading may be made out by the shipper, master of the towing vessel, owner, or agent of the owner. However, in the case of unmanned barges the master of the towing vessel shall either have a copy of the shipping papers for each barge in his tow or he shall make an entry in the towing vessel's log book giving the name of the shipper, location where the barge was loaded, and the kind, grade, and quantity of cargo by compartment in the barge. The barge shall not be delayed in order to secure the exact quantities of cargo.

§ 151.45–8 Illness, alcohol, drugs.

A person who is under the influence of liquor or other stimulants, or is so ill as to render him unfit to perform service shall not be permitted to perform any duties on the barge.

§ 151.45–9 Signals.

While fast to a dock, a vessel during transfer of bulk cargo shall display a red flag by day or a red light by night, which signal shall be so placed that it

will be visible on all sides. When at anchor, a vessel during transfer of bulk cargo shall display a red flag by day, placed so that it will be visible on all sides. This flag may be metallic.

Subpart 151.50—Special Requirements

EDITORIAL NOTE: Nomenclature changes to Subpart 151.50 appear at 60 FR 50465, Sept. 29, 1995 and at 61 FR 50732, Sept. 27, 1996.

§ 151.50–1 General.

Special requirements found in this subpart pertain to specific cargoes and to similar groups of cargoes. These requirements are in addition to and take precedence over any other requirements found in these regulations.

§ 151.50–5 Cargoes having toxic properties.

When table 151.05 refers to this section, the following apply:

(a) [Reserved]

(b) Independent tanks shall be designed and tested for a head of at least 8 feet above the top of the tank using the specific gravity of the product to be carried. In addition, tank design calculations shall demonstrate that the tank can withstand, without rupture, a single loading to the highest level to which the product may rise, if that exceeds 8 feet. In general, plate less than five-sixteenths inch in thickness shall not be used in the fabrication of independent tanks unless otherwise approved.

(c)(1) Cargo tanks transporting liquids having a Reid vapor pressure exceeding 14 pounds per square inch absolute or vented at a gauge pressure exceeding 4 pounds per square inch, or where air or water pressure is used to discharge the cargo, shall be fabricated as arc-welded unfired pressure vessels.

(2) Unfired pressure vessel cargo tanks shall be designed for a pressure not less than the vapor pressure, in pounds per square inch gauge, of the lading at 115°F., or the maximum air or water pressure used to discharge the cargo, whichever is greater, but in no case shall the design pressure of such tanks be less than 30 pounds per square inch gauge.

(d) *Piping.* (1) The pumps and piping used for cargo transfer shall be independent of all other piping.

(2) Where multiple cargoes are carried, and the cargo piping conveying cargoes covered under this section are led through cargo tanks containing other products, the piping shall be encased in a tunnel.

(3) Where cargo lines handling other products, or bilge and ballast piping are led through tanks containing cargoes covered by this section, the piping shall be enclosed in a tunnel.

(e) Gravity type cargo tanks shall be fitted with an approved pressure-vacuum relief valve of not less than 2½-inch size, which shall be set at a pressure of not less than 3 pounds per square inch gauge, but not in excess of the design pressure of the tank.

(f) The discharge fittings from each safety relief or pressure vacuum relief valve shall be directed in such a manner as to not impinge on another tank, piping or any other equipment which would increase the fire hazard should burning products be discharged from the safety or pressure vacuum relief valve as a result of a fire or other casualty. In addition, the discharges shall be directed away from areas where it is likely that persons might be working and as remote as practicable from ventilation inlets and ignition sources. A common discharge header may be employed if desired. The area near the discharge fittings shall be clearly marked as a hazardous area.

(g) A means shall be provided for either the reclamation or safe venting of vapors during the loading and unloading operations. For this purpose the safety relief or pressure vacuum relief valve shall be provided with a valved bypass to a vapor return line shore connection which shall be used whenever vapor return shore facilities are available. In the event vapors must be vented to the atmosphere, a vent riser shall extend at least 12 feet above the highest level accessible to personnel. The vent riser may be collapsible for ease of stowage when not in use. Vapor return lines or vent risers for tanks carrying the same class product may be connected to a common header system if desired. Tanks carrying cargoes covered by this section shall be vented

independent of tanks carrying other products.

(h) The pump room ventilation outlet duct exhausts shall terminate at a distance of at least 6 feet above the enclosed space or pump room and at least 6 feet from any entrance to the interior part of the vessel. The discharge end of the exhaust ducts shall be located so as to preclude the possibility of recirculating contaminated air through the pump room, or other spaces where personnel may be present.

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

§151.50–6 Motor fuel antiknock compounds.

When transporting motor fuel antiknock compounds containing tetraethyl lead and tetramethyl lead the requirements listed in this section shall be observed.

(a) Tanks used for these cargoes shall not be used for the transportation of any other cargo except those commodities to be used in the manufacture of tetraethyl lead and tetramethyl lead.

(b) Pump rooms shall be equipped with forced ventilation with complete air change every 2 minutes. Air analysis shall be run for lead content to determine if the atmosphere is satisfactory prior to personnel entering the pump room.

(c) Entry into cargo tanks used for the transportation of these cargoes is not permitted.

(d) No internal tank inspection is required. If it is desired to internally inspect tanks used for these cargoes, the Commandant must be notified in advance before such inspection is made.

(e) The provisions of §151.50–5 shall also be met as a requirement for shipping antiknock compounds containing tetraethyl lead and tetramethyl lead.

§151.50–10 Alkylene oxides.

(a) For the purpose of this part, alkylene oxides are considered to be ethylene oxide and propylene oxide.

(b) Alkylene oxides transported under the provisions of this part shall be acetylene free.

(c)(1) No other product may be transported in tanks certified for an alkylene oxide except that the Commandant may approve subsequent transportation of other products and return to alkylene oxide service if tanks, piping and auxiliary equipment are adequately cleaned to the satisfaction of the Marine Inspector.

(2) Unless authorized by the Commandant, no other kind of cargo except methane, ethane, propane, butane and pentane shall be on board a tank vessel certificated for the carriage of an alkylene oxide at the same time an alkylene oxide in either the liquid or vapor state is present in any cargo tank. Alkylene oxide tanks shall not be installed in tanks intended for any other cargo.

(d) All valves, flanges, fittings, and accessory equipment shall be of a type suitable for use with the alkylene oxides and shall be made of steel or stainless steel, or other materials acceptable to the Commandant. Impurities of copper, magnesium and other acetylide-forming metals shall be kept to a minimum. The chemical composition of all material used shall be submitted to the Commandant for approval prior to fabrication. Disks or disk faces, seats and other wearing parts of valves shall be made of stainless steel containing not less than 11 percent chromium. Mercury, silver, aluminum, magnesium, copper, and their alloys shall not be used for any valves, gauges, thermometers, or any similar devices. Gaskets shall be constructed of spirally wound stainless steel with ''Teflon'' or other suitable material. All packing and gaskets shall be constructed of materials which do not react spontaneously with or lower the autoignition temperature of the alkylene oxides.

(e) The pressure rating of valves, fittings, and accessories shall be not less than the maximum pressure for which the cargo tank is designed, or the shutoff head of the cargo pump, whichever is greater, but in no case less than 150 pounds per square inch. Welded fittings manufactured in accordance with A.N.S.I. Standards shall be used wherever possible, and the number of pipe joints shall be held to a minimum. Threaded joints in the cargo liquid and vapor lines are prohibited.

(f) The thermometer shall terminate in the liquid space and shall be attached to the shell by welding with the end of the fitting being provided with a gastight screwed plug or bolted cover.

(g) Automatic float continuous reading tape gauge, and similar types, shall be fitted with a shutoff valve located as close to the tank as practicable, which shall be designed to close automatically in the event of fracture of the external gauge piping. An auxiliary gauging device shall always be used in conjunction with an automatic gauging device.

(h) Filling and discharge piping shall extend to within 4 inches of the bottom of the tank or sump pit if one is provided.

(i) *Venting.* (1) The discharge fittings from each safety relief or pressure vacuum relief valve shall be directed in such a manner as to not impinge on another tank, piping or any other equipment which would increase the fire hazard should burning products be discharged from the safety or pressure vacuum relief valve as a result of a fire or other casualty. In addition, the discharges shall be directed away from areas where it is likely that persons might be working and as remote as practicable from ventilation inlets and ignition sources. A common discharge header may be employed if desired. The area near the discharge fittings shall be clearly marked as a hazardous area.

(2) A means shall be provided for either the reclamation or safe venting of vapors during the loading and unloading operations. For this purpose, the safety relief or pressure vacuum relief valve shall be provided with a valved bypass to a vapor return line shore connection which shall be used whenever vapor return shore facilities are available. In the event vapors must be vented to the atmosphere, a vent riser shall be connected to the vapor return line and extend at least 12 feet above the highest level accessible to personnel. The vent riser may be collapsible for ease of stowage when not in use. The vent riser shall not be connected to a safety relief or pressure vacuum valve. Vapor return lines or vent risers for tanks carrying the same class product may be connected to a common header system if desired. Tanks carrying alkylene oxides shall be vented independent of tanks carrying other products.

(3) The outlet of each vent riser shall be fitted with acceptable corrosion-resistant flame screen of suitable material or a flame arrester suitable for use with alkylene oxide.

(j) *Ventilation.* (1) All enclosed spaces within the hull shall be vented or ventilated in accordance with the provisions of this subchapter except as otherwise provided for in this subpart.

(2) The enclosed spaces in which the cargo tanks are located shall be inerted by injection of a suitable inert gas or shall be well ventilated.

(3) The enclosed spaces in which the cargo tanks are located, if an inerting system is not installed, shall be fitted with forced ventilation of such capacity to provide a complete change of air every three minutes and arranged in such a manner that any vapors lost into the space will be removed. The ventilation system shall be in operation at all times cargo is being loaded or discharged. No electrical equipment shall be fitted within the spaces or within ten feet of the ventilation exhaust from these spaces.

(4) All ventilation machinery shall be of nonsparking construction and shall not provide a source of vapor ignition.

(5) Each vent shall be fitted with a flame screen of corrosion resistant wire which is suitable for use with the alkylene oxide.

(k)(1) Flexible metal hose fabricated of stainless steel or other acceptable material, resistant to the action of the alkylene oxide, shall be fitted to the liquid and vapor lines during cargo transfer.

(2) The hose shall be marked with the maximum pressure guaranteed by the manufacturer, and with his certification with the words ''Certified for _____ Oxide.''

(3) Cargo hose intended for alkylene oxide service shall not be used for any other products except those which are compatible with the alkylene oxide.

(l) Vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(m) Cargo shall be discharged by pumping or by displacement with nitrogen or other acceptable inert gas. In no case shall air be allowed to enter the system. During loading and unloading operations, the vapor shall not be discharged to the atmosphere. Provisions shall be made to return all displaced vapor to the loading facility. The loading rate and the pressure applied to the tank to discharge the cargo shall be so limited to prevent opening the safety relief valves.

(n) During cargo transfer, a water hose with pressure to the nozzle, when atmospheric temperatures permit, shall be connected to a water supply for immediate use during filling and discharge operations and any spillage of alkylene oxide shall be immediately washed away. This requirement can be met by facilities provided from shore.

(o) Prior to disconnecting shore lines, the pressure in the liquid and vapor lines shall be relieved through suitable valves installed at the loading header. The liquid and vapor discharged from these lines shall not be discharged to atmosphere.

(p) The safety relief valves shall be tested by liquid, gas, or vapor pressure at least once every 2 years to determine the accuracy of adjustment and, if necessary, shall be reset. Alkylene oxides shall not be used as the testing medium.

(q) The special requirements for ethylene oxide contained in §151.50–12 and for propylene oxide contained in §151.50–13 shall also be observed.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85–061, 54 FR 50966, Dec. 11, 1989]

§ 151.50–12 Ethylene oxide.

(a)(1) Ethylene oxide shall be carried in fixed, independent, pressure vessel type cargo tanks, designed, constructed, arranged and, if necessary, equipped with machinery to maintain the cargo temperature below 90°F. except as otherwise provided for in paragraph (a)(3) of this section.

(2) Ethylene oxide shall be loaded at a temperature below 70°F.

(3) When ethylene oxide is to be transported at or near atmospheric pressure, the Commandant may permit the use of alternate methods of storage which are consistent with the minimum requirements of this subpart.

(b)(1) All cargo tanks shall be constructed of a carbon steel or stainless steel acceptable to the Commandant. Impurities of copper, magnesium and other acetylide-forming metals shall be kept to a minimum. The chemical composition of all steel used shall be submitted to the Commandant for approval prior to fabrication. Aluminum, copper and other acetylide-forming metals, such as silver, mercury, magnesium, and their alloys shall not be used as materials of construction for tanks or equipment used in handling ethylene oxide.

(2) Cargo tanks shall meet the requirements of Class I pressure vessels.

(3) Cargo tanks shall be designed for the maximum pressure of vapor or gas used in discharging the cargo but in no case shall the design pressure of such tanks be less than 75 pounds per square inch gauge. The tank shell and heads shall not be less than 5/16-inch thick.

(c)(1) Cargo tanks shall be located below deck in holds or enclosed spaces with the domes or trunks extended above the weather deck and terminating in the open. Provisions shall be made to maintain the watertightness of the deck by means of watertight seals around such domes or trunks. The holds or enclosed spaces, in which the ethylene oxide tanks are located, shall not be used for any other purpose. However, in open hopper type barges of a suitable design approved for such service, the weatherdeck may not be required to be watertight.

(2) All cargo tanks shall be installed with the manhole openings and all tank connections located above the weatherdeck in the open.

(3) Tanks shall be electrically bonded to the hull.

(4) No welding of any kind shall be done on cargo tanks or supporting structure unless authorized by the Commandant.

(d) All cargo tanks, piping, valves, fittings, and similar equipment which may contain ethylene oxide in either the liquid or vapor phase, including the vent risers, shall be insulated. Flanges need not be covered, but if covered, a small opening shall be left at the bottom of the flange cover to detect leaks.

Insulation shall be of an approved incombustible material suitable for use with ethylene oxide, which does not significantly lower the autoignition temperature and which does not react spontaneously with ethylene oxide. The insulation shall be of such thickness as to provide a thermal conductance of not more than 0.075 B.t.u. per square foot per degree Fahrenheit differential in temperature per hour.

(e)(1) When cooling systems are installed to maintain the temperature of the liquid below 90°F., at least two complete cooling plants, automatically regulated by temperature variations within the tanks shall be provided; each to be complete with the necessary auxiliaries for proper operation. The control system shall also be capable of being manually operated. An alarm shall be provided to indicate malfunctioning of the temperature controls. The capacity of each cooling system shall be sufficient to maintain the temperature of the liquid cargo at or below the design temperature of the system.

(2) An alternate arrangement may consist of three cooling plants, any two of which shall be sufficient to maintain the temperature of the liquid cargo at or below the design temperature of the system.

(3) Cooling systems requiring compression of ethylene oxide are prohibited.

(f) In addition to the shutoff valve required, all tank connections larger than one-half inch inside pipe size, except safety relief valves and liquid level gauging devices, shall be fitted with either internal back pressure check valves or internal excess flow valves in conjunction with a quick closing stop valve operable from at least two remote locations. The quick closing stop valve shall be of the ''fail safe'' type acceptable to the Commandant and shall be equipped with a fusible plug designed to melt between 208°F. and 220°F., which will cause the quick closing valve to close automatically in case of fire. The quick closing valve shall be located as close to the tank as possible.

(g) Piping systems intended for ethylene oxide service shall not be used for any other product and shall be completely separate from all other systems. The piping system shall be designed so that no cross connections may be made either through accident or design.

(h) Each safety relief valve shall be set to start to discharge at not less than 75 pounds per square inch gauge, nor more than the design pressure of the tank.

(i) The filling density shall not exceed 83 percent.

(j)(1) The cargo shall be shipped under a suitable protective inerting gas system, such as nitrogen. When nitrogen gas is used, the gas inerting system shall be so designed that the vapor space above the liquid cargo will be filled and maintained with a gas mixture of not less than 45 percent nitrogen. Other gases proposed for inerting use may be given consideration by the Commandant. Original charging only of protective inerting gas at the loading facility is not considered adequate. A sufficient amount of spare inerting gas as approved by the Commandant shall be provided on the vessel in order to maintain the proper concentration of the gas in the event of normal leakage or other losses.

(2) Any inerting gas selected should be at least 98 percent pure and free of reactive materials, such as ammonia, hydrogen sulfide, sulfur compounds, and acetylene.

(k) Prior to loading, a sample from the cargo tank will be taken to insure that the pad gas will meet the requirements of paragraph (j) of this section and that the oxygen content of the vapor space will be not more than 2 percent maximum. If necessary, a sample will be taken after loading to insure the vapor space meets this requirement.

(l) The cargo piping shall be inspected and tested at least once in each 2 calendar years.

(m) In those cases where the cargo transfer hose used is not part of the barge's equipment, the person in charge of the transfer operation shall determine that the provisions of §151.50–10(k) have been met before using this hose. A certificate of test, supplied by the transfer facility, will be considered as adequate for this determination.

(n) The provisions of § 151.50–10 shall be complied with as a requirement for shipping ethylene oxide.

(o) A hydrostatic test of 1½ times the design pressure shall be made on the cargo tanks at least once in each 4 years at the time the internal examination is made and at such other times as considered necessary by the Officer in Charge, Marine Inspection.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85–061, 54 FR 50966, Dec. 11, 1989]

§ 151.50–13 Propylene oxide.

(a)(1) Pressure vessel cargo tanks shall meet the requirements of Class II pressure vessels.

(2) Cargo tanks shall be designed for the maximum pressure expected to be encountered during loading, storing and discharging the cargo but in no case shall the design pressure of pressure vessel tanks be less than thirty (30) pounds per square inch gauge. The tank shell and heads shall not be less than 5/16-inch thick.

(b) When propylene oxide is carried on board a vessel, piping systems in propylene oxide service shall not be used for any other product and shall be completely separate from all other systems. The piping system shall be designed so that no cross connection may be made through inadvertence.

(c) Each safety relief valve shall be set to start to discharge at not less than 30 pounds per square inch gauge, nor more than the design pressure of the tank.

(d) Filling density shall not exceed 80 percent.

(e)(1) The cargo shall be shipped under a suitable protective padding, such as nitrogen gas. Other gases proposed for use as padding may be given consideration by the Commandant. Original charging only of protective gas padding at the loading facility is not considered adequate. A sufficient amount of spare padding gas as approved by the Commandant shall be provided on the vessel in order to maintain the proper concentration of the gas in the event of normal leakage or other losses.

(2) Any padding gas selected should be at least 98 percent pure and free of reactive materials.

(f) Prior to loading, a sample from the cargo tank will be taken to insure that the pad gas will meet the requirements of paragraph (e) of this section and that the oxygen content of the vapor space will be not more than 2 percent maximum. If necessary, a sample will be taken after loading to insure the vapor space meets this requirement.

(g) The cargo piping shall be subjected to a hydrostatic test of 1½ times the maximum pressure to which they may be subjected in service.

(h) The Commandant may permit the transportation of propylene oxide in other than pressure vessel type tanks if it is shown to his satisfaction that a degree of safety is obtained consistent with the minimum requirements of this subpart.

(i) The provisions of § 151.50–10 shall be complied with as a requirement for shipping propylene oxide.

§ 151.50–20 Inorganic acids.

(a)(1) Gravity type cargo tanks shall be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is the greater. The plate thickness of any part of the tank shall not be less than three-eighths inch.

(2) Gravity tank vents. (i) The outlet end of the gravity tank vent shall terminate above the weatherdeck, clear of all obstructions and away from any source of ignition.

(ii) The gravity tank vent shall terminate in a gooseneck bend and shall be fitted with a single flame screen or two fitted flame screens as described in § 151.03–25. No shutoff valve or frangible disk shall be fitted in the vent lines.

(b)(1) Pressure vessel type cargo tanks shall be independent of the vessel's structure and shall be designed for the maximum pressure to which they may be subjected when compressed air is used to discharge the cargo, but in no case shall the design pressure be less than that indicated as follows:

Fluorosilicic Acid—50 pounds per square inch gauge.
Hydrochloric Acid—50 pounds per square inch gauge.
Hydrofluorosilicic Acid, see Fluorosilicic Acid.

Phosphoric Acid—30 pounds per square inch gauge.
Sulfuric Acid—50 pounds per square inch gauge.

(2) Pressure vessel type cargo tanks shall be of welded construction meeting the requirements for Class II or Class III given in Part 54 of this chapter.

(3) When compressed air is used to discharge the cargo, the tank shall be fitted with a vent led to the atmosphere in which a rupture disk shall be installed. The rupture disk shall be designed to burst at a pressure not exceeding the design pressure of the tank. An auxiliary vent to relieve the pressure or vacuum in the tank during the cargo transfer operation may be led from the vent line between the tank and the rupture disk. A shutoff valve may be fitted in the auxiliary vent.

(c) Openings in tanks are prohibited below deck, except for access openings used for inspection and maintenance of tanks, or unless otherwise specifically approved by the Commandant. Openings shall be fitted with bolted cover plates and acid-resistant gaskets.

(d) Where special arrangements are approved by the Commandant to permit a pump suction to be led from the bottom of the tank, the filling and discharge lines shall be fitted with shutoff valves located above the weatherdeck or operable therefrom.

(e) The outage shall not be less than 1 percent.

(f) All enclosed compartments containing cargo tanks and all machinery spaces containing cargo pumps shall be fitted with effective means of ventilation.

(g) A separator shall be fitted in compressed air lines to the tank when air pressure is used to discharge the cargo.

(h) Only installed electric or portable battery lights shall be used during the cargo transfer operations. Smoking is prohibited and the person in charge of cargo transfer shall post No Smoking signs during cargo transfer operations.

(i) Tanks approved for the transportation of acid cargoes subject to this section shall not be used for the transportation of any other commodity, except upon authorization by the Commandant (G–MSO).

(j) Each cargo tank shall be subjected to an internal examination at least once in every 4 years. If cargo tank lining is required and the lining of the cargo tank has deteriorated in service or is not in place, the Marine Inspector may require the tank to be tested by such nondestructive means as he may consider necessary to determine its condition.

(k) The special requirements for fluorosilicic acid in §151.50–77, for hydrochloric acid in §151.50–22, for *hydrofluorosilicic acid, see* fluorosilicic acid, for phosphoric acid in §151.50–23, and for sulfuric acid in §151.50–21 also apply to the carriage of those acids.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by GGD 80–001, 46 FR 63279, Dec. 31, 1981; CGD 82–063b, 48 FR 4781, Feb. 3, 1983; CGD 88–100, 54 FR 40040, Sept. 29, 1989; CGD 92–100, 59 FR 17028, Apr. 11, 1994]

§151.50–21 Sulfuric acid.

(a) *How sulfuric acid may be carried.* (1) Sulfuric acid of concentration of 77.5 percent (1.7019 specific gravity) (59.8° Baumé) or greater concentrations with or without an inhibitor, provided the corrosive effect on steel measured at 100°F. is not greater than that of 66° Baumé commercial sulfuric acid, may be transported in unlined gravity type cargo tanks or unlined pressure vessel type cargo tanks.

(2) Sulfuric acid of concentration of 65.25 percent (1.559 specific gravity) (52° Baumé) or greater concentrations, provided the corrosive effect on steel measured at 100°F. is not greater than that of 52° Baumé commercial sulfuric acid, may be transported in unlined pressure vessel type cargo tanks independent of the vessel's structure.

(3) Sulfuric acid of concentration not to exceed 65.25 percent (1.559 specific gravity) (52° Baumé) may be transported in gravity type cargo tanks or pressure-vessel type cargo tanks which are lined with lead or other equally suitable acid-resistant material acceptable to the Commandant.

(4) Sulfuric acid of concentration not to exceed 51 percent (1.408 specific gravity) (42° Baumé) and spent sulfuric acid resulting from the use of sulfuric acid in industrial processes may be transported in gravity type cargo tanks which are lined with rubber or

other equally suitable acid-resistant material acceptable to the Commandant. See §151.15–3(f)(2).

(5) Spent or sludge sulfuric acid resulting from the use of sulfuric acid in industrial processes may be transported in unlined gravity type cargo tanks or unlined pressure vessel type cargo tanks, provided the corrosive effect on steel is not greater than that of commercial sulfuric acid as prescribed in paragraph (a)(1) of this section.

(b) Heating coils will be the only acceptable means of liquefying frozen or congealed sulfuric acid.

(c) During cargo transfer, a water hose shall be connected to a water supply ready for immediate use and any leakage or spillage of acid shall be immediately washed down. This requirement can be met by facilities provided from shore.

(d) The requirements of §151.50–20 are also applicable to the shipment of sulfuric acid.

§151.50–22 Hydrochloric acid.

(a) Hydrochloric acid shall be carried in gravity or pressure type cargo tanks which are independent of the vessel's structure provided such tanks are lined with rubber or other equally suitable material acceptable to the Commandant. See §151.15–3(f)(2).

(b) Notwithstanding the provisions of §151.50–20(b)(3), compressed air may be used to discharge hydrochloric acid from gravity type cargo tanks only if the tanks are of cylindrical shape with dished heads, provided the air pressure does not exceed the design pressure of the tank but in no case shall it exceed 10 pounds per square inch gauge. Such tanks shall be fitted with pressure relief devices and need not be vented to the atmosphere as required by §151.50–20(b)(3).

(c) During cargo transfer, a water hose shall be connected to a water supply and be ready for immediate use. Any leakage or spillage of acid shall be immediately washed down. This requirement can be met by facilities provided from shore.

(d) Spent hydrochloric acid or hydrochloric acid adulterated by other chemicals, inhibitors, oils, solvents, water, etc., shall not be transported in bulk except upon authorization by the Commandant (G–MSO).

(e) The requirements of §151.50–20 are also applicable to the shipment of hydrochloric acid.

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

§151.50–23 Phosphoric acid.

(a) The term *phosphoric acid* as used in this subpart shall include, in addition to phosphoric acid, aqueous solutions of phosphoric acid, and super phosphoric acid.

(b) Phosphoric acid may be carried in either gravity or pressure type cargo tanks. The tanks shall be rubber-lined, or lined or clad with other suitable material acceptable to the Commandant, or shall be fabricated of a phosphoric acid resistant stainless steel. See §151.15–3(f)(2).

(c) The vessel's shell plating shall not be used as any part of the boundaries of gravity type cargo tanks.

(d) Cargo piping, including valves, fittings, and flanges where exposed to the acid, shall be rubber-lined, or lined, coated or clad with other corrosion-resistant material, or shall be fabricated of a phosphoric acid resistant stainless steel. Vent piping, including flanges and fittings, shall be similarly protected at least to the height of the flangible disk if such is installed.

(e) Phosphoric acid adulterated by other chemicals, inhibitors, oils, solvents, etc., shall not be transported in bulk cargo tanks except upon authorization by the Commandant (G–MSO).

(f) The requirements of §151.50–20 are also applicable to the shipment of phosphoric acid.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983]

§151.50–30 Compressed gases.

(a) All tank inlet and outlet connections, except safety relief valves, liquid level gauging devices, and pressure gauges shall be marked to designate whether they terminate in the vapor or liquid space. Labels, when used, shall be of corrosion-resistant materials and may be attached to valves.

(b) *Venting.* (1) Except as provided in paragraph (b)(2) of this section each

safety relief valve installed on a cargo tank shall be connected to a branch vent of a venting system which shall be constructed so that the discharge of gas will be directed vertically upward to a point at least 10 feet above the weatherdeck or the top of any tank or house located above the weatherdeck.

(2) Safety valves on cargo tanks in barges may be connected to individual or common risers which shall extend to a reasonable height above the deck. Where the escape of vapors from the venting system may interfere with towing operations, the installation shall be acceptable to the Commandant, and the arrangement shall be such as to minimize the hazard of escaping vapors. Arrangements specially provided for venting cargo tanks forming part of the hull on unmanned barges will be given special consideration by the Commandant.

(3) The capacity of branch vents or vent headers shall depend upon the number of cargo tanks connected to such branch or header as provided in Table 151.50–30(b)(3).

TABLE 151.50–30(b)(3)—CAPACITY OF BRANCH VENTS OR VENT HEADERS

Number of cargo tanks	*Percent of total valve discharge*
1 or 2	100
3	90
4	80
5	70
6 or more	60

(4) Return bends and restrictive pipe fittings are prohibited. Vents and headers shall be so installed as to minimize stresses on safety relief valves and their mounting nozzles.

(5) When vent discharge risers are installed, they shall be so located as to protect against physical damage and be fitted with loose raincaps.

(6) When vent discharge risers are installed and their installation in accordance with the provisions of this paragraph results in restrictions in the operation of the barge due to navigation clearances, the vents may be designed so as to be collapsible when passing under such low clearance obstacles.

(c) *Repairs involving welding or burning.* (1) Repairs involving welding or burning shall not be undertaken on the cargo tanks or piping while cargo in either the liquid or vapor state is present therein.

(2) Repairs involving welding or burning on parts of the barge other than cargo tanks or piping may be undertaken provided positive pressure is maintained in the tanks or the tanks have been vented or washed internally.

(d) *Respiratory equipment.* (1) At least one approved self-contained breathing apparatus shall be available in a readily accessible location off the barge at all times during the cargo transfer operations. This equipment shall not be considered to be part of the barge equipment, and the barge shall not be required to carry this equipment en route.

(2) The approved self-contained breathing apparatus, masks, and all respiratory protective devices shall be of types suitable for starting and operating at the temperatures encountered, and shall be maintained in good operating condition.

(3) Personnel involved in the cargo transfer operations shall be adequately trained in the use of the respiratory equipment.

(e) *Filling densities and container design pressure.* For compressed gases transported at or near ambient temperatures, the maximum filling densities and minimum design pressure of container as indicated in Table 151.50–30(e) shall apply. Deviations from the tabulated values shall be submitted to the Commandant for approval. Where cargo is to be carried at temperatures below ambient, the tank shall be designed in accordance with §151.15–3(b)(3) and the maximum amount of cargo shall be in accordance with §151.45–6(b).

TABLE 151.50–30(e)—FILLING DENSITIES AND CONTAINER DESIGN PRESSURES

Kind of gas	Maximum permitted filling density (percent by weight, see § 151.03–21)		Minimum design pressure of tank (pounds per square inch gauge)	
	Uninsulated tanks	Insulated tanks	Uninsulated tanks	Insulated tanks
Ammonia, anhydrous	57	58	250	215
Chlorine	125	125	300	300
Dichlorodifluoromethane	123	125	147	127
Dimethylamine	61	62	46	36
Methyl chloride	85	87	131	112
Monochlorodi-fluoromethane	110	113	243	211
Vinyl chloride	86	87	81	67

(f) The shell and head thickness of liquefied compressed cargo tanks shall not be less than five-sixteenths inch.

(g) The special requirements for ammonia (anhydrous) in § 151.50–32, for argon in § 151.50–36, for chlorine in § 151.50–31, for nitrogen in § 151.50–36, and for vinyl chloride in § 151.50–34 also apply to the carriage of those gases.

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

§ 151.50–31 Chlorine.

(a) *Chlorine barges.* Subparts 98.03 and 98.20 of Part 98 of this chapter have been revoked. However, chlorine barges that were certified in accordance with the requirements of subpart 98.20 of part 98 of this chapter and having hulls modified, if necessary, to comply with §§ 98.03–5(c) and 98.03–25(c) of this chapter, shall be considered as complying with this part.

(b) *Design and construction of cargo tanks.* (1) The cargo tanks shall meet the requirements of Class I pressure vessels.

(2) Tanks shall be designed for a pressure of not less than 300 pounds per square inch gauge. For the maximum allowable working pressure of tanks in service, see paragraph (q) of this section.

(3) Each tank shall be provided with one or more 24-inch inside diameter manhole, fitted with a cover located above the maximum liquid level and as close as possible to the top of the tank. There shall be no other openings in the tank.

(c) Tanks may be installed ''on deck'' or ''under deck'' with the tank protruding above deck. If a portion of the tank extends above the weatherdeck, provision shall be made to maintain the weathertightness on the deck. All tanks shall be installed with the manhole opening located above the weatherdeck. Hopper type barges operating on protected inland waters may have tanks located in the hopper space.

(d) All valves, flanges, fittings and accessary equipment shall be of a type suitable for use with chlorine and shall be made of metal, corrosion-resistant to chlorine in either the gas or liquid phase. Cast or malleable iron shall not be used. Valves, flanges, and flanged joints shall be 300 pounds A.N.S.I. standard minimum with tongue and groove or raised face. Joints shall be fitted with sheet lead or other suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints held to a minimum. Threaded joints in cargo lines and vapor lines shall not be used in sizes above 1 inch internal diameter. Welded ''hammerlock'' unions or other unions approved by the Commandant may be used at terminal points of fixed barge piping.

(e) Each tank shall be provided with liquid and vapor connections fitted with manually operated shutoff valves and with safety relief valves. All valves shall be bolted to the cover or covers specified in paragraph (b)(3) of this section and shall be protected against mechanical damage by a suitable protective metal housing. A drain connection shall be provided from the protective housing.

(f) All liquid and vapor connections, except safety relief valves, shall be

fitted with automatic excess flow valves, which shall be located on the inside of the tank. Bypass openings are not permitted in excess flow valves.

(g) Chlorine barge cargo piping shall not be fitted with the nonreturn valves specified by § 151.20–20(b).

(h) Liquid level gauging devices of any type are prohibited on chlorine tanks.

(i) A pressure gauge shall be attached to the vapor shutoff valve or vapor line so as to indicate the pressure in the tank at all times during loading and unloading.

(j) Piping including connections between tank valves and fixed barge piping, shall be of a thickness of not less than Schedule 80.

(k) In multiple tank installations the tanks shall not be interconnected by piping or manifolds which may contain liquid chlorine. Manifolding of vapor lines of individual tanks into a common header for connection to shore is permitted. More than one cargo tank may be filled or discharged at a time, provided each tank is filled from or discharged to shore tanks through separate lines.

(l) Connections between fixed barge piping and shore piping shall be fabricated from one of the following:

(1) Schedule 80 seamless pipe, having flexible metallic joints.

(2) Corrosion-resistant metallic pipe (equivalent to Schedule 80) not subject to deterioration by chlorine, having flexible metallic joints.

(3) Flexible metallic hose acceptable to the Commandant. If paragraphs (k)(1) or (2) of this section are used, the flexible metallic joints shall meet the requirements for cargo hose. See § 151.04–5(h).

(m) Safety relief valves shall discharge into the protective housing surrounding the valves. Suitable provisions shall be made to vent the housing. The arrangement shall be such as to minimize the hazard of escaping vapors.

(n) *Cargo transfer operations.* (1) The amount of chlorine loaded into each cargo tank shall be determined by weight. Draft marks shall not be used as a means of weighing. Any chlorine vapors vented during the filling operation shall be disregarded when calculating the maximum amount of chlorine to be loaded into the cargo tanks.

(2) Prior to the start of filling operations, care shall be exercised to insure that the cargo tanks are empty, dry, and free from foreign matter.

(3) After the filling operation is completed, the vapor in each cargo tank shall be analyzed to determine the percentage of gaseous chlorine in the vapor space. If it should contain less than 80 percent chlorine by volume, vapors shall be withdrawn through the vent or vapor line until the vapor in the cargo tanks contains at least 80 percent chlorine by volume.

(4) After filling connections are removed, upon completion of the loading of a cargo tank, all connections at the tank shall be tested for leakage of chlorine by the aqua ammonia method.

(5) The chlorine in the cargo tanks shall be discharged by the pressure differential method. If the vapor pressure of the chlorine is not sufficient to force the liquid out of the tank, compressed air, or other nonreactive gas, may be used to secure the desired rate of discharge, provided the air or gas is oil-free and thoroughly dried by passing it over activated aluminum oxide, silica gel, or other acceptable drying agent, and provided the supply pressure is limited to 75 percent of maximum allowable pressure of chlorine tanks.

(6) After completion of cargo transfer, any liquid chlorine in the cargo piping shall be removed and cargo transfer piping shall be disconnected at the cargo tanks. After disconnecting the cargo piping, both ends of the line shall be closed and all inlet and outlet valves on the tank shall be plugged or fitted with blind flanges.

(o) During cargo transfer, every person on the barge shall carry on his person a respiratory protective device which will protect the wearer against chlorine vapors and will provide respiratory protection for emergency escape from a contaminated area resulting from cargo leakage. This respiratory protective equipment shall be of such size and weight that the person wearing it will not be restricted in movement or in the wearing of a life-saving device.

(p) During each internal inspection, each cargo tank must be tested

hydrostatically to 1½ times the maximum allowable pressure as determined by the safety relief valve setting.

(q) During each internal inspection, each cargo tank excess flow valve and safety relief valve must be inspected and tested in accordance with paragraphs (g) and (i) of §151.04–5 of this chapter.

(r) When periodic inspection indicates that a cargo tank has deteriorated in service, the maximum allowable pressure shall be recalculated, using the minimum thickness found by actual measurement. The recalculated maximum allowable pressure shall be not less than 275 pounds per square inch gauge. If the recalculated maximum allowable pressure is less than 275 pounds per square inch gauge, the cargo tanks shall be withdrawn from service.

(s) The following substances shall not be carried as stores on board barges transporting chlorine in bulk: hydrogen, methane, liquefied petroleum gases, coal gas, acetylene, ammonia, turpentine, compounds containing metallic powders, finely divided metals or finely divided organic materials.

(t) The requirements of §151.50–30 for compressed gases are also applicable to the shipment of chlorine.

[CGFR 70—10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85–061, 54 FR 50966, Dec. 11, 1989; CGD 85–061, 55 FR 41918, Oct. 16, 1990]

§151.50–32 Ammonia, anhydrous.

(a) The anhydrous ammonia tanks may be installed in the bulk liquid cargo tanks provided the liquid surrounding the enclosed anhydrous ammonia tanks complies with the following chemical and physical properties:

(1) Boiling point above 125°F. atmospheric pressure.

(2) Inert to ammonia at 100°F. at atmospheric pressure.

(3) Noncorrosive in the liquid and vapor phase to the ammonia tanks and piping.

(b) Copper, copper alloys, and copper bearing alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with anhydrous ammonia liquid or vapor.

(c) Valves, flanges and pipe fittings shall be of the tongue and groove or raised-face type, fitted with suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints shall be held to a minimum. Threaded joints are not permitted for pipe diameters exceeding 2 inches. Brazed joints are prohibited.

(d) All enclosed spaces containing cargo tanks fitted with bottom outlet connections shall be provided with mechanical ventilation of sufficient capacity to assure a change of air every 3 minutes.

(e) Each cargo tank shall be electrically grounded to the hull.

(f) When transferring cargo, a hose shall be connected to a water supply so that if leakage of anhydrous ammonia occurs the vapor may be dispersed by the use of water fog. This requirement can be met by facilities provided from shore.

(g) During cargo transfer operations, every person on the vessel shall carry on his person or have close at hand at all times a canister mask approved for ammonia or each person shall carry on his person a respiratory protective device which will protect the wearer against ammonia vapors and will provide respiratory protection for emergency escape from a contaminated area resulting from cargo leakage. This respiratory protective equipment shall be of such size and weight that the person wearing it will not be restricted in movement or in the wearing of a lifesaving device.

(h) [Reserved]

(i) The requirements of §151.50–30 for compressed gases are also applicable to the shipment of anhydrous ammonia.

[CGFR 70—10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 85–061, 54 FR 50966, Dec. 11, 1989]

§151.50–34 Vinyl chloride (vinyl chloride monomer).

(a) Copper, aluminum, magnesium, mercury, silver, and their alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with vinyl chloride liquid or vapor.

(b) Valves, flanges, and pipe fittings shall be of the tongue and groove or

raised-face type, fitted with suitable gasket material. Welded fittings shall be used wherever possible and the number of pipe joints shall be held to a minimum. Threaded joints are not permitted for pipe diameters exceeding 2 inches. Brazed joints are prohibited.

(c) Each cargo tank shall be electrically grounded to the hull.

(d) The vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(e) To the extent he deems it necessary, the Officer in Charge, Marine Inspection, may require that sufficient insulation shall be removed from insulated tanks at least once in each 8 calendar years to permit spot external examination of the tanks and insulation in accordance with §151.04–5(c).

(f) The requirements of §151.50–30 for compressed gases are also applicable to the shipment of vinyl chloride.

(g) The person in charge of cargo transfer shall ensure that:

(1) Cargo vapors are returned to the cargo tank or shore disposition for reclamation or destruction during cargo transfer operations;

(2) Continuous monitoring for vinyl chloride vapor leaks is conducted aboard a tank barge undergoing vinyl chloride transfer operations. Fixed or portable instrumentation may be utilized to ensure that personnel are not exposed to vinyl chloride vapor concentrations in excess of 1 ppm averaged over any eight hour period of 5 ppm averaged over any period not exceeding 15 minutes. The method of monitoring and measurement shall have an accuracy (with a confidence level of 95 percent) of not less than plus or minus 50 percent from 0.25 through 0.5 ppm, plus or minus 35 percent from over 0.5 ppm through 1.0 ppm, and plus or minus 25 percent over 1.0 ppm;

(3) Cargo transfer operation is discontinued or corrective action is initiated by the person in charge to minimize exposure to personnel whenever a vinyl chloride vapor concentration in excess of 1 ppm is detected. If the vinyl chloride vapor concentration exceeds 5 ppm for over 15 minutes, action to reduce the leak can be continued only if the respiratory protection requirements of 29 CFR 1910.1017 are met by all personnel in the area of the leak;

(4) Those portions of cargo lines which will be open to the atmosphere after piping is disconnected are free of vinyl chloride liquid and that the vinyl chloride vapor concentration in the area of the cargo piping disconnect points is not greater than 5 ppm;

(5) Any restricted gauge fitted on a tank containing vinyl chloride is effectively out of service by locking or sealing the device so that it cannot be used; and

(6) A restricted gauge is not to be used as a ''check'' on the required closed gauge, nor as a means or sampling.

(h) The words ''CANCER—SUSPECT AGENT'' must be added to the warning signs required by 46 CFR 151.45–2(e).

(i) Signs bearing the legend:

CANCER—SUSPECT AGENT IN THIS AREA

PROTECTIVE EQUIPMENT REQUIRED

AUTHORIZED PERSONNEL ONLY

must be posted whenever hazardous operations, such as tank cleaning, are in progress.

(j) A tank barge undergoing cargo transfer operations must be designated a ''regulated area'' having access limited to authorized persons and requiring a daily roster of authorized persons who may board the barge.

(k) Employees engaged in hazardous operations, such as tank cleaning, must be provided, and be required to wear and use respiratory protection in accordance with the provisions of 29 CFR 1910.1017 and protective garments, provided clean and dry for each use, to prevent skin contact with liquid vinyl chloride.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 74–167R, 40 FR 17026, Apr. 16, 1975; CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§151.50–36 Argon or nitrogen.

(a) A cargo tank that contains argon or nitrogen and that has a maximum allowable working pressure of 172 kPa (25 psig) or greater must have one of the following arrangements:

(1) A refrigeration system that keeps the tank pressure below the safety relief valve operating pressure when ambient temperatures are 46°C (115°F) air and 32°C (90°F) water.

(2) A relief valve or pressure control valve that maintains the tank pressure below the setting of the tank's required safety relief valve in ambient temperatures of 46°C (115°F) air and 32°C (90°F) water.

(b) A cargo tank with a maximum allowable working pressure of less than 172 kPa (25 psig) is approved by the Commandant (G–MSO) on a case by case basis.

(c) Section 151.50–30 also applies to the carriage of argon or nitrogen.

[CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§151.50–40 Additional requirements for carbon disulfide (carbon bisulfide) and ethyl ether.

(a) The provisions of this section are applicable if specifically referenced in the Special Requirements column of Table 151.05.

(b) Cargo tanks shall be electrically bonded to the hull of the vessel. A vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected and any spillage has been removed.

(c) Pumps may be used for discharging cargo: *Provided,* That they are the vertical submerged type designed to avoid liquid pressure against the shaft gland and are suitable for use with the cargo.

(d) Provisions shall be made to maintain an inert gas padding in the cargo tank during loading, unloading and during transit.

(e) Provisions shall be made to prevent any leakage being washed into the waterways at the loading and unloading points.

(f) The special requirements of §151.50–41 for carbon disulfide (*carbon bisulfide*) and §151.50–42 for ethyl ether shall also be observed.

[CFGR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 88–100, 54 FR 40029, Sept. 29, 1989]

§151.50–41 Carbon disulfide (carbon bisulfide).

(a) All openings shall be in the top of the tank.

(b) Loading lines shall terminate near the bottom of the tank.

(c) A standard ullage opening shall be provided for secondary and emergency sounding.

(d) If a cargo discharge pump is used, it shall be inserted through a cylindrical well extending from the tank top to a point near the tank bottom. A blanket of water shall be formed in this well before attempting pump removal.

(e) Water or inert gas displacement may be used for discharging cargo provided the cargo system is designed for the expected pressure and temperature. This method for discharging may be used with pressure type tanks only.

(f) Adequate natural ventilation shall be provided for the voids around the cargo tanks while the vessel is under way. During loading and unloading, forced ventilation shall be used. The forced ventilation shall be of sufficient capacity to provide a complete change of air within each void space every 5 minutes. The ventilating fan shall be of nonsparking construction.

(g) Because of its low ignition temperature and the close clearances required to arrest its flame propagation, carbon disulfide (*carbon bisulfide*) requires safeguards beyond those required for any electrical hazard groups.

(h) The requirements of §151.50–40 are also applicable to the shipment of carbon disulfide (*carbon bisulfide*).

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

§151.50–42 Ethyl ether.

(a)(1) Gravity tanks shall be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is greater. All openings shall be in the top of the tank.

(2) Pressure vessel type tanks shall be designed for the maximum pressure to which they may be subjected when pressure is used to discharge the cargo, but in no case shall the design pressure be less than 50 pounds per square inch

gauge. All openings shall be in the top of the tank.

(b) Adequate natural ventilation shall be provided for the voids around the cargo tanks while the vessel is underway. If a power ventilation system is installed, all blowers shall be of nonsparking construction. Power driven ventilation equipment shall not be located in the void spaces surrounding the cargo tanks.

(c) Pressure relief valve settings shall not be less than 3 pounds per square inch gauge for gravity tanks. For pressure vessels, the relief valve setting shall not exceed the design pressure of the tank.

(d) Inert gas displacement may be used for discharging cargo from pressure vessel tanks provided the cargo system is designed for the expected pressure and the discharge pressure does not exceed 50 pounds per square inch gauge or the design pressure of the tank, whichever is less.

(e) No electrical equipment except for approved lighting fixtures shall be installed in enclosed spaces adjacent to the cargo tanks. Lighting fixtures must be approved for use in Class I, Group C, hazardous locations. The installation of electrical equipment on the weather deck shall comply with the requirements of part 111, subpart 111.105 of this chapter.

(f) Copper, silver, mercury and magnesium or other acetylide forming metals and their alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings and other items of equipment that may come in contact with the cargo vapor or liquid.

(g) Precautions shall be taken to prevent the contamination of ethyl ether by strong oxidizing agents.

(h) The requirements of § 151.50–40 are also applicable to the shipment of ethyl ether.

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

§ 151.50–50 Elemental phosphorus in water.

(a) Tanks shall be designed and tested for a head equivalent to the design lading of phosphorus and its water blanket extended to 8 feet above the tank top. In addition, tank design calculations shall demonstrate that the tank can withstand, without rupture, a single loading to the highest level to which the water blanket may rise, if that exceeds 8 feet. Tanks shall not be less than 5/16-inch thick.

(b) When a water displacement method of discharge is used, pressure vessel type cargo tanks, designed and tested in accordance with Subchapter F of this chapter shall be employed. Such tanks shall be designed for the maximum pressure to which they may be subjected when water pressure is used to discharge the cargo.

(c) Each cargo tank shall be fitted with an approved pressure vacuum relief valve set to discharge at a pressure not exceeding 2 pounds per square inch. When transferring cargo, the vent discharge shall lead overboard above the waterline. When pressure vessel type tanks are used, each tank shall be fitted with a relief valve of suitable size.

(d) Sufficient outage shall be provided to prevent the tank from being liquid full at any time, but in no case shall the outage be less than 1 percent. When pressure vessel type tanks are used, outage need not be provided.

(e) The use of compressed air to discharge cargo is prohibited.

(f) Cargo shall be loaded at a temperature not exceeding 140°F., and then cooled until the water above the cargo has a temperature not exceeding 105°F. prior to the movement of the vessel. Upon presentation of satisfactory proof that procedures followed will provide adequate safety in transportation and handling, the Commandant may authorize movement of the vessel following cooling of the water above the cargo to a temperature exceeding 105°F.

(g) Coils in which steam or hot water is circulated to heat the cargo so that it may be pumped shall be located outside the cargo tanks.

(h) A fixed ballast piping system (including a power driven pump of ample capacity), or other means acceptable to the Commandant shall be installed so that any void space surrounding the tanks may be flooded.

(i) All openings shall be in the top of the tank and shall be fitted with bolted

cover plates and gaskets resistant to the attack of phosphorus pentoxide.

(j) All enclosed compartments containing cargo tanks shall be provided with effective means of ventilation.

(k) Cargo lines shall be traced with steam piping and secured thereto by lagging to prevent solidification of cargo during transfer operations.

(l) During cargo transfer, a water hose shall be connected to a water supply ready for immediate use, and any spillage of phosphorus shall be immediately washed down. This requirement can be met by facilities provided from shore.

(m) At least two fresh air masks or self-contained breathing apparatus shall be stowed on board the vessel at all times for use of personnel entering the tanks or adjacent spaces.

(n) Authorization from the Commandant (G–MSO) shall be obtained to transport lading other than phosphorus in the cargo tanks or to have on board any other cargo when phosphorus is laden in the tanks.

(o) Mechanical ventilation of sufficient capacity to insure a change of air within the cargo tanks every 3 minutes shall be provided during the inspection and maintenance of the cargo tanks.

(p) Cargo tanks shall be electrically bonded to the hull of the barge. A vessel shall be electrically bonded to the shore piping prior to connecting the cargo hose. This electrical bonding shall be maintained until after the cargo hose has been disconnected.

[CGFR 70–10, 35 FR 3714, Feb. 24, 1970, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983]

§151.50–55 Sulfur (molten).

(a) Ventilation (cargo tank):

(1) Cargo tank ventilation shall be provided to maintain the concentration of H_2S below one-half of its lower explosive limit throughout the cargo tank vapor space for all conditions of carriage; i.e., below 1.85 percent by volume.

(2) Where mechanical ventilation systems are used for maintaining low gas concentrations in cargo tanks, an alarm system shall be provided to give warning if the system fails.

(3) Connections shall be provided to enable sampling of the atmosphere over the cargo in each cargo tank for analysis.

(4) The ventilation system shall be designed and arranged to preclude the depositing of sulfur within the system.

(b) Void spaces:

(1) Openings to void spaces adjacent to cargo tanks shall be designed and fitted to prevent the entry of water, sulfur or cargo vapors.

(2) Connections shall be provided to enable sampling and analyzing vapors in void spaces.

(c) Temperature controls shall be provided in accordance with §151.20–10 and applicable sections of Subpart 151.40 of this part. Heat transfer media shall be steam, and alternate media will require specific approval of the Commandant.

[CGFR 70—10, 35 FR 3714, Feb. 25, 1970]

§151.50–60 Benzene.

The person in charge of a Coast Guard inspected barge must ensure that the provisions of part 197, subpart C, of this chapter are applied.

[CGD 88–040, 56 FR 65006, Dec. 13, 1991]

§151.50–70 Cargoes requiring inhibition or stabilization.

When table 151.05 refers to this section, that cargo must be—

(a) Inhibited; or

(b) Stabilized.

[CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§151.50–73 Chemical protective clothing.

When table 151.05 refers to this section, the following apply:

(a) The person in charge of cargo handling operations shall ensure that the following chemical protective clothing constructed of materials resistant to permeation by the cargo being handled is worn by all personnel engaged in an operation listed in paragraph (b) of this section:

(1) Splash protective eyewear.

(2) Long-sleeved gloves.

(3) Boots or shoe covers.

(4) Coveralls or lab aprons.

NOTE: ''Guidelines for the Selection of Chemical Protective Clothing'', Third Edition, 1987, available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway Ave., Cincinnati, OH 45211–4438, provides information on the proper clothing for the cargo being handled.

(b) The section applies during the following operations:

(1) Sampling cargo.

(2) Transferring cargo.

(3) Making or breaking cargo hose connections.

(4) Gauging a cargo tank, unless gauging is by closed system.

(5) Opening cargo tanks.

(c) Coveralls or lab aprons may be replaced by splash suits or aprons constructed of light weight or disposable materials if, in the judgment of the person in charge of cargo handling operations,

(1) Contact with the cargo is likely to occur only infrequently and accidentally; and

(2) The splash suit or apron is disposed of immediately after contamination.

(d) Splash protective eyewear must be tight-fitting chemical-splash goggles, face shields, or similar items intended specifically for eye protection from chemical splashing or spraying.

(e) The person in charge of cargo handling operations shall ensure that each person in the vicinity of an operation listed in the paragraph (b) of this section or in the vicinity of tanks, piping, or pumps being used to transfer the cargo wears splash protective eyewear under paragraph (d) of this section.

[CGD 88–100, 54 FR 40040, Sept. 29, 1989]

§ 151.50–74 Ethylidene norbornene.

When Table 151.05 refers to this section, the following apply:

(a) 151.50–5 (g) and (h)

(b) Rubber hoses or fittings may not be used in transfer operations.

[CGD 80–001, 46 FR 63279, Dec. 31, 1981]

§ 151.50–75 Ferric chloride solution.

A containment system (cargo tank piping system, venting system, and gauging system) carrying this solution must be lined with rubber, corrosion resistant plastic, or a material approved by the Commandant (G–MSO).

[CGD 80–001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983; CGD 88–100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50–76 Hydrochloric acid, spent (NTE 15%).

(a)(1) Gravity type cargo tanks must be designed and tested to meet the rules of the American Bureau of Shipping for a head of water at least 8 feet above the tank top or the highest level the lading may rise, whichever is greater. The plate thickness of any part of the tank may not be less than three-eighths inch. A shell plating of a barge may not be on the boundary of any part of the cargo tank.

(2) Gravity tank vents must:

(i) Terminate above the weatherdeck, clear of all obstructions and away from any from any source of ignition; and

(ii) Be fitted with a single flame screen or two fitted flame screens as described in § 151.03–25. Neither a shutoff valve nor a frangible disk may be fitted in the vent lines.

(b) Openings in the tanks are prohibited below deck, except for access openings used for inspection and maintenance of tanks, or unless otherwise specifically approved by the Commandant (G–MSO). Openings must be fitted with bolted cover plates and acid-resistant gaskets.

(c) Where special arrangements are approved by the Commandant (G–MSO) to permit a pump suction to be led from the bottom of the tank, the filling and discharge lines must be fitted with shutoff valves located above the weatherdeck or operable from it.

(d) The outage may not be less than 1 percent.

(e) An enclosed compartment containing, or a compartment adjacent to, a cargo tank:

(1) May have no electrical equipment that does not meet or exceed class I–B electrical requirements; and

(2) Must have at least one gooseneck vent of 2.5 inch diameter or greater. The structural arrangement of the compartment must provide for the free passage of air and gases to the vent or vents.

(f) No lights may be used during the cargo transfer operations, except installed electric or portable battery lights. Smoking is prohibited and the person in charge of cargo transfer shall ensure that ''No Smoking'' signs are displayed during cargo transfer operations.

(g) Tanks approved for the transportation of acid cargoes subject to this section may not be used for the transportation of any other commodity, except upon authorization by the Commandant (G–MSO).

(h) Each cargo tank must be examined internally at least once in every 4 years. If the lining of the cargo tank has deteriorated in service or is not in place, the Marine Inspector may require the tank to be tested by such nondestructive means as he may consider necessary to determine its condition.

[CGD 80–001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983]

§ 151.50–77 Fluorosilicic acid (30% or less) (hydrofluorosilicic acid).

(a) Hydrofluorosilicic acid must be carried in gravity or pressure type cargo tanks independent of the vessel's structure. The tanks must be lined with rubber or other equally suitable material approved by the Commandant (G–MSO). See § 151.15–3(f)(2).

(b) Notwithstanding the provisions of § 151.50–20(b)(3), no compressed air may be used to discharge hydrofluorosilicic acid from gravity type cargo tanks unless:

(1) The tanks are of cylindrical shape with dished heads, and

(2) The air pressure does not exceed:

(i) The design pressure of the tank, and

(ii) 10 pounds per square inch gauge. The tanks must be fitted with pressure relief devices.

(c) During cargo tansfer, a water hose must be connected to a water supply and be ready for immediate use. Any leakage or spillage of acid must be immediately washed down. This requirement can be met by facilities provided from shore.

[CGD 80–001, 46 FR 63279, Dec. 31, 1981, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983; CGD 92–100, 59 FR 17028, Apr. 11, 1994]

§ 151.50–79 Methyl acetylene-propadiene mixture.

(a) The composition of the methyl acetylene-propadiene mixture at loading must be within one of the following sets of composition limits:

(1) Composition 1 is:

(i) Maximum methyl acetylene to propadiene molar ratio of 3 to 1;

(ii) Maximum combined concentration of methyl acetylene and propadiene of 65 mole percent;

(iii) Minimum combined concentration of propane, butane, and isobutane of 24 mole percent, of which at least one-third (on a molar basis) must be butanes and one-third propane; and

(iv) Maximum combined concentration of propylene and butadiene of 10 mole percent.

(2) Composition 2 is:

(i) Maximum methyl acetylene and propadiene combined concentration of 30 mole percent;

(ii) Maximum methyl acetylene concentration of 20 mole percent;

(iii) Maximum propadiene concentration of 20 mole percent;

(iv) Maximum propylene concentration of 45 mole percent;

(v) Maximum butadiene and butylenes combined concentration of 2 mole percent;

(vi) Minimum saturated C_4 hydrocarbon concentration of 4 mole percent; and

(vii) Minimum propane concentration of 25 mole percent.

(b) A barge carrying a methyl acetylene-propadiene mixture must have a refrigeration system that does not compress the cargo vapor or have a refrigeration system with the following features:

(1) A vapor compressor that does not raise the temperature and pressure of the vapor above 60°C (140°F) and 1.72 MPa guage (250 psig) during its operations, and that does not allow vapor to stagnate in the compressor while it continues to run.

(2) At the discharge piping from each compressor stage or each cylinder in the same stage of a reciprocating compressor:

(i) Two temperature actuated shutdown switches set to operate at 60°C (140°F) or less;

(ii) A pressure actuated shutdown switch set to operate at 1.72 MPa gauge (250 psig) or less; and

(iii) A safety relief valve set to relieve at 1.77 MPa gauge (256 psig) or less anywhere except into the compressor suction line.

(c) The piping system, including the cargo refrigeration system, for tanks to be loaded with methyl acetylene-propadiene mixture must be completely separate from piping and refrigeration systems for other tanks. If the piping system for the tanks to be loaded with methyl acetylene-propadiene mixture is not independent, the required piping separation must be accomplished by the removal of spool pieces, valves or other pipe sections and the installation of blank flanges at these locations. The required separation applies to all liquid and vapor piping, liquid and vapor vent lines and any other possible connections, such as common inert gas supply lines.

[CGD 80–001, 46 FR 63279, Dec. 31, 1981]

§ 151.50–80 Nitric acid (70% or less).

(a) Tanks, cargo piping, valves, fittings, and flanges (where exposed to the acid) must be lined with nitric acid resistant rubber or fabricated from nitric acid resistant stainless steel. See § 151.15–3(f)(2).

(b) During cargo transfer, a water hose must be connected to a water supply, ready for immediate use. Any leakage or spillage of acid must be immediately washed down. This requirement can be met by facilities provided from shore.

(c) Nitric acid contaminated by other chemicals, oils, solvents, etc. may not be transported in bulk without an authorization from the Commandant (G–MSO).

[CGD 80–001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983; CGD 88–100, 54 FR 40041, Sept. 29, 1989]

§ 151.50–81 Special operating requirements for heat sensitive cargoes.

When table 151.05 refers to this section, the following apply to the cargo:

(a) Must not be carried in a tank equipped with heating coils unless the heating supply to the coils is disconnected.

(b) Must not be carried in a tank adjacent to another tank containing an elevated temperature cargo.

(c) Must not be carried in a deck tank.

[CGD 80–001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 88–100, 54 FR 40041, Sept. 29, 1989]

§ 151.50–84 Sulfur dioxide.

(a) Sulfur dioxide that is transported under the provisions of this part may not contain more than 100 ppm of water.

(b) Cargo piping must be at least Schedule 40 pipe.

(c) Flanges must be 150 lb. A.N.S.I. Standard minimum with tongue and groove or raised face.

(d) A cargo tank must:

(1) Meet the requirements of a Class I welded pressure vessel;

(2) Be designed for a maximum allowable working pressure of at least 125 psig;

(3) Be hydrostatically tested every two years to at least 188 psig;

(4) Be provided with one or more manholes that are fitted with a cover sized not less than 15 inches by 23 inches or 13 inches nominal diameter, located above the maximum liquid level, and as close as possible to the top of the tank;

(5) Have no openings other than those required in paragraph (d)(4) of this section;

(6) Have no liquid level gauges other than closed or indirect gauges;

(7) Have all valves and the closed gauge that is required by Table 151.05 bolted to the cover or covers that are required in paragraph (d)(4) of this section;

(8) Have a metal housing that is fitted with a drain and vent connection protecting all valves and the closed gauge within this housing against mechanical damage;

(9) Have all safety relief valves discharging into the protective housing;

(10) Not be interconnected with another cargo tank by piping or manifold that carriers cargo liquid, except vapor lines connected to a common header, and

(11) Have an excess flow valve that is located on the inside of the tank for

every liquid and vapor connection, except the safety relief valve;

(12) Have no bypass opening on any excess flow valve.

(e) Cargo transfer operations:

(1) May not be conducted with more than one cargo tank at a time unles each tank is filled from or discharged to shore tanks through separate lines;

(2) Must be conducted with connections between fixed barge piping and shore piping of either Schedule 40 pipe having flexible metallic joints that meet §151.04–5(h) or of flexible metallic hose that is acceptable to the Commandant (G–MSO);

(3) From barge to shore must be by pressurization with an oil free, non-reactive gas that has a maximum of 100 ppm moisture;

(4) Must be conducted with vapor return to shore connections that ensure that all vapor is returned to shore; and

(5) Must be conducted with every person on the barge carrying a respiratory protective device that protects the wearer against sulfur dioxide vapors and provides respiratory protection for emergency escape from a contaminated area that results from cargo leakage.

(f) Respiratory protective equipment must be of a size and weight that allows unrestricted movement and wearing of a lifesaving device.

(g) After the completion of cargo transfer, all liquid sulfur dioxide in the cargo piping must be removed and cargo transfer piping must be disconnected at the cargo tanks. After the cargo piping is disconnected, both ends of the line must be plugged or fitted with blind flanges.

[CGD 80–001, 46 FR 63280, Dec. 31, 1981, as amended by CGD 82–063b, 48 FR 4781, Feb. 3, 1983; CGD 88–100, 54 FR 40041, Sept. 29, 1989; 55 FR 17276, Apr. 24, 1990]

§ 151.50–86 Alkyl (C7–C9) nitrates.

(a) The carriage temperature of octyl nitrates must be maintained below 100°C (212°F) in order to prevent the occurrence of a self-sustaining exothermic decomposition reaction.

(b) Octyl nitrates may not be carried in a deck tank unless the tank has a combination of insulation and a water deluge system sufficient to maintain the tank's cargo temperature below 100°C (212°F) and the cargo temperature rise at or below 1.5°C (2.7°F)/hour, for a fire of 650°C (1200°F).

[CGD 88–100, 54 FR 40040, Sept. 29, 1989; CGD 92–100, 59 FR 17028, Apr. 11, 1994]

Subpart 151.55—Special Requirements for Materials of Construction

§ 151.55–1 General.

(a) This section provides special requirements for the materials of construction of equipment that may come into contact with various cargoes. Table 151.05 contains specific requirements for various cargoes.

(b) Copper, copper alloys, zinc, and aluminum shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to §151.56–1(a),(b), and (c).)

(c) Copper, copper alloys, zinc, galvanized steel, and mercury shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to §151.56–1(b),(c), and (g).)

(d) Aluminum, magnesium, zinc, and lithium shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to §151.56–1(a),(c), and (d).)

(e) Copper and copper bearing alloys shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo liquid or vapor. (Equivalent to §151.56–1(b).)

(f) Aluminum or copper or alloys of either shall not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with the cargo vapor or liquid. (Equivalent to §151.56–1(a) and (b).)

(g) Aluminum, stainless steel, or steel covered with a suitable protective lining or coating shall be used as materials of construction for tanks, pipelines, valves fittings, and other items of equipment that may come in contact

with the cargo liquid or vapor. (Equivalent to § 151.58–1(a).)

(h) Alkaline or acidic materials, such as caustic soda or sulfuric acid, should not be allowed to contaminate this cargo.

(i) For concentrations of 98 percent or greater, aluminum or stainless steel shall be used as materials of construction. For concentrations of less than 98 percent, 304L or 316 stainless steel shall be used as materials of construction.

(j) Zinc, alloys that have more than 10 percent zinc by weight, and aluminum may not be used as materials of construction for tanks, pipelines, valves, fittings, and other items of equipment that may come in contact with cargo liquid or vapor. (Equivalent to § 151.56–1(a) and (c).)

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 73–275R, 41 FR 3087, Jan. 21, 1976; CGD 75–223, 42 FR 8378, Feb. 10, 1977; CGD 88–100, 54 FR 40041, Sept. 29, 1989]

Subpart 151.56—Prohibited Materials of Construction

§ 151.56–1 Prohibited materials.

When one of the following paragraphs of this section is referenced in table 151.05, the materials listed in that paragraph may not be used in components that contact the cargo or its vapor:

(a) Aluminum or aluminum alloys.

(b) Copper or copper alloys.

(c) Zinc, galvanized steel, or alloys having more than 10 percent zinc by weight.

(d) Magnesium.

(e) Lead.

(f) Silver or silver alloys.

(g) Mercury.

[CGD 88–100, 54 FR 40041, Sept. 29, 1989]

Subpart 151.58—Required Materials of Construction

§ 151.58–1 Required materials.

When one of the following paragraphs of this section is referenced in table 151.05, only those materials listed in that paragraph may be used in components that contact the cargo or its vapor:

(a) Aluminum, stainless steel, or steel covered with a protective lining or coating. (See § 151.15–3(f)(2).)

(b)–(c) [Reserved]

(d) Solid austenitic stainless steel.

(e) Stainless steel or steel covered with a suitable protective lining or coating. (See § 151.15–3(f)(2).)

[CGD 88–100, 54 FR 40041, Sept. 29, 1989]

PART 152 [RESERVED]

PART 153—SHIPS CARRYING BULK LIQUID, LIQUEFIED GAS, OR COMPRESSED GAS HAZARDOUS MATERIALS

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