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Title 49 —Transportation

Subtitle B —Other Regulations Relating to Transportation

Chapter I —Pipeline and Hazardous Materials Safety Administration, Department of Transportation

Subchapter C —Hazardous Materials Regulations

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PART 180—CONTINUING QUALIFICATION AND MAINTENANCE OF PACKAGINGS

Authority: 49 U.S.C. 5101-5128; 49 CFR 1.81 and 1.97.

Source: Amdt. 180-2, 54 FR 25032, June 12, 1989, unless otherwise noted.

Subpart A—General

§ 180.1 Purpose and scope.

This part prescribes requirements pertaining to the maintenance, reconditioning, repair, inspection and testing of packagings, and any other function having an effect on the continuing qualification and use of a packaging under the requirements of this subchapter.

§ 180.2 Applicability.

- (a) Any person who performs a function prescribed in this part shall perform that function in accordance with this part.
- (b) Any person who performs a function prescribed in this part is considered subject to the regulations of this subchapter when that person—
 - (1) Makes any representation indicating compliance with one or more of the requirements of this part; or
 - (2) Reintroduces into commerce a packaging that bears markings indicating compliance with this part.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended by Amdt. 180-2, 56 FR 27877, June 17, 1991]

§ 180.3 General requirements.

- (a) No person may represent, mark, certify, sell, or offer a packaging or container as meeting the requirements of this part, or a special permit pertaining to this part issued under subchapter A of this chapter, whether or not the packaging or container is intended to be used for the transportation of a hazardous material, unless it is marked, maintained, reconditioned, repaired, or retested, as appropriate, in accordance with this part, an approval issued thereunder, or a special permit issued under subchapter A of this chapter.
- (b) The representations, markings, and certifications subject to the prohibitions of paragraph (a) of this section include:
 - (1) Identifications that include the letters “DOT”, “MC”, “ICC”, or “UN”;
 - (2) Special permit, approval, and registration numbers that include the letters “DOT”;
 - (3) Test dates displayed in association with specification, registration, approval, or exemption markings indicating conformance to a test or retest requirement of this subchapter, an approval issued thereunder, or a special permit issued under subchapter A of this chapter;
 - (4) Documents indicating conformance to the testing, inspection, maintenance or other continuing qualification requirements of this part; and
 - (5) Sales literature, including advertising, indicating that the packaging or container represented therein conforms to requirements contained in subchapter A or C of this chapter.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended by Amdt. 180-3, 58 FR 33306, June 16, 1993; 70 FR 73166, Dec. 9, 2005]

Subpart B [Reserved]

Subpart C—Qualification, Maintenance and Use of Cylinders

Source: 67 FR 51660, Aug. 8, 2002, unless otherwise noted.

§ 180.201 Applicability.

This subpart prescribes requirements, in addition to those contained in parts 107, 171, 172, 173, and 178 of this chapter, for the continuing qualification, maintenance, or periodic requalification of DOT specification and exemption cylinders and UN pressure receptacles.

[71 FR 33894, June 12, 2006]

§ 180.203 Definitions.

As used in this section, the word “cylinder” includes UN pressure receptacles. In addition to the definitions contained in § 171.8 of this subchapter, the following definitions apply to this subpart:

Commercially free of corrosive components means a hazardous material having a moisture content less than 55 ppm and free of components that will adversely react with the cylinder (e.g., chemical stress corrosion).

Condemn means a determination that a cylinder is unserviceable for the continued transportation of hazardous materials in commerce and that the cylinder may not be restored by repair, rebuilding, requalification, or any other procedure.

Filled or charged means an introduction or presence of a hazardous material in a cylinder.

Mobile unit means a vehicle specifically authorized under a RIN to carry out requalification operations identified under the RIN within specified geographic areas away from the principle place of business. Mobile units must comply with the requirements outlined in the approval issuance letter from the Associate Administrator for Hazardous Materials Safety (see § 107.805 of subchapter A of this chapter).

Non-corrosive service means a hazardous material that, in the presence of moisture, is not corrosive to the materials of construction of a cylinder (including valve, pressure relief device, etc.).

Over-heated means a condition in which the temperature of any portion of an aluminum cylinder has reached 176 °C (350 °F) or higher, or in which the temperature of any portion of a steel or nickel cylinder has reached 343 °C (650 °F) or higher.

Over-pressurized means a condition in which the internal pressure applied to a cylinder has reached or exceeded the yield point of the cylinder.

Permanent expansion means a permanent increase in a cylinder's volume after the test pressure is released.

Proof pressure test means a liquid-based pressure test by interior pressurization without the determination of a cylinder's expansion.

Rebuild means the replacement of a pressure part (e.g. a wall, head, or pressure fitting) by welding.

Repair means a procedure for correction of a rejected cylinder that may involve welding.

Requalification means the completion of a visual inspection and/or the test(s) required to be performed on a cylinder to determine its suitability for continued service.

Requalification identification number or RIN means a code assigned by DOT to uniquely identify a cylinder requalification, repair, or rebuilding facility.

[67 FR 51660, Aug. 8, 2002, as amended at 71 FR 33894, June 12, 2006; 85 FR 85432, Dec. 28, 2020]

§ 180.205 General requirements for requalification of specification cylinders.

- (a) **General.** Each cylinder used for the transportation of hazardous materials must be an authorized packaging. To qualify as an authorized packaging, each cylinder must conform to this subpart, the applicable requirements specified in part 173 of this subchapter, and the applicable requirements of subpart C of part 178 of this subchapter.
- (b) **Persons performing requalification functions.** No person may represent that a repair or requalification of a cylinder has been performed in accordance with the requirements in this subchapter unless that person holds a current approval issued under the procedural requirements prescribed in subpart I of part 107 of this chapter. No person may mark a cylinder with a RIN and a requalification date or otherwise represent that a DOT specification or special permit cylinder has been requalified unless all applicable requirements of this subpart have been met. A person who requalifies cylinders must maintain the records prescribed in § 180.215 at each location at which it inspects, tests, or marks cylinders.
- (c) **Periodic requalification of cylinders.** Each cylinder bearing a DOT, CRC, BTC, or CTC specification marking must be requalified and marked as specified in the requalification table in § 180.209(a) or requalified and marked by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter). Each cylinder bearing both a TC specification marking and also marked with a corresponding DOT specification marking must be requalified and marked as specified in the requalification table in § 180.209(a) or requalified and marked by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations. Each cylinder bearing a DOT special permit (or exemption) number must be requalified and marked in conformance with this section and the terms of the applicable special permit (or exemption). Each cylinder bearing only a TC mark must be requalified and marked as specified in the Transport Canada TDG Regulations, except that registration with Transport Canada is not required and cylinders must be marked with the requalifier's DOT issued requalifier identification number. No cylinder may be filled with a hazardous material and offered for transportation in commerce unless that cylinder has been successfully requalified and marked in accordance with this subpart. A cylinder may be requalified at any time during or before the month and year that the requalification is due. However, a cylinder filled before the requalification becomes due may remain in service until it is emptied. A cylinder with a specified service life may not be refilled and offered for transportation after its authorized service life has expired.
 - (1) Each cylinder that is requalified in accordance with the requirements specified in this section must be marked in accordance with § 180.213 or the requirements of the Transport Canada TDG Regulations, or in the case of a TC cylinder requalified in the United States by a DOT RIN holder, in accordance with the requirements of the Transport Canada TDG Regulations except that registration with Transport Canada is not required and cylinders must be marked with the requalifiers DOT issued requalifier identification number.
 - (2) Each cylinder that fails requalification must be:
 - (i) Rejected and may be repaired or rebuilt in accordance with § 180.211 or § 180.212, as appropriate; or
 - (ii) Condemned in accordance with paragraph (i) of this section.

- (3) For DOT specification cylinders, the marked service pressure may be changed upon approval of the Associate Administrator and in accordance with written procedures specified in the approval.
 - (4) For a specification 3, 3A, 3AA, 3AL, 3AX, 3AAX, 3B, 3BN, or 3T cylinder filled with gases in other than Division 2.2, from the first requalification due on or after December 31, 2003, the burst pressure of a CG-1, CG-4, or CG-5 pressure relief device must be at test pressure with a tolerance of plus zero to minus 10%. An additional 5% tolerance is allowed when a combined rupture disc is placed inside a holder. This requirement does not apply if a CG-2, CG-3 or CG-9 thermally activated relief device or a CG-7 reclosing pressure valve is used on the cylinder.
 - (5) Each 3-series specification cylinder that is horizontally mounted on a motor vehicle or in a framework and that is: 12 feet or longer; has an outside diameter greater than or equal to 18 inches; and is supported by the neck mounting surface during transportation in commerce must be inspected at the time of requalification in accordance with CGA C-23 (IBR, see § 171.7 of this subchapter).
- (d) **Conditions requiring test and inspection of cylinders.** Without regard to any other periodic requalification requirements, a cylinder must be tested and inspected in accordance with this section prior to further use if—
- (1) The cylinder shows evidence of dents, corrosion, cracked or abraded areas, leakage, or any other condition that might render it unsafe for use in transportation;
 - (2) The cylinder has been in an accident and has been damaged to an extent that may adversely affect its lading retention capability;
 - (3) The cylinder shows evidence of or is known to have thermal damage, or have been over-heated;
 - (4) Except in association with an authorized repair, evidence of removal of wall thickness via grinding, sanding or other means;
 - (5) For a cylinder subject to paragraph (c)(5) of this section, if there is visible corrosion around the neck or under the flange/sleeve, as outlined in Section 4.2 of CGA C-23, it must be removed and examined in accordance with CGA C-23 before being returned to service; or
 - (6) The Associate Administrator determines that the cylinder may be in an unsafe condition.
- (e) **Cylinders containing Class 8 (corrosive) liquids.** A cylinder previously containing a Class 8 (corrosive) liquid may not be used to transport a Class 2 material in commerce unless the cylinder is—
- (1) Visually inspected, internally and externally, in accordance with paragraph (f) of this section and the inspection is recorded as prescribed in § 180.215;
 - (2) Requalified in accordance with this section, regardless of the date of the previous requalification. When requalification is performed using ultrasonic examination, the cylinder must be visually inspected in accordance with paragraph (e)(1) of this section;
 - (3) Marked in accordance with § 180.213; and
 - (4) Decontaminated to remove all significant residue or impregnation of the Class 8 material.
- (f) **Visual inspection.** Except as otherwise provided in this subpart, each time a cylinder is pressure tested, it must be given an internal and external visual inspection.

- (1) The visual inspection must be performed in accordance with the following standards (all IBR, see § 171.7 of this subchapter): CGA C-6 for steel and nickel cylinders; CGA C-6.1 for seamless aluminum cylinders; CGA C-6.2 for fiber reinforced composite special permit cylinders; CGA C-6.3 for low pressure aluminum cylinders; CGA C-8 for DOT 3HT cylinders; and CGA C-13 for DOT 8 series cylinders.
- (2) If a cylinder or tube is requalified by ultrasonic examination, only an external visual inspection is required.
- (3) For each cylinder with a coating or attachments that would inhibit inspection of the cylinder, the coating or attachments must be removed before performing the visual inspection.
- (4) Each cylinder subject to visual inspection must be approved, rejected, or condemned according to the criteria in the applicable CGA standard.
- (5) In addition to other requirements prescribed in this paragraph (f), each specification cylinder manufactured of aluminum alloy 6351-T6 and used in self-contained underwater breathing apparatus (SCUBA), self-contained breathing apparatus (SCBA), or oxygen service must be inspected for sustained load cracking in accordance with appendix C to this part at the first scheduled five-year requalification period after January 1, 2007, and every five years thereafter.
- (6) Except in association with an authorized repair, removal of wall thickness via grinding, sanding, or other means is not permitted. Removal of paint or loose material to prepare the cylinder for inspection is permitted (*i.e.*, shot blasting).
- (7) Chasing of cylinder threads to clean them is permitted, but removal of metal must not occur. Re-tapping of cylinder threads is not permitted, except by the original manufacturer, as provided in § 180.212.

(g) **Pressure test.**

- (1) Unless otherwise provided, each cylinder required to be retested under this subpart must be retested by means suitable for measuring the expansion of the cylinder under pressure. Testing must be performed in accordance with CGA C-1 (except for paragraph 5.3.2.2, if the required accuracy of the pressure indicating device can be demonstrated by other recognized means such as calibration certificates) (IBR, see § 171.7 of this subchapter).
- (2) The pressure indicating device and expansion indicating device must meet the resolution requirements of CGA C-1. Midpoint visual interpolation is allowed.
- (3) Each day before retesting, the retester shall confirm, by using a calibrated cylinder or other method authorized in writing by the Associate Administrator, that:
 - (i) The pressure-indicating device, as part of the retest apparatus, is accurate within $\pm 1.0\%$ of the prescribed test pressure of any cylinder tested that day. The pressure indicating device, itself, must be certified as having an accuracy of $\pm 0.5\%$, or better, of its full range, and must permit readings of pressure from 90%-110% of the minimum prescribed test pressure of the cylinder to be tested. The accuracy of the pressure indicating device within the test system can be demonstrated at any point within 500 psig of the actual test pressure for test pressures at or above 3000 psig, or 10% of the actual test pressure for test pressures below 3000 psig.
 - (ii) The expansion-indicating device, as part of the retest apparatus, meets the accuracy requirements of CGA C-1.

- (4) Test equipment must be verified each day before retesting as required in CGA C-1.
 - (i) The retester must demonstrate calibration in conformance with this paragraph (g) to an authorized inspector on any day that it retests cylinders.
 - (ii) A retester must maintain calibrated cylinder certificates in conformance with § 180.215(b)(4).
- (5) A system check may be performed at or below 90% of test pressure prior to the retest. In the case of a malfunction of the test equipment or operator error, the test may be repeated in accordance with CGA C-1, section 5.7.1. This paragraph (g) does not authorize retest of a cylinder otherwise required to be condemned under paragraph (i) of this section.
- (h) **Ultrasonic examination (UE).** Requalification of cylinders and tubes using UE must be performed in accordance with CGA C-20 (IBR, see § 171.7 of this subchapter).
- (i) **Cylinder rejection.** A cylinder must be rejected when, after a visual inspection, it meets a condition for rejection under the visual inspection requirements of paragraph (f) of this section.
 - (1) Except as provided in paragraphs (i)(3) and (4) of this section, a cylinder that is rejected may not be marked as meeting the requirements of this section.
 - (2) The requalifier must notify the cylinder owner, in writing, that the cylinder has been rejected.
 - (3) Unless the cylinder is repaired or rebuilt in conformance with requirements in § 180.211, it may not be filled with a hazardous material and offered for transportation where use of a specification packaging is required.
 - (4) A rejected cylinder with a service pressure of less than 900 psig may be requalified and marked if the cylinder is repaired or rebuilt and subsequently inspected and tested in conformance with—
 - (i) The visual inspection requirements of paragraph (f) of this section;
 - (ii) Part 178 of this subchapter and this part;
 - (iii) Any special permit covering the manufacture, requalification, and/or use of that cylinder; and
 - (iv) Any approval required under § 180.211.
- (j) **Cylinder condemnation.**
 - (1) A cylinder must be condemned when—
 - (i) The cylinder meets a condition for condemnation under the visual inspection requirements of paragraph (f) of this section.
 - (ii) The cylinder leaks through its wall.
 - (iii) Evidence of cracking exists to the extent that the cylinder is likely to be weakened appreciably.
 - (iv) For a DOT specification cylinder, other than a DOT 4E aluminum cylinder or a special permit cylinder, permanent expansion exceeds 10 percent of total expansion.
 - (v) For a DOT 3HT cylinder—
 - (A) The pressure test yields an elastic expansion exceeding the marked rejection elastic expansion (REE) value.
 - (B) The cylinder shows evidence of denting or bulging.

- (C) The cylinder bears a manufacture or an original test date older than twenty-four years or after 4380 pressurizations, whichever occurs first. If a cylinder is refilled, on average, more than once every other day, an accurate record of the number of rechargings must be maintained by the cylinder owner or the owner's agent.
 - (vi) For a DOT 4E aluminum cylinder, permanent expansion exceeds 12 percent of total expansion.
 - (vii) For a DOT special permit cylinder, permanent expansion exceeds the limit in the applicable special permit, or the cylinder meets another criterion for condemnation in the applicable special permit.
 - (viii) For an aluminum or an aluminum-lined composite special permit cylinder, the cylinder is known to have been or shows evidence of having been overheated. Arc burns must be considered evidence of overheating.
 - (ix) The cylinder is known to have been or shows evidence of having been over-pressurized.
 - (x) For a cylinder with a specified service life, its authorized service life has expired.
 - (xi) The cylinder has been stamped on the sidewall, except as provided in part 178 of this subchapter.
- (2) When a cylinder must be condemned, the requalifier must—
- (i) Communicate condemnation of the cylinder as follows:
 - (A) Stamp a series of Xs over the DOT-specification number and the marked pressure or stamp “CONDEMNED” on the shoulder, top head, or neck using a steel stamp;
 - (B) For composite cylinders, securely affix to the cylinder a label with the word “CONDEMNED” overcoated with epoxy near, but not obscuring, the original cylinder manufacturer's label; or
 - (C) As an alternative to the stamping or labeling as described in this paragraph (j)(2), at the direction of the owner, the requalifier may render the cylinder incapable of holding pressure. If a condemned cylinder contains hazardous materials, the requalifier must stamp the cylinder “CONDEMNED” and affix a readily visible label on the cylinder stating: “UN REJECTED, RETURNING TO ORIGIN FOR PROPER DISPOSITION.” The requalifier may only transport the condemned cylinder by private motor vehicle carriage to a facility capable of safely removing the contents of the cylinder.
 - (ii) Notify the cylinder owner, in writing, that the cylinder is condemned and may not be filled with hazardous material and offered for transportation in commerce where use of a specification packaging is required.
- (3) No person may remove, obliterate, or alter the required condemnation communication of paragraph (j)(2) of this section.
- (k) **Training materials.** Training materials may be used for training persons who requalify cylinders using the volumetric expansion test method.

[67 FR 51660, Aug. 8, 2002, as amended at 68 FR 24662, May 8, 2003; 68 FR 75764, Dec. 31, 2003; 70 FR 34077, June 13, 2005; 70 FR 73166, Dec. 9, 2005; 71 FR 51128, Aug. 29, 2006; 73 FR 4720, Jan. 28, 2008; 75 FR 53597, Sept. 1, 2010; 82 FR 15896, Mar. 30, 2017; 85 FR 85433, Dec. 28, 2020; 89 FR 15666, Mar. 4, 2024]

§ 180.207 Requirements for requalification of UN pressure receptacles.

(a) *General.*

- (1) Each UN pressure receptacle used for the transportation of hazardous materials must conform to the requirements prescribed in paragraphs (a), (b) and (d) in § 180.205.
- (2) No pressure receptacle due for requalification may be filled with a hazardous material and offered for transportation in commerce unless that pressure receptacle has been successfully requalified and marked in accordance with this subpart or requalified and marked by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter). A pressure receptacle may be requalified at any time during or before the month and year that the requalification is due. However, a pressure receptacle filled before the requalification becomes due may remain in service until it is emptied. In accordance with the Transport Canada TDG Regulations a CAN marked UN cylinder may be requalified in the United States by a domestic requalifier, provided the requirements in §§ 178.69, 178.70, and 178.71, as applicable, are met.
- (3) A pressure receptacle with a specified service life may not be requalified after its authorized service life has expired. A pressure receptacle with a specified service life may not be refilled and offered for transportation after its authorized service life has expired unless approval has been obtained in writing from the Associate Administrator.

(b) *Periodic requalification of UN pressure receptacles.*

- (1) Each pressure receptacle that is successfully requalified in accordance with the requirements specified in this section must be marked in accordance with § 180.213. The requalification results must be recorded in accordance § 180.215.
- (2) Each pressure receptacle that fails requalification must be rejected or condemned in accordance with the applicable ISO requalification standard.

- (c) *Requalification interval.* Each UN pressure receptacle that becomes due for periodic requalification must be requalified at the interval specified in the following table before it is filled:

TABLE 1—REQUALIFICATION INTERVALS OF UN PRESSURE RECEPTACLES

Interval (years)	UN pressure receptacles/hazardous materials
10	Pressure receptacles for all hazardous materials except as noted below (also for dissolved acetylene, see paragraph (d)(3) of this section):
5	Composite pressure receptacles.
5	Metal hydride storage systems
5	Pressure receptacles used for: All Division 2.3 materials. UN1013, Carbon dioxide. UN1043, Fertilizer ammoniating solution with free ammonia.

Interval (years)	UN pressure receptacles/hazardous materials
5	UN1051, Hydrogen cyanide, stabilized containing less than 3% water. UN1052, Hydrogen fluoride, anhydrous. UN1745, Bromine pentafluoride. UN1746, Bromine trifluoride. UN2073, Ammonia solution. UN2495, Iodine pentafluoride. UN2983, Ethylene Oxide and Propylene oxide mixture, not more than 30% ethylene oxide. Pressure receptacles used for adsorbed gases.

(d) **Requalification procedures.** Each UN pressure receptacle must be requalified in conformance with the procedures contained in the following standards, as applicable. Furthermore, when a pressure test is performed on a UN pressure receptacle, the test must be a water jacket volumetric expansion test suitable for the determination of the cylinder expansion or a hydraulic proof pressure test. The test equipment must conform to the accuracy requirements in § 180.205(g). Alternative methods (e.g., acoustic emission) or requalification procedures may be performed if prior approval has been obtained in writing from the Associate Administrator.

(1) **Seamless steel.**

(i) Each seamless steel UN pressure receptacle, including pressure receptacles exceeding 150 L capacity installed in multiple-element gas containers (MEGCs) or in other service, must be requalified in accordance with ISO 6406:2005(E) (IBR, see § 171.7 of this subchapter). However, UN cylinders with a tensile strength greater than or equal to 950 MPa must be requalified by ultrasonic examination in accordance with ISO 6406:2005(E). For seamless steel cylinders and tubes, the internal inspection and hydraulic pressure test may be replaced by a procedure conforming to ISO 16148:2016(E) (IBR, see § 171.7 of this subchapter).

(ii) Each seamless steel UN pressure receptacle that is horizontally mounted on a motor vehicle or in a framework and that: is 12 feet or longer; has an outside diameter greater than or equal to 18 inches; and is supported by a neck mounting surface during transportation must be inspected at the time of requalification in accordance with CGA C-23 (IBR, see § 171.7 of this subchapter). Notwithstanding the periodic inspection, if the seamless steel UN pressure receptacle shows visible corrosion, as outlined in Section 4.2 of CGA C-23, around the neck or under the flange/sleeve, then it must be removed and examined in accordance with Section 6 of CGA C-23 prior to returning to service.

(2) **Seamless UN aluminum:** Each seamless aluminum UN pressure receptacle must be requalified in accordance with ISO 10461 (IBR, see § 171.7 of this subchapter).

(3) **Dissolved acetylene UN cylinders:** Each dissolved acetylene cylinder must be requalified in accordance with ISO 10462:2013(E)/Amd 1:2019 (IBR, see § 171.7 of this subchapter). However, a cylinder may continue to be requalified in accordance with ISO 10462:2013(E) (IBR, see § 171.7 of this subchapter) without the supplemental amendment until December 31, 2024. Further, a cylinder requalified in accordance with ISO 10462:2013(E) until December 31, 2018, may continue to be used

until its next required requalification. The porous mass and the shell must be requalified no sooner than three (3) years, six (6) months, from the date of manufacture. Thereafter, subsequent requalifications of the porous mass and shell must be performed at least once every 10 years.

- (4) **Composite UN cylinders:** Each composite cylinder must be inspected and tested in accordance with ISO 11623:2015(E) (IBR, see § 171.7 of this subchapter). Until December 31, 2020, ISO 11623:2002(E) (IBR, see § 171.7 of this subchapter) may be used.
- (5) **UN cylinders for adsorbed gases:** Each UN cylinder for adsorbed gases must be inspected and tested in accordance with § 173.302c of this subchapter and ISO 11513:2019(E) (IBR, see § 171.7 of this subchapter). However, a UN cylinder may continue to be requalified in accordance with ISO 11513:2011(E) (IBR, see § 171.7 of this subchapter) until December 31, 2024.
- (6) **Valves:** Inspection and maintenance of cylinder valves must be carried out in accordance with ISO 22434:2006 Transportable gas cylinders—Inspection and maintenance of cylinder valves (IBR, see § 171.7 of this subchapter).
- (7) **UN cylinder bundles:** UN cylinder bundles containing compressed, liquefied, and dissolved gas must be inspected and tested in accordance with ISO 20475:2018(E) (IBR, see § 171.7 of this subchapter).
- (8) **UN pressure drums:** UN pressure drums must be inspected and tested in accordance with ISO 23088:2020 (IBR, see § 171.7 of this subchapter).

[71 FR 33894, June 12, 2006, as amended at 71 FR 54397, Sept. 14, 2006; 76 FR 3389, Jan. 19, 2011; 80 FR 1168, Jan. 8, 2015; 82 FR 15897, Mar. 30, 2017; 85 FR 27901, May 11, 2020; 85 FR 85434, Dec. 28, 2020; 86 FR 45000, July 26, 2022; 89 FR 15667, Mar. 4, 2024; 89 FR 25490, Apr. 10, 2024]

§ 180.209 Requirements for requalification of specification cylinders.

- (a) **Periodic qualification of cylinders.** Each specification cylinder that becomes due for periodic requalification, as specified in the following table, must be requalified and marked in conformance with the requirements of this subpart. Requalification records must be maintained in accordance with § 180.215. Table 1 follows:

TABLE 1 TO PARAGRAPH (a)—REQUALIFICATION OF CYLINDERS¹

Specification under which cylinder was made	Minimum test pressure (psig) ²	Requalification period (years)
3	3000 psig	5.
3A, 3AA	5/3 times service pressure, except non-corrosive service (see § 180.209(g))	5, 10, or 12 (see § 180.209(b), (f), (h), and (j)).
3AL	5/3 times service pressure	5 or 12 (see § 180.209(j) and (m) ⁴).
3AX, 3AAX	5/3 times service pressure	5.
3B, 3BN	2 times service pressure (see § 180.209(g))	5 or 10 (see § 180.209(f)).
3E	Test not required	
3HT	5/3 times service pressure	3 (see §§ 180.209(k) and 180.213(c)).
3T	5/3 times service pressure or UE ³	5.
4AA480	2 times service pressure (see § 180.209(g))	5 or 10 (see § 180.209(h)).
4B, 4BA, 4BW, 4B-240ET	2 times service pressure, except non-corrosive service (see § 180.209(g))	5, 7, 10, or 12 (see § 180.209(e), (f), and (j)).
4D, 4DA, 4DS	2 times service pressure	5.
4E	2 times service pressure, except non-corrosive service (see § 180.209(g))	5, 10, or 12 (see § 180.209(e)).
4L	Test not required	

¹ Any cylinder not exceeding two inches outside diameter and less than two feet in length is excepted from volumetric expansion test.

² For cylinders not marked with a service pressure, see § 173.301a(b) of this subchapter.

³ Minimum test pressure is not applicable to those cylinders and tubes requalified using ultrasonic examination.

⁴ This provision does not apply to cylinders used for carbon dioxide, fire extinguisher, or other industrial gas service.

Specification under which cylinder was made	Minimum test pressure (psig) ²	Requalification period (years)
8, 8AL		10 or 20 (see § 180.209(i)).
Exemption or special permit cylinder	See current exemption or special permit, or UE ³ as allowed by CGA C-20 (2014)	See current exemption or special permit.
Foreign cylinder (see § 173.301(j) of this subchapter for restrictions on use)	As marked on cylinder, but not less than 5/3 of any service or working pressure marking	5 (see §§ 180.209(l) and 180.213(d)(2)).

¹ Any cylinder not exceeding two inches outside diameter and less than two feet in length is excepted from volumetric expansion test.

² For cylinders not marked with a service pressure, see § 173.301a(b) of this subchapter.

³ Minimum test pressure is not applicable to those cylinders and tubes requalified using ultrasonic examination.

⁴ This provision does not apply to cylinders used for carbon dioxide, fire extinguisher, or other industrial gas service.

TABLE 1 TO PARAGRAPH (a)—REQUALIFICATION OF CYLINDERS¹

Specification under which cylinder was made	Minimum test pressure (psig) ²	Requalification period (years)
3	3000 psig	5.
3A, 3AA	5/3 times service pressure, except non-corrosive service (see § 180.209(g))	5, 10, or 12 (see § 180.209(b), (f), (h), and (j)).
3AL	5/3 times service pressure	5 or 12 (see § 180.209(j) and (m) ⁴).
3AX, 3AAX	5/3 times service pressure	5.

¹ Any cylinder not exceeding two inches outside diameter and less than two feet in length is excepted from volumetric expansion test.

² For cylinders not marked with a service pressure, see § 173.301a(b) of this subchapter.

³ Minimum test pressure is not applicable to those cylinders and tubes requalified using ultrasonic examination.

⁴ This provision does not apply to cylinders used for carbon dioxide, fire extinguisher, or other industrial gas service.

Specification under which cylinder was made	Minimum test pressure (psig) ²	Requalification period (years)
3B, 3BN	2 times service pressure (see § 180.209(g))	5 or 10 (see § 180.209(f)).
3E	Test not required	
3HT	5/3 times service pressure	3 (see §§ 180.209(k) and 180.213(c)).
3T	5/3 times service pressure or UE ³	5.
4AA480	2 times service pressure (see § 180.209(g))	5 or 10 (see § 180.209(h)).
4B, 4BA, 4BW, 4B-240ET	2 times service pressure, except non-corrosive service (see § 180.209(g))	5, 7, 10, or 12 (see § 180.209(e), (f), and (j)).
4D, 4DA, 4DS	2 times service pressure	5.
4E	2 times service pressure, except non-corrosive service (see § 180.209(g))	5, 10, or 12 (see § 180.209(e)).
4L	Test not required	
8, 8AL		10 or 20 (see § 180.209(i)).
Exemption or special permit cylinder	See current exemption or special permit, or UE ³ as allowed by CGA C-20 (2014)	See current exemption or special permit.
Foreign cylinder (see § 173.301(j) of this subchapter for restrictions on use)	As marked on cylinder, but not less than 5/3 of any service or working pressure marking	5 (see §§ 180.209(l) and 180.213(d)(2)).

¹ Any cylinder not exceeding two inches outside diameter and less than two feet in length is excepted from volumetric expansion test.

² For cylinders not marked with a service pressure, see § 173.301a(b) of this subchapter.

³ Minimum test pressure is not applicable to those cylinders and tubes requalified using ultrasonic examination.

⁴ This provision does not apply to cylinders used for carbon dioxide, fire extinguisher, or other industrial gas service.

(b) DOT 3A or 3AA cylinders.

- (1) A cylinder conforming to specification DOT 3A or 3AA with a water capacity of 56.7 kg (125 lb) or less that is removed from any cluster, bank, group, rack, or vehicle each time it is filled, may be requalified every ten years instead of every five years, provided the cylinder conforms to all of the following conditions:

- (i) The cylinder was manufactured after December 31, 1945.

- (ii) The cylinder is used exclusively for air; argon; cyclopropane; ethylene; helium; hydrogen; krypton; neon; nitrogen; nitrous oxide; oxygen; sulfur hexafluoride; xenon; chlorinated hydrocarbons, fluorinated hydrocarbons, liquefied hydrocarbons, and mixtures thereof that are commercially free from corroding components; permitted mixtures of these gases (see § 173.301(d) of this subchapter); and permitted mixtures of these gases with up to 30 percent by volume of carbon dioxide, provided the gas has a dew point at or below minus (52 °F) at 1 atmosphere.
 - (iii) [Reserved]
 - (iv) The cylinder is dried immediately after hydrostatic testing to remove all traces of water.
 - (v) The cylinder is not used for underwater breathing.
 - (vi) Each cylinder is stamped with a five-pointed star at least one-fourth of an inch high immediately following the test date.
- (2) If, since the last required requalification, a cylinder has not been used exclusively for the gases specifically identified in paragraph (b)(1)(ii) of this section, but currently conforms with all other provisions of paragraph (b)(1) of this section, it may be requalified every 10 years instead of every five years, provided it is first requalified and examined as prescribed by § 173.302a(b) (2), (3) and (4) of this subchapter.
- (3) Except as specified in paragraph (b)(2) of this section, if a cylinder, marked with a star, is filled with a compressed gas other than as specified in paragraph (b)(1)(ii) of this section, the star following the most recent test date must be obliterated. The cylinder must be requalified five years from the marked test date, or prior to the first filling with a compressed gas, if the required five-year requalification period has passed.
- (c) **DOT 4-series cylinders.** A DOT 4-series cylinder, except a 4L cylinder, that at any time shows evidence of a leak, internal or external corrosion, denting, bulging or rough usage to the extent that it is likely to be weakened appreciably, or that has lost 5 percent or more of its official tare weight must be requalified before being refilled and offered for transportation. (Refer to CGA C-6 or C-6.3 (IBR, see § 171.7 of this subchapter), as applicable, regarding cylinder weakening.) After testing, the actual tare weight must be recorded as the new tare weight on the test report and marked on the cylinder. The previous tare weight must be strike-lined through, but not obliterated.
- (d) **Cylinders 5.44 kg (12 lb) or less with service pressures of 300 psig or less.** A cylinder of 5.44 kg (12 lb) or less water capacity authorized for service pressure of 300 psig or less must be given a complete external visual inspection at the time periodic requalification becomes due. External visual inspection must be in accordance with CGA C-6 or CGA C-6.1 (IBR, see § 171.7 of this subchapter). The cylinder may be proof pressure tested. The test is successful if the cylinder, when examined under test pressure, does not display a defect described in § 180.205(j)(1)(ii) or (iii). Upon successful completion of the test and inspection, the cylinder must be marked in accordance with § 180.213.
- (e) **Cylinders in non-corrosive gas service.** A cylinder made in conformance with DOT Specifications 4B, 4BA, 4BW, or 4E protected externally by a suitable corrosion-resistant coating and used exclusively for non-corrosive gas that is commercially free from corroding components may be requalified by volumetric expansion testing every 12 years instead of every 5 years. As an alternative, the cylinder may be subjected to a proof pressure test at least two times the marked service pressure, but this latter type of test must be

repeated every 10 years after expiration of the initial 12-year period. When subjected to a proof pressure test, as prescribed in CGA C-1 (IBR, see § 171.7 of this subchapter), the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

- (f) **Poisonous materials.** A cylinder conforming to specification DOT 3A, 3AA, 3B, 4BA, or 4BW having a service pressure of 300 psig or less and used exclusively for methyl bromide, liquid; mixtures of methyl bromide and ethylene dibromide, liquid; mixtures of methyl bromide and chlorpicrin, liquid; mixtures of methyl bromide and petroleum solvents, liquid; or methyl bromide and nonflammable, nonliquefied compressed gas mixtures, liquid; commercially free of corroding components, and protected externally by a suitable corrosion resistant coating (such as galvanizing or painting) and internally by a suitable corrosion resistant lining (such as galvanizing) may be tested every 10 years instead of every five years, provided a visual internal and external examination of the cylinder is conducted every five years in accordance with CGA Pamphlet C-6. The cylinder must be examined at each filling, and rejected if a dent, corroded area, leak or other condition indicates possible weakness.
- (g) **Visual inspections.** A cylinder conforming to a specification listed in the table in this paragraph (g) and used exclusively in the service indicated may, instead of a periodic hydrostatic test, be given a complete external visual inspection at the time periodic requalification becomes due. External visual inspection must be in conformance with CGA C-6 or C-6.3, as applicable. When this inspection is used instead of hydrostatic testing, subsequent inspections are required at five-year intervals after the first inspection. Inspections must be made only by persons holding a current RIN and the results recorded and maintained in conformance with § 180.215. Records must include: Date of inspection (month and year); DOT-specification number; cylinder identification (registered symbol and serial number, date of manufacture, and owner); type of cylinder protective coating (including statement as to need of refinishing or recoating); conditions checked (e.g., leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footring or protective ring or fire damage); and disposition of cylinder (returned to service, returned to cylinder manufacturer for repairs or condemned). A cylinder passing requalification by the external visual inspection must be marked in conformance with § 180.213. Specification cylinders must be in exclusive service as shown in table 2 to this paragraph (g):

TABLE 2 TO PARAGRAPH (g)

Cylinders conforming to—	Used exclusively for—
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4AA480	Anhydrous ammonia of at least 99.95% purity.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Butadiene, inhibited, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4AA480, DOT 4B, DOT 4BA, DOT 4BW	Cyclopropane that is commercially free from corroding components.

Cylinders conforming to—	Used exclusively for—
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Chlorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Fluorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Liquefied hydrocarbon gas that is commercially free of corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Liquefied petroleum gas that meets the detail requirements limits in Table 1 of ASTM 1835, Standard Specification for Liquefied Petroleum (LP) Gases (incorporated by reference; see § 171.7 of this subchapter) or an equivalent standard containing the same limits.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Methylacetylene-propadiene, stabilized, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Propylene that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Anhydrous mono, di, trimethylamines that are commercially free from corroding components.
DOT 4B240, DOT 4BW240	Ethyleneimine, stabilized.
DOT 4BW	Alkali metal alloys, liquid, n.o.s., Alkali metal dispersions or Alkaline earth metal dispersions, Potassium, Potassium Sodium alloys and Sodium that are commercially free of corroding components.

(h) **Cylinders containing anhydrous ammonia.** A cylinder conforming to specification DOT 3A, 3A480X, or 4AA480 used exclusively for anhydrous ammonia, commercially free from corroding components, and protected externally by a suitable corrosion-resistant coating (such as paint) may be requalified every 10 years instead of every five years.

(i) **Requalification of DOT-8 series cylinders.**

- (1) Each owner of a DOT-8 series cylinder used to transport acetylene must have the cylinder shell and the porous filler requalified in accordance with CGA Pamphlet C-13 (IBR, see § 171.7 of this subchapter). Requalification must be performed in accordance with the following schedule:

Date of cylinder manufacture	Shell (visual inspection) requalification		Porous filler requalification	
	Initial	Subsequent	Initial	Subsequent
Before January 1, 1991	Before January 1, 2001	10 years	Before January 1, 2011	Not required.
On or after January 1, 1991	10 years ¹	10 years	5 to 20 years ²	Not required.

¹ Years from the date of cylinder manufacture.

² No sooner than 5 years, and no later than 20 years from the date of manufacture.

- (2) Unless requalified and marked in accordance with CGA Pamphlet C-13 before October 1, 1994, an acetylene cylinder must be requalified by a person who holds a current RIN.
- (3) If a cylinder valve is replaced, a cylinder valve of the same weight must be used or the tare weight of the cylinder must be adjusted to compensate for valve weight differential.
- (4) The person performing a visual inspection or requalification must record the results as specified in § 180.215.
- (5) The person performing a visual inspection or requalification must mark the cylinder as specified in § 180.213.
- (j) **Cylinder used as a fire extinguisher.** Only a DOT-specification cylinder used as a fire extinguisher in conformance with § 173.309(a) of this subchapter may be requalified in conformance with this paragraph (j). The testing procedures, calibration of the testing equipment, accuracy of the pressure indicating device, accuracy of the testing equipment must be as prescribed in CGA C-1.
- (1) A DOT 4B, 4BA, 4B240ET or 4BW cylinder used as a fire extinguisher may be tested as follows:
- (i) For a cylinder with a water capacity of 5.44 kg (12 pounds) or less, by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C-1. A requalification must be performed by the end of 12 years after the original test date and at 12-year intervals thereafter.
- (A) Each cylinder must be tested to a minimum of two (2) times service pressure.
- (B) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.
- (C) When testing using the proof pressure test method, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

- (ii) For a cylinder having a water capacity over 5.44 kg (12 pounds), by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C-1. For the water-jacket or direct expansion test, the requalification must be performed by the end of 12 years after the original test date and at 12-year intervals thereafter. For the proof-pressure test, a requalification must be performed by the end of 12 years after the original test date and at seven (7) year intervals.
 - (A) Each cylinder must be tested to a minimum of two (2) times service pressure.
 - (B) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.
 - (C) When testing using the proof pressure test method, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.
- (2) A DOT 3A, 3AA, or 3AL cylinder must be requalified by:
 - (i) The water-jacket or direct expansion method. A requalification must be performed 12 years after the original test date and at 12-year intervals thereafter.
 - (ii) Each cylinder must be tested to a minimum of $\frac{5}{3}$ times service pressure.
 - (iii) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.
- (k) **3HT cylinders.** In addition to the other requirements of this section, a cylinder marked DOT-3HT must be requalified in accordance with CGA C-8 (IBR, see § 171.7 of this subchapter).
- (l) **Requalification of foreign cylinders filled for export.** A cylinder manufactured outside the United States, other than as provided in §§ 171.12(a) and 171.23(a) of this subchapter, that has not been manufactured, inspected, tested and marked in accordance with part 178 of this subchapter may be filled with compressed gas in the United States, and shipped solely for export if it meets the following requirements, in addition to other requirements of this subchapter:
 - (1) It has been inspected, tested and marked in conformance with the procedures and requirements of this subpart or the Associate Administrator has authorized the filling company to fill foreign cylinders under an alternative method of qualification; and
 - (2) It is offered for transportation in conformance with the requirements of §§ 171.12(a)(4) or 171.23(a)(5) of this subchapter.
- (m) **DOT-3AL cylinders manufactured of 6351-T6 aluminum alloy.** In addition to the periodic requalification and marking described in § 180.205, each cylinder manufactured of aluminum alloy 6351-T6 used in self-contained underwater breathing apparatus (SCUBA), self-contained breathing apparatus (SCBA), or oxygen service must be requalified and inspected for sustained load cracking in accordance with the non-destructive examination method described in the following table. Each cylinder with sustained load

cracking that has expanded into the neck threads must be condemned in accordance with § 180.205(j). This paragraph (m) does not apply to cylinders used for carbon dioxide, fire extinguisher, or other industrial gas service.

TABLE 4 TO PARAGRAPH (M)—REQUALIFICATION AND INSPECTION OF DOT-3AL CYLINDERS MADE OF ALUMINUM ALLOY 6351-T6

Requalification requirement	Examination procedure ¹	Sustained Load Cracking Condemnation Criteria ²	Requalification period (years)
Eddy current examination combined with visual inspection	Eddy current—In accordance with Appendix C of this part Visual inspection—In accordance with CGA Pamphlet C-6.1 (IBR; see § 171.7 of this subchapter)	Any crack in the neck or shoulder of 2 thread lengths or more	5

¹ The requalifier performing eddy current must be familiar with the eddy current equipment and must standardize (calibrate) the system in accordance with the requirements provided in Appendix C to this part.

² The eddy current must be applied from the inside of the cylinder's neck to detect any sustained load cracking that has expanded into the neck threads.

[67 FR 51660, Aug. 8, 2002, as amended at 68 FR 24662, May 8, 2003; 68 FR 55544, Sept. 26, 2003; 68 FR 48572, Aug. 14, 2003; 68 FR 75764, Dec. 31, 2003; 70 FR 73166, Dec. 9, 2005; 71 FR 51128, Aug. 29, 2005; 72 FR 55696, Oct. 1, 2007; 74 FR 53189, Oct. 16, 2009; 81 FR 3685, Jan. 21, 2016; 81 FR 35545, June 2, 2016; 85 FR 68797, Oct. 30, 2020; 85 FR 75716, Nov. 25, 2020; 85 FR 85434, Dec. 28, 2020; 89 FR 15667, Mar. 4, 2024]

Editorial Note: At 71 FR 54397, Sept. 14, 2006, § 180.209 was amended in (a)(1) table 1; however, because of the inaccurate amendatory language, the amendment could not be incorporated.

§ 180.211 Repair, rebuilding and reheat treatment of DOT-4 series specification cylinders.

- (a) **General requirements for repair and rebuilding.** Any repair or rebuilding of a DOT-4 series cylinder must be performed by a person holding an approval as specified in § 107.805 of this chapter or by a registered facility in Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter). A person performing a rebuild function is considered a manufacturer subject to the requirements of § 178.2(a)(2) and subpart C of part 178 of this subchapter. The person performing a repair, rebuild, or reheat treatment must record the test results as specified in § 180.215. Each cylinder that is successfully repaired or rebuilt must be marked in accordance with § 180.213.
- (b) **General repair requirements.** Each repair of a DOT 4-series cylinder must be made in accordance with the following conditions:

- (1) The repair and the inspection of the work performed must be made in accordance with the requirements of the cylinder specification.
- (2) The person performing the repair must use the procedure, equipment, and filler metal or brazing material as authorized by the approval issued under § 107.805 of this chapter.
- (3) Welding and brazing must be performed on an area free from contaminants.
- (4) A weld defect, such as porosity in a pressure retaining seam, must be completely removed before re-welding. Puddling may be used to remove a weld defect only by the tungsten inert gas shielded arc process.
- (5) After removal of a non-pressure attachment and before its replacement, the cylinder must be given a visual inspection in accordance with § 180.205(f).
- (6) Reheat treatment of DOT 4B, 4BA or 4BW specification cylinders after replacement of non-pressure attachments is not required when the total weld material does not exceed 20.3 cm (8 inches). Individual welds must be at least 7.6 cm (3 inches) apart.
- (7) After repair of a DOT 4B, 4BA or 4BW cylinder, the weld area must be leak tested at the service pressure of the cylinder.
- (8) Repair of weld defects must be free of cracks.
- (9) When a non-pressure attachment with the original cylinder specification markings is replaced, all markings must be transferred to the attachment on the repaired cylinder.
- (10) Walls, heads or bottoms of cylinders with defects or leaks in base metal may not be repaired, but may be replaced as provided for in paragraph (d) of this section.

(c) Additional repair requirements for 4L cylinders.

- (1) Repairs to a DOT 4L cylinder must be performed in accordance with paragraphs (a) and (b) of this section and are limited to the following:
 - (i) The removal of either end of the insulation jacket to permit access to the cylinder, piping system, or neck tube.
 - (ii) The replacement of the neck tube. At least a 13 mm (0.51 inch) piece of the original neck tube must be protruding above the cylinder's top end. The original weld attaching the neck tube to the cylinder must be sound and the replacement neck tube must be welded to this remaining piece of the original neck tube.
 - (iii) The replacement of material such as, but not limited to, the insulating material and the piping system within the insulation space is authorized. The replacement material must be equivalent to that used at the time of original manufacture.
 - (iv) Other welding procedures that are permitted by CGA Pamphlet C-3 (IBR, see § 171.7 of this subchapter), and not excluded by the definition of "rebuild," are authorized.
- (2) After repair, the cylinder must be—
 - (i) Pressure tested in accordance with the specifications under which the cylinder was originally manufactured;

- (ii) Leak tested before and after assembly of the insulation jacket using a mass spectrometer detection system; and
- (iii) Tested for heat conductivity requirements.

(d) **General rebuilding requirements.**

- (1) The rebuilding of a DOT 4-series cylinder must be made in accordance with the following requirements:
 - (i) The person rebuilding the cylinder must use the procedures and equipment as authorized by the approval issued under § 107.805 of this chapter.
 - (ii) After removal of a non-pressure component and before replacement of any non-pressure component, the cylinder must be visually inspected in accordance with CGA Pamphlet C-6 (IBR, see § 171.7 of this subchapter).
 - (iii) The rebuilder may rebuild a DOT 4B, 4BA or 4BW cylinder having a water capacity of 9.07 kg (20 lb) or greater by replacing a head of the cylinder using a circumferential joint. When this weld joint is located at other than an original welded joint, a notation of this modification must be shown on the Manufacturer's Report of Rebuilding in § 180.215(c)(2). The weld joint must be on the cylindrical section of the cylinder.
 - (iv) Any welding and the inspection of the rebuilt cylinder must be in accordance with the requirements of the applicable cylinder specification and the following requirements:
 - (A) Rebuilding of any cylinder involving a joint subject to internal pressure may only be performed by fusion welding;
 - (B) Welding must be performed on an area free from contaminants; and
 - (C) A weld defect, such as porosity in a pressure retaining seam, must be completely removed before re-welding. Puddling may be used to remove a weld defect only by using the tungsten inert gas shielded arc process.
- (2) Any rebuilt cylinder must be—
 - (i) Heat treated in accordance with paragraph (f) of this section;
 - (ii) Subjected to a volumetric expansion test on each cylinder. The results of the tests must conform to the applicable cylinder specification;
 - (iii) Inspected and have test data reviewed to determine conformance with the applicable cylinder specification; and
 - (iv) Made of material conforming to the specification. Determination of conformance shall include chemical analysis, verification, inspection and tensile testing of the replaced part. Tensile tests must be performed on the replaced part after heat treatment by lots defined in the applicable specification.
- (3) For each rebuilt cylinder, an inspector's report must be prepared to include the information listed in § 180.215(c).
- (4) Rebuilding a cylinder with brazed seams is prohibited.

- (5) When an end with the original cylinder specification markings is replaced, all markings must be transferred to the rebuilt cylinder.

(e) **Additional rebuilding requirements for DOT 4L cylinders.**

- (1) The rebuilding of a DOT 4L cylinder must be performed in accordance with paragraph (d) of this section. Rebuilding of a DOT 4L cylinder is:
 - (i) Substituting or adding material in the insulation space not identical to that used in the original manufacture of that cylinder;
 - (ii) Making a weld repair not to exceed 150 mm (5.9 inches) in length on the longitudinal seam of the cylinder or 300 mm (11.8 inches) in length on a circumferential weld joint of the cylinder; or
 - (iii) Replacing the outer jacket.
- (2) Reheat treatment of cylinders is prohibited.
- (3) After rebuilding, each inner containment vessel must be proof pressure tested at 2 times its service pressure. Each completed assembly must be leak-tested using a mass spectrometer detection system.

(f) **Reheat treatment.**

- (1) Prior to reheat treatment, each cylinder must be given a visual inspection, internally and externally, in accordance with § 180.205(f).
- (2) Cylinders must be segregated in lots for reheat treatment. The reheat treatment and visual inspection must be performed in accordance with the specification for the cylinders except as provided in paragraph (f)(4) of this section.
- (3) After reheat treatment, each cylinder in the lot must be subjected to a volumetric expansion test and meet the acceptance criteria in the applicable specification or be scrapped.
- (4) After all welding and heat treatment, a test of the new weld must be performed as required by the original specification. The test results must be recorded in accordance with § 180.215.

(g) **Repair, rebuilding and reheat treatment in Canada.** Repair, rebuilding, or reheat treatment of a DOT-4 series specification cylinder performed by a registered facility in Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter) is authorized.

[67 FR 51660, Aug. 8, 2002, as amended at 68 FR 24664, May 8, 2003; 68 FR 75764, Dec. 31, 2003; 71 FR 54398, Sept. 14, 2006; 82 FR 15897, Mar. 30, 2017]

§ 180.212 Repair of seamless DOT 3-series specification cylinders and seamless UN pressure receptacles.

(a) **General requirements for repair of DOT 3-series cylinders and UN pressure receptacles.**

- (1) No person may repair a DOT 3-series cylinder or a seamless UN pressure receptacle unless—
 - (i) The repair facility holds an approval issued under the provisions in § 107.805 of this chapter; and

- (ii) Except as provided in paragraph (b) of this section, the repair and the inspection is performed under the provisions of an approval issued under subpart H of part 107 of this chapter or by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations (IBR; see § 171.7 of this subchapter) and conform to the applicable cylinder specification or ISO standard contained in part 178 of this subchapter.
- (2) The person performing the repair must prepare a report containing, at a minimum, the results prescribed in § 180.215.
- (3) If grinding is performed on a DOT 3-series cylinder or a seamless UN pressure receptacle, the following conditions apply after grinding has been completed. Grinding must not be used to remove arc burns from a cylinder, as such a cylinder must be condemned:
 - (i) Ultrasonic examination must be conducted to ensure that the wall thickness is not less than the minimum design requirement. The wall thickness must be measured in at least 3 different areas for every 10 square inches of grinding area.
 - (ii) The cylinder must be requalified in conformance with § 180.205.
 - (iii) The cylinder must be marked in accordance with § 180.213(f)(10) to indicate compliance with this paragraph (a)(3).
- (4) DOT 3-series seamless steel tubes with an outside diameter greater than $9\frac{5}{8}$ in (244.5 mm) may be processed by a repair facility for derating the marked service pressure in accordance with CGA C-27 (IBR, see § 171.7 of this subchapter).

(b) **Repairs not requiring prior approval.** Approval is not required for the following specific repairs:

- (1) The removal and replacement of a neck ring or foot ring on a DOT 3A, 3AA or 3B cylinder or a UN pressure receptacle that does not affect a pressure part of the cylinder when the repair is performed by a repair facility or a cylinder manufacturer of these types of cylinders. The repair may be made by welding or brazing in conformance with the original specification. After removal and before replacement, the cylinder must be visually inspected and any defective cylinder must be rejected. The heat treatment, testing and inspection of the repair must be performed under the supervision of an inspector and must be performed in accordance with the original specification.
- (2) External rethreading of a DOT 3AX, 3AAX, or 3T specification cylinder or a UN pressure receptacle, and external threading of a seamless DOT 3AX, 3AAX, or 3T specification cylinder or seamless UN pressure receptacle originally manufactured without external threads; or the internal rethreading of a DOT-3 series cylinder or a seamless UN pressure receptacle when performed by a cylinder manufacturer of these types of cylinders. The repair work must be performed under the supervision of an independent inspection agency. Upon completion of the rethreading or post-manufacture threading, the threads must be gauged in accordance with Federal Standard H-28 or an equivalent standard containing the same specification limits. The rethreaded cylinder or UN pressure receptacle must be stamped clearly and legibly with the words "RETHREAD" and a post-manufacture threaded cylinder or UN pressure receptacle must be stamped clearly and legibly with the words "POST-THREAD", on the shoulder, top head, or neck. No DOT specification cylinder or UN pressure receptacle may be rethreaded more than one time without approval of the Associate Administrator.

[71 FR 33895, June 12, 2006, as amended at 71 FR 54398, Sept. 14, 2006; 72 FR 55697, Oct. 1, 2007; 82 FR 15897, Mar. 30, 2017; 85 FR 85435, Dec. 28, 2020; 89 FR 15668, Mar. 4, 2024]

§ 180.213 Requalification markings.

- (a) **General.** Each cylinder or UN pressure receptacle requalified in accordance with this subpart with acceptable results must be marked as specified in this section. Required specification markings may not be altered or removed.
- (b) **Placement of markings.** Each cylinder must be plainly and permanently marked on the metal of the cylinder as permitted by the applicable specification. Unless authorized by the cylinder specification, marking on the cylinder sidewall is prohibited.
 - (1) Requalification and required specification markings must be legible so as to be readily visible at all times. Illegible specification markings may be remarked on the cylinder as provided by the original specification. Requalification markings may be placed on any portion of the upper end of the cylinder excluding the sidewall, as provided in this section. Requalification and required specification markings that are illegible may be reproduced on a metal plate and attached as provided by the original specification.
 - (2) Previous requalification markings may not be obliterated, except that, when the space originally provided for requalification dates becomes filled, additional dates may be added as follows:
 - (i) All preceding requalification dates may be removed by peening provided that—
 - (A) Permission is obtained from the cylinder owner;
 - (B) The minimum wall thickness is maintained in accordance with manufacturing specifications for the cylinder; and
 - (C) The original manufacturing test date is not removed.
 - (ii) When the cylinder is fitted with a footring, additional dates may be marked on the external surface of the footring.
- (c) **Requalification marking method.** The depth of requalification markings may not be greater than specified in the applicable specification. The markings must be made by stamping, engraving, scribing or applying a label embedded in epoxy that will remain legible and durable throughout the life of the cylinder, or by other methods that produce a legible, durable mark.
 - (1) A cylinder used as a fire extinguisher (see § 180.209(j)) may be marked by using a pressure sensitive label.
 - (2) For a DOT 3HT cylinder, when stamped, the test date and RIN must be applied by low-stress steel stamps to a depth no greater than that prescribed at the time of manufacture. Stamping on the sidewall is not authorized.
 - (3) For a composite cylinder, the requalification markings must be applied on a pressure sensitive label, securely affixed and overcoated with epoxy in a manner prescribed by the cylinder manufacturer, near the original manufacturer's label. Stamping of the composite surface is not authorized.
- (d) **Requalification markings.** Each cylinder successfully passing requalification must be marked with the RIN set in a square pattern, between the month and year of the requalification date. The first character of the RIN must appear in the upper left corner of the square pattern; the second in the upper right; the third in the lower right; and the fourth in the lower left. Example: A cylinder requalified in September 2006, and approved by a person who has been issued RIN "A123", would be marked plainly and permanently into the

metal of the cylinder in accordance with location requirements of the cylinder specification or on a metal plate permanently secured to the cylinder in accordance with paragraph (b) of this section. An example of the markings prescribed in this paragraph (d) is as follows:

A1

9 06 X

32

Where:

"9" is the month of requalification

"A123" is the RIN

"06" is the year of requalification, and

"X" represents the symbols described in paragraphs (f)(2) through (f)(8) of this section.

- (1) Upon written request, variation from the marking requirement may be approved by the Associate Administrator.
- (2) A cylinder subject to the requirements of § 171.23(a)(5) of this subchapter must be marked with the date and RIN in accordance with this paragraph (d) and paragraph (f)(11) of this section, or marked in accordance with the requalification authorized by the Associate Administrator in accordance with § 171.23(a)(5)(i) of this subchapter.
- (e) **Size of markings.** The size of the markings must be at least 6.35 mm ($\frac{1}{4}$ in.) high, except RIN characters must be at least 3.18 mm ($\frac{1}{8}$ in.) high.
- (f) **Marking illustrations.** Examples of required requalification markings for DOT specification and special permit cylinders are illustrated as follows:
 - (1) For designation of the 5-year volumetric expansion test, 10-year volumetric expansion test for UN cylinders and cylinders conforming to § 180.209(f) and (h), or 12-year volumetric expansion test for fire extinguishers conforming to § 173.309(a) of this subchapter and cylinders conforming to § 180.209(e) and (g), the marking is as illustrated in paragraph (d) of this section.
 - (2) For designation of the 10-year volumetric expansion test for cylinders conforming to § 180.209(b), the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with a five-point star.
 - (3) For designation of special filling limits up to 10% in excess of the marked service pressure for cylinders conforming to § 173.302a(b) of this subchapter, the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with a plus sign "+".
 - (4) For designation of the proof pressure test, the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the letter "S".
 - (5) For designation of the 5-year external visual inspection for cylinders conforming to § 180.209(g), the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the letter "E".

- (6) For designation of DOT 8 series cylinder shell requalification only, the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the letter "S".
- (7) For designation of DOT 8 series and UN cylinder shell and porous filler requalification, the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the letters "FS."
- (8) For designation of a nondestructive examination combined with a visual inspection, the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the type of test performed, for example the letters "AE" for acoustic emission or "UE" for ultrasonic examination.
- (9) For designation of the eddy current examination combined with a visual inspection, the marking is as illustrated in paragraph (d) of this section, except the "X" is replaced with the letters "VE."
- (10) For designation of grinding with ultrasonic wall thickness examination, the marking is as illustrated in paragraph (d) of this section, except the "X" is replaced with the letter "R".
- (11) For designation of requalification of a foreign cylinder requalified in conformance with §§ 171.23(a)(5) of this subchapter and 180.209(l), the marking is as illustrated in paragraph (d) of this section, except that the "X" is replaced with the letters "EX" to indicate that the cylinder is for export only.

- (g) **Visual inspection requalification markings.** (1) Alternative to the marking requirements of paragraphs (d) and (f)(5) of this section, each cylinder successfully passing a visual inspection only, in accordance with § 180.209(g), may be marked with the visual inspection number (e.g., V123456) issued to a person performing visual inspections. Examples of the way the markings may be applied are as follows:

Figure 2 to Paragraph (g)(1)

03 V123 14 E 654	V123456 0314 E
0314 E V123456	V123456 0314E
0314 E V123456	

(2) Where:

- (i) "03" is the month of requalification (the additional numeral "0" is optional);
- (ii) "V123456" is the RIN;
- (iii) "14" is the year of requalification; and
- (iv) "E" to indicate visual inspection.

[67 FR 51660, Aug. 8, 2002, as amended at 70 FR 73166, Dec. 9, 2005; 71 FR 33896, June 12, 2006; 71 FR 51128, Aug. 29, 2006; 71 FR 78635, Dec. 29, 2006; 75 FR 53597, Sept. 1, 2010; 80 FR 72929, Nov. 23, 2015; 81 FR 3686, Jan. 21, 2016; 85 FR 75716, Nov. 25, 2020; 85 FR 85435, Dec. 28, 2020]

§ 180.215 Reporting and record retention requirements.

- (a) **Facility records.** A person who requalifies, repairs or rebuilds cylinders must maintain the following records where the requalification is performed:
- (1) Current RIN issuance letter;
 - (2) If the RIN has expired and renewal is pending, a copy of the renewal request;
 - (3) Copies of notifications to Associate Administrator required under § 107.805 of this chapter;
 - (4) Current copies of those portions of this subchapter applicable to its cylinder requalification and marking activities at that location;
 - (5) Current copies of all special permits governing exemption cylinders requalified or marked by the qualifier at that location; and
 - (6) The information contained in each applicable CGA or ASTM standard incorporated by reference in § 171.7 of this subchapter applicable to the qualifier's activities.
- (b) **Requalification records.** Daily records of visual inspection, pressure test, eddy current examination if required, and ultrasonic examination if permitted under a special permit, as applicable, must be maintained by the person who performs the requalification until either the expiration of the requalification period or until the cylinder is again requalified, whichever occurs first. A single date may be used for each test sheet, provided each test on the sheet was conducted on that date. Ditto marks or a solid vertical line may be used to indicate repetition of the preceding entry for the following entries only: Date; actual dimensions; manufacturer's name or symbol, if present; owner's name or symbol, if present; and test operator. Blank spaces may not be used to indicate repetition of a prior entry. A symbol may be used for the actual dimensions if there is a reference chart available at the facility that lists the actual dimensions of every symbol used. The records must include the following information:
- (1) **Calibration test records.** For each test to demonstrate calibration, the date; serial number of the calibrated cylinder; calibration test pressure; total, elastic and permanent expansions; and legible identification of test operator. The test operator must be able to demonstrate that the results of the daily calibration verification correspond to the hydrostatic tests performed on that day. The daily verification of calibration(s) may be recorded on the same sheets as, and with, test records for that date, or may be recorded on a separate sheet.
 - (2) **Pressure test and visual inspection records.** The date of requalification; serial number; DOT-specification or special permit number; marked pressure; actual dimensions; manufacturer's name or symbol, if present; year of manufacture; owner's name or symbol, if present; gas service; result of visual inspection; actual test pressure; total, elastic and permanent expansions; percent permanent expansion; disposition, with reason for any repeated test, rejection or condemnation; and legible identification of test operator. For each cylinder marked pursuant to § 173.302a(b)(5) of this subchapter, the test sheet must indicate the method by which any average or maximum wall stress was computed. Records must be kept for all completed, as well as unsuccessful tests. The entry for a repeated test must indicate the date of the earlier test, if conducted on a different day.
 - (3) **Wall stress.** Calculations of average and maximum wall stress pursuant to § 173.302a(b)(3) of this subchapter, if performed.
 - (4) **Calibration certificates.** The most recent certificate of calibration must be maintained for each calibrated cylinder, pressure indicating device, and expansion indicating device.

(c) *Repair, rebuilding or reheat treatment records.*

- (1) Records covering welding or brazing repairs, rebuilding or reheat treating shall be retained for a minimum of fifteen years by the approved facility.
- (2) A record of rebuilding, in accordance with § 180.211(d), must be completed for each cylinder rebuilt. The record must be clear, legible, and contain the following information:
 - (i) Name and address of test facility, date of test report, and name of original manufacturer;
 - (ii) Marks stamped on cylinder to include specification number, service pressure, serial number, symbol of manufacturer, inspector's mark, and other marks, if any;
 - (iii) Cylinder outside diameter and length in inches;
 - (iv) Rebuild process (welded, brazed, type seams, etc.);
 - (v) Description of assembly and any attachments replaced (e.g., neckrings, footrings);
 - (vi) Chemical analysis of material for the cylinder, including seat and Code No., type of analysis (ladle, check), chemical components (Carbon (C), Phosphorous (P), Sulfur (S), Silicon (Si), Manganese (Mn), Nickel (Ni), Chromium (Cr), Molybdenum (Mo), Copper (Cu), Aluminum (Al), Zinc (Zn)), material manufacturer, name of person performing the analysis, results of physical tests of material for cylinder (yield strength (psi), tensile strength (psi), elongation percentage (inches), reduction in area percentage, weld bend, tensile bend, name of inspector);
 - (vii) Results of a test on a cylinder, including test method, test pressure, total expansion, permanent expansion, elastic expansion, percent permanent expansion (permanent expansion may not exceed ten percent (10 percent) of total expansion), and volumetric capacity (volumetric capacity of a rebuilt cylinder must be within ± 3 percent of the calculated capacity);
 - (viii) Each report must include the following certification statement: "I certify that this rebuilt cylinder is accurately represented by the data above and conforms to all of the requirements in Subchapter C of Chapter I of Title 49 of the Code of Federal Regulations.". The certification must be signed by the rebuild technician and principal, officer, or partner of the rebuild facility.
- (3) A record of grinding and ultrasonic examination in conformance with § 180.212(a)(3) must be completed for each cylinder on which grinding is performed. The record must be clear, legible, and contain the following information:
 - (i) Name and address of the test facility, date of test report, and name or original manufacturer;
 - (ii) Marks stamped on cylinder to include specification number, service pressure, serial number, symbol of manufacturer, and date of manufacture;
 - (iii) Cylinder outside diameter and length in inches;
 - (iv) Detailed map of where the grinding was performed on the cylinder; and
 - (v) Wall thickness measurements in grind area in conformance with § 180.212(a)(3)(i).

[67 FR 51660, Aug. 8, 2002, as amended at 68 FR 24664, May 8, 2003; 70 FR 73166, Dec. 9, 2005; 71 FR 54398, Sept. 14, 2006; 72 FR 55697, Oct. 1, 2007; 85 FR 85436, Dec. 28, 2020]

§ 180.217 Requalification requirements for MEGCs.

- (a) **Periodic inspections.** Each MEGC must be given an initial visual inspection and test in accordance with § 178.75(i) of this subchapter before being put into service for the first time. After the initial inspection, a MEGC must be inspected at least once every five years in accordance with this subpart or by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter).
- (b) **Exceptional inspection and test.** If a MEGC shows evidence of damaged or corroded areas, leakage, or other conditions that indicate a deficiency that could affect the integrity of the MEGC, an exceptional inspection and test must be performed, regardless of the last periodic inspection and test. The extent of the exceptional inspection and test will depend on the amount of damage or deterioration of the MEGC. As a minimum, an exceptional inspection of a MEGC must include inspection as specified in paragraph (a)(1) of this section.
- (c) **Correction of unsafe condition.** When evidence of any unsafe condition is discovered, the MEGC may not be returned to service until the unsafe condition has been corrected and the MEGC has been requalified in accordance with the applicable tests and inspection.
- (d) **Repairs and modifications to MEGCs.** No person may perform a modification to an approved MEGC that may affect conformance to the applicable ISO standard or safe use, and that involve a change to the design type or affect its ability to retain the hazardous material in transportation. Before making any modification changes to an approved MEGC, the owner must obtain approval from the Associate Administrator as prescribed in § 178.74 of this subchapter. The repair of a MEGC's structural equipment is authorized provided such repairs are made in accordance with the requirements prescribed for its approved design and construction. Any repair to the pressure receptacles of a MEGC must meet the requirements of § 180.212.
- (e) **Requalification markings.** Each MEGC must be durably and legibly marked in English, with the year and month, and the type of the most recent periodic requalification performed (e.g., 2004-05 AE/UE, where "AE" represents acoustic emission and "UE" represents ultrasonic examination) followed by the stamp of the approval agency who performed or witnessed the most recent test.
- (f) **Records.** The owner of each MEGC or the owner's authorized agent must retain a written record of the date and results of all repairs and required inspections and tests. The report must contain the name and address of the person performing the inspection or test. The periodic test and inspection records must be retained until the next inspection or test is completed. Repair records and the initial exceptional inspection and test records must be retained during the period the MEGC is in service and for one year thereafter. These records must be made available for inspection by a representative of the Department on request.

[71 FR 33896, June 12, 2006, as amended at 85 FR 27901, May 11, 2020]

Subpart D—Qualification and Maintenance of IBCs

§ 180.350 Applicability and definitions.

This subpart prescribes requirements, in addition to those contained in parts 107, 171, 172, 173 and 178 of this subchapter, applicable to any person responsible for the continuing qualification, maintenance, or periodic retesting of an IBC. The following definitions apply:

- (a) **Remanufactured IBCs** are metal, rigid plastic or composite IBCs produced as a UN type from a non-UN type, or are converted from one UN design type to another UN design type. Remanufactured IBCs are subject to the same requirements of this subchapter that apply to new IBCs of the same type (also see § 178.801(c)(1) of this subchapter for design type definition).
- (b) **Repaired IBCs** are metal, rigid plastic or composite IBCs that, as a result of impact or for any other cause (such as corrosion, embrittlement or other evidence of reduced strength as compared to the design type), are restored so as to conform to the design type and to be able to withstand the design type tests. For the purposes of this subchapter, the replacement of the rigid inner receptacle of a composite IBC with one from the original manufacturer is considered a repair. Routine maintenance of IBCs (see definition in paragraph (c) of this section) is not considered repair. The bodies of rigid plastic IBCs and the inner receptacles of composite IBCs are not repairable.
- (c) Routine maintenance of IBCs is the routine performance on:
 - (1) Metal, rigid plastic or composite IBCs of operations such as:
 - (i) Cleaning;
 - (ii) Removal and reinstallation or replacement of body closures (including associated gaskets), or of service equipment conforming to the original manufacturer's specifications provided that the leaktightness of the IBC is verified; or
 - (iii) Restoration of structural equipment not directly performing a hazardous material containment or discharge pressure retention function so as to conform to the design type (for example, the straightening of legs or lifting attachments), provided the containment function of the IBC is not affected.
 - (2) Plastics or textile flexible IBCs of operations, such as:
 - (i) Cleaning; or
 - (ii) Replacement of non-integral components, such as non-integral liners and closure ties, with components conforming to the original manufacturer's specification; provided that these operations do not adversely affect the containment function of the flexible IBC or alter the design type.

[68 FR 45042, July 31, 2003, as amended at 69 FR 76186, Dec. 20, 2004; 76 FR 3389, Jan. 19, 2011]

§ 180.351 Qualification of IBCs.

- (a) **General.** Each IBC used for the transportation of hazardous materials must be an authorized packaging.
- (b) **IBC specifications.** To qualify as an authorized packaging, each IBC must conform to this subpart, the applicable requirements specified in part 173 of this subchapter, and the applicable requirements of subparts N and O of part 178 of this subchapter.

[Amdt. 180-5, 59 FR 38079, July 26, 1994, as amended at 66 FR 45391, Aug. 28, 2001]

§ 180.352 Requirements for retest and inspection of IBCs.

- (a) **General.** Each IBC constructed in accordance with a UN standard for which a test or inspection specified in paragraphs (b)(1), (b)(2) and (b)(3) of this section is required may not be filled and offered for transportation or transported until the test or inspection has been successfully completed. This paragraph does not apply to any IBC filled prior to the test or inspection due date. The requirements in this section do not apply to DOT 56 and 57 portable tanks.
- (b) **Test and inspections for metal, rigid plastic, and composite IBCs.** Each IBC is subject to the following test and inspections:
 - (1) Each IBC intended to contain solids that are loaded or discharged under pressure or intended to contain liquids must be tested in accordance with the leakproofness test prescribed in § 178.813 of this subchapter prior to its first use in transportation and every 2.5 years thereafter, starting from the date of manufacture or the date of a repair conforming to paragraph (d)(1) of this section. For this test, the IBC is not required to have its closures fitted.
 - (2) An external visual inspection must be conducted initially after production and every 2.5 years starting from the date of manufacture or the date of a repair conforming to paragraph (d)(1) of this section to ensure that:
 - (i) The IBC is marked in accordance with requirements in § 178.703 of this subchapter. Missing or damaged markings, or markings difficult to read must be restored or returned to original condition.
 - (ii) Service equipment is fully functional and free from damage which may cause failure. Missing, broken, or damaged parts must be repaired or replaced.
 - (iii) The IBC is capable of withstanding the applicable design qualification tests. The IBC must be externally inspected for cracks, warpage, corrosion or any other damage which might render the IBC unsafe for transportation. An IBC found with such defects must be removed from service or repaired in accordance with paragraph (d) of this section. The inner receptacle of a composite IBC must be removed from the outer IBC body for inspection unless the inner receptacle is bonded to the outer body or unless the outer body is constructed in such a way (e.g., a welded or riveted cage) that removal of the inner receptacle is not possible without impairing the integrity of the outer body. Defective inner receptacles must be replaced in accordance with paragraph (d) of this section or the entire IBC must be removed from service. For metal IBCs, thermal insulation must be removed to the extent necessary for proper examination of the IBC body.
 - (3) Each metal, rigid plastic and composite IBC must be internally inspected at least every five years to ensure that the IBC is free from damage and to ensure that the IBC is capable of withstanding the applicable design qualification tests.
 - (i) The IBC must be internally inspected for cracks, warpage, and corrosion or any other defect that might render the IBC unsafe for transportation. An IBC found with such defects must be removed from hazardous materials service until restored to the original design type of the IBC.
 - (ii) Metal IBCs must be inspected to ensure the minimum wall thickness requirements in § 178.705(c)(1)(iv) of this subchapter are met. Metal IBCs not conforming to minimum wall thickness requirements must be removed from hazardous materials service.

- (c) **Visual inspection for flexible, fiberboard, or wooden IBCs.** Each IBC must be visually inspected prior to first use and permitted reuse, by the person who places hazardous materials in the IBC, to ensure that:
- (1) The IBC is marked in accordance with requirements in § 178.703 of this subchapter. Additional marking allowed for each design type may be present. Required markings that are missing, damaged or difficult to read must be restored or returned to original condition.
 - (2) Proper construction and design specifications have been met.
 - (i) Each flexible IBC must be inspected to ensure that:
 - (A) Lifting straps if used, are securely fastened to the IBC in accordance with the design type.
 - (B) Seams are free from defects in stitching, heat sealing or gluing which would render the IBC unsafe for transportation of hazardous materials. All stitched seam-ends must be secure.
 - (C) Fabric used to construct the IBC is free from cuts, tears and punctures. Additionally, fabric must be free from scoring which may render the IBC unsafe for transport.
 - (ii) Each fiberboard IBC must be inspected to ensure that:
 - (A) Fluting or corrugated fiberboard is firmly glued to facings.
 - (B) Seams are creased and free from scoring, cuts, and scratches.
 - (C) Joints are appropriately overlapped and glued, stitched, taped or stapled as prescribed by the design. Where staples are used, the joints must be inspected for protruding staple-ends which could puncture or abrade the inner liner. All such ends must be protected before the IBC is authorized for hazardous materials service.
 - (iii) Each wooden IBC must be inspected to ensure that:
 - (A) End joints are secured in the manner prescribed by the design.
 - (B) IBC walls are free from defects in wood. Inner protrusions which could puncture or abrade the liner must be covered.
- (d) **Requirements applicable to repair of IBCs.**
- (1) Except for flexible and fiberboard IBCs and the bodies of rigid plastic and composite IBCs, damaged IBCs may be repaired and the inner receptacles of composite packagings may be replaced and returned to service provided:
 - (i) The repaired IBC conforms to the original design type, is capable of withstanding the applicable design qualification tests, and is retested and inspected in accordance with the applicable requirements of this section;
 - (ii) An IBC intended to contain liquids or solids that are loaded or discharged under pressure is subjected to a leakproofness test as specified in § 178.813 of this subchapter and is marked with the date of the test; and
 - (iii) The IBC is subjected to the internal and external inspection requirements as specified in paragraph (b) of this section.
 - (iv) The person performing the tests and inspections after the repair must durably mark the IBC near the manufacturer's UN design type marking to show the following:

- (A) The country in which the tests and inspections were performed;
 - (B) The name or authorized symbol of the person performing the tests and inspections; and
 - (C) The date (month, year) of the tests and inspections.
- (v) Retests and inspections performed in accordance with paragraphs (d)(1)(i) and (ii) of this section may be used to satisfy the requirements for the 2.5 and five year periodic tests and inspections required by paragraph (b) of this section, as applicable.
- (2) Except for flexible and fiberboard IBCs, the structural equipment of an IBC may be repaired and returned to service provided:
 - (i) The repaired IBC conforms to the original design type and is capable of withstanding the applicable design qualification tests; and
 - (ii) The IBC is subjected to the internal and external inspection requirements as specified in paragraph (b) of this section.
- (3) Service equipment may be replaced provided:
 - (i) The repaired IBC conforms to the original design type and is capable of withstanding the applicable design qualification tests;
 - (ii) The IBC is subjected to the external visual inspection requirements as specified in paragraph (b) of this section; and
 - (iii) The proper functioning and leak tightness of the service equipment, if applicable, is verified.
- (e) **Requirements applicable to routine maintenance of IBCs.** Except for routine maintenance of metal, rigid plastics and composite IBCs performed by the owner of the IBC, whose State and name or authorized symbol is durably marked on the IBC, the party performing the routine maintenance shall durably mark the IBC near the manufacturer's UN design type marking to show the following:
 - (1) The country in which the routine maintenance was carried out; and
 - (2) The name or authorized symbol of the party performing the routine maintenance.
- (f) **Retest date.** The date of the most recent periodic retest must be marked as provided in § 178.703(b) of this subchapter.
- (g) **Record retention.**
 - (1) The owner or lessee of the IBC must keep records of periodic retests, initial and periodic inspections, and tests performed on the IBC if it has been repaired or remanufactured.
 - (2) Records must include design types and packaging specifications, test and inspection dates, name and address of test and inspection facilities, names or name of any persons conducting test or inspections, and test or inspection specifics and results.
 - (3) Records must be kept for each packaging at each location where periodic tests are conducted, until such tests are successfully performed again or for at least 2.5 years from the date of the last test. These records must be made available for inspection by a representative of the Department on request.

[Amdt. 180-5, 59 FR 38079, July 26, 1994, as amended at 64 FR 10782, Mar. 5, 1999; 65 FR 58632, Sept. 29, 2000; 66 FR 45186, 45391, Aug. 28, 2001; 68 FR 45042, July 31, 2003; 69 FR 76186, Dec. 20, 2004; 70 FR 34399, June 14, 2005; 70 FR 56099, Sept. 23, 2005; 71 FR 78635, Dec. 29, 2006]

Subpart E—Qualification and Maintenance of Cargo Tanks

§ 180.401 Applicability.

This subpart prescribes requirements, in addition to those contained in parts 107, 171, 172, 173 and 178 of this subchapter, applicable to any person responsible for the continuing qualification, maintenance or periodic testing of a cargo tank.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 55 FR 37065, Sept. 7, 1990]

§ 180.403 Definitions.

In addition to the definitions contained in §§ 171.8, 178.320(a) and 178.345-1 of this subchapter, the following definitions apply to this subpart:

Corroded or abraded means any visible reduction in the material thickness of the cargo tank wall or valve due to pitting, flaking, gouging, or chemical reaction to the material surface that effects the safety or serviceability of the cargo tank. The term does not include cosmetic or minor surface degradation that does not effect the safety or serviceability of the cargo tank

Corrosive to the tank or valve means that the lading has been shown through experience or test data to reduce the thickness of the material of construction of the tank wall or valve.

Delivery hose assembly means a liquid delivery hose and its attached couplings.

Modification means any change to the original design and construction of a cargo tank or a cargo tank motor vehicle that affects its structural integrity or lading retention capability including changes to equipment certified as part of an emergency discharge control system required by § 173.315(n)(2) of this subchapter. Any modification that involves welding on the cargo tank wall must also meet all requirements for “Repair” as defined in this section. Excluded from this category are the following:

- (1) A change to motor vehicle equipment such as lights, truck or tractor power train components, steering and brake systems, and suspension parts, and changes to appurtenances, such as fender attachments, lighting brackets, ladder brackets; and
- (2) Replacement of components such as valves, vents, and fittings with a component of a similar design and of the same size.

Owner means the person who owns a cargo tank motor vehicle used for the transportation of hazardous materials, or that person's authorized agent.

Piping system means any component of a cargo tank delivery system, other than a delivery hose assembly, that contains product during loading or unloading.

Rebarrelling means replacing more than 50 percent of the combined shell and head material of a cargo tank.

Repair means any welding on a cargo tank wall done to return a cargo tank or a cargo tank motor vehicle to its original design and construction specification, or to a condition prescribed for a later equivalent specification in effect at the time of the repair. Excluded from this category are the following:

- (1) A change to motor vehicle equipment such as lights, truck or tractor power train components, steering and brake systems, and suspension parts, and changes to appurtenances, such as fender attachments, lighting brackets, ladder brackets; and
- (2) Replacement of components such as valves, vents, and fittings with a component of a similar design and of the same size.
- (3) Replacement of an appurtenance by welding to a mounting pad.

Replacement of a barrel means to replace the existing tank on a motor vehicle chassis with an unused (new) tank. For the definition of *tank*, see § 178.320, § 178.345, or § 178.338-1 of this subchapter, as applicable.

Stretching means any change in length, width or diameter of the cargo tank, or any change to a cargo tank motor vehicle's undercarriage that may affect the cargo tank's structural integrity.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 55 FR 37065, Sept. 7, 1990; Amdt. 180-3, 57 FR 45466, Oct. 1, 1992; Amdt. 180-7, 59 FR 55177, Nov. 3, 1994; 60 FR 17402, Apr. 5, 1995; Amdt. 180-10, 61 FR 51342, Oct. 1, 1996; 63 FR 52850, Oct. 1, 1998; 64 FR 28050, May 24, 1999; 68 FR 19286, Apr. 18, 2003; 69 FR 54047, Sept. 7, 2004]

§ 180.405 Qualification of cargo tanks.

- (a) **General.** Unless otherwise provided in this subpart, each cargo tank used for the transportation of hazardous material must be an authorized packaging.
- (b) **Cargo tank specifications.**
 - (1) To qualify as an authorized packaging, each cargo tank must conform to this subpart, the applicable requirements specified in part 173 of this subchapter for the specific lading, and where a DOT specification cargo tank is required, an applicable specification in effect on the date initial construction began: MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, MC 338, DOT 406, DOT 407, or DOT 412 (§§ 178.337, 178.338, 178.345, 178.346, 178.347, 178.348 of this subchapter). However, except as provided in paragraphs (b)(2), (d), (e), (f)(5), and (f)(6) of this section, no cargo tank may be marked or certified after August 31, 1995, to the applicable MC 306, MC 307, MC 312, MC 331, or MC 338 specification in effect on December 30, 1990.
 - (2) **Exception.** A cargo tank originally manufactured to the MC 306, MC 307, or MC 312 specification may be recertified to the original specification provided:
 - (i) Records are available verifying the cargo tank was originally manufactured to the specification;
 - (ii) If the cargo tank was stretched, rebarrelled, or modified, records are available verifying that the stretching, rebarrelling, or modification was performed in accordance with the National Board Inspection Code and this part;
 - (iii) A Design Certifying Engineer or Registered Inspector verifies the cargo tank conforms to all applicable requirements of the original specification and furnishes to the owner written documentation that verifies the tank conforms to the original structural design requirements in effect at the time the tank was originally constructed;
 - (iv) The cargo tank meets all applicable tests and inspections required by § 180.407(c); and

- (v) The cargo tank is recertified to the original specification in accordance with the reporting and record retention provisions of § 180.417. The certification documents required by § 180.417(a)(3) must include both the date the cargo tank was originally certified to the specification and the date it was recertified. The specification plate on the cargo tank or the cargo tank motor vehicle must display the date the cargo tank was originally certified to the specification.

(c) *Cargo tank specifications no longer authorized for construction.*

- (1) A cargo tank made to a specification listed in column 1 of table 1 or table 2 of this paragraph (c)(1) may be used when authorized in this part, provided—
 - (i) The cargo tank initial construction began on or before the date listed in table 1, column 2, as follows:

TABLE 1

Column 1	Column 2
MC 300	Sept. 2, 1967
MC 301	June 12, 1961
MC 302, MC 303, MC 304, MC 305, MC 310, MC 311	Sept. 2, 1967
MC 330	May 15, 1967

- (ii) The cargo tank was marked or certified before the date listed in table 2, column 2, as follows:

TABLE 2

Column 1	Column 2
MC 306, MC 307, MC 312	Sept. 1, 1995

- (2) A cargo tank of a specification listed in paragraph (c)(1) of this section may have its pressure relief devices and outlets modified as follows:
 - (i) A Specification MC 300, MC 301, MC 302, MC 303, or MC 305 cargo tank, to conform with a Specification MC 306 or DOT 406 cargo tank (See §§ 178.346-3 and 178.346-4 of this subchapter).
 - (ii) A Specification MC 306 cargo tank to conform to a Specification DOT 406 cargo tank (See §§ 178.346-3 and 178.346-4 of this subchapter).
 - (iii) A Specification MC 304 cargo tank, to conform with a Specification MC 307 or DOT 407 cargo tank (See §§ 178.347-4 and 178.345-11 of this subchapter).

- (iv) A Specification MC 307 cargo tank, to conform with a Specification DOT 407 cargo tank (See §§ 178.347-4 and 178.345-11 of this subchapter).
- (v) A Specification MC 310 or MC 311 cargo tank, to conform with a Specification MC 312 or DOT 412 cargo tank (See §§ 178.348-4 and 178.345-11 of this subchapter).
- (vi) A Specification MC 312 cargo tank, to conform with a Specification DOT 412 cargo tank (See §§ 178.348-4 and 178.345-11 of this subchapter).
- (vii) A Specification MC 330 cargo tank, to conform with a Specification MC 331 cargo tank, except as specifically required by § 173.315 of this subchapter (see §§ 178.337-8 and 178.337-9 of this subchapter).

(d) **MC 338 cargo tank.** The owner of a cargo tank that conforms to and was used under the terms of an exemption issued before October 1, 1984, that authorizes the transportation of a cryogenic liquid shall remove the exemption number stenciled on the cargo tank and stamp the specification plate (or a plate placed adjacent to the specification plate) "DOT MC 338" followed by the exemption number, for example, "DOT MC 338-E * * * *". (Asterisks to be replaced by the exemption number). The cargo tank must be remarked prior to the expiration date of the exemption. During the period the cargo tank is in service, the owner of a cargo tank that is remarked in this manner must retain at its principal place of business a copy of the last exemption in effect. No new construction of cargo tanks pursuant to such exemption is authorized.

- (1) The holding time must be determined, as required in § 178.338-9 of this subchapter, on each cargo tank or on at least one cargo tank of each design. Any subsequent cargo tank manufactured to the same design type (see § 178.320), if not individually tested, must have the optional test regimen performed during the first shipment (see § 178.338-9 (b) and (c) of this subchapter).
- (2) The holding time determined by test for one authorized cryogenic liquid may be used as the basis for establishing the holding time for other authorized cryogenic liquids.

(e) **MC 331 cargo tanks.** The owner of a MC 331 (§ 178.337 of this subchapter) cargo tank that conforms to and was used under an exemption issued before October 1, 1984, that authorizes the transportation of ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid; or hydrogen chloride, refrigerated liquid shall remove the exemption number stenciled on the cargo tank and stamp the exemption number on the specification plate (or a plate placed adjacent to the specification plate), immediately after the DOT Specification, for example, "DOT MC 331-E * * * *". (Asterisks to be replaced by the exemption number.) The cargo tank must be remarked prior to the expiration date of the exemption. During the period the cargo tank is in service, the owner of a cargo tank that is remarked in this manner must retain at the owner's principal place of business a copy of the last exemption in effect.

(f) **MC 306, MC 307, MC 312 cargo tanks.** Either a Registered Inspector or a Design Certifying Engineer and the owner of a MC 306, MC 307 or MC 312 cargo tank motor vehicle constructed in accordance with and used under an exemption issued before December 31, 1990, that authorizes a condition specified in this paragraph shall examine the cargo tank motor vehicle and its design to determine if it meets the requirements of the applicable MC 306, MC 307 or MC 312 specification in effect at the time of manufacture, except as specified herein.

- (1) A cargo tank motor vehicle constructed after August 1, 1981, or the date specified in the applicable exemption, in conformance with the following conditions that apply, may be remarked and certified in accordance with paragraphs (f) (5) and (6) of this section:

- (i) A vacuum-loaded cargo tank must have an ASME Code stamped specification plate marked with a minimum internal design pressure of 25 psig, and be designed for a minimum external design pressure of 15 psig.
 - (ii) An outlet equipped with a self-closing system which includes an external stop-valve must have the stop valve and associated piping protected within the vehicle's rear-end tank protection device, vehicle frame or an equally adequate accident damage protection device (See § 178.345-8 of this subchapter.) The self-closing system (See § 178.345-11 of this subchapter) must be equipped with a remotely actuated means of closure as follows:
 - (A) For a cargo tank used in other than corrosive service, the remote means of closure must be activated for closure by manual or mechanical means and, in case of fire, by an automatic heat activated means.
 - (B) For a cargo tank used in corrosive service, the remote means of closure may be actuated by manual or mechanical means only.
 - (iii) A cargo tank having an unreinforced portion of the shell exceeding 60 inches must have the circumferential reinforcement located so that the thickness and tensile strength of shell material in combination with the frame and circumferential reinforcement produces a structural integrity at least equal to that prescribed in § 178.345-3 of this subchapter or the specification in effect at time of manufacture.
 - (iv) A cargo tank having a projection from the tank shell or head that may contain lading in any tank position is authorized, provided such projection is as strong as the tank shell or head and is located within the motor vehicle's rear-end tank protection or other appropriate accident damage protection device.
 - (v) A cargo tank may be constructed of nickel, titanium, or other ASME sheet or plate materials in accordance with an exemption.
- (2) A vacuum-loaded cargo tank constructed after August 1, 1981, or the date specified in the applicable exemption, in conformance with paragraph (f)(1) of this section, except that an outlet equipped with an external valve which is not part of a self-closing system:
- (i) Must be equipped with a self-closing system prior to September 1, 1993.
 - (ii) May be remarked and certified in accordance with paragraphs (f)(5) and (6) of this section after the cargo tank motor vehicle has been equipped with the self-closing system.
- (3) A vacuum-loaded cargo tank constructed prior to August 1, 1981, in conformance with paragraph (f)(1) of this section, except for paragraph (f)(1)(i), may be remarked and certified in accordance with paragraphs (f)(5) and (6) of this section.
- (4) A vacuum-loaded cargo tank constructed prior to August 1, 1981, in conformance with paragraph (f)(1) of this section, except for paragraph (f)(1)(i) of this section, and except that an outlet is equipped with an external valve which is not part of a self-closing system:
- (i) Must be equipped with a self-closing system prior to September 1, 1993.
 - (ii) May be remarked and certified in accordance with paragraphs (f)(5) and (6) of this section after the cargo tank motor vehicle has been equipped with the self-closing system.

- (5) The owner of a cargo tank for which a determination has been made that the cargo tank is in conformance with paragraph (f) (1), (2), (3), or (4) of this section shall complete a written certification, in English, signed by the owner and containing at least the following information:
 - (i) A statement certifying that each cargo tank conforms to § 180.405 (f) (1), (2), (3), or (4);
 - (ii) The applicable DOT exemption number, the applicable specification number and the owner's and manufacturer's serial number for the cargo tank;
 - (iii) A statement setting forth any modifications made to bring the cargo tank into conformance with § 180.405(f) (1), (2), (3), or (4), or the applicable specification;
 - (iv) A statement identifying the person certifying the cargo tank and the date of certification.
- (6) The owner of a certified cargo tank shall remove the exemption number stenciled on the cargo tank and shall durably mark the specification plate (or a plate placed adjacent to the specification plate) "MC + + + -E ****#####" (where " + + + " is to be replaced by the applicable specification number, "*" by the exemption number and " # # # #" by the alloy.)
- (7) A cargo tank remarked and certified in conformance with this paragraph (f) is excepted from the provisions of § 180.405(c).
- (8) During the period the cargo tank is in service, and for one year thereafter, the owner of a cargo tank that is certified and remarked in this manner must retain on file at its principal place of business a copy of the certificate and the last exemption in effect.

(g) **Cargo tank manhole assemblies.**

- (1) MC 306, MC 307, and MC 312 cargo tanks marked or certified after December 30, 1990, and DOT 406, DOT 407, and DOT 412 cargo tank motor vehicles must be equipped with manhole assemblies conforming with § 178.345-5 of this subchapter.
- (2) On or before August 31, 1995, each owner of a cargo tank marked or certified before December 31, 1990, authorized for the transportation of a hazardous material, must have the cargo tank equipped with manhole assemblies conforming with § 178.345-5, except for the dimensional requirements in § 178.345-5(a), the hydrostatic testing requirements in § 178.345-5(b), and the marking requirements in § 178.345-5(e) of this subchapter. A manhole assembly meeting one of the following provisions is considered to be in compliance with this paragraph:
 - (i) Manhole assemblies on MC 300, MC 301, MC 302, MC 303, MC 305, MC 306, MC 310, MC 311, and MC 312 cargo tanks that are marked or certified in writing as conforming to § 178.345-5 of this subchapter or TTMA RP No. 61-98 (incorporated by reference; see § 171.7 of this subchapter), or are tested and certified in accordance with TTMA TB No. 107 (incorporated by reference; see § 171.7 of this subchapter).
 - (ii) Manhole assemblies on MC 304 and MC 307 cargo tanks.
 - (iii) Manhole assemblies on MC 310, MC 311, and MC 312 cargo tanks with a test pressure of 36 psig or greater.
- (3) [Reserved]

- (h) **Pressure relief system.** Properly functioning reclosing pressure relief valves and frangible or fusible vents need not be replaced. However, replacement of reclosing pressure relief valves on MC-specification cargo tanks is authorized subject to the following requirements:

- (1) Until August 31, 1998, the owner of a cargo tank may replace a reclosing pressure relief device with a device which is in compliance with the requirements for pressure relief devices in effect at the time the cargo tank specification became superseded. If the pressure relief device is installed as an integral part of a manhole cover assembly, the manhole cover must comply with the requirements of paragraph (g) of this section.
 - (2) After August 31, 1998, replacement for any reclosing pressure relief valve must be capable of reseating to a leak-tight condition after a pressure surge, and the volume of lading released may not exceed 1 L. Specific performance requirements for these pressure relief valves are set forth in § 178.345-10(b)(3) of this subchapter.
 - (3) As provided in paragraph (c)(2) of this section, the owner of a cargo tank may elect to modify reclosing pressure relief devices to more recent cargo tank specifications. However, replacement devices constructed to the requirements of § 178.345-10 of this subchapter must provide the minimum venting capacity required by the original specification to which the cargo tank was designed and constructed.
- (i) **Flammable cryogenic liquids.** Each cargo tank used to transport a flammable cryogenic liquid must be examined after each shipment to determine its actual holding time (See § 173.318(g)(3) of this subchapter.)
 - (j) **Withdrawal of certification.** A specification cargo tank that for any reason no longer meets the applicable specification may not be used to transport hazardous materials unless the cargo tank is repaired and retested in accordance with §§ 180.413 and 180.407 prior to being returned to hazardous materials service. If the cargo tank is not in conformance with the applicable specification requirements, the specification plate on the cargo tank must be removed, obliterated or securely covered. 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.
 - (k) **DOT-specification cargo tank with no marked design pressure or a marked design pressure of less than 3 psig.** The owner of an MC 300, MC 301, MC 302, MC 303, MC 305, MC 306, or MC 312 cargo tank with a pressure relief system set at 3 psig, must mark or remark the cargo tank with an MAWP or design pressure of not less than 3 psig.
 - (l) **MC 300, MC 301, MC 302, MC 303, MC 305, MC 306 cargo tank—Rear accident damage protection.**
 - (1) Notwithstanding the requirements in § 180.405(b), the applicable specification requirement for a rear bumper or rear-end tank protection device on MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 cargo tanks does not apply to a cargo tank truck (power unit) until July 1, 1992, if the cargo tank truck—
 - (i) Was manufactured before July 1, 1989;
 - (ii) Is used to transport gasoline or any other petroleum distillate product; and
 - (iii) Is operated in combination with a cargo tank full trailer. However, an empty cargo tank truck, without a cargo tank full trailer attached, may be operated without the required rear bumper or rear-end tank protection device on a one-time basis while being transported to a repair facility for installation of a rear bumper or rear-end protection device.

(2) Each cargo tank shall be provided with a rear accident damage protection device to protect the tank and piping in the event of a rear-end collision and reduce the likelihood of damage which could result in the loss of lading. The rear-end protection device must be in the form of a rear-end tank protection device meeting the requirements of § 178.345-8(d) or a rear bumper meeting the following:

- (i) The bumper shall be located at least 6 inches to the rear of any vehicle component used for loading or unloading or that may contain lading while the vehicle is in transit.
- (ii) The dimensions of the bumper shall conform to § 393.86 of this title.
- (iii) The structure of the bumper must be designed in accordance with § 178.345-8(d)(3) of this subchapter.

(m) *Specification MC 330, MC 331 cargo tank motor vehicles, and nonspecification cargo tank motor vehicles conforming to § 173.315(k) of this subchapter, intended for use in the transportation of liquefied compressed gases.*

(1) No later than the date of its first scheduled pressure test after July 1, 2001, each specification MC 330 and MC 331 cargo tank motor vehicle, and each nonspecification cargo tank motor vehicle conforming to § 173.315(k) of this subchapter, marked and certified before July 1, 2001, that is used to transport a Division 2.1 material, a Division 2.2 material with a subsidiary hazard, a Division 2.3 material, or anhydrous ammonia must have an emergency discharge control capability as specified in § 173.315(n) of this subchapter. Each passive shut-off system installed prior to July 1, 2001, must be certified by a Design Certifying Engineer that it meets the requirements of § 173.315(n)(2) of this subchapter.

(2) The requirement in paragraph (m)(1) of this section does not apply to a cargo tank equal to or less than 13,247.5 L (3,500 gallons) water capacity transporting in metered delivery service a Division 2.1 material, a Division 2.2 material with a subsidiary hazard, or anhydrous ammonia equipped with an off-truck remote shut-off device that was installed prior to July 1, 2000. The device must be capable of stopping the transfer of lading by operation of a transmitter carried by a qualified person attending unloading of the cargo tank. The device is subject to the requirement in § 177.840(o) of this subchapter for a daily test at 45.72 meters (150 feet).

(3) Each specification MC 330 and MC 331 cargo tank in metered delivery service of greater than 13,247.5 L (3,500 gallons) water capacity transporting a Division 2.1 material, a Division 2.2 material with a subsidiary hazard, or anhydrous ammonia, marked and certified before July 1, 1999, must have an emergency discharge control capability as specified in §§ 173.315(n) and 177.840 of this subchapter no later than the date of its first scheduled pressure test after July 1, 2001, or July 1, 2003, whichever is earlier.

(n) **Thermal activation.** No later than the date of its first scheduled leakage test after July 1, 1999, each specification MC 330 or MC 331 cargo tank motor vehicle and each nonspecification cargo tank motor vehicle conforming to § 173.315(k) of this subchapter, marked and certified before July 1, 1999, that is used to transport a liquefied compressed gas, other than carbon dioxide and chlorine, that has a water capacity of 13,247.5 L (3,500 gallons) or less must be equipped with a means of thermal activation for the internal self-closing stop valve as specified in § 178.337-8(a)(4) of this subchapter.

(o) **On-truck remote control of self-closing stop valves—MC 330, MC 331, and MC 338.** On or before October 2, 2006—

- (1) Each owner of an MC 330 or MC 331 cargo tank motor vehicle marked or certified before January 1, 1995, must equip the cargo tank with an on-vehicle remote means of closure of the internal self-closing stop valve in conformance with § 178.337-8(a)(4) of this subchapter. This requirement does not apply to cargo tanks used only for carbon dioxide and marked “For carbon dioxide only” or intended for use in chlorine service only.
- (2) Each owner of an MC 338 cargo tank motor vehicle marked or certified before January 1, 1995, must equip each remotely controlled shutoff valve with an on-vehicle remote means of automatic closure in conformance with § 178.338-11(c) of this subchapter. This requirement does not apply to cargo tanks used for the transportation of argon, carbon dioxide, helium, krypton, neon, nitrogen, or xenon, or mixtures thereof.

[Amdt. 180-2, 54 FR 25032, June 12, 1989]

Editorial Note: For FEDERAL REGISTER citations affecting § 180.405, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§ 180.407 Requirements for test and inspection of specification cargo tanks.

(a) **General.**

- (1) A cargo tank constructed in accordance with a DOT specification for which a test or inspection specified in this section has become due, may not be filled and offered for transportation or transported until the test or inspection has been successfully completed. This paragraph does not apply to any cargo tank filled prior to the test or inspection due date.
- (2) Except during a pressure test, a cargo tank may not be subjected to a pressure greater than its design pressure or MAWP.
- (3) A person witnessing or performing a test or inspection specified in this section must meet the minimum qualifications prescribed in § 180.409.
- (4) Each cargo tank must be evaluated in accordance with the acceptable results of tests and inspections prescribed in § 180.411.
- (5) Each cargo tank which has successfully passed a test or inspection specified in this section must be marked in accordance with § 180.415.
- (6) A cargo tank which fails a prescribed test or inspection must:
 - (i) Be repaired and retested in accordance with § 180.413; or
 - (ii) Be removed from hazardous materials service and the specification plate removed, obliterated or covered in a secure manner.

(b) **Conditions requiring test and inspection of cargo tanks.** Without regard to any other test or inspection requirements, a specification cargo tank must be tested and inspected in accordance with this section prior to further use if:

- (1) The cargo tank shows evidence of dents, cuts, gouges, corroded or abraded areas, leakage, or any other condition that might render it unsafe for hazardous materials service. At a minimum, any area of a cargo tank showing evidence of dents, cuts, digs, gouges, or corroded or abraded areas must be thickness tested in accordance with the procedures set forth in paragraphs (i)(2), (i)(3), (i)(5), (i)(6),

(i)(9), and (i)(10) of this section and evaluated in accordance with the criteria prescribed in § 180.411. Any signs of leakage must be repaired in accordance with § 180.413. The suitability of any repair affecting the structural integrity of the cargo tank must be determined either by the testing required in the applicable manufacturing specification or in paragraph (g)(1)(iv) of this section.

- (2) The cargo tank has sustained damage to an extent that may adversely affect its lading retention capability. A damaged cargo tank must be pressure tested in accordance with the procedures set forth in paragraph (g) of this section.
- (3) The cargo tank has been out of hazardous materials transportation service for a period of one year or more. Each cargo tank that has been out of hazardous materials transportation service for a period of one year or more must be pressure tested in accordance with § 180.407(g) prior to further use.
- (4) [Reserved]
- (5) The Department so requires based on the existence of probable cause that the cargo tank is in an unsafe operating condition.

- (c) **Periodic test and inspection.** Each specification cargo tank must be tested and inspected as specified in the following table by an inspector meeting the qualifications in § 180.409. The retest date shall be determined from the specified interval identified in the following table from the most recent inspection or the CTMV certification date.

COMPLIANCE DATES—INSPECTIONS AND TEST UNDER § 180.407(c)

Test or inspection (cargo tank specification, configuration, and service)	Date by which first test must be completed (see Note 1)	Interval period after first test
External Visual Inspection:		
All cargo tanks designed to be loaded by vacuum with full opening rear heads	September 1, 1991	6 months.
All other cargo tanks	September 1, 1991	1 year.
Internal Visual Inspection:		
All insulated cargo tanks, except MC 330, MC 331, MC 338 (see Note 4)	September 1, 1991	1 year.
All cargo tanks transporting lading corrosive to the tank	September 1, 1991	1 year.
MC 331 cargo tanks less than 3,500 gallons water capacity in dedicated propane service constructed of nonquenched and tempered NQT SA-612 steel (see Note 5)		10 years.

NOTE 1: If a cargo tank is subject to an applicable inspection or test requirement under the regulations in effect on December 30, 1990, and the due date (as specified by a requirement in effect on December 30, 1990) for completing the required inspection or test occurs before the compliance date listed in table I, the earlier date applies.

NOTE 2: Pressure testing is not required for MC 330 or MC 331 cargo tanks in dedicated sodium metal service.

NOTE 3: Pressure testing is not required for uninsulated lined cargo tanks, with a design pressure MAWP 15 psig or less, which receive an external visual inspection and lining inspection at least once each year.

NOTE 4: Insulated cargo tanks equipped with manholes or inspection openings may perform either an internal visual inspection in conjunction with the external visual inspection or a hydrostatic or pneumatic pressure-test of the cargo tank.

NOTE 5: A 10-year inspection interval period also applies to cargo tanks constructed of NQT SA-202 or NQT SA-455 steel provided the materials have full-size equivalent (FSE) Charpy vee notch (CVN) energy test data that demonstrated 75% shear-area ductility at 32 °F with an average of 3 or more samples >15 ft-lb FSE with no sample <10 ft-lb FSE.

Test or inspection (cargo tank specification, configuration, and service)	Date by which first test must be completed (see Note 1)	Interval period after first test
All other cargo tanks, except MC 338	September 1, 1995	5 years.
Lining Inspection:		
All lined cargo tanks transporting lading corrosive to the tank	September 1, 1991	1 year.
Leakage Test:		
MC 330 and MC 331 cargo tanks in chlorine service	September 1, 1991	2 years.
All other cargo tanks except MC 338	September 1, 1991	1 year.
Pressure Test:		
(Hydrostatic or pneumatic) (See Notes 2 and 3)		
All cargo tanks which are insulated with no manhole or insulated and lined, except MC 338	September 1, 1991	1 year.
All cargo tanks designed to be loaded by vacuum with full opening rear heads	September 1, 1992	2 years.
MC 330 and MC 331 cargo tanks in chlorine service	September 1, 1992	2 years.
MC 331 cargo tanks less than 3,500 gallons water capacity in dedicated propane service constructed of nonquenched and tempered NQT SA-612		10 years.
NOTE 1: If a cargo tank is subject to an applicable inspection or test requirement under the regulations in effect on December 30, 1990, and the due date (as specified by a requirement in effect on December 30, 1990) for completing the required inspection or test occurs before the compliance date listed in table I, the earlier date applies.		
NOTE 2: Pressure testing is not required for MC 330 or MC 331 cargo tanks in dedicated sodium metal service.		
NOTE 3: Pressure testing is not required for uninsulated lined cargo tanks, with a design pressure MAWP 15 psig or less, which receive an external visual inspection and lining inspection at least once each year.		
NOTE 4: Insulated cargo tanks equipped with manholes or inspection openings may perform either an internal visual inspection in conjunction with the external visual inspection or a hydrostatic or pneumatic pressure-test of the cargo tank.		
NOTE 5: A 10-year inspection interval period also applies to cargo tanks constructed of NQT SA-202 or NQT SA-455 steel provided the materials have full-size equivalent (FSE) Charpy vee notch (CVN) energy test data that demonstrated 75% shear-area ductility at 32 °F with an average of 3 or more samples >15 ft-lb FSE with no sample <10 ft-lb FSE.		

Test or inspection (cargo tank specification, configuration, and service)	Date by which first test must be completed (see Note 1)	Interval period after first test
steel (See Note 5) All other cargo tanks	September 1, 1995	5 years.
Thickness Test: All unlined cargo tanks transporting material corrosive to the tank, except MC 338	September 1, 1992	2 years.

NOTE 1: If a cargo tank is subject to an applicable inspection or test requirement under the regulations in effect on December 30, 1990, and the due date (as specified by a requirement in effect on December 30, 1990) for completing the required inspection or test occurs before the compliance date listed in table I, the earlier date applies.

NOTE 2: Pressure testing is not required for MC 330 or MC 331 cargo tanks in dedicated sodium metal service.

NOTE 3: Pressure testing is not required for uninsulated lined cargo tanks, with a design pressure MAWP 15 psig or less, which receive an external visual inspection and lining inspection at least once each year.

NOTE 4: Insulated cargo tanks equipped with manholes or inspection openings may perform either an internal visual inspection in conjunction with the external visual inspection or a hydrostatic or pneumatic pressure-test of the cargo tank.

NOTE 5: A 10-year inspection interval period also applies to cargo tanks constructed of NQT SA-202 or NQT SA-455 steel provided the materials have full-size equivalent (FSE) Charpy vee notch (CVN) energy test data that demonstrated 75% shear-area ductility at 32 °F with an average of 3 or more samples >15 ft-lb FSE with no sample <10 ft-lb FSE.

(d) **External visual inspection and testing.** The following applies to the external visual inspection and testing of cargo tanks:

(1) Where insulation precludes a complete external visual inspection as required by paragraphs (d)(2) through (d)(6) of this section, the cargo tank also must be given an internal visual inspection in accordance with paragraph (e) of this section. If external visual inspection is precluded because any part of the cargo tank wall is externally lined, coated, or designed to prevent an external visual inspection, those areas of the cargo tank must be internally inspected. If internal visual inspection is precluded because the cargo tank is lined, coated, or designed so as to prevent access for internal inspection, the tank must be hydrostatically or pneumatically tested in accordance with paragraph (g)(1)(iv) of this section. Those items able to be externally inspected must be externally inspected and noted in the inspection report.

(2) The external visual inspection and testing must include as a minimum the following:

- (i) The tank shell and heads must be inspected for corroded or abraded areas, dents, distortions, defects in welds and any other conditions, including leakage, that might render the tank unsafe for transportation service;
 - (ii) The piping, valves, and gaskets must be carefully inspected for corroded areas, defects in welds, and other conditions, including leakage, that might render the tank unsafe for transportation service;
 - (iii) All devices for tightening manhole covers must be operative and there must be no evidence of leakage at manhole covers or gaskets;
 - (iv) All emergency devices and valves including self-closing stop valves, excess flow valves and remote closure devices must be free from corrosion, distortion, erosion and any external damage that will prevent safe operation. Remote closure devices and self-closing stop valves must be functioned to demonstrate proper operation;
 - (v) Missing bolts, nuts and fusible links or elements must be replaced, and loose bolts and nuts must be tightened;
 - (vi) All markings on the cargo tank required by parts 172, 178 and 180 of this subchapter must be legible;
 - (vii) [Reserved]
 - (viii) All major appurtenances and structural attachments on the cargo tank including, but not limited to, suspension system attachments, connecting structures, and those elements of the upper coupler (fifth wheel) assembly that can be inspected without dismantling the upper coupler (fifth wheel) assembly must be inspected for any corrosion or damage which might prevent safe operation;
 - (ix) For cargo tanks transporting lading corrosive to the tank, areas covered by the upper coupler (fifth wheel) assembly must be inspected at least once in each two year period for corroded and abraded areas, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for transportation service. The upper coupler (fifth wheel) assembly must be removed from the cargo tank for this inspection.
- (3) All reclosing pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation. All reclosing pressure relief valves on cargo tanks carrying lading corrosive to the valve must be removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve required to be removed and tested must be tested according to the requirements set forth in paragraph (j) of this section.
- (4) Ring stiffeners or other appurtenances, installed on cargo tanks constructed of mild steel or high-strength, low-alloy steel, that create air cavities adjacent to the tank shell that do not allow for external visual inspection must be thickness tested in accordance with paragraphs (i)(2) and (i)(3) of this section, at least once every 2 years. At least four symmetrically distributed readings must be taken to establish an average thickness for the ring stiffener or appurtenance. If any thickness reading is less than the average thickness by more than 10%, thickness testing in accordance with paragraphs (i)(2) and (i)(3) of this section must be conducted from the inside of the cargo tank on the area of the tank wall covered by the appurtenance or ring stiffener.
- (5) Corroded or abraded areas of the cargo tank wall must be thickness tested in accordance with the procedures set forth in paragraphs (i)(2), (i)(3), (i)(5), (i)(6), (i)(9), and (i)(10) of this section.

- (6) The gaskets on any full opening rear head must be:
 - (i) Visually inspected for cracks or splits caused by weather or wear; and
 - (ii) Replaced if cuts or cracks which are likely to cause leakage, or are of a depth one-half inch or more, are found.
- (7) The inspector must record the results of the external visual examination as specified in § 180.417(b).

(e) **Internal visual inspection.**

- (1) When the cargo tank is not equipped with a manhole or inspection opening, or the cargo tank design precludes an internal inspection, the tank shall be hydrostatically or pneumatically tested in accordance with 180.407(c) and (g).
- (2) The internal visual inspection must include as a minimum the following:
 - (i) The tank shell and heads must be inspected for corroded and abraded areas, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for transportation service.
 - (ii) Tank liners must be inspected as specified in § 180.407(f).
- (3) Corroded or abraded areas of the cargo tank wall must be thickness tested in accordance with paragraphs (i)(2), (i)(3), (i)(5), (i)(6), (i)(9), and (i)(10) of this section.
- (4) The inspector must record the results of the internal visual inspection as specified in § 180.417(b).

(f) **Lining inspection.** The integrity of the lining on all lined cargo tanks, when lining is required by this subchapter, must be verified at least once each year as follows:

- (1) Rubber (elastomeric) lining must be tested for holes as follows:
 - (i) Equipment must consist of:
 - (A) A high frequency spark tester capable of producing sufficient voltage to ensure proper calibration;
 - (B) A probe with an "L" shaped 2.4 mm (0.09 inch) diameter wire with up to a 30.5 cm (12-inch) bottom leg (end bent to a 12.7 mm (0.5 inch) radius), or equally sensitive probe; and
 - (C) A steel calibration coupon 30.5 cm × 30.5 cm (12 inches × 12 inches) covered with the same material and thickness as that to be tested. The material on the coupon shall have a test hole to the metal substrate made by puncturing the material with a 22 gauge hypodermic needle or comparable piercing tool.
 - (ii) The probe must be passed over the surface of the calibration coupon in a constant uninterrupted manner until the hole is found. The hole is detected by the white or light blue spark formed. (A sound lining causes a dark blue or purple spark.) The voltage must be adjusted to the lowest setting that will produce a minimum 12.7 mm (0.5 inch) spark measured from the top of the lining to the probe. To assure that the setting on the probe has not changed, the spark tester must be calibrated periodically using the test calibration coupon, and the same power source, probe, and cable length.

- (iii) After calibration, the probe must be passed over the lining in an uninterrupted stroke.
- (iv) Holes that are found must be repaired using equipment and procedures prescribed by the lining manufacturer or lining installer.
- (2) Linings made of other than rubber (elastomeric material) must be tested using equipment and procedures prescribed by the lining manufacturer or lining installer.
- (3) Degraded or defective areas of the cargo tank liner must be removed and the cargo tank wall below the defect must be inspected. Corroded areas of the tank wall must be thickness tested in accordance with paragraphs (i)(2), (i)(3), (i)(5) and (i)(6) of this section.
- (4) The inspector must record the results of the lining inspection as specified in § 180.417(b).
- (g) **Pressure test.** All components of the cargo tank wall, as defined in § 178.320(a) of this subchapter, must be pressure tested as prescribed by this paragraph.
 - (1) **Test Procedure –**
 - (i) As part of the pressure test, the inspector must perform an external and internal visual inspection, except that on an MC 338 cargo tank, or a cargo tank not equipped with a manhole or inspection opening, an internal inspection is not required.
 - (ii) All self-closing pressure relief valves, including emergency relief vents and normal vents, must be removed from the cargo tank for inspection and testing according to the requirements in paragraph (j) of this section.
 - (iii) Except for cargo tanks carrying lading corrosive to the tank, areas covered by the upper coupler (fifth wheel) assembly must be inspected for corroded and abraded areas, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for transportation service. The upper coupler (fifth wheel) assembly must be removed from the cargo tank for this inspection.
 - (iv) Each cargo tank must be tested hydrostatically or pneumatically to the internal pressure specified in the following table. At no time during the pressure test may a cargo tank be subject to pressures that exceed those identified in the following table:

TABLE 1 TO PARAGRAPH (g)(1)(iv)

Specification	Test pressure
MC 300, 301, 302, 303, 305, 306	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or design pressure, whichever is greater.
MC 304, 307	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times the design pressure, whichever is greater.
MC 310, 311, 312	The test pressure on the name plate or specification plate, 20.7 kPa (3 psig) or 1.5 times the design pressure, whichever is greater.
MC 330, 331	The test pressure on the name plate or specification plate, 1.5 times either the MAWP or the re-rated pressure, whichever is applicable.

Specification	Test pressure
MC 338	The test pressure on the name plate or specification plate, 1.25 times either the MAWP or the re-rated pressure, whichever is applicable.
DOT 406	The test pressure on the name plate or specification plate, 34.5 kPa (5 psig) or 1.5 times the MAWP, whichever is greater.
DOT 407	The test pressure on the name plate or specification plate, 275.8 kPa (40 psig) or 1.5 times the MAWP, whichever is greater.
DOT 412	The test pressure on the name plate or specification plate, or 1.5 times the MAWP, whichever is greater.

(v) [Reserved]

(vi) Each cargo tank of a multi-tank cargo tank motor vehicle must be tested with the adjacent cargo tanks empty and at atmospheric pressure.

(vii) All closures except pressure relief devices must be in place during the test. All prescribed loading and unloading venting devices rated at less than test pressure may be removed during the test. If retained, the devices must be rendered inoperative by clamps, plugs, or other equally effective restraining devices. Restraining devices may not prevent detection of leaks or damage the venting devices and must be removed immediately after the test is completed.

(viii) **Hydrostatic test method.** Each cargo tank, including its domes, must be filled with water or other liquid having similar viscosity, at a temperature not exceeding 100 °F. The cargo tank must then be pressurized to not less than the pressure specified in paragraph (g)(1)(iv) of this section. The cargo tank, including its closures, must hold the prescribed test pressure for at least 10 minutes during which time it shall be inspected for leakage, bulging or any other defect.

(ix) **Pneumatic test method.** Pneumatic testing may involve higher risk than hydrostatic testing. Therefore, suitable safeguards must be provided to protect personnel and facilities should failure occur during the test. The cargo tank must be pressurized with air or an inert gas. The pneumatic test pressure in the cargo tank must be reached by gradually increasing the pressure to one-half of the test pressure. Thereafter, the pressure must be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. The test pressure must be held for at least 5 minutes. The pressure must then be reduced to the MAWP, which must be maintained during the time the entire cargo tank surface is inspected. During the inspection, a suitable method must be used for detecting the existence of leaks. This method must consist either of coating the entire surface of all joints under pressure with a solution of soap and water, or using other equally sensitive methods.

(2) When testing an insulated cargo tank, the insulation and jacketing need not be removed unless it is otherwise impossible to reach test pressure and maintain a condition of pressure equilibrium after test pressure is reached, or the vacuum integrity cannot be maintained in the insulation space. If an MC 338 cargo tank used for the transportation of a flammable gas or oxygen, refrigerated liquid is opened for any reason, the cleanliness must be verified prior to closure using the procedures contained in § 178.338-15 of this subchapter.

- (3) Each MC 330 and MC 331 cargo tank constructed of quenched and tempered steel in accordance with Part UHT in Section VIII of the ASME Code (IBR, see § 171.7 of this subchapter), or constructed of other than quenched and tempered steel but without postweld heat treatment, used for the transportation of anhydrous ammonia or any other hazardous materials that may cause corrosion stress cracking, must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of the pressure test prescribed in this section. Each MC 330 and MC 331 cargo tank constructed of quenched and tempered steel in accordance with Part UHT in Section VIII of the ASME Code and used for the transportation of liquefied petroleum gas must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of the pressure test prescribed in this section. The wet fluorescent magnetic particle inspection must be in accordance with Section V of the ASME Code and CGA Technical Bulletin TB-2 (IBR, see § 171.7 of this subchapter). This paragraph does not apply to cargo tanks that do not have manholes. (See § 180.417(c) for reporting requirements.)
- (4) All pressure bearing portions of a cargo tank heating system employing a medium such as, but not limited to, steam or hot water for heating the lading must be hydrostatically pressure tested at least once every 5 years. The test pressure must be at least the maximum system design operating pressure and must be maintained for five minutes. A heating system employing flues for heating the lading must be tested to ensure against lading leakage into the flues or into the atmosphere.
- (5) **Exceptions.**
 - (i) Pressure testing is not required for MC 330 and MC 331 cargo tanks in dedicated sodium metal service.
 - (ii) Pressure testing is not required for uninsulated lined cargo tanks, with a design pressure or MAWP of 15 psig or less, which receive an external visual inspection and a lining inspection at least once each year.
- (6) **Acceptance criteria.** A cargo tank that leaks, fails to retain test pressure or pneumatic inspection pressure, shows distortion, excessive permanent expansion, or other evidence of weakness that might render the cargo tank unsafe for transportation service, may not be returned to service, except as follows: A cargo tank with a heating system which does not hold pressure may remain in service as an unheated cargo tank if:
 - (i) The heating system remains in place and is structurally sound and no lading may leak into the heating system, and
 - (ii) The specification plate heating system information is changed to indicate that the cargo tank has no working heating system.
- (7) The inspector must record the results of the pressure test as specified in § 180.417(b).
- (h) **Leakage test.** The following requirements apply to cargo tanks requiring a leakage test:
 - (1) Each cargo tank must be tested for leaks in accordance with paragraph (c) of this section. The leakage test must include testing product piping with all valves and accessories in place and operative, except that any venting devices set to discharge at less than the leakage test pressure must be removed or rendered inoperative during the test. All internal or external self-closing stop valves must be tested for leak tightness. Each cargo tank of a multi-cargo tank motor vehicle must be tested with adjacent cargo tanks empty and at atmospheric pressure. Test pressure must be

maintained for at least 5 minutes. Cargo tanks in liquefied compressed gas service must be externally inspected for leaks during the leakage test. Suitable safeguards must be provided to protect personnel should a failure occur. Cargo tanks may be leakage tested with hazardous materials contained in the cargo tank during the test. Leakage test pressure must be no less than 80% of MAWP marked on the specification plate except as follows:

- (i) A cargo tank with an MAWP of 690 kPa (100 psig) or more may be leakage tested at its maximum normal operating pressure provided it is in dedicated service or services; or
 - (ii) An MC 330 or MC 331 cargo tank in dedicated liquified petroleum gas service may be leakage tested at not less than 414 kPa (60 psig).
 - (iii) An operator of a specification MC 330 or MC 331 cargo tank, and a nonspecification cargo tank authorized under § 173.315(k) of this subchapter, equipped with a meter may check leak tightness of the internal self-closing stop valve by conducting a meter creep test. (See appendix B to this part.)
 - (iv) An MC 330 or MC 331 cargo tank in dedicated service for anhydrous ammonia may be leakage tested at not less than 414 kPa (60 psig).
 - (v) A non-specification cargo tank required by § 173.8(d) of this subchapter to be leakage tested, must be leakage tested at not less than 16.6 kPa (2.4 psig), or as specified in paragraph (h)(2) of this section.
- (2) Cargo tanks used to transport petroleum distillate fuels that are equipped with vapor collection equipment may be leak tested in accordance with the Environmental Protection Agency's "Method 27—Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure-Vacuum Test," as set forth in Appendix A to 40 CFR part 60. Test methods and procedures and maximum allowable pressure and vacuum changes are in 40 CFR 63.425(e). The hydrostatic test alternative, using liquid in Environmental Protection Agency's "Method 27—Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure-Vacuum Test," may not be used to satisfy the leak testing requirements of this paragraph. The test must be conducted using air.
- (3) A cargo tank that fails to retain leakage test pressure may not be returned to service as a specification cargo tank, except under conditions specified in § 180.411(d).
- (4) After July 1, 2000, Registered Inspectors of specification MC 330 and MC 331 cargo tanks, and nonspecification cargo tanks authorized under § 173.315(k) of this subchapter must visually inspect the delivery hose assembly and piping system while the assembly is under leakage test pressure utilizing the rejection criteria listed in § 180.416(g). Delivery hose assemblies not permanently attached to the cargo tank motor vehicle may be inspected separately from the cargo tank motor vehicle. In addition to a written record of the inspection prepared in accordance with § 180.417(b), the Registered Inspector conducting the test must note the hose identification number, the date of the test, and the condition of the hose assembly and piping system tested.
- (5) The inspector must record the results of the leakage test as specified in § 180.417(b).

(i) **Thickness testing.**

- (1) The shell and head thickness of all unlined cargo tanks used for the transportation of materials corrosive to the tank must be measured at least once every 2 years, except that cargo tanks measuring less than the sum of the minimum prescribed thickness, plus one-fifth of the original corrosion allowance, must be tested annually.

- (2) Measurements must be made using a device capable of accurately measuring thickness to within ± 0.002 of an inch.
- (3) Any person performing thickness testing must be trained in the proper use of the thickness testing device used in accordance with the manufacturer's instruction.
- (4) Thickness testing must be performed in the following areas of the cargo tank wall, as a minimum:
 - (i) Areas of the tank shell and heads and shell and head area around any piping that retains lading;
 - (ii) Areas of high shell stress such as the bottom center of the tank;
 - (iii) Areas near openings;
 - (iv) Areas around weld joints;
 - (v) Areas around shell reinforcements;
 - (vi) Areas around appurtenance attachments;
 - (vii) Areas near upper coupler (fifth wheel) assembly attachments;
 - (viii) Areas near suspension system attachments and connecting structures;
 - (ix) Known thin areas in the tank shell and nominal liquid level lines; and
 - (x) Connecting structures joining multiple cargo tanks of carbon steel in a self-supporting cargo tank motor vehicle.
- (5) Minimum thicknesses for MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, and MC 312 cargo tanks are determined based on the definition of minimum thickness found in § 178.320(a) of this subchapter. The following Tables I and II identify the "In-Service Minimum Thickness" values to be used to determine the minimum thickness for the referenced cargo tanks. The column headed "Minimum Manufactured Thickness" indicates the minimum values required for new construction of DOT 400 series cargo tanks, found in Tables I and II of §§ 178.346-2, 178.347-2, and 178.348-2 of this subchapter. In-Service Minimum Thicknesses for MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, and MC 312 cargo tanks are based on 90 percent of the manufactured thickness specified in the DOT specification, rounded to three places.

**TABLE I—IN-SERVICE MINIMUM THICKNESS FOR MC 300, MC 303, MC 304, MC 306, MC 307, MC 310, MC 311, AND MC 312 SPECIFICATION CARGO TANKS
CONSTRUCTED OF STEEL AND STEEL ALLOYS**

Minimum manufactured thickness (US gauge or inches)	Nominal decimal equivalent for (inches)	In-service minimum thickness reference (inches)
19	0.0418	0.038
18	0.0478	0.043
17	0.0538	0.048

Minimum manufactured thickness (US gauge or inches)	Nominal decimal equivalent for (inches)	In-service minimum thickness reference (inches)
16	0.0598	0.054
15	0.0673	0.061
14	0.0747	0.067
13	0.0897	0.081
12	0.1046	0.094
11	0.1196	0.108
10	0.1345	0.121
9	0.1495	0.135
8	0.1644	0.148
7	0.1793	0.161
3/16	0.1875	0.169
1/4	0.2500	0.225
5/16	0.3125	0.281
3/8	0.3750	0.338

**TABLE II—IN-SERVICE MINIMUM THICKNESS FOR MC 301, MC 302, MC 304, MC 305, MC 306, MC 307, MC 311, AND MC 312 SPECIFICATION CARGO TANKS
CONSTRUCTED OF ALUMINUM AND ALUMINUM ALLOYS**

Minimum manufactured thickness	In-service minimum thickness (inches)
0.078	0.070
0.087	0.078
0.096	0.086
0.109	0.098
0.130	0.117
0.141	0.127
0.151	0.136
0.172	0.155
0.173	0.156
0.194	0.175
0.216	0.194
0.237	0.213
0.270	0.243
0.360	0.324
0.450	0.405

Minimum manufactured thickness	In-service minimum thickness (inches)
0.540	0.486

- (6) An owner of a cargo tank that no longer conforms to the minimum thickness prescribed for the design as manufactured may use the cargo tank to transport authorized materials at reduced maximum weight of lading or reduced maximum working pressure, or combinations thereof, provided the following conditions are met:
 - (i) A Design Certifying Engineer must certify that the cargo tank design and thickness are appropriate for the reduced loading conditions by issuance of a revised manufacturer's certificate, and
 - (ii) The cargo tank motor vehicle's nameplate must reflect the revised service limits.
- (7) An owner of a cargo tank that no longer conforms with the minimum thickness prescribed for the specification may not return the cargo tank to hazardous materials service. The tank's specification plate must be removed, obliterated or covered in a secure manner.
- (8) The inspector must record the results of the thickness test as specified in § 180.417(b).
- (9) For MC 331 cargo tanks constructed before October 1, 2003, minimum thickness shall be determined by the thickness indicated on the U1A form minus any corrosion allowance. For MC 331 cargo tanks constructed after October 1, 2003, the minimum thickness will be the value indicated on the specification plate. If no corrosion allowance is indicated on the U1A form then the thickness of the tank shall be the thickness of the material of construction indicated on the U1A form with no corrosion allowance.
- (10) For 400-series cargo tanks, minimum thickness is calculated according to tables in each applicable section of this subchapter for that specification: § 178.346-2 for DOT 406 cargo tanks, § 178.347-2 for DOT 407 cargo tanks, and § 178.348-2 for DOT 412 cargo tanks.
- (j) **Pressure vent bench test.** When required by this section, pressure relief valves must be tested for proper function as follows:
 - (1) Each self-closing pressure relief valve must open and reseal to a leaktight condition at the pressures prescribed for the applicable cargo tank specification or at the following pressures:
 - (i) For MC 306 cargo tanks:
 - (A) With MC 306 reclosing pressure relief valves, it must open at not less than 3 psi and not more than 4.4 psi and must reseal to a leak tight-condition at no less than 2.7 psi.
 - (B) With reclosing pressure relief valves modified as provided in § 180.405(c) to conform with DOT 406 specifications, according to the pressures set forth for a DOT 406 cargo tank in § 178.346-3 of this subchapter.
 - (ii) For MC 307 cargo tanks:

- (A) With MC 307 reclosing pressure relief valves, it must open at not less than the cargo tank MAWP and not more than 110% of the cargo tank MAWP and must reseal to a leak tight-condition at no less than 90% of the cargo tank MAWP.
 - (B) With reclosing pressure relief valves modified as provided in § 180.405(c) to conform with DOT 407 specifications, according to the pressures set forth for a DOT 407 cargo tank in § 178.347-4 of this subchapter.
- (iii) For MC 312 cargo tanks:
- (A) With MC 312 reclosing pressure relief valves, it must open at not less than the cargo tank MAWP and not more than 110% of the cargo tank MAWP and must reseal to a leak tight-condition at no less than 90% of the cargo tank MAWP.
 - (B) With reclosing pressure relief valves modified as provided in § 180.405(c) to conform with DOT 412 specifications, according to the pressures set forth for a DOT 412 cargo tank in § 178.348-4 of this subchapter.
- (iv) For MC 330 or MC 331 cargo tanks, it must open at not less than the required set pressure and not more than 110% of the required set pressure and must reseal to a leak-tight condition at no less than 90% of the required set pressure.
- (v) For DOT 400-series cargo tanks, according to the pressures set forth for the applicable cargo tank specification in §§ 178.346-3, 178.347-4, and 178.348-4, respectively, of this subchapter.
- (vi) For cargo tanks not specified in this paragraph, it must open at not less than the required set pressure and not more than 110% of the required set pressure and must reseal to a leak-tight condition at no less than 90% of the required set pressure or the pressure prescribed for the applicable cargo tank specification.
- (2) Normal vents (1 psig vents) must be tested according to the testing criteria established by the valve manufacturer.
- (3) Self-closing pressure relief devices not tested or failing the tests in paragraph (j)(1) of this section must be repaired or replaced.

[Amdt. 180-2, 54 FR 25032, June 12, 1989]

Editorial Note: For FEDERAL REGISTER citations affecting § 180.407, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

§ 180.409 Minimum qualifications for inspectors and testers.

- (a) Except as otherwise provided in this section, any person performing or witnessing the inspections and tests specified in § 180.407(c) must—
 - (1) Be registered with the Federal Motor Carrier Safety Administration in accordance with part 107, subpart F of this chapter,
 - (2) Be familiar with DOT-specification cargo tanks and trained and experienced in use of the inspection and testing equipment needed, and

- (3) Have the training and experience required to meet the definition of “Registered Inspector” in § 171.8 of this chapter.
- (b) A person who only performs annual external visual inspections and leakage tests on a cargo tank motor vehicle, owned or operated by that person, with a capacity of less than 13,250 L (3,500 gallons) used exclusively for flammable liquid petroleum fuels, is not required to meet the educational and years of experience requirements set forth in the definition of “Registered Inspector” in § 171.8 of this subchapter. Although not required to meet the educational and years of experience requirements, a person who performs visual inspections or leakage tests or signs the inspection reports must have the knowledge and ability to perform such inspections and tests and must perform them as required by this subchapter, and must register with the Department as required by subpart F of part 107 of this chapter.
- (c) A person who performs only annual external visual inspections and leakage tests on a permanently mounted non-bulk tank, owned or operated by that person, for petroleum products as authorized by § 173.8(c) of this subchapter, is not required to be registered in accordance with subpart F of part 107 of this chapter. In addition the person who signs the inspection report required by § 180.417(b) of this subpart for such non-bulk tanks is not required to be registered. Although not required to register, a person who performs visual inspections or leakage tests or signs the inspection reports must have the knowledge and ability to perform such inspections and tests and must perform them as required by this subchapter.
- (d) A motor carrier or cargo tank owner who meets the requirements of paragraph (a) of this section may use an employee who is not a Registered Inspector to perform a portion of the pressure retest required by § 180.407(g). External and internal visual inspections must be accomplished by a Registered Inspector, but the hydrostatic or pneumatic pressure test, as set forth in § 180.407(g)(1)(viii) and (ix), respectively, may be done by an employee who is not a Registered Inspector provided that—
 - (1) The employee is familiar with the cargo tank and is trained and experienced in the use of the inspection and testing equipment used;
 - (2) The employer submits certification that such employee meets the qualification requirements to the Associate Administrator, Attn: (PHH-32), Pipeline and Hazardous Materials Safety Administration, Department of Transportation, East Building, 1200 New Jersey Avenue, SE., Washington, DC 20590; and
 - (3) The employer retains a copy of the tester's qualifications with the documents required by § 180.417(b).

[Amdt. 180-2, 55 FR 37069, Sept. 7, 1990, as amended by Amdt. 180-3, 56 FR 66287, Dec. 20, 1991; 57 FR 45466, Oct. 1, 1992; Amdt. 180-11, 62 FR 1217, Jan. 8, 1997; 66 FR 45391, Aug. 28, 2001; 68 FR 19288, Apr. 18, 2003; 70 FR 56100, Sept. 23, 2005; 72 FR 55697, Oct. 1, 2007]

§ 180.411 Acceptable results of tests and inspections.

- (a) **Corroded or abraded areas.** The minimum thickness may not be less than that prescribed in the applicable specification.
- (b) **Dents, cuts, digs and gouges.** For evaluation procedures, see CGA C-6 (IBR, see § 171.7 of this subchapter).

- (1) For dents at welds or that include a weld, the maximum allowable depth is $\frac{1}{2}$ inch. For dents away from welds, the maximum allowable depth is $\frac{1}{10}$ of the greatest dimension of the dent, but in no case may the depth exceed one inch.
- (2) The minimum thickness remaining beneath a cut, dig, or gouge may not be less than that prescribed in the applicable specification.
- (c) **Weld or structural defects.** Any cargo tank with a weld defect such as a crack, pinhole, or incomplete fusion, or a structural defect must be taken out of hazardous materials service until repaired.
- (d) **Leakage.** All sources of leakage must be properly repaired prior to returning a tank to hazardous materials service.
- (e) **Relief valves.** Any pressure relief valve that fails to open and reclose at the prescribed pressure must be repaired or replaced.
- (f) **Liner integrity.** Any defect shown by the test must be properly repaired.
- (g) **Pressure test.** Any tank that fails to meet the acceptance criteria found in the individual specification that applies must be properly repaired.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 68 FR 75764, Dec. 31, 2003]

§ 180.413 Repair, modification, stretching, rebarrelling, or mounting of specification cargo tanks.

- (a) **General.** Any repair, modification, stretching, rebarrelling, or mounting of a cargo tank must be performed in conformance with the requirements of this section.
 - (1) Except as otherwise provided in this section, each repair, modification, stretching, or rebarrelling of a specification cargo tank must be performed by a repair facility holding a valid National Board Certificate of Authorization for use of the National Board "R" stamp and must be made in accordance with the edition of the National Board Inspection Code in effect at the time the work is performed.
 - (i) Repairs, modifications, stretchings, and rebarrellings performed on non-ASME stamped specification cargo tanks may be performed by:
 - (A) A cargo tank manufacturer holding a valid ASME Certificate of Authorization for the use of the ASME "U" stamp using the quality control procedures used to obtain the Certificate of Authorization; or
 - (B) A repair facility holding a valid National Board Certificate of Authorization for use of the National Board "R" stamp using the quality control procedures used to obtain the Certificate of Authorization.
 - (ii) A repair, modification, stretching, or rebarrelling of a non-ASME stamped cargo tank may be done without certification by an Authorized Inspector, completion of the R-1 form, or being stamped with the "R" stamp.
 - (iii) A repair, as defined in § 180.403, of a DOT specification cargo tank used for the transportation of hazardous materials in the United States may be performed by a facility in Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter) provided:

- (A) The facility holds a valid Certificate of Authorization from a provincial pressure vessel jurisdiction for repair;
 - (B) The facility is registered in accordance with the Transport Canada TDG Regulations to repair the corresponding TC specification; and
 - (C) All repairs are performed using the quality control procedures used to obtain the Certificate of Authorization.
- (2) Prior to each repair, modification, stretching, rebarrelling, or mounting, the cargo tank motor vehicle must be emptied of any hazardous material lading. In addition, cargo tank motor vehicles used to transport flammable or toxic lading must be sufficiently cleaned of residue and purged of vapors so any potential hazard is removed, including void spaces between double bulkheads, piping and vapor recovery systems.
- (3) Each person performing a repair, modification, stretching, rebarrelling or mounting of a DOT specification cargo tank must be registered in accordance with subpart F of part 107 of this chapter.
- (b) **Repair.** The suitability of each repair affecting the structural integrity or lading retention capability of the cargo tank must be determined by the testing required either in the applicable manufacturing specification or in § 180.407(g)(1)(iv). Except for a repair performed by a facility in Canada in accordance with paragraph (a)(1)(iii) of this section, each repair of a cargo tank involving welding on the shell or head must be certified by a Registered Inspector. The following provisions apply to specific cargo tank repairs:
- (1) DOT 406, DOT 407, and DOT 412 cargo tanks must be repaired in accordance with the specification requirements in effect at the time of repair;
 - (2) MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 cargo tanks must be repaired in accordance with either the most recent revision of the original specification or with the DOT 406 specification in effect at the time of repair;
 - (3) MC 304 and MC 307 cargo tanks must be repaired in accordance with either the most recent revision of the original specification or with the DOT 407 specification in effect at the time of repair;
 - (4) MC 310, MC 311, and MC 312 cargo tanks must be repaired in accordance with either the most recent revision of the original specification or with the DOT 412 specification in effect at the time of repair;
 - (5) MC 338 cargo tanks must be repaired in accordance with the specification requirements in effect at the time of repair; and
 - (6) MC 330 and MC 331 cargo tanks must be repaired in accordance with the repair procedures described in CGA Technical Bulletin TB-2 (IBR, see § 171.7 of this subchapter) and the National Board Inspection Code (IBR, see § 171.7 of this subchapter). Each cargo tank having cracks or other defects requiring welded repairs must meet all inspection, test, and heat treatment requirements in § 178.337-16 of this subchapter in effect at the time of the repair, except that postweld heat treatment after minor weld repairs is not required. When a repair is made of defects revealed by the wet fluorescent magnetic particle inspection, including those repaired by grinding, the affected area of the cargo tank must again be examined by the wet fluorescent magnetic particle method after hydrostatic testing to assure that all defects have been removed.

- (c) **Maintenance or replacement of piping, valves, hoses, or fittings.** After each repair, maintenance or replacement of a pipe, valve, hose, or fitting on a cargo tank, that component must be installed in accordance with the provisions of the applicable specification before the cargo tank is returned to service.
- (1) After maintenance or replacement that does not involve welding on the cargo tank wall, the repaired or replaced piping, valve, hose, or fitting must be tested for leaks. This requirement is met when the piping, valve, hose, or fitting is tested after installation in accordance with § 180.407(h)(1). A hose may be tested before or after installation on the cargo tank.
 - (2) After repair or replacement of piping, valves, or fittings that involves welding on the cargo tank wall, the cargo tank must be pressure tested in accordance with the applicable manufacturing specification or § 180.407(g)(1)(iv). In addition, the affected piping, valve, or fitting must be tested in accordance with paragraph (c)(1) of this section.
 - (3) Hoses on cargo tanks in dedicated liquefied compressed gas, except carbon dioxide, service are excepted from these testing requirements, but must be tested in accordance with § 180.416(f).
- (d) **Modification, stretching, or rebarrelling.** Modification, stretching or rebarrelling of a cargo tank motor vehicle must conform to the following provisions:
- (1) The design of the modified, stretched, or rebarrelled cargo tank motor vehicle must be certified in writing by a Design Certifying Engineer as meeting the structural integrity and accident damage protection requirements of the applicable specification.
 - (2) Except as provided in paragraph (d)(2)(v) of this section, all new material and equipment affected by modification, stretching, or rebarrelling must meet the requirements of the specification in effect at the time such work is performed, and all applicable structural integrity requirements (§ 178.337-3, § 178.338-3, or § 178.345-3 of this subchapter). The work must conform to the requirements of the applicable specification as follows:
 - (i) For specification MC 300, MC 301, MC 302, MC 303, MC 305 and MC 306 cargo tanks, the provisions of either specification MC 306 or DOT 406 until August 31, 1995 and, thereafter to specification DOT 406 only;
 - (ii) For specification MC 304 and MC 307 cargo tanks, the provisions of either specification MC 307 or DOT 407 until August 31, 1995 and, thereafter to specification DOT 407 only;
 - (iii) For specification MC 310, MC 311, and MC 312 cargo tanks, the provisions of either specification MC 312 or DOT 412 until August 31, 1995 and, thereafter to specification DOT 412 only;
 - (iv) For specification MC 330 cargo tanks, the provisions of specification MC 331; and
 - (v) For specification MC 338 cargo tanks, the provisions of specification MC 338. However, structural modifications to MC 338 cargo tanks authorized under § 180.405(d) may conform to applicable provisions of the ASME Code instead of specification MC 338, provided the structural integrity of the modified cargo tank is at least equivalent to that of the original cargo tank.
 - (3) The person performing the modification, stretching, or rebarrelling must:
 - (i) Have knowledge of the original design concept, particularly with respect to structural design analysis, material and welding procedures.

- (ii) Assure compliance of the rebuilt cargo tank's structural integrity, venting, and accident damage protection with the applicable specification requirements.
- (iii) Assure compliance with all applicable Federal Motor Carrier Safety Regulations for all newly installed safety equipment.
- (iv) Assure the suitability of each modification, stretching and rebarrelling that affects the lading retention capability of the cargo tank by performing the tests required in the applicable specification or § 180.407(g)(1)(iv).
- (v) Any modification that changes information displayed on the specification plate requires the installation of a supplemental specification plate, nameplate, or both containing the information that reflects the cargo tank as modified, stretched or rebarrelled. The plate must include the name of the person or facility doing the work, DOT registration number, date work is completed, retest information, and any other information that differs from the original plate. The supplemental plates must be installed immediately adjacent to the existing plate or plates.
- (vi) On a variable specification cargo tank, install a supplemental or new variable specification plate, and replace the specification listed on the original specification plate with the words "see variable specification plate."

- (4) A Registered Inspector must certify that the modified, stretched, or rebarrelled cargo tank conforms to the requirements of this section and the applicable specification by issuing a supplemental certificate of compliance. The registration number of the Registered Inspector must be entered on the certificate.

(e) **Mounting of cargo tanks.** Mounting a cargo tank on a cargo tank motor vehicle must be:

- (1) Performed as required by paragraph (d)(2) of this section and certified by a Design Certifying Engineer if the mounting of a cargo tank on a motor vehicle chassis involves welding on the cargo tank head or shell or any change or modification of the methods of attachment; or
- (2) In accordance with the original specification for attachment to the chassis or the specification for attachment to the chassis in effect at the time of the mounting, and performed under the supervision of a Registered Inspector if the mounting of a cargo tank on a motor vehicle chassis does not involve welding on the cargo tank head or shell or a change or modification of the methods of attachment.

(f) **Records.** Each owner of a cargo tank motor vehicle must retain at the owner's principal place of business all records of repair, modification, stretching, or rebarrelling, including notation of any tests conducted to verify the suitability of the repair, modification, stretching, or rebarrelling made to each cargo tank during the time the cargo tank motor vehicle is in service and for one year thereafter. Copies of these records must be retained by a motor carrier, if not the owner of the cargo tank motor vehicle, at its principal place of business during the period the cargo tank motor vehicle is in the carrier's service.

[68 FR 19288, Apr. 18, 2003; 68 FR 52372, Sept. 3, 2003, as amended at 68 FR 75764, Dec. 31, 2003; 82 FR 15897, Mar. 30, 2017]

§ 180.415 Test and inspection markings.

- (a) Each cargo tank successfully completing the test and inspection requirements contained in § 180.407 must be marked as specified in this section.

- (b) Each cargo tank must be durably and legibly marked, in English, with the date (month and year) and the type of test or inspection performed, subject to the following provisions:
 - (1) The date must be readily identifiable with the applicable test or inspection.
 - (2) The markings must be in letters and numbers at least 32 mm (1.25 inches) high, near the specification plate or anywhere on the front head.
 - (3) The type of test or inspection may be abbreviated as follows:
 - (i) V for external visual inspection and test;
 - (ii) I for internal visual inspection;
 - (iii) P for pressure test;
 - (iv) L for lining inspection;
 - (v) T for thickness test; and
 - (vi) K for leakage test for a cargo tank tested under § 180.407, except § 180.407(h)(2); and
 - (vii) K-EPA27 for a cargo tank tested under § 180.407(h)(2) after October 1, 2004.

Examples to paragraph (b). The markings “10-99 P, V, L” represent that in October 1999 a cargo tank passed the prescribed pressure test, external visual inspection and test, and the lining inspection. The markings “2-00 K-EPA27” represent that in February 2000 a cargo tank passed the leakage test under § 180.407(h)(2). The markings “2-00 K, K-EPA27” represent that in February 2000 a cargo tank passed the leakage test under both § 180.407(h)(1) and under EPA Method 27 in § 180.407(h)(2).

- (c) For a cargo tank motor vehicle composed of multiple cargo tanks constructed to the same specification, which are tested and inspected at the same time, one set of test and inspection markings may be used to satisfy the requirements of this section. For a cargo tank motor vehicle composed of multiple cargo tanks constructed to different specifications, which are tested and inspected at different intervals, the test and inspection markings must appear in the order of the cargo tank's corresponding location, from front to rear.

[Amdt. 180-2, 56 FR 27879, June 17, 1991, as amended by Amdt. 180-3, 56 FR 66287, Dec. 20, 1991; 57 FR 45466, Oct. 1, 1992; Amdt. 180-6, 59 FR 49135, Sept. 26, 1994; Amdt. 180-10, 61 FR 51343, Oct. 1, 1996; 68 FR 19290, Apr. 18, 2003; 68 FR 52372, Sept. 3, 2003]

§ 180.416 Discharge system inspection and maintenance program for cargo tanks transporting liquefied compressed gases.

- (a) **Applicability.** This section is applicable to an operator using specification MC 330, MC 331, and nonspecification cargo tanks authorized under § 173.315(k) of this subchapter for transportation of liquefied compressed gases other than carbon dioxide. Paragraphs (b), (c), (d)(1), (d)(5), (e), (f), and (g)(1) of this section, applicable to delivery hose assemblies, apply only to hose assemblies installed or carried on the cargo tank.

- (b) **Hose identification.** By July 1, 2000, the operator must assure that each delivery hose assembly is permanently marked with a unique identification number and maximum working pressure.
- (c) **Post-delivery hose check.** After each unloading, the operator must visually check that portion of the delivery hose assembly deployed during the unloading.
- (d) **Monthly inspections and tests.**
 - (1) The operator must visually inspect each delivery hose assembly at least once each calendar month the delivery hose assembly is in service.
 - (2) The operator must visually inspect the piping system at least once each calendar month the cargo tank is in service. The inspection must include fusible elements and all components of the piping system, including bolts, connections, and seals.
 - (3) At least once each calendar month a cargo tank is in service, the operator must actuate all emergency discharge control devices designed to close the internal self-closing stop valve to assure that all linkages operate as designed. appendix A to this part outlines acceptable procedures that may be used for this test.
 - (4) The operator of a cargo tank must check the internal self-closing stop valve in the liquid discharge opening for leakage through the valve at least once each calendar month the cargo tank is in service. On cargo tanks equipped with a meter, the meter creep test as outlined in appendix B to this part or a test providing equivalent accuracy is acceptable. For cargo tanks that are not equipped with a meter, appendix B to this part outlines one acceptable method that may be used to check internal self-closing stop valves for closure.
 - (5) The operator must note each inspection in a record. That record must include the inspection date, the name of the person performing the inspection, the hose assembly identification number, the manufacturer of the hose assembly, the date the hose was assembled and tested, and an indication that the delivery hose assembly and piping system passed or failed the tests and inspections. The operator must retain a copy of each test and inspection record at its principal place of business or where the vehicle is housed or maintained until the next test of the same type is successfully completed.
- (e) **Annual hose leakage test.** The owner of a delivery hose assembly that is not permanently attached to a cargo tank motor vehicle must ensure that the hose assembly is annually tested in accordance with § 180.407(h)(4).
- (f) **New or repaired delivery hose assemblies.** Each operator of a cargo tank must ensure each new and repaired delivery hose assembly is tested at a minimum of 120 percent of the hose maximum working pressure.
 - (1) The operator must visually examine the delivery hose assembly while it is under pressure.
 - (2) Upon successful completion of the pressure test and inspection, the operator must assure that the delivery hose assembly is permanently marked with the month and year of the test.
 - (3) After July 1, 2000, the operator must complete a record documenting the test and inspection, including the date, the signature of the inspector, the hose owner, the hose identification number, the date of original delivery hose assembly and test, notes of any defects observed and repairs made, and an indication that the delivery hose assembly passed or failed the tests and inspections. A copy

of each test and inspection record must be retained by the operator at its principal place of business or where the vehicle is housed or maintained until the next test of the same type is successfully completed.

(g) Rejection criteria.

- (1)** No operator may use a delivery hose assembly determined to have any condition identified below for unloading liquefied compressed gases. An operator may remove and replace damaged sections or correct defects discovered. Repaired hose assemblies may be placed back in service if retested successfully in accordance with paragraph (f) of this section.
 - (i)** Damage to the hose cover that exposes the reinforcement.
 - (ii)** Wire braid reinforcement that has been kinked or flattened so as to permanently deform the wire braid.
 - (iii)** Soft spots when not under pressure, bulging under pressure, or loose outer covering.
 - (iv)** Damaged, slipping, or excessively worn hose couplings.
 - (v)** Loose or missing bolts or fastenings on bolted hose coupling assemblies.
- (2)** No operator may use a cargo tank with a piping system found to have any condition identified in this paragraph (g)(2) for unloading liquefied compressed gases.
 - (i)** Any external leak identifiable without the use of instruments.
 - (ii)** Bolts that are loose, missing, or severely corroded.
 - (iii)** Manual stop valves that will not actuate.
 - (iv)** Rubber hose flexible connectors with any condition outlined in paragraph (g)(1) of this section.
 - (v)** Stainless steel flexible connectors with damaged reinforcement braid.
 - (vi)** Internal self-closing stop valves that fail to close or that permit leakage through the valve detectable without the use of instruments.
 - (vii)** Pipes or joints that are severely corroded.

[64 FR 28051, May 24, 1999, as amended at 78 FR 15330, Mar. 11, 2013]

§ 180.417 Reporting and record retention requirements.

(a) Vehicle certification.

- (1)** Each owner of a specification cargo tank must retain the manufacturer's certificate, the manufacturer's ASME U1A data report, where applicable, and related papers certifying that the specification cargo tank identified in the documents was manufactured and tested in accordance with the applicable specification. This would include any certification of emergency discharge control systems required by § 173.315(n) of this subchapter or § 180.405(m). The owner must retain the documents throughout his ownership of the specification cargo tank and for one year thereafter. In the event of a change in ownership, the prior owner must retain non-fading photo copies of these documents for one year.

- (2) Each motor carrier who uses a specification cargo tank motor vehicle must obtain a copy of the manufacturer's certificate and related papers or the alternative report authorized by paragraph (a)(3)(i) or (ii) of this section and retain the documents as specified in this paragraph (a)(2). A motor carrier who is not the owner of a cargo tank motor vehicle must also retain a copy of the vehicle certification report for as long as the cargo tank motor vehicle is used by that carrier and for one year thereafter. The information required by this section must be maintained at the company's principal place of business or at the location where the vehicle is housed or maintained. The provisions of this section do not apply to a motor carrier who leases a cargo tank for less than 30 days.

(3) **DOT Specification cargo tanks —**

- (i) **Non-ASME Code stamped cargo tanks** —If an owner does not have a manufacturer's certificate for a cargo tank and he wishes to certify it as a specification cargo tank, the owner must perform appropriate tests and inspections, under the direct supervision of a Registered Inspector, to determine if the cargo tank conforms with the applicable specification. Both the owner and the Registered Inspector must certify that the cargo tank fully conforms to the applicable specification. The owner must retain the certificate, as specified in this section.
- (ii) **ASME Code Stamped cargo tanks.** If the owner does not have the manufacturer's certificate required by the specification and the manufacturer's data report required by the ASME, the owner may contact the National Board for a copy of the manufacturer's data report, if the cargo tank was registered with the National Board, or copy the information contained on the cargo tank's identification and ASME Code plates. Additionally, both the owner and the Registered Inspector must certify that the cargo tank fully conforms to the specification. The owner must retain such documents, as specified in this section.

- (b) **Test or inspection reporting.** Each person performing a test or inspection as specified in § 180.407 must prepare a written report, in English, in accordance with this paragraph.

(1) Each test or inspection report must include the following information:

- (i) Owner's and manufacturer's unique serial number for the cargo tank;
- (ii) Name of cargo tank manufacturer;
- (iii) Cargo tank DOT or MC specification number;
- (iv) MAWP of the cargo tank;
- (v) Minimum thickness of the cargo tank shell and heads when the cargo tank is thickness tested in accordance with § 180.407(d)(5), § 180.407(e)(3), § 180.407(f)(3), or § 180.407(i);
- (vi) Indication of whether the cargo tank is lined, insulated, or both; and
- (vii) Indication of special service of the cargo tank (e.g., transports material corrosive to the tank, dedicated service, etc.)

(2) Each test or inspection report must include the following specific information as appropriate for each individual type of test or inspection:

- (i) Type of test or inspection performed;
- (ii) Date of test or inspection (month and year);

- (iii) Listing of all items tested or inspected, including information about pressure relief devices that are removed, inspected and tested or replaced, when applicable (type of device, set to discharge pressure, pressure at which device opened, pressure at which device re-seated, and a statement of disposition of the device (e.g., reinstalled, repaired, or replaced)); information regarding the inspection of upper coupler assemblies, when applicable (visually examined in place, or removed for examination); and, information regarding leakage and pressure testing, when applicable (pneumatic or hydrostatic testing method, identification of the fluid used for the test, test pressure, and holding time of test);
 - (iv) Location of defects found and method of repair;
 - (v) ASME or National Board Certificate of Authorization number of facility performing repairs, if applicable;
 - (vi) Name and address of person performing test;
 - (vii) Registration number of the facility or person performing the test;
 - (viii) Continued qualification statement, such as "cargo tank meets the requirements of the DOT specification identified on this report" or "cargo tank fails to meet the requirements of the DOT specification identified on this report";
 - (ix) DOT registration number of the registered inspector; and
 - (x) Dated signature of the registered inspector and the cargo tank owner.
- (3) The owner and the motor carrier, if not the owner, must each retain a copy of the test and inspection reports until the next test or inspection of the same type is successfully completed. This requirement does not apply to a motor carrier leasing a cargo tank for fewer than 30 days.

(c) Additional requirements for Specification MC 330 and MC 331 cargo tanks.

- (1) After completion of the pressure test specified in § 180.407(g)(3), each motor carrier operating a Specification MC 330 or MC 331 cargo tank in anhydrous ammonia, liquefied petroleum gas, or any other service that may cause stress corrosion cracking, must make a written report containing the following information:
- (i) Carrier's name, address of principal place of business, and telephone number;
 - (ii) Complete identification plate data required by Specification MC 330 or MC 331, including data required by ASME Code;
 - (iii) Carrier's equipment number;
 - (iv) A statement indicating whether or not the tank was stress relieved after fabrication;
 - (v) Name and address of the person performing the test and the date of the test;
 - (vi) A statement of the nature and severity of any defects found. In particular, information must be furnished to indicate the location of defects detected, such as in weld, heat-affected zone, the liquid phase, the vapor phase, or the head-to-shell seam. If no defect or damage was discovered, that fact must be reported;
 - (vii) A statement indicating the methods employed to make repairs, who made the repairs, and the date they were completed. Also, a statement of whether or not the tank was stress relieved after repairs and, if so, whether full or local stress relieving was performed;

(viii) A statement of the disposition of the cargo tank, such as “cargo tank scrapped” or “cargo tank returned to service”; and

(ix) A statement of whether or not the cargo tank is used in anhydrous ammonia, liquefied petroleum gas, or any other service that may cause stress corrosion cracking. Also, if the cargo tank has been used in anhydrous ammonia service since the last report, a statement indicating whether each shipment of ammonia was certified by its shipper as containing 0.2 percent water by weight.

(2) A copy of the report must be retained by the carrier at its principal place of business during the period the cargo tank is in the carrier's service and for one year thereafter. Upon a written request to, and with the approval of, the Field Administrator, Regional Service Center, Federal Motor Carrier Safety Administration for the region in which a motor carrier has its principal place of business, the carrier may maintain the reports at a regional or terminal office.

(3) The requirement in paragraph (c)(1) of this section does not apply to a motor carrier leasing a cargo tank for less than 30 days.

(d) **Supplying certificates and reports.** Each person offering a DOT-specification cargo tank for sale or lease must provide the purchaser or lessee a copy of the cargo tank certificate of compliance, records of repair, modification, stretching, or rebarrelling; and the most recent inspection and test reports made under this section. Copies of such reports must be provided to the lessee if the cargo tank is leased for more than 30 days.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 55 FR 21038, May 22, 1990; 55 FR 37069, Sept. 7, 1990; 56 FR 27879, June 17, 1991; 58 FR 12905, Mar. 8, 1993; Amdt. 180-2, 59 FR 1786, Jan. 12, 1994; Amdt. 180-10, 61 FR 51343, Oct. 1, 1996; 63 FR 52850, Oct. 1, 1998; 64 FR 28052, May 24, 1999; 65 FR 50463, Aug. 18, 2000; 67 FR 61016, Sept. 27, 2002; 68 FR 19290, Apr. 18, 2003; 68 FR 52372, Sept. 3, 2003; 69 FR 54047, Sept. 7, 2004; 70 FR 34077, June 13, 2005; 76 FR 43532, July 20, 2011; 85 FR 75717, Nov. 25, 2020]

Subpart F—Qualification and Maintenance of Tank Cars

Source: Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, unless otherwise noted.

§ 180.501 Applicability.

(a) This subpart prescribes requirements, in addition to those contained in parts 107, 171, 172, 173, 174, and 179 of this subchapter, applicable to any person who manufactures, fabricates, marks, maintains, repairs, inspects, or services tank cars to ensure continuing qualification.

(b) This subpart also establishes the minimum acceptable framework for an owner's qualification program for tank cars and components. Owners should follow this subpart in developing their written procedures (work instructions), as required under § 179.7(d), for use by tank car facility employees. The owner's qualification program for each tank car, or a fleet of tank cars, must identify where to inspect, how to inspect, and the acceptance criteria. Alternative inspection and test procedures or intervals based on a damage-tolerance analysis or service reliability assessment must be approved by the Associate Administrator for Railroad Safety in accordance with 180.509(l). Tank car facilities must incorporate the owner's qualification program in their quality assurance program, as required under § 179.7(a)(2), (b)(3), (b)(5), and (d).

- (c) Any person who performs a function prescribed in this part shall perform that function in accordance with this part.
- (d) Where, in this subpart, a person is required to make documents available to FRA upon request, such request means that credentialed FRA personnel or an authorized representative of the Department may view the documents and make copies of them. The document owner's may seek confidential treatment of the documents presented. See § 105.30.

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended by Amdt. 179-50, 61 FR 33256, June 26, 1996; 77 FR 37986, June 25, 2012]

§ 180.503 Definitions.

The following definitions and those contained in §§ 171.8 and 179.2 of this subchapter apply:

Coating/lining owner means the person with the financial responsibility for purchasing and maintaining the integrity of the interior coating or lining.

Corrosive to the tank or service equipment means a material identified in Appendix D of this part or a material when in contact with the inner shell of the tank or service equipment has a corrosion rate on steel greater than 2.5 milli-inch per year (mpy) (0.0025 inch per year).

Defects mean abrasions; corrosion; cracks; dents; flaws in welds; distortions; erosion; missing, damaged, leaking or loose components and fasteners; and other conditions or imperfections that may make a tank car unsafe for transportation and/or require it to be removed from service.

Design level of reliability and safety means the level of reliability and safety built into the tank car and, therefore, inherent in its specification, design, and manufacture.

Inspection and test means a careful and critical examination of a tank car and its appurtenances performed by qualified personnel following the owner's qualified procedures.

Interior heater system means a piping system located within the tank shell that uses a fluid medium to heat the lading for the purposes of unloading.

Maintenance means upkeep, or preservation, including repairs necessary and proper to ensure an in-operation tank car's specification until its next qualification.

Modification means any change to a tank car that affects the certificate of construction prescribed in § 179.5, including an alteration prescribed in § 179.6, or conversion.

Objectively reasonable and articulable belief means a belief based on particularized and identifiable facts that provide an objective basis to believe or suspect that a tank car or a class or design of tank cars may be in an unsafe operating condition.

Qualification, as relevant to a tank car, means the car and its components conforms to the specification to which it was designed, manufactured, or modified to the requirements of this subpart, to the applicable requirements of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter), and to the owner's acceptance criteria. Qualification is accomplished by careful and critical examination that verifies conformance using inspections and tests based on a written program approved by the tank car owner

followed by a written representation of that conformance. A tank car that passes the appropriate tests for its specification, has a signed test report, is marked to denote this passage, and is considered qualified for hazardous materials transportation under this subchapter.

Qualification of	Tests and inspections	§ 180.509 ^(*)
Tank	Visual Inspection	d
	Structural Integrity Inspection	e
	Thickness Test: Note 1	f
	Safety System Inspection	h
Service Equipment	Service Equipment	k
Coating/lining	Internal Coatings and Linings	i

Note 1: Subparagraph (f)(2) may require thickness tests at an interval different from the other items for qualification of the tank.

Railworthy, Railworthiness for a tank car means that the tank, service equipment, safety systems, and all other components covered by this subchapter conform to the HMR, and are otherwise suitable for continued service and capable of performing their intended function until their next qualification.

Reactive to the tank or service equipment means a material that, in contact with the inner shell of the tank, or with the service equipment, may react to produce heat, gases, and/or pressure which could substantially reduce the effectiveness of the packaging or the safety of its use.

Reinforced tank shell butt weld means the portion of a butt weld covered by a reinforcing pad.

Reinforcing pad means an attachment welded directly to the tank supporting major structural components for the purpose of preventing damage to the tank through fatigue, overstressing, denting, puncturing, or tearing.

Reliability means the quantified ability of an item or structure to operate without failure for the specified period of its design life or until its next qualification.

Representation means attesting through documenting, in writing or by marking on the tank (or jacket), that a tank car is qualified and railworthy. See also §§ 180.511 and 180.517(b).

Safety system means one or more of the following: Thermal protection systems, insulation systems, tank head puncture resistance systems, coupler vertical restraint systems, and systems used to protect discontinuities (e.g., skid protection and protective housings) as required under this subchapter.

Service equipment means equipment used for loading and unloading (including an interior heating system), sampling, venting, vacuum relief, pressure relief, and measuring the amount of lading or the lading temperature.

Service equipment owner means the party responsible for bearing the cost of the maintenance of the service equipment.

Tank car owner means the person to whom a rail car's reporting marks are assigned, as listed in the Universal Machine Language Equipment Register (UMLER).

Tank car tank means the shell, heads, tank shell and head weld joints, attachment welds, sumps, nozzles, flanges, and all other components welded thereto that are either in contact with the lading or contain the lading.

[77 FR 37986, June 25, 2012, as amended at 81 FR 35546, June 2, 2016; 89 FR 52994, June 24, 2024]

§ 180.505 Quality assurance program.

The quality assurance program requirements of § 179.7 of this subchapter apply.

§ 180.507 Qualification of tank cars.

- (a) Each tank car marked as meeting a “DOT” specification or any other tank car used for the transportation of a hazardous material must meet the requirements of this subchapter or the applicable specification to which the tank was constructed.
- (b)
 - (1) Tank cars prescribed in the following table are no longer authorized for construction but may remain in hazardous materials service provided they conform to all applicable safety requirements of this subchapter:

TABLE 1 TO PARAGRAPH (b)(1)

Specification prescribed in the current regulations	Other specifications permitted	Notes
105A200W	105A100W	1
105A200ALW	105A100ALW	1

Note 1 to Table 1 to paragraph (b)(1): Tanks built as Specification DOT 105A100W or DOT 105A100ALW may be altered and converted to DOT 105A200W and DOT 105A200ALW, respectively.

- (2) [Reserved]
- (3) Specification DOT-113A175W, DOT-113C60W, DOT-113D60W, and DOT-113D120W tank cars may continue in use, but new construction is not authorized.
- (4) Class DOT 105A and 105S tank cars used to transport hydrogen chloride, refrigerated liquid under the terms of DOT-E 3992 may continue in service, but new construction is not authorized.
- (5) Specification DOT-103A-ALW, 103AW, 103ALW, 103ANW, 103BW, 103CW, 103DW, 103EW, and 104W tank cars may continue in use, but new construction is not authorized.

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended at 68 FR 48572, Aug. 14, 2003; 77 FR 37987, June 25, 2012; 87 FR 79785, Dec. 27, 2022]

§ 180.509 Requirements for inspection and test of specification tank cars.

- (a) **General.** Each tank car owner must ensure that a tank car facility:
 - (1) Inspects and tests each item according to the requirements specified in this section;
 - (2) Evaluates each item according to the acceptable results of inspections and tests specified in § 180.511;
 - (3) Marks each tank car as specified in § 180.515 that is qualified to transport hazardous materials;
 - (4) Prepares the documentation as required by § 180.517 for each item qualified under this section. A copy of the documentation required by § 180.517 must be sent to the owner as appropriate and according to the owner's instructions.
- (b) **Conditions requiring qualification of tank cars.** Without regard to the qualification compliance date requirements of any paragraph of this section, an owner of a tank car or an internal coating or lining must ensure an appropriate inspection and test according to the type of defect and the type of maintenance or repair performed if:
 - (1) The tank car shows evidence of abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that may make the tank car unsafe for transportation,
 - (2) The tank car was in an accident and shows evidence of damage to an extent that may adversely affect its capability to retain its contents or to otherwise remain railworthy.
 - (3) The tank bears evidence of damage caused by fire.
 - (4) The Associate Administrator for Railroad Safety, FRA, requires it based on the existence of an objectively reasonable and articulable belief that a tank car or a class or design of tank cars may be in an unsafe operating condition.
- (c) **Frequency of inspection and tests.** Each tank car shall have an inspection and test according to the requirements of this paragraph.
 - (1) For Class 107 tank cars and tank cars of riveted construction, the tank car must have a hydrostatic pressure test and visual inspection conforming to the requirements in effect prior to July 1, 1996, for the tank specification.
 - (2) For Class DOT 113 tank cars, see § 173.319(e) of this subchapter.

- (3) Fusion welded tank cars must be inspected and tested to be qualified and maintained in accordance with the following table. All qualification requirements need not be done at the same time or at the same facility.

FREQUENCY OF QUALIFICATION INSPECTION AND TESTS

Section 180.509(*)	Description	Maximum interval
D	Visual inspection	10 years.
E	Structural integrity inspection	10 years.
F	Thickness test	See § 180.509(f).
H	Safety Systems	10 years.
I	Internal coating or lining (for materials corrosive or reactive to the tank) (See definitions at § 180.503)	See § 180.509(i).
J	Leakage pressure test	After reassembly.
K	Service equipment (including pressure relief device)	See § 180.509(k).

- (d) **Visual inspection.** At a minimum, each tank car facility must visually inspect the tank externally and internally as follows:

- (1) An internal inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that makes the tank car unsafe for transportation, and except in the areas where insulation or a thermal protection system precludes it, an external inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that makes the tank car unsafe for transportation, and for DOT 115 class tank cars, an internal inspection of the inner container and external inspection of the outer shell and heads for defects in welds, or any other condition that may make the tank car unsafe for transportation;
- (2) When an internal coating or lining, head protection, insulation, or thermal protection is removed in part or in whole, the internal and external exposed surface of the tank must be visually inspected for defects in welds or any other condition that may make the tank car unsafe for transportation, and this inspection must precede any application or reapplication of a coating or lining;
- (3) An inspection of the service equipment, including gaskets, for indications of corrosion and other conditions that may make the tank car unsafe for transportation;
- (4) An inspection for missing or loose bolts, nuts, or elements that may make the tank car unsafe for transportation;
- (5) An inspection of all closures on the tank car for conditions that may make the tank car unsafe for transportation, including an inspection of the protective housings for proper condition;

- (6) An inspection of excess flow valves with threaded seats for tightness; and
- (7) An inspection of the required markings on the tank car for legibility.

(e) **Structural integrity inspections and tests.**

- (1) Each tank car owner must ensure the structural elements on the tank car qualify with the applicable requirements of this subchapter. At a minimum, the structural integrity inspection and test must include:
 - (i) All transverse fillet welds greater than 0.64 cm (0.25 inch) within 121.92 cm (4 feet) of the bottom longitudinal centerline except body bolster pad attachment welds;
 - (ii) The termination of longitudinal fillet welds greater than 0.64 cm (0.25 inch) within 121.92 cm (4 feet) of the bottom longitudinal centerline; and
 - (iii) The tank shell butt welds within 60.96 cm (2 feet) of the bottom longitudinal centerline, unless the tank car owner can determine by analysis (e.g., finite element analysis, damage-tolerance analysis, or service reliability assessment) that the structure will not develop defects that reduce the design level of safety and reliability or fail within its operational life or prior to the next required inspection. The owner must maintain all documentation used to make such determination at its principal place of business and make the data available to FRA or an authorized representative of the Department upon request.
- (2) For DOT 115 class tanks, paragraphs (e)(1)(i) through (iii) of this section apply only to the outer shell fillet welds and to the non-reinforced exposed outer shell butt welds.
- (3) The inspection requirements of paragraph (e)(1)(iii) of this section do not apply to reinforced tank shell butt welds until the time of lining removal or application for tank cars with an internal lead, glass, or rubber lining.
- (4) Each tank car facility must inspect and test the elements identified in paragraph (e)(1) of this section by one or more of the following methods:
 - (i) Dye penetrant testing (PT);
 - (ii) Radiographic examination (RT);
 - (iii) Magnetic particle testing (MT);
 - (iv) Ultrasonic testing (UT); and
 - (v) Direct, remote, or enhanced visual inspection, using, for example, magnifiers, fiberscopes, borescopes, and/or machine vision technology (VT).

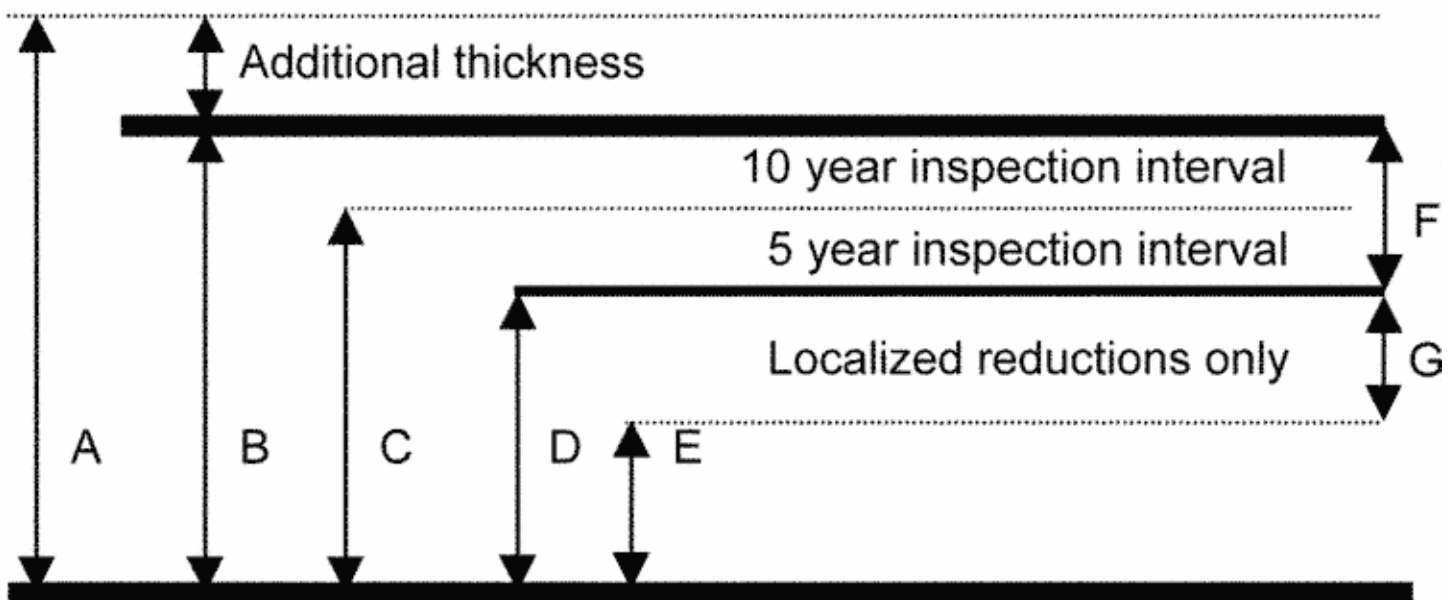
(f) **Thickness tests.**

- (1) The tank car owner must ensure that each tank car facility measures the thickness of the tank car shell, heads, sumps, protective housing (i.e., domes), and nozzles on each tank car by using a device capable of accurately measuring the thickness to within ± 0.05 mm (± 0.002 inch).
- (2) The tank car owner must ensure that each tank car has a thickness test measurement:
 - (i) At the time of an internal coating or lining application or replacement, or
 - (ii) At least once every ten (10) years for a tank that does not have an internal coating or lining, or

- (iii) At least once every five (5) years for a tank that does not have an internal coating or lining when:
 - (A) The tank is used to transport a material that is corrosive or reactive to the tank (see Appendix D of this part) or service equipment as defined § 180.503, and
 - (B) The remaining shell and head thickness is tested and determined to be at or below line C in Figure A of this paragraph.

Figure A

Tank and Shell Thickness Qualification Frequencies



Where:

- A. As-built tank shell or head thickness with additional thickness.
- B. Required minimum tank shell or head thickness after forming per part 179.
- C. Inspection frequency adjustment point (design minimum shell or head thickness, minus $\frac{1}{2}$ of the table value in paragraph (g) of this section).
- D. Condemning limit for general corrosion (required minimum shell or head thickness, minus the value in paragraph (g) of this section).

E. Condemning limit for localized corrosion (required minimum shell or head thickness, minus the table value in paragraph (g) of this section, minus 1.58 mm ($\frac{1}{16}$ inch)). See Note 1 in paragraph (g) of this section for diameter limitations and minimum separation distances.

F. Allowable shell or head thickness reduction (table value in paragraph (g) of this section).

G. Additional thickness reduction for localized areas in paragraph (g) of this section.

- (3) For a localized repair of an internal coating or lining where a material corrosive to the tank or service equipment as defined § 180.503 has contacted the tank, a qualified individual must verify the coating or lining's conformance with paragraph (g) of this section by measuring the shell or head in the area of the repair. The thickness test applies only to the non-lined or coated repaired area, and is not a qualification event. Modification of the tank stencil is not required.
- (4) Operation of a tank car below the condemning limit for general corrosion or the condemning limit for localized corrosion (as shown in Figure A of this section) is prohibited.
- (5) For sumps, protective housing (i.e., domes), nozzles, and nozzle reinforcing pads, the tank car owner must determine if any reduction in wall thickness affects the design levels of reliability and safety built into sump, protective housing, nozzle, or nozzle reinforcement. Each tank car owner must maintain at its principal place of business documentation describing the allowable thickness reductions for sumps, protective housings, and nozzles, and nozzle reinforcements. This documentation must be made available to FRA or an authorized representative of the Department upon request.
- (6) After repairs, alterations, conversions, modifications, or blasting of tank car that results in a reduction of the tank's thickness, and anytime a tank car coating or lining is removed, a qualified individual must measure the thickness of the tank in the area of reduced thickness to ensure that the thickness of the tank conforms to paragraph (g) of this section.

(g) **Service life thickness allowance.**

- (1) A tank car found with a thickness below the required minimum thickness after forming for its specification, as stated in part 179 of this subchapter, may continue in service if any reduction in the required minimum thickness is not more than that provided in the following table:

ALLOWABLE SHELL THICKNESS REDUCTIONS

Marked tank test pressure	Top shell and tank head	Bottom shell
60 psig <200 psig	3.17 mm	1.58 mm.
	1/8 inch	1/16 inch.
≥200 psig	0.79 mm	0.79 mm.

Marked tank test pressure	Top shell and tank head	Bottom shell
	1/32 inch	1/32 inch.

Note 1. A tank car owner may add an extra 1.58 mm ($1/16$ inch) to the values in the table for local reductions. Local reductions are those that do not exceed 20.32 linear centimeters (8 linear inches) measured at the longest diameter, and are separated from the other local reductions by at least 40.64 cm (16 inches).

Note 2. Any reduction in the tank car shell thickness may not affect the structural strength of the tank car to the extent that the tank car no longer conforms to the applicable provisions of Section 6.2 of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter).

Note 3. For DOT 115 class tank cars, shell thickness reductions apply only to the outer shell of the tank car. There is no shell or head thickness reduction authorized for the inner tank.

(2) [Reserved]

(h) **Safety system inspections.** Each tank car owner must ensure qualification of the tank car safety systems. However, inspections of foam or cork insulation systems are not required.

(i) **Internal coating and lining inspection and test.**

(1) At a minimum, the owner of an internal coating or lining applied to protect a tank used to transport a material that is corrosive or reactive to the tank must ensure an inspection adequate enough to detect defects or other conditions that could reduce the design level of reliability and safety of the tank is performed. In addition, the owner of a coating or lining of tank cars used to transport hazardous materials must ensure the lining complies with § 173.24(b)(2) and (b)(3) of this subchapter.

(2) The owner of the internal coating or lining must establish and maintain a record of the service life of the coating or lining and commodity combination, that is, the specific hazardous materials that were loaded into a tank and the coating or lining in place at the time of loading. The owner of the internal coating or lining must use its knowledge of the service life of each coating or lining and commodity combination to establish an appropriate inspection interval for that coating or lining and commodity combination. This interval must not exceed eight (8) years, unless the coating or lining owner can establish, document, and show that the service history or scientific analysis of the coating or lining and commodity pairing supports a longer inspection interval. The owner must maintain at its principal place of business a written procedure for collecting and documenting the performance of the coating or lining applied within the tank car for its service life. The internal coating or lining owner must provide this documentation, including inspection and test, repair, removal, and application procedures, to the FRA or car owner upon request. Further, the offeror must provide commodity information to the car owner and the owner of the internal coating or lining upon request.

(3) The owner of the internal coating or lining must provide the test method and acceptance criteria to the tank car owner and to the person responsible for qualifying the coating or lining. The tank car facility inspecting and testing the internal coating or lining must follow the inspection and test procedure, including the acceptance requirements, established by the internal coating or lining owner.

(j) **Leakage pressure test.** Unless the design of the service equipment arrangement precludes it (e.g., there is no fitting to pressurize the tank), each owner of a tank car must ensure that the tank, service equipment, and closures installed, replaced, or reinstalled on the tank car are leak tested. The test may be conducted with the lading in the tank. When the test pressure exceeds the start-to-discharge or burst pressure of a pressure relief device, the device must be rendered inoperative. The written procedures and test method for leak testing must ensure the sensitivity and reliability of the test method to prevent premature failure. This section does not apply to facilities that remove closures for the sole purpose of loading or unloading the lading (e.g., blind flanges, pipe plugs, etc.).

(k) **Service equipment inspection and test.**

(1) Each tank car owner must ensure the qualification of tank car service equipment at least once every ten (10) years. The tank car owner must analyze the service equipment inspection and test results for any given lading and, based on the analysis, adjust the inspection and test frequency to ensure that the design level of reliability and safety of the equipment is met. The owner must maintain at its principal place of business all supporting documentation used to make such analyses and inspection and test frequency adjustments. The supporting documentation must be made available to FRA or an authorized representative of the Department upon request.

(2) Each tank car facility must qualify service equipment, including reclosing pressure relief devices and interior heater systems in accordance with the applicable provisions of Appendix D of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter).

(l) **Alternative inspection and test procedures.** When approved by the Associate Administrator for Railroad Safety, FRA, a tank car owner, or a coating or lining owner may use an alternative inspection and test procedure or interval based on a damage-tolerance analysis (that must include a determination of the probable locations and modes of damage due to fatigue, corrosion, and accidental damage), or based on a service reliability assessment (that must be supported by analysis of systematically collected data) in lieu of the other requirements of this section.

(m) **Inspection and test compliance date for tank cars.**

(1) After July 1, 2000, each tank car with a metal jacket or with a thermal protection system shall have an inspection and test conforming to this section no later than the date the tank car requires a periodic hydrostatic pressure test (i.e., the marked due date on the tank car for the hydrostatic test).

(2) After July 1, 1998, each tank car without a metal jacket shall have an inspection and test conforming to this section no later than the date the tank car requires a periodic hydrostatic pressure test (i.e., the marked due date on the tank car for the hydrostatic test).

(3) For tank cars on a 20-year periodic hydrostatic pressure test interval (i.e., Class DOT 103W, 104W, 111A60W1, 111A100W1, and 111A100W3 tank cars), the next inspection and test date is the midpoint between the compliance date in paragraph (l)(1) or (2) of this section and the remaining years until the tank would have had a hydrostatic pressure test.

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended by Amdt. 179-50, 61 FR 33256, June 26, 1996; 62 FR 51561, Oct. 1, 1997; 63 FR 52851, Oct. 1, 1998; 66 FR 45391, Aug. 28, 2001; 68 FR 75765, Dec. 31, 2003; 71 FR 54398, Sept. 14, 2006; 77 FR 37987, June 25, 2012]

§ 180.511 Acceptable results of inspections and tests.

Provided it conforms to other applicable requirements of this subchapter, a tank car is qualified for use if it successfully passes the inspections and tests set forth below conducted in accordance with this subpart. A representation of that qualification must consist of marking the tank in accordance with § 180.515.

- (a) **Visual inspection.** A tank car successfully passes the visual inspection when the inspection shows no structural defect that may cause leakage from or failure of the tank before the next inspection and test interval.
- (b) **Structural integrity inspection and test.** A tank car successfully passes the structural integrity inspection and test when it shows no structural defect that may initiate cracks or propagate cracks and cause failure of the tank before the next inspection and test interval.
- (c) **Service life shell thickness.** A tank car successfully passes the service life shell thickness inspection when the tank shell and heads show no thickness reduction below that allowed in § 180.509(g).
- (d) **Safety system inspection.** A tank car successfully passes the safety system inspection when each thermal protection system, tank head puncture resistance system, coupler vertical restraint system, and system used to protect discontinuities (e.g., breakage grooves on bottom outlets and protective housings) on the tank car conform to this subchapter and show no indication of a defect that may reduce reliability before the next inspection and test interval.
- (e) **Lining and coating inspection.** A tank car successfully passes the lining and coating inspection and test when the lining or coating conforms to the owner's acceptance criteria.
- (f) **Leakage pressure test.** A tank car successfully passes the leakage pressure test when all product piping, fittings and closures show no indication of leakage.
- (g) **Hydrostatic test.** A Class 107 tank car, the inner tank of a Class 115 tank car, or a riveted tank car successfully passes the hydrostatic test when it shows no leakage, distortion, excessive permanent expansion, or other evidence of weakness that might render the tank car unsafe for transportation service.
- (h) **Service equipment.** A tank car successfully passes the service equipment inspection and test when this equipment conforms to this subchapter and applicable provisions of Appendix D of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter), and shows no indication of a defect that may reduce reliability during the qualification interval.

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended by Amdt. 179-50, 61 FR 33256, June 26, 1996; 66 FR 45187, Aug. 28, 2001; 77 FR 37990, June 25, 2012]

§ 180.513 Repairs, alterations, conversions, and modifications.

- (a) To work on tank cars, a tank car facility must comply with the applicable requirements of this subpart, the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter), and the owner's requirements.

- (b) **Responsibilities of Tank Car Facility.** A tank car facility must obtain the permission of the equipment owner before performing work affecting alteration, conversion, repair, or qualification of the owner's equipment. For the purposes of qualification and maintenance, the tank car facility must use the written instructions furnished by the owner or have written confirmation from the owner allowing the use of written instructions furnished by the owner or have written confirmation from the owner allowing the use of written instructions furnished by another. A tank car facility must not use, copy distribute, forward or provide to another person the owner's confidential and proprietary written instructions, procedures, manuals, and records without the owner's permission. A tank car facility must report all work performed to the owner. The tank car facility must also report observed damage, deterioration, failed components, or non-compliant parts to the owner. A tank car facility must incorporate the owner's Quality Assurance Program into their own Quality Assurance Program.
- (c) Unless the exterior tank car shell or interior tank car jacket has a protective coating, after a repair that requires the complete removal of the tank car jacket, the exterior tank car shell and the interior tank car jacket must have a protective coating applied to prevent the deterioration of the tank shell and tank jacket. Previously applied coatings that still provide effective protection need not be covered over.
- (d) After repair, replacement, or qualification of tank car service equipment, the tank service equipment must successfully pass the leak test prescribed in § 180.509(j).

[77 FR 37990, June 25, 2012]

§ 180.515 Markings.

- (a) When a tank car passes the required inspection and test with acceptable results, the tank car facility must mark the date of the inspection and test and due date of the next inspection and test qualified on the tank car in accordance with the applicable provisions of Appendix C of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter). When a tank car facility performs multiple inspections and tests at the same time, one date may be used to satisfy the requirements of this section. One date also may be shown when multiple inspections and tests have the same due date. Dates displayed on the "consolidated stencil" (see the applicable provisions of Appendix C of the AAR Specifications for Tank Cars) take precedence over dates modified, and not stenciled, pursuant to interval adjustments for service equipment, linings, and granted alternative inspection intervals.
- (b) Converted DOT 105, 109, 112, 114, or 120 class tank cars must have the new specification and conversion date permanently marked in letters and figures at least 0.95 cm (0.375 inch) high on the outside of the manway nozzle or the edge of the manway nozzle flange on the left side of the car. The marking may have the last numeral of the specification number omitted (e.g., "DOT 111A100W" instead of "DOT 111A100W1").
- (c) When qualified within six months of installation and protected from deterioration, the test date marking of a reclosing pressure relief device is the installation date on the tank car.
- (d) The specification marking for DOT 113 tank cars built in accordance with the DOT 113C120W9 specification must display the last numeral of the specification number (i.e., "DOT 113C120W9").

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended by Amdt. 179-50, 61 FR 33256, June 26, 1996; 63 FR 52851, Oct. 1, 1998; 66 FR 45391, Aug. 28, 2001; 68 FR 75765, Dec. 31, 2003; 77 FR 37991, June 25, 2012; 85 FR 45030, July 24, 2020]

§ 180.517 Reporting and record retention requirements.

- (a) **Certification and representation.** Each owner of a specification tank car must retain the certificate of construction (AAR Form 4-2) and related papers certifying that the manufacture of the specification tank car identified in the documents is in accordance with the applicable specification. The builder's signature on the certificate of construction and the marking of the tank car with the tank specification is the representation that all of the appropriate inspections and tests were successfully performed to qualify the tank for use. The owner must retain the documents throughout the period of ownership of the specification tank car and for one year thereafter. Upon a change of ownership, the applicable provisions prescribed in Section 1.3.15 of the AAR Specifications for Tank Cars (IBR, see § 171.7 of this subchapter) apply. The builder of the car or a facility performing work on the car may retain copies of relevant records.
- (b) **Inspection and test reporting.** Each tank car that is inspected and tested as specified in § 180.509 must have a written report, in English, prepared according to this paragraph. Marking the tank car with the specification (or retaining the specification marking on the tank) is the representation that all of the appropriate inspections and tests were performed and the results meet the tank car owner's acceptance criteria to qualify the car for continued use. The report may be created and retained electronically, but, upon request by FRA for a copy of the report, it must be made available in common readable form. The owner must retain a copy of the inspection and test reports until successfully completing the next inspection and test of the same type. The inspection and test report must include the following:
- (1) Type of inspection and test performed (a checklist is acceptable);
 - (2) The results of each inspection and test performed;
 - (3) Tank car reporting mark and number;
 - (4) Tank car specification;
 - (5) Inspection and test date (month and year);
 - (6) Location and description of defects found and method used to repair each defect;
 - (7) The name and address of the tank car facility and the name and signature of inspector; and
 - (8) The unique code (station stencil) identifying the facility.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 68 FR 75765, Dec. 31, 2003; 77 FR 37991, June 25, 2012]

§ 180.519 Periodic retest and inspection of tank cars other than single-unit tank car tanks.

- (a) **General.** Unless otherwise provided in this subpart, tanks designed to be removed from cars for filling and emptying and tanks built to a Class DOT 107A specification and their safety relief devices must be retested periodically as specified in Retest Table 1 of paragraph (b)(5) of this section. Retests may be made at any time during the calendar year the retest falls due.
- (b) **Pressure test.**
- (1) Each tank must be subjected to the specified hydrostatic pressure and its permanent expansion determined. Pressure must be maintained for 30 seconds and for as long as necessary to secure complete expansion of the tank. Before testing, the pressure gauge must be shown to be accurate within 1 percent at test measure. The expansion gauge must be shown to be accurate, at test

pressure, to within 1 percent. Expansion must be recorded in cubic cm. Permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure and the tank must not leak or show evidence of distress.

- (2) Each tank, except tanks built to specification DOT 107A, must also be subjected to interior air pressure test of at least 100 psig under conditions favorable to detection of any leakage. No leaks may appear.
- (3) Safety relief valves must be retested by air or gas, must start-to-discharge at or below the prescribed pressure and must be vapor tight at or above the prescribed pressure.
- (4) Rupture discs and fusible plugs must be removed from the tank and visually inspected.
- (5) Tanks must be retested as specified in Retest Table 1 of this paragraph (b)(5), and before returning to service after repairs involving welding or heat treatment:

RETEST TABLE 1

Specification	Retest interval—years		Minimum Retest pressure—psig		Pressure relief valve pressure—psig	
	Tank	Pressure relief devices ^d	Tank hydrostatic expansion ^c	Tank air test	Start-to-discharge	Vapor tight
DOT 27	5	2	500	100	375	300
106A500	5	2	500	100	375	300
106A500X	5	2	500	100	375	300
106A800	5	2	800	100	600	480
106A800X	5	2	800	100	600	480
106A800NCI	5	2	800	100	600	480
107A ****	^d 5	^a 2	(^b)	None	None	None
110A500-W	5	2	500	100	375	300
110A600-W	5	2	600	100	500	360
110A800-W	5	2	800	100	600	480
110A1000-W	5	2	1,000	100	750	600

Notes:

^a If DOT 107A **** tanks are used for transportation of flammable gases, one rupture disc from each car must be burst at the interval prescribed. The sample disc must burst at a pressure not exceeding the marked test pressure of the tank and not less than 70 percent of the marked test pressure. If the sample disc does not burst within the prescribed limits, all discs on the car must be replaced.

^b The hydrostatic expansion test pressure must at least equal the marked test pressure.

^c See § 180.519(b)(1).

^d Safety relief valves of the spring-loaded type on tanks used exclusively for fluorinated hydrocarbons and mixtures thereof which are free from corroding components may be retested every 5 years.

Specification	Retest interval—years		Minimum Retest pressure—psig		Pressure relief valve pressure—psig	
	Tank	Pressure relief devices ^d	Tank hydrostatic expansion ^c	Tank air test	Start-to-discharge	Vapor tight
BE-27	5	2	500	100	375	300

Notes:

^a If DOT 107A * * * * tanks are used for transportation of flammable gases, one rupture disc from each car must be burst at the interval prescribed. The sample disc must burst at a pressure not exceeding the marked test pressure of the tank and not less than 70 percent of the marked test pressure. If the sample disc does not burst within the prescribed limits, all discs on the car must be replaced.

^b The hydrostatic expansion test pressure must at least equal the marked test pressure.

^c See § 180.519(b)(1).

^d Safety relief valves of the spring-loaded type on tanks used exclusively for fluorinated hydrocarbons and mixtures thereof which are free from corroding components may be retested every 5 years.

- (6) The month and year of test, followed by a “V” if visually inspected as described in paragraph (c) of this section, must be plainly and permanently stamped into the metal of one head or chime of each tank with successful test results; for example, 01-90 for January 1990. On DOT 107A**** tanks, the date must be stamped into the metal of the marked end, except that if all tanks mounted on a car have been tested, the date may be stamped into the metal of a plate permanently applied to the bulkhead on the “A” end of the car. Dates of previous tests and all prescribed markings must be kept legible.
- (c) **Visual inspection.** Tanks of Class DOT 106A and DOT 110A-W specifications (§§ 179.300 and 179.301 of this subchapter) used exclusively for transporting fluorinated hydrocarbons and mixtures thereof, and that are free from corroding components, may be given a periodic complete internal and external visual inspection in place of the periodic hydrostatic retest. Visual inspections shall be made only by competent persons. The tank must be accepted or rejected in accordance with the criteria in CGA C-6 (IBR, see § 171.7 of this subchapter).
- (d) **Written records.** The results of the pressure test and visual inspection must be recorded on a suitable data sheet. Completed copies of these reports must be retained by the owner and by the person performing the pressure test and visual inspection as long as the tank is in service. The information to be recorded and checked on these data sheets are: Date of test and inspection; DOT specification number; tank identification (registered symbol and serial number, date of manufacture and ownership symbol); type of protective coating (painted, etc., and statement as to need for refinishing or recoating); conditions checked (leakage, corrosion, gouges, dents or digs, broken or damaged chime or protective ring, fire, fire damage, internal condition); test pressure; results of tests; and disposition of tank (returned to service, returned to manufacturer for repair, or scrapped); and identification of the person conducting the retest or inspection.

[Amdt. 180-8, 60 FR 49079, Sept. 21, 1995, as amended by Amdt. 179-50, 61 FR 33257, June 26, 1996; 65 FR 58633, Sept. 29, 2000; 66 FR 45187, 45392, Aug. 28, 2001; 68 FR 75765, Dec. 31, 2003]

Subpart G—Qualification and Maintenance of Portable Tanks

Source: 66 FR 33453, June 21, 2001, unless otherwise noted.

§ 180.601 Applicability.

This subpart prescribes requirements, in addition to those contained in parts 107, 171, 172, 173, and 178 of this subchapter, applicable to any person responsible for the continuing qualification, maintenance or periodic retesting of a portable tank.

§ 180.603 Qualification of portable tanks.

- (a) Each portable tank used for the transportation of hazardous materials must be an authorized packaging.
- (b) To qualify as an authorized packaging, each portable tank must conform to the requirements of this subchapter and the applicable design specification to which the portable tank was constructed.
- (c) The following portable tanks are authorized for use provided they conform to all applicable safety requirements of this subchapter: 51, 56, 57, 60, IM 101, IM 102 and UN portable tanks.
- (d) A portable tank that also meets the definition of “container” in 49 CFR 450.3(a)(3) must conform to the requirements in parts 450 through 453 of this title for compliance with Annex II of the Convention for Safe Containers (CSC).
- (e) **Exemption portable tanks based on DOT 51 portable tanks.** The owner of a portable tank constructed in accordance with and used under an exemption issued prior to August 31, 1996, which was in conformance with the requirements for Specification DOT 51 portable tanks with the exception of the location of fill and discharge outlets, shall examine the portable tank and its design to determine if it meets the outlet requirements in effect on October 1, 1996. If the owner determines that the portable tank is in compliance with all requirements of the DOT 51 specification, the exemption number stenciled on the portable tank shall be removed and the specification plate (or a plate placed adjacent to the specification plate) shall be durably marked “DOT 51-E*****” (where ***** is to be replaced by the exemption number). During the period the portable tank is in service, and for one year thereafter, the owner of the portable tank must retain on file, at its principal place of business, a copy of the last exemption in effect.

§ 180.605 Requirements for periodic testing, inspection, and repair of portable tanks.

- (a) A portable tank constructed in accordance with a DOT specification for which a test or inspection specified in this subpart has become due, must be tested or inspected prior to being returned for transportation.
- (b) **Conditions requiring test and inspection of portable tanks.** Without regard to any other test or inspection requirements, a Specification or UN portable tank must be tested and inspected in accordance with this section prior to further use if any of the following conditions exist:
 - (1) The portable tank shows evidence of dents, corroded or abraded areas, leakage, or any other condition that might render it unsafe for transportation service.
 - (2) The portable tank has been in an accident and has been damaged to an extent that may adversely affect its ability to retain the hazardous material.

- (3) The portable tank has been out of hazardous materials transportation service for a period of one year or more.
 - (4) The portable tank has been modified from its original design specification.
 - (5) The portable tank is in an unsafe operating condition.
- (c) **Schedule for periodic inspections and tests.** Each Specification portable tank must be tested and inspected in accordance with the following schedule:
- (1) Each IM or UN portable tank must be given an initial inspection and test before being placed into service, a periodic inspection and test at least once every 5 years, and an intermediate periodic inspection and test at least every 2.5 years following the initial inspection and the last 5 year periodic inspection and test.
 - (2) Each Specification 51 portable tank must be given a periodic inspection and test at least once every five years.
 - (3) Each Specification 56 or 57 portable tank must be given a periodic inspection and test at least once every 2.5 years.
 - (4) Each Specification 60 portable tank must be given a periodic inspection and test at the end of the first 4-year period after the original test; at least once every 2 years thereafter up to a total of 12 years of service; and at least once annually thereafter. Retesting is not required on a rubber-lined tank except before each relining.
- (d) **Intermediate periodic inspection and test.** For IM and UN portable tanks the intermediate 2.5 year periodic inspection and test must include at least an internal and external examination of the portable tank and its fittings taking into account the hazardous materials intended to be transported; a leakage test; and a test of the satisfactory operation of all service equipment. Sheathing, thermal insulation, etc. need only be removed to the extent required for reliable appraisal of the condition of the portable tank. For portable tanks intended for the transportation of a single hazardous material, the internal examination may be waived if it is leakage tested in accordance with the procedures in paragraph (h) of this section prior to each filling, or if approved by the Associate Administrator. Portable tanks used for dedicated transportation of refrigerated liquefied gases that are not fitted with inspection openings are excepted from the internal inspection requirement.
- (e) **Periodic inspection and test.** The 5 year periodic inspection and test must include an internal and external examination and, unless excepted, a pressure test as specified in this section. Sheathing, thermal insulation, etc. need only to be removed to the extent required for reliable appraisal of the condition of the portable tank. Except for DOT Specification 56 and 57 portable tanks, reclosing pressure relief devices must be removed from the tank and tested separately unless they can be tested while installed on the portable tank. For portable tanks where the shell and equipment have been pressure-tested separately, after assembly they must be subjected together to a leakage test and effectively tested and inspected for corrosion. Portable tanks used for the transportation of refrigerated, liquefied gases are excepted from the requirement for internal inspection and the hydraulic pressure test during the 5-year periodic inspection and test, if the portable tanks were pressure tested to a minimum test pressure of 1.3 times the design pressure using an inert gas as prescribed in § 178.338-16(a) and (b) of this subchapter before putting the portable tank into service initially and after any exceptional inspections and tests specified in paragraph (f) of this section.

- (f) **Exceptional inspection and test.** The exceptional inspection and test is necessary when a portable tank shows evidence of damaged or corroded areas, or leakage, or other conditions that indicate a deficiency that could affect the integrity of the portable tank. The extent of the exceptional inspection and test must depend on the amount of damage or deterioration of the portable tank. It must include at least the inspection and a pressure test according to paragraph (e) of this section. Pressure relief devices need not be tested or replaced unless there is reason to believe the relief devices have been affected by the damage or deterioration.
- (g) **Internal and external examination.** The internal and external examinations must ensure that:
- (1) The shell is inspected for pitting, corrosion, or abrasions, dents, distortions, defects in welds or any other conditions, including leakage, that might render the portable tank unsafe for transportation. The wall thickness must be verified by appropriate measurement if this inspection indicates a reduction of wall thickness;
 - (2) The piping, valves, and gaskets are inspected for corroded areas, defects, and other conditions, including leakage, that might render the portable tank unsafe for filling, discharge or transportation;
 - (3) Devices for tightening manhole covers are operative and there is no leakage at manhole covers or gaskets;
 - (4) Missing or loose bolts or nuts on any flanged connection or blank flange are replaced or tightened;
 - (5) All emergency devices and valves are free from corrosion, distortion and any damage or defect that could prevent their normal operation. Remote closure devices and self-closing stop-valves must be operated to demonstrate proper operation;
 - (6) Required markings on the portable tank are legible and in accordance with the applicable requirements; and
 - (7) The framework, the supports and the arrangements for lifting the portable tank are in satisfactory condition.
- (h) **Pressure test procedures for specification 51, 56, 57, 60, IM or UN portable tanks.**
- (1) Each Specification 57 portable tank must be leak tested by a minimum sustained air pressure of at least 3 psig applied to the entire tank. Each Specification 51 or 56 portable tank must be tested by a minimum pressure (air or hydrostatic) of at least 2 psig or at least one and one-half times the design pressure (maximum allowable working pressure, or re-rated pressure) of the tank, whichever is greater. The leakage test for portable tanks used for refrigerated liquefied gas must be performed at 90% of MAWP. Leakage tests for all other portable tanks must be at a pressure of at least 25% of MAWP. During each air pressure test, the entire surface of all joints under pressure must be coated with or immersed in a solution of soap and water, heavy oil, or other material suitable for the purpose of detecting leaks. The pressure must be held for a period of time sufficiently long to assure detection of leaks, but in no case less than five minutes. During the air or hydrostatic test, relief devices may be removed, but all the closure fittings must be in place and the relief device openings plugged. Lagging need not be removed from a lagged tank if it is possible to maintain the required test pressure at constant temperature with the tank disconnected from the source of pressure.
 - (2) Each Specification 60 portable tank must be retested by completely filling the tank with water or other liquid having a similar viscosity, the temperature of the liquid must not exceed 37.7 °C (100 °F) during the test, and applying a pressure of 60 psig. The portable tank must be capable of holding the

prescribed pressure for at least 10 minutes without leakage, evidence of impending failure, or failure. All closures shall be in place while the test is made and the pressure shall be gauged at the top of the tank. Safety devices and/or vents shall be plugged during this test.

- (3) Each Specification IM or UN portable tank, except for UN portable tanks used for non-refrigerated and refrigerated liquefied gases, and all piping, valves and accessories, except pressure relief devices, must be hydrostatically tested with water, or other liquid of similar density and viscosity, to a pressure not less than 150% of its maximum allowable working pressure. UN portable tanks used for the transportation of non-refrigerated liquefied gases must be hydrostatically tested with water, or other liquid of similar density and viscosity, to a pressure not less than 130% of its maximum allowable working pressure. UN portable tanks used for the transportation of refrigerated liquefied gases may be tested hydrostatically or pneumatically using an inert gas to a pressure not less than 1.3 times the design pressure. For pneumatic testing, due regard for protection of all personnel must be taken because of the potential hazard involved in such a test. The pneumatic test pressure in the portable tank must be reached by gradually increasing the pressure to one-half of the test pressure. Thereafter, the test pressure must be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. The pressure must then be reduced to a value equal to four-fifths of the test pressure and held for a sufficient time to permit inspection of the portable tank for leaks. The minimum test pressure for a portable tank is determined on the basis of the hazardous materials that are intended to be transported in the portable tanks. For liquid, solid and non-refrigerated liquefied gases, the minimum test pressure for specific hazardous materials are specified in the applicable T Codes assigned to a particular hazardous material in the § 172.101 Table of this subchapter. While under pressure the tank shall be inspected for leakage, distortion, or any other condition which might render the tank unsafe for service. A portable tank fails to meet the requirements of the pressure test if, during the test, there is permanent distortion of the tank exceeding that permitted by the applicable specification; if there is any leakage; or if there are any deficiencies that would render the portable tank unsafe for transportation. Any portable tank that fails must be rejected and may not be used again for the transportation of a hazardous material unless the tank is adequately repaired, and, thereafter, a successful test is conducted in accordance with the requirements of this paragraph. An approval agency shall witness the hydrostatic or pneumatic test. Any damage or deficiency that might render the portable tank unsafe for service shall be repaired to the satisfaction of the witnessing approval agency. The repaired tank must be retested to the original pressure test requirements. Upon successful completion of the hydrostatic or pneumatic test, as applicable, the witnessing approval agency shall apply its name, identifying mark or identifying number in accordance with paragraph (k) of this section.

- (i) **Rejection criteria.** When evidence of any unsafe condition is discovered, the portable tank may not be returned to service until it has been repaired and the pressure test is repeated and passed.
- (j) **Repair.** The repair of a portable tank is authorized, provided such repairs are made in accordance with the requirements prescribed in the specification for the tank's original design and construction. In addition to any other provisions of the specification, no portable tank may be repaired so as to cause leakage or cracks or so as to increase the likelihood of leakage or cracks near areas of stress concentration due to cooling metal shrinkage in welding operations, sharp fillets, reversal of stresses, or otherwise. No field welding may be done except to non-pressure parts. Any cutting, burning or welding operations on the shell of an IM or UN portable tank must be done with the approval of the approval agency and be done in accordance with the requirements of this subchapter, taking into account the pressure vessel code used for the construction of the shell. A pressure test to the original test pressure must be performed after the work is completed.

(k) **Inspection and test markings.**

- (1) Each IM or UN portable tank must be durably and legibly marked, in English, with the date (month and year) of the last pressure test, the identification markings of the approval agency witnessing the test, when required, and the date of the last visual inspection. The marking must be placed on or near the metal identification plate, in letters and numerals of not less than 3 mm (0.118 inches) high when on the metal identification plate, and 12 mm (0.47 inches) high when on the portable tank.
- (2) Each Specification DOT 51, 56, 57 or 60 portable tank must be durably and legibly marked, in English, with the date (month and year) of the most recent periodic retest. The marking must be placed on or near the metal certification plate and must be in accordance with § 178.3 of this subchapter. The letters and numerals must not be less than 3 mm (0.118 inches) high when on the metal certification plate, and 12 mm (0.47 inches) high when on the portable tank, except that a portable tank manufactured under a previously authorized specification may continue to be marked with smaller markings if originally authorized under that specification (for example, DOT Specification 57 portable tanks).

(l) **Record retention.**

- (1) The owner of each portable tank or his authorized agent shall retain a written record of the date and results of all required inspections and tests, including an ASME manufacturer's date report, if applicable, and the name and address of the person performing the inspection or test, in accordance with the applicable specification. The manufacturer's data report, including a certificate(s) signed by the manufacturer, and the authorized design approval agency, as applicable, indicating compliance with the applicable specification of the portable tank, and related papers certifying that the portable tank was manufactured and tested in accordance with the applicable specification must be retained in the files of the owner, or his authorized agent, during the time that such portable tank is used for such service, except for Specifications 56 and 57 portable tanks.
- (2) If the owner does not have the manufacturer's certificate required by the specification and the manufacturer's data report required by the ASME, the owner may contact the National Board for a copy of the manufacturer's data report, if the portable tank was registered with the National Board, or copy the information contained on the portable tanks specification plate and ASME Code data plates.

[Amdt. 180-2, 54 FR 25032, June 12, 1989, as amended at 67 FR 15744, Apr. 3, 2002; 68 FR 45042, July 31, 2003; 74 FR 53189, Oct. 16, 2009; 82 FR 15897, Mar. 30, 2017; 83 FR 55811, Nov. 7, 2018; 87 FR 79785, Dec. 27, 2022]

Appendix A to Part 180—Internal Self-closing Stop Valve Emergency Closure Test for Liquefied Compressed Gases

1. In performing this test, all internal self-closing stop valves must be opened. Each emergency discharge control remote actuator (on-truck and off-truck) must be operated to ensure that each internal self-closing stop valve's lever, piston, or other valve indicator has moved to the closed position.
2. On pump-actuated pressure differential internal valves, the three-way toggle valve handle or its cable attachment must be activated to verify that the toggle handle moves to the closed position.

[64 FR 28052, May 24, 1999, as amended at 67 FR 15744, Apr. 3, 2002]

Appendix B to Part 180—Acceptable Internal Self-closing Stop Valve Leakage Tests for Cargo Tanks Transporting Liquefied Compressed Gases

For internal self-closing stop valve leakage testing, leakage is defined as any leakage through the internal self-closing valve or to the atmosphere that is detectable when the valve is in the closed position. On some valves this will require the closure of the pressure by-pass port.

(a) Meter Creep Test.

1. An operator of a cargo tank equipped with a calibrated meter may check the internal self-closing stop valve for leakage through the valve seat using the meter as a flow measurement indicator. The test is initiated by starting the delivery process or returning product to the cargo tank through the delivery system. This may be performed at an idle. After the flow is established, the operator closes the internal self-closing stop valve and monitors the meter flow. The meter flow must stop within 30 seconds with no meter creep within 5 seconds after the meter stops.
2. On pump-actuated pressure differential internal self-closing stop valves, the valve must be closed with the remote actuator to assure that it is functioning. On other types of internal self-closing stop valves, the valve(s) may be closed using either the normal valve control or the discharge control system (e.g., remote).
3. Rejection criteria: Any detectable meter creep within the first five seconds after initial meter stoppage.

(b) Internal Self-Closing Stop Valve Test.

An operator of a cargo tank that is not equipped with a meter may check the internal self-closing stop valve(s) for leakage as follows:

1. The internal self-closing stop valve must be in the closed position.
2. All of the material in the downstream piping must be evacuated, and the piping must be returned to atmospheric temperature and pressure.
3. The outlet must be monitored for 30 seconds for detectable leakage.
4. Rejection criteria. Any detectable leakage is considered unacceptable.

[64 FR 28052, May 24, 1999]

Appendix C to Part 180—Eddy Current Examination With Visual Inspection for DOT 3AL Cylinders Manufactured of Aluminum Alloy 6351-T6

1. **Examination Procedure.** Each facility performing eddy current examination with visual inspection must develop, update, and maintain a written examination procedure applicable to the test equipment it uses to perform eddy current examinations.
2. **Visual examinations.** Visual examinations of the neck and shoulder area of the cylinder must be conducted in accordance with CGA pamphlet C-6.1 (IBR; see § 171.7 of this subchapter).

3. **Eddy Current Equipment.** A reference ring and probe for each DOT-3AL cylinder manufactured of aluminum alloy 6351-T6 to be inspected must be available at the examination facility. Eddy current equipment must be capable of accurately detecting the notches on the standard reference ring.
4. **Eddy Current Reference Ring.** The reference ring must be produced to represent each cylinder to be tested. The reference ring must include artificial notches to simulate a neck crack. The size of the artificial notch (depth and length) must have a depth less than or equal to $\frac{1}{3}$ of the wall thickness of the neck and a length greater than or equal to two threads. The standard reference must have a drawing that includes the diameter of the ring, and depth and length of each notch.
5. **Condemnation Criteria.** A cylinder must be condemned if the eddy current examination combined with visual examination reveals any crack in the neck or shoulder of 2 thread lengths or more.
6. **Examination equipment records.** Records of eddy current inspection equipment shall contain the following information:
 - (i) Equipment manufacturer, model number and serial number.
 - (ii) Probe description and unique identification (e.g., serial number, part number, etc.).
7. **Eddy current examination reporting and record retention requirements.** Daily records of eddy current examinations must be maintained by the person who performs the requalification until either the expiration of the requalification period or until the cylinder is again requalified, whichever occurs first. These records shall be made available for inspection by a representative of the Department on request. Eddy current examination records shall contain the following information:
 - (i) Specification of each standard reference ring used to perform the eddy current examination.
 - (ii) DOT specification or exemption number of the cylinder; manufacturer's name or symbol; owner's name or symbol, if present; serial number; and, date of manufacture.
 - (iii) Name of test operator performing the eddy current examination.
 - (iv) Date of eddy current examination.
 - (vi) Acceptance/condemnation results (e.g., pass or fail).
 - (vii) Retester identification number.
8. **Personnel Qualification Requirements.** Each person who performs eddy current and visual examinations, and evaluates and certifies retest results must be certified by the employer that he/she has been properly trained and tested in the eddy current and visual examination procedures.
9. **Training Records.** A record of current training must be maintained for each employee who performs eddy current and visual examinations in accordance with § 172.704(d).

[71 FR 51129, Aug. 29, 2006]

Appendix D to Part 180—Hazardous Materials Corrosive to Tanks or Service Equipment

This list contains materials identified either by proper shipping name in 49 CFR 172.101 or shipped under an "n.o.s." shipping description that, under certain conditions, can corrode carbon steel tanks or service equipment at a rate that may reduce the design level of reliability and safety of the tank or equipment to an unsafe level before the next qualification. Materials identified on this list are considered corrosive to the tank or service equipment.

While every effort was made to identify materials deemed corrosive to the tank or service equipment, owners and operators are cautioned that this list may not be inclusive. Tank car owners and operators are reminded of their duty to ensure that no in-service tank will deteriorate below the specified minimum thickness requirements in this subchapter. See § 180.509(f)(3). In addition, FRA states a tank car owner must designate an internal coating or lining appropriately based on its knowledge of the chemical and not rely simply on this list. Regarding future thickness tests, this list may also be modified based on an analysis of the test results by the car owner, the Department of Transportation, or the Association of American Railroads' Tank Car Committee.

Hazardous Materials Table Proper Shipping Names (See § 172.101)

Acetic acid, glacial or Acetic acid solution

Aluminum chloride, solution

Arsenic acid, liquid

Arsenic acid, solid

Butyric acid

Ferric chloride, solution

Fertilizer ammoniating solution (*Nitrogen fertilizer solution*)

Fluoroboric acid

Fluorosilicic acid

Formaldehyde, solutions, flammable

Formaldehyde, solutions

Hydrobromic acid

Hydrochloric acid

Hydrochloric acid solution

Hydrofluoric acid and Sulfuric acid mixtures

Hydrofluoric acid

Hydrogen peroxide and peroxyacetic acid mixtures, stabilized

Hydrogen, peroxide, aqueous solutions

Hydrogen peroxide, stabilized or Hydrogen peroxide aqueous solutions, stabilized

Hypochlorite solutions

Nitric acid

Phenyl phosphorus dichloride

Phenyl phosphorus thiodichloride

Phosphoric acid solution

Phosphoric acid, solid

Phosphorus trichloride (*Phosphorus chloride*)

Sodium chlorate

Sodium chlorate, aqueous solution

Sodium hydrosulfide

Sulfur, molten

Sulfuric acid

Sulfuric acid, fuming

Sulfuric acid, spent

Zinc chloride, anhydrous

Zinc chloride, solution

Materials Transported Under an "N.O.S." Description

Benzoic acid (Environmentally hazardous substance, liquid, n.o.s., (RQ 5,000 pounds)

Bisulphites, aqueous solution, n.o.s. (Ammonium bisulfide)

Black liquor (Corrosive liquids, n.o.s. (contains sulfuric acid))

Calcium lignosulfonate (not regulated under this subchapter)

Hexanoic acid (Corrosive liquids, n.o.s. (contains hexanoic acid))

Lignin liquor (not regulated under this subchapter)

Lithium chloride (not regulated under this subchapter)

Sodium polyacrylate (not regulated under this subchapter)

Titanium sulfate solution (Corrosive liquids, n.o.s. (contains sulfuric acid))

White liquor (not regulated under this subchapter)

[77 FR 37991, June 25, 2012]