



DEPARTMENT OF TRANSPORTATION  
HAZARDOUS MATERIALS REGULATIONS BOARD  
WASHINGTON, D. C. 20590

27595

[Docket No. HM-86, Amdts. 173-76, 177-28, 178-29]

**CARGO TANK USE AND TESTING, COMPRESSED GASES IN PORTABLE AND CARGO TANKS, AND SPECIFICATION MC 331**

The purpose of these amendments to the Department's Hazardous Materials Regulations is to delete obsolete requirements, to update the regulations, and to make editorial changes pertaining to the specifications for the MC 331 cargo tank and to the use and testing of portable and cargo tanks.

On June 4, 1971, the Hazardous Materials Regulations Board published a notice of proposed rulemaking, Docket No. HM-86; Notice No. 71-15 (36 FR 10882) that proposed these amendments. Interested persons were afforded an opportunity to participate in this rulemaking. The Board received several comments.

Editorial changes were suggested to improve the language in the regulations. Some of these recommendations were adopted. A few other comments, on such things as jacket thickness and testing, although considered to have merit by the Board, were outside the scope of the rulemaking proposal, and therefore, could not be considered in the final amend-

ment. Objection was made to the removal of § 173.33(e) (5) which specified the retest requirements for certain non-DOT specification tanks. However, the comments did not present adequate justification for retaining this rule.

For these non-specification tanks, it is the Board's opinion that individual assessment of the retest requirements is preferable. They may be handled by special permit if such tanks are authorized for use in transportation.

Comments were received on the proposed requirement for welded pipe joints in §§ 173.33(g) (1) and 178.337-9(b) (1). The commenters demonstrated the difficulty and the lack of necessity for a requirement that all pipe joints be welded. The Board agrees with these comments and has reverted to language similar to that contained in the original regulation.

In § 173.33(g) (1), one commenter objected to requiring "other pressure parts" such as pump seals to have a bursting strength of at least four times the design pressure of the tank. To assure that the containment safety level for which the tank is designed is actually attained in practice, the Board continues to believe that the tank and its components must have the same bursting strength. However, it agrees to excepting pump seals from this bursting strength require-

ment. Several comments were made regarding a safe location for the safety relief valve on a portion of liquid piping closed at both ends. The Board agrees with the commenters, however, the Board feels the recommendation is outside the scope of this rulemaking proposal.

A commenter suggested that each tank taken out of service be reported to the Bureau of Motor Carrier Safety. The Board agrees that reporting of the removal from service is as important as the reporting of the placing into service. However, since this provision was not included in the rulemaking proposal, it will be considered in separate rulemaking.

A recommendation was made that, for consistency, the test date markings be placed on the right side near the front of each tank since the metal certification plates are located in various places on older tanks. The Board agrees and has provided in § 177.824(h) for a consistent and uniform location.

Objections were received on the requirement for grouping of pipes, fittings, and openings in a cargo tank. There was no safety related justification presented that was considered adequate to support changing the present requirement for grouping which, in fact, was not proposed to be changed. The Board has revised the wording editorially, but has made no change to the requirement formerly stated in § 178.337-9(b) (6).

Several comments were received regarding the proposed requirement in § 178.337-11(c) for remotely controlled internal shut-off valves on all liquid and vapor discharge lines. The Board recognizes the difficulty in applicability of this requirement in all instances without any provision for exception and has provided for alternate use of excess flow valves and manually operated external valves under certain circumstances.

Comments were made regarding the need for specifying a minimum melting point for fusible elements. The Board agrees but still believes that a maximum melting point must be provided to assure satisfactory operations of the automatic closing feature of the internal shut-off valve. By providing a maximum melting point, cargo tank operators may still comply with the lower maximum specified in the current requirements of the Occupational Safety and Health Administration regulations, 29 CFR 1910.110(g) (2) (iv) (c) without conflicting with the requirements of this Department.

Based on several comments regarding rotary gauges on heads of smaller tanks, and based on the requirements of NFPA Pamphlet No. 58 (Storage and Handling of Liquefied Petroleum Gases 1972), the Board has taken cognizance of the practices followed in loading local delivery units. Based on the known experience, it

appears that filling differences in smaller tanks caused by the attitude of a tank are not a significant problem, and the action proposed by the Board to eliminate the use of such gauges as primary filling controls is not warranted. However, the Board recognizes that the smaller tanks are primarily used in local service. Thus, inadequate outage resulting from overfilling of such tanks has not been a problem because of the short duration of trips involved. Therefore, the Board has provided for the use of gauges at locations other than mid-length of the tank in certain small tanks provided the tanks are unloaded within 24 hours after each filling of the tank.

When other than local service is desired of these tanks, § 173.315(h) requires primary gauging devices at mid-length of tanks not filled by weight. These can be installed for this service without imposing an undue burden on the tank operator.

In consideration of the foregoing, 49 CFR Parts 173, 177, and 178 are amended as follows:

**PART 173—SHIPPERS**

(A) In § 173.33, the introductory texts of paragraphs (e) and (g) and paragraphs (e) (1), (g) (1) through (4) and (g) (8) and (i) (1), (2), and (3) and the exception following the introductory text of paragraph (i) are amended; paragraph (g) (5) is canceled and paragraphs (g) (6) through (g) (11) are redesignated (g) (5) through (g) (10); paragraphs (e) (6) through (e) (10) are redesignated (e) (5) through (e) (9); present paragraph (c) (5) and Note 1 following paragraph (i) (3) are canceled as follows:

**§ 173.33 Cargo tank use authorization.**

(e) A Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank must not be used unless it has successfully met the following requirements, as applicable:

(1) Each cargo tank must be tested at least once every 5 years in accordance with subparagraphs (2), (3), and (4) of this paragraph. The tank and each safety valve of any cargo tank used for the transportation of chlorine must be retested at least once every 2 years.

\* \* \* \* \*

(5) [Canceled].

\* \* \* \* \*

(g) On any tank used for a compressed gas except chlorine, the bursting pressure of all piping, pipe fittings, hose and other pressure parts except pump seals and safety relief devices must be at least 4 times the design pressure of the tank. In addition, the bursting pressure may not be less than 4 times any higher

pressure to which each pipe, pipe fitting, hose and other pressure part may be subjected in service by the action of a pump or other device. For tanks used in transporting chlorine, see subparagraphs (8) through (10) of this paragraph.

(1) Welded pipe joints must be used wherever possible. Where copper tubing is permitted, joints must be brazed or be of equally strong metal union type. The melting point of brazing material must be no lower than 1000° F. The method of joining tubing must not decrease its strength, such as by the cutting of threads. Screwed fittings must be at least extra heavy. Nonmalleable metals may not be used in the construction of any valve or fitting.

(2) Each hose coupling must be designed for a pressure at least 20 percent in excess of the hose design pressure and so there will be no leakage when connected.

(3) Provision must be made to prevent damage to piping due to thermal expansion and contraction, jarring, and vibration. Slip joints may not be used for this purpose.

(4) Piping and fittings must be grouped in the smallest practicable space and be protected from damage as required by the specification.

(5) [Canceled]

(8) *Chlorine cargo tanks.* No piping, hose, or other means of loading or unloading may be attached to any valve of a cargo tank containing chlorine except at the time of loading or unloading. No hose, piping, or tubing used for loading or unloading may be mounted or carried on the motor vehicle. Except at the time of loading or unloading, the pipe connection of each angle valve must be closed with a screw plug which is chained or otherwise fastened to prevent misplacement.

(i) \* \* \*

EXCEPTION: Any liquid level gauging device which is constructed so that the outward flow of tank contents does not exceed that passed by a 0.060-inch diameter opening, or any safety device connection, is not required to be equipped with an excess-flow valve.

(1) Each excess-flow valve must close automatically at the rated flow of gas or liquid as specified by the valve manufacturer. The flow rating of the piping, fittings, valves, and hose on each side of the excess-flow valve must be greater than that of the excess-flow valve. If branching or any other restriction is incorporated in the system so that the flow rating is less than that of the excess-flow valve at the tank, additional excess-flow valves must be located where the flow rates are reduced.

(2) An excess-flow valve may be designed with a bypass, not to exceed 0.040-inch diameter opening, to allow equalization of pressures.

(3) Each filling and discharge line must be provided with a manual shut-off valve located as close to the tank as practicable. However, when an internal shut-off valve that closes automatically is used, a manual shut-off valve must be located in the line ahead of the hose connection. The use of a so-called "stop-check" or excess flow valve to satisfy the requirements of this rule and of paragraph (i) of this section with one

valve is prohibited except as provided in § 178.337-11(c) of this subchapter.

NOTE 1.—[Canceled]

(B) In § 173.315(a) (1) Table Notes 2 and 4 are amended; the introductory text of paragraph (h) and paragraphs (h) (2), (3), and (4) are amended; the table following paragraph (h) (2) is replaced to follow the introductory text of paragraph (h), and paragraph (i) is amended as follows:

§ 173.315 Compressed gases in cargo tanks and portable tank containers.

(a) \* \* \*  
(1) \* \* \*

NOTE 2.—See § 173.32 for authority to use other portable tanks.

NOTE 4.—In the design of tanks for sulfur dioxide and chlorine a corrosion allowance of 20 percent or 0.10 inch, whichever is less, must be added to the metal thickness. In chlorine tanks the wall thickness must be at least five-eighths inch, including corrosion allowance.

(h) Each cargo tank and portable tank, except a tank filled by weight, must be equipped with one or more of the gauging devices described in the following table which indicate accurately the maximum permitted liquid level. Additional gauging devices may be installed but may not be used as primary controls for filling of cargo tanks and portable tanks. Gauge glasses are not permitted on any cargo tank or portable tank. Primary gauging devices used on cargo tanks of less than 3500 gallons water capacity are exempt from the longitudinal location requirements specified in subparagraphs (2) and (3) of this paragraph provided: (1) The tank length does not exceed three times the tank diameter; and (2) the cargo tank is unloaded within 24 hours after each filling of the tank.

(Table that presently follows paragraph (h) (2) of this section remains the same.)

(2) If the primary gauging device is adjustable, it must be capable of adjustment so that the end of the tube will be in the location specified in subparagraph (3) of this paragraph for at least one of the loadings to be transported, at the filling level corresponding to an average loading temperature. Exterior means must be provided to indicate this adjustment. The gauging device must be legibly and permanently marked in increments not exceeding 20 Fahrenheit degrees (or not exceeding 25 p.s.i.g. on tanks for carbon dioxide or nitrous oxide), to indicate the maximum levels to which the tank may be filled with liquid at temperatures above 20° F. However, if it is not practicable to so mark the gauging device, this information must be legibly and permanently marked on a plate affixed to the tank adjacent to the gauging device.

(3) A dip tube gauging device consists of a pipe or tube with a valve at its outer end with its intake limited by an orifice not larger than 0.060 inch in diameter. If a fixed length dip tube is used, the intake must be located midway of the tank both longitudinally and laterally and at maximum permitted filling level. In tanks for liquefied petroleum gases,

the intake must be located at the level reached by the lading when the tank is loaded to maximum filling density at 40° F.

(4) Each opening for a pressure gauge, except on a tank used exclusively for the transportation of carbon dioxide or nitrous oxide, must be restricted at or inside the tank by an orifice no larger than 0.060 inch in diameter.

(i) Each tank must be provided with one or more safety relief valves which, unless otherwise specified in this Part, must be safety relief valves of the spring-loaded type. Each valve must be arranged to discharge upward and unobstructed to the outside of the protective housing to prevent any impingement of escaping gas upon the tank. For each chlorine tank the protective housing must be in compliance with the requirements set forth in the applicable specification.

(1) Safety relief valves on each tank must have a total relieving capacity as determined by the flow formulas contained in CGA Pamphlet S-1.2. Safety relief valves must have a total relieving capacity sufficient to prevent a maximum pressure in the tank of more than 120 percent of the design pressure. For an insulated tank the required relieving capacity of the relief valves must be the same as for an uninsulated tank, unless the insulation will remain in place and will be effective under fire conditions. In this case, each insulated tank must be covered by a sheet metal jacket of not less than 16 gauge thickness. An MC 330 cargo tank that has safety relief valves sized by Fetterly's formula dated November 27, 1928, may be continued in service. Copies of this formula may be obtained from the Bureau of Explosives.

(2) Each safety relief valve must be arranged to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the safety relief valve must be provided with means for sealing the adjustment and it must be sealed.

(3) Each safety relief valve on a tank must be set to start-to-discharge at pressure no higher than 110 percent of the tank design pressure and no lower than the design pressure specified in paragraph (a) (1) of this section for the gas transported.

(4) Each safety relief valve must be plainly and permanently marked with the pressure in p.s.i.g. at which it is set to discharge, with the actual rate of discharge of the device in cubic feet per minute of the gas or of air at 60° F. and 14.7 p.s.i.a., and with the manufacturer's name or trade name and catalog number. The start-to-discharge valve must be visible after the valve is installed. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

(5) Each safety relief valve must have direct communication with the vapor space in the tank.

(6) Each connection to a safety relief valve must be of sufficient size to provide the required rate of discharge through the safety relief valve.

(7) No shut-off valve may be installed between a safety relief valve and tank, except in cases where two or more safety relief valves are installed on the

same tank, and one or more safety shut-off valves are arranged to always provide the required relief capacity through at least one of the safety relief valves.

(8) Each safety relief valve outlet must be provided with a protective device to prevent the entrance and accumulation of dirt and water. This device must not impede flow through the valve.

(9) On tanks for carbon dioxide or nitrous oxide, each safety relief device must be installed and located so that the cooling effect of the contents will not prevent the effective operation of the device. In addition to the required safety relief valves, these tanks may be equipped with one or more pressure controlling devices.

(10) Each tank for carbon dioxide also may be equipped with one or more frangible disc devices set to function at a pressure not over two times nor less than 1.5 times the design pressure of the tank.

(11) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with a safety relief valve without an intervening shut-off valve to prevent excessive hydrostatic pressure that could burst the piping or hose.

(12) Subject to conditions of paragraph (a)(1) of this section for the methyl chloride and sulfur dioxide optional portable tanks, one or more fusible plugs approved by the Bureau of Explosives may be used on these tanks in place of safety relief valves of the spring-loaded type. The fusible plug or plugs must be in accordance with CGA Pamphlet S-1.2, to prevent a pressure rise in the tank of more than 120 percent of the design pressure. If the tank is over 30 inches long, each end must have the total specified safety discharge area.

(13) Safety relief valves on chlorine tank motor vehicles must be in conformance with the standard of the Chlorine Institute, Inc., Type 1-1/2 JQ225 Dwg. H51970 dated October 7, 1968.

**PART 177—SHIPMENTS MADE BY WAY OF COMMON, CONTRACT OR PRIVATE CARRIERS BY PUBLIC HIGHWAY**

(A) In § 177.824, paragraph (a)(1) and paragraphs (e), (f), (h), and (i) are amended as follows:

**§ 177.824 Retesting and inspection of cargo tanks.**

(a) \* \* \*  
(1) Each cargo tank, except specifications MC 330 and MC 331 cargo tanks, must be in compliance with the testing requirements prescribed in paragraphs (a), (b), (c), and (d) of this section. Each cargo tank must be in accordance with the marking requirement of paragraph (h) of this section.

(e) *Compressed gas cargo tanks, specifications MC 330 and MC 331.* Each cargo tank constructed in compliance with specification MC 330 or MC 331 § 178.337 of this subchapter must be

inspected and tested in accordance with § 173.33 of this subchapter.

(f) *Reporting requirements.* Each motor carrier shall file a complete listing of MC 330 and MC 331 cargo tanks he has in service, with the Director, Bureau of Motor Carrier Safety, Federal Highway Administration, Department of Transportation, Washington, D.C. 20590. Each motor carrier, when he places in service any MC 330 or MC 331 cargo tank (other than cargo tanks used in interchange service which are reported by another carrier), shall file a supplemental report with that Bureau.

(1) The initial listing and each subsequent report must include the following information:

(i) The carrier's name, address, and telephone number.

(ii) "Cargo tank placed in service" followed by the date of placement.

(iii) Each cargo tank identified as follows:

- (a) Carrier's equipment number;
- (b) Manufacturer's name;
- (c) Manufacturer's serial number;
- (d) Specification MC 330 or MC 331;
- (e) "QT" (Quenched and tempered) or "NQT" (Not quenched and tempered).

(2) A copy of each report required by this paragraph must be retained by the carrier during the period the tank is in the carrier's service and for 1 year thereafter.

(h) *Test date markings.* The month and year of the last test must be durably and legibly marked on the tank in letters not less than 1/4 inches high, on the right side near the front. These markings must be near the metal certification plate, except on any tank having the plate other than on the right side near the front.

(i) *Withdrawal of certification.* If, as the result of an accident or for any other reason a cargo tank no longer meets the applicable specification, the carrier shall remove the metal certification plate or make it illegible (see § 173.24(c)(1)(v) of this subchapter). The details of the conditions necessitating withdrawal of the certification must be recorded and signed on the written certificate for that cargo tank. The vehicle owner shall retain the certificate for at least 1 year after withdrawal of the certification.

(B) In § 177.840, paragraph (g) is added to read as follows:

**§ 177.840 Compressed gases.**

(g) Each liquid discharge valve on a cargo tank, other than an engine fuel line valve, must be closed during transportation except during loading and unloading.

**PART 178—SHIPPING CONTAINER SPECIFICATIONS**

In §§ 178.337-1 paragraph (e), 178.337-2 paragraph (c), 178.337-4 and 178.337-8 paragraph (b) is amended; in § 178.337-9 paragraphs (a) and (b) are amended; in § 178.337-11, paragraphs (a) (2) and (3) and paragraph (b) are amended, para-

graph (a) (4) and Note 1 following paragraph (b) are canceled, the introductory text of paragraph (c) and paragraph (c) (5) are amended, paragraph (c) (6) is added; in § 178.337-13, paragraphs (a) and (b) are amended; in § 178.337-14, paragraphs (a), (b), and (c) are amended; in § 178.337-15 paragraph (a) is amended to read as follows:

**§ 178.337 Specification MC 331; cargo tanks constructed of steel, primarily for transportation of compressed gases as defined in the Compressed Gas Section.**

**§ 178.337-1 General requirements.**

(e) *Insulation for carbon dioxide, chlorine, and nitrous oxide tanks.* See § 173.33(j) of this subchapter.

**§ 178.337-2 Material.**

(c) *For ammonia.* See § 173.33(h)(1) of this subchapter.

**§ 178.337-4 Joints.**

(b) *Welding procedure and welder performance tests* must be made annually in accordance with Section IX of the ASME Code. In addition to the essential variables named therein, the following must be considered as essential variables: number of passes; thickness of plate; heat input per pass; and manufacturer's identification of rod and flux. When fabrication is done in accordance with Part UHT of the ASME Code, filler material containing more than 0.08 percent vanadium must not be used. The number of passes, thickness of plate, and heat input per pass may not vary more than 25 percent from the procedure or welder qualifications. Records of the qualifications must be retained for at least 5 years by the tank manufacturer and must be made available to duly identified representatives of the Department and the owner of the tank.

**§ 178.337-8 Outlets.**

(b) *Chlorine tank valves.* See § 173.33 (g) (9) and (i) (4) of this subchapter. Regarding chlorine tank outlets, see also § 178.337-1(c)(2) of this section.

**§ 178.337-9 Safety relief devices, valves and connections.**

(a) *Safety relief valves.* (1) See § 173.315(i) of this subchapter.

(2) On tanks for carbon dioxide or nitrous oxide see § 173.315(i)(9) and (i)(10) of this subchapter.

(3) Each valve must be designed, constructed, and marked for a rated pressure not less than the tank design pressure at the temperature expected to be encountered.

(b) *Piping, valves, and fittings.* (1) See § 173.33(g)(1) and (3) of this subchapter.

(2) Piping and fittings must be in conformance with § 173.33(g) of this sub-

chapter and must be protected from damage as required by § 178.337-10 of this section.

§ 178.337-11 Emergency discharge control.

- (a) \* \* \*
- (2) Excess flow valves must be in conformance with § 173.33(i) of this subchapter.
- (3) Chlorine tanks. See § 173.33(i) (4) of this subchapter.
- (4) [Canceled]
- (b) Shut-off valves. See § 173.33(i) (3) of this subchapter.

NOTE.—Canceled.

(c) Liquid or vapor discharge openings. Except for an engine fuel line on a truck-mounted tank, of not over 3/4-inch diameter and equipped with a valve having an integral excess flow valve, each liquid or vapor discharge opening in a tank used for a flammable liquid, flammable compressed gas, or anhydrous ammonia must be equipped with a remotely controlled internal shut-off valve. However, on any liquid or vapor discharge opening of less than 1/4-inches diameter, an excess flow valve together with a manually operated external valve may be used in place of a remotely controlled internal shut-off valve. Each remotely controlled internal valve must be in conformance with the following requirements:

(5) On a tank over 3,500 gallons water capacity, each internal shut-off valve must be provided with remote means of automatic closure, both mechanical and thermal, that are installed at the ends of the tank in at least two, diagonally opposite locations. If the discharge connection at the tank is not in the general vicinity of one of the two locations specified above, one additional fusible element must be installed so that heat from a fire in that area will activate the emergency control system. Fusible elements may not have a melting point exceeding 250°F.

(6) On a tank of 3,500 gallons water capacity or less, each internal shut-off valve must be provided with at least one remote control station, and the actuating means may be mechanical. This station must be at one end of the tank, away from the discharge connection area.

§ 178.337-13 Supporting and anchoring.

- (a) A cargo tank that is not permanently attached to or integral with a ve-

nicle chassis must be secured by turn-buckles or equally efficient securing devices for drawing the tank down tight on the frame. Anchors, stops, or other means must be provided to prevent relative motion between the tank and the vehicle chassis when the vehicle is in operation.

(b) A tank motor vehicle designed and constructed so that the cargo tank constitutes in whole or in part the stress member used in place of a frame must have the tank supported by external cradles. A cargo tank mounted on a frame must be supported by external cradles or longitudinal members. The cradles, where used, must subtend at least 120 degrees of the shell circumference. The design calculations for the supports must include beam stress, shear stress, torsion stress, bending moment, and acceleration stress, for the loaded vehicle as a unit, using a factor of safety of 4, based on the ultimate strength of the material and on a 2 "g" longitudinal and lateral loading and 3 times the static weight in vertical loading (see Appendix G of the ASME Code).

§ 178.337-14 Gauging devices.

- (a) Liquid level gauging devices. See § 173.315(h) of this subchapter.
- (b) Pressure gauges. See §§ 173.33(g) (7) and 173.315(h) of this subchapter.
- (c) Orifices. See § 173.315(h) (3) and (4) of this subchapter.

§ 178.337-15 Pumps and compressors. See § 173.33(g) (6) and (10) of this subchapter.

This amendment is effective March 31, 1974. However, immediate compliance with the regulations as amended herein is authorized immediately.

(Sec. 831-835, Title 18, United States Code; sec. 9 Department of Transportation Act (49 U.S.C. 1657).)

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