



U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

NOV 4 2003

DOT-E 12095
(SIXTH REVISION)

EXPIRATION DATE: August 31, 2005

1. **GRANTEE:** Persons listed in Appendix A to this exemption.
2. **PURPOSE AND LIMITATION:**
 - a. This exemption authorizes an alternative qualification program for all DOT specification tank cars and for non-DOT specification tank cars used for the transportation of hazardous materials in commerce. This exemption provides no relief from any regulation other than as specifically stated.
 - b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.
3. **REGULATORY SYSTEM AFFECTED:** 49 CFR Parts 106, 107 and 171-180.
4. **REGULATIONS FROM WHICH EXEMPTED:** 49 CFR § 172.203(a), § 172.302(c), Subpart F of Part 180, except as specified herein.
5. **BASIS:** This exemption is based on the Railway Progress Institute's application dated October 27, 2003, submitted in accordance with § 107.109.
6. **HAZARDOUS MATERIALS (49 CFR § 172.101):** The proper shipping description, for each Hazardous Material in an authorized tank car, under the terms of this exemption must be as specified in 49 CFR Subpart B of Part 172, an exemption issued under 49 CFR Subpart B of Part 107, or as authorized in § 171.12 or § 171.12a.

APPENDIX B = QUALIFY PROGRAM

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7. SAFETY CONTROL MEASURES: Packagings authorized are DOT and non-DOT Specification tank cars. Each tank car must be qualified in accordance with the Alternative Tank Car Qualification Program (TCQ-1) attached as Appendix B.
8. SPECIAL PROVISIONS:
 - (a) The marking requirement of § 172.203(a) and § 172.302(c) are waived.
 - (b) Persons who receive tank cars for qualification under the terms of this exemption may qualify them on behalf of a holder or party to this exemption, provided all terms of this exemption are complied with and a current copy of this exemption, including all appendices, is maintained at the location where such qualification occurs.
9. MODES OF TRANSPORTATION AUTHORIZED: Rail freight.
10. MODAL REQUIREMENTS: None as a requirement of this exemption.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation laws, 49 U.S.C. 5101 et seq:
 - o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
 - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee" as defined in § 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by § 172.700 through § 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect unless a regulation has been amended making the exemption no longer necessary.

12. **REPORTING REQUIREMENTS:** The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (Sections 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must inform the AAHMS, in writing, of any incidents involving the package and shipments made under the terms of this exemption.

Issued in Washington, D.C.:



fe Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

NOV 4 2003

(DATE)

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590.
Attention: DHM-31.

Copies of this exemption may be obtained by accessing the Hazardous Materials Safety Homepage at <http://hazmat.dot.gov/exemptions> Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

PO: JR/sln

AUG 24 2004.

The following are hereby granted party status to this exemption based on their application(s) submitted in accordance with § 107.107 or § 107.109, as appropriate:

Company Name City/State	Application Date	Issue Date	Expiration Date
A.E. Staley Manufacturing Company Decatur, IL	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
ACF Industries, Inc. St. Charles, MO	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
ADM Transportation Company Decatur, IL	Dec 01, 2003	Jan 02, 2004	Aug 31, 2005
Aeropres Corporation Shreveport, LA	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Albemarle Corporation Baton Rouge, LA	Oct 10, 2003	Nov 04, 2003	Aug 31, 2005
AllTranstek, LLC Downers Grove, IL	Dec 12, 2003	Dec 31, 2003	Aug 31, 2005
American Railcar Industries St. Charles, MO	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
Arrendadora Nacional de Carros De Ferrocarril Florida, MX (US Agent: Mann, Frankford, Stein & Lipp/Pan American Railroad, Houston, TX)	Oct 15, 2003	Nov 04, 2003	Aug 31, 2005
Astaris, LLC St. Louis, MO	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
BASF Corporation Mt. Olive, NJ	Nov 25, 2003	Dec 31, 2003	Aug 31, 2005
BOC Gases Murray Hill, NJ	Dec 10, 2003	Dec 31, 2003	Aug 31, 2005
BP Chemical Naperville, Illinois Naperville, IL	Nov 03, 2003	Nov 25, 2003	Aug 31, 2005

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Company Name City/State	Application Date	Issue Date	Expiration Date
BP Products North America, Inc. (Former Grantee: BP Amoco Oil) Warrenville, IL	Dec 01, 2003	Dec 31, 2003	Aug 31, 2005
CIT Rail Resources Chicago, IL	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
CarMath, Inc. Brandon, SD	Nov 19, 2003	Dec 31, 2003	Aug 31, 2005
Cargill, Inc. Wayzata, MN	Sep 23, 2003	Oct 16, 2003	Aug 31, 2005
Celtran, Inc. Dallas, TX	Sep 23, 2003	Oct 16, 2003	Aug 31, 2005
Chevron Oronite Company LLC Houston, TX	Dec 09, 2003	Dec 31, 2003	Aug 31, 2005
Chevron Phillips Chemical Company LP The Woodlands, TX	Dec 09, 2003	Dec 31, 2003	Aug 31, 2005
Chevron Products Company San Ramon, CA	Oct 28, 2003	Nov 25, 2003	Aug 31, 2005
Clean Harbors Environmental Services, Inc. Braintree, MA	Nov 20, 2003	Dec 31, 2003	Aug 31, 2005
Coffeyville Resources Nitrogen Fertilizers, LLC Kansas City, KS	Aug 3, 2004	Aug 9, 2004	Aug 31, 2005
Conagra, Inc. Omaha, NE	Sep 23, 2003	Oct 16, 2003	Aug 31, 2005
Coors Brewing Company Golden, CO	Nov 24, 2003	Dec 31, 2003	Aug 31, 2005
DAK Americas Leland, NC	Dec 18, 2003	Dec 31, 2003	Aug 31, 2005
DuPont Wilmington, DE	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
DuPont Dow Elastomers (DDE) Wilmington, DE	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
Eastman Chemical Company Kingsport, TN	Nov 11, 2003	Nov 25, 2003	Aug 31, 2005

Company Name City/State	Application Date	Issue Date	Expiration Date
Eli Lilly and Company Clinton, IN	Jul 08, 2003	Sep 25, 2003	Aug 31, 2005
Ethyl Petroleum Additives, Inc. Richmond, VA	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
ExxonMobil Chemical Company Houston, TX	Dec 23, 2003	Jan 09, 2004	Aug 31, 2005
FMC Corporation Philadelphia, PA	Dec 04, 2003	Nov 04, 2003	Aug 31, 2005
Flexsys America L.P. Akron, OH	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Frit Car, Inc. Brewton, AL	Dec 02, 2003	Dec 31, 2003	Aug 31, 2005
Frit Car, Inc. Bridgeton, NC	Oct 29, 2003	Nov 25, 2003	Aug 31, 2005
G.E. Capital Rail Services Chicago, IL	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
GATX Rail Corporation Chicago, IL	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
GLNX Corporation Woodlands, TX	Dec 16, 2003	Dec 31, 2003	Aug 31, 2005
Georgia Gulf Corporation Plaquemine, LA	Nov 24, 2003	Dec 31, 2003	Aug 31, 2005
Honeywell International Inc. Morristown, NJ	Sep 30, 2003	Oct 16, 2003	Aug 31, 2005
Huntsman Corporation Houston, TX	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
INVISTA Wilmington, DE (Former Grantee: DuPont Textiles & Interiors)	Oct 27, 2003	Jun 7, 2004	Aug 31, 2005
J.R. Simplot Co. Boise, ID	Sep 23, 2003	Oct 16, 2003	Aug 31, 2005
LCI, Ltd. Jacksonville Beach, FL	Oct 29, 2003	Nov 25, 2003	Aug 31, 2005
LLCX Inc. Jacksonville Beach, FL	Oct 29, 2003	Nov 25, 2003	Aug 31, 2005

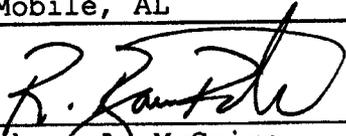
Company Name City/State	Application Date	Issue Date	Expiration Date
Lyondell-Equistar Houston, TX	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Mallard Transportation Company Tulsa, OK	Sep 18, 2003	Sep 25, 2003	Aug 31, 2005
Monsanto Company St. Louis, MO	Oct 31, 2003	Nov 25, 2003	Aug 31, 2005
NTL Transportation Ltd. Chicago, IL	Nov 06, 2003	Nov 25, 2003	Aug 31, 2005
NashTex Leasing, Incorporated Nash, TX	Nov 30, 2003	Dec 31, 2003	Aug 31, 2005
Occidental Chemical Corporation Pasadena, TX	Oct 01, 2003	Oct 16, 2003	Aug 31, 2005
Old World Industries, Inc. Northbrook, IL	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Olin Corporation Charleston, TN	Aug 01, 2003	Sep 25, 2003	Aug 31, 2005
OyxVinyl, LTD Pasadena, TX	Oct 09, 2003	Oct 16, 2003	Aug 13, 2005
P4 Production LLC St. Louis, MO	Nov 04, 2003	Nov 25, 2003	Aug 31, 2005
PLM Transportation Equipment Corporation Chicago, IL	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
PPG Industries, Inc. Pittsburgh, PA	Sep 11, 2003	Sep 25, 2003	Aug 31, 2005
Poole Chemical Company Texline, TX	Nov 06, 2003	Nov 25, 2003	Aug 31, 2005
Potash Corp. (RCS) (Former Grantee: PCS Phosphate) Northbrook, IL	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Procor Limited Oakville, Ontario, CN	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005

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Company Name City/State	Application Date	Issue Date	Expiration Date
Railway Supply Institute (Former Grantee: Railway Progress Institute) Washington DC	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
Rampart Range Corporation Larkspur, CO	Nov 07, 2003	Nov 25, 2003	Aug 31, 2005
Reagent Chemical & Research, Inc. Port Arthur, TX	Sep 12, 2003	Oct 16, 2003	Aug 31, 2005
Relco Tank Line, Inc. Redmond, OR	Nov 25, 2003	Dec 31, 2003	Aug 31, 2005
Resolution Performance Products, LLC Houston, TX	Dec 12, 2003	Dec 31, 2003	Aug 31, 2005
Rhodia Inc. Cranbury, NJ	Oct 28, 2003	Nov 04, 2003	Aug 31, 2005
S.M. Brooks Freight Nash, TX	Nov 30, 2003	Dec 31, 2003	Aug 31, 2005
Safety-Kleen Systems, Inc. Plano, TX	Nov 04, 2003	Nov 25, 2003	Aug 31, 2005
Shell Chemical LP (Former Grantee: Shell Chemical Company) Houston, TX	Apr 27, 2004	Apr 28, 2004	Aug 31, 2005
Services Unlimited Marina Del Ray, CA	Feb 9, 2004	Mar 10, 2004	Aug 31, 2005
Solutia, Inc. St. Louis, MO	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
Southwest Rail Industries, Inc. Weimar, TX	May 12, 2004	Jun 7, 2004	Aug 31, 2005
Sunoco, Inc. (R&M) Philadelphia, PA	Dec 04, 2003	Dec 31, 2003	Aug 31, 2005
The Anderson's Incorporated Maumee, OH	Dec 16, 2003	Jan 02, 2004	Aug 31, 2005
The Dow Chemical Company Midland, MI	Oct 22, 2003	Nov 04, 2003	Aug 31, 2005

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Company Name City/State	Application Date	Issue Date	Expiration Date
The Fertilizer Institute Washington, DC	Nov 21, 2003	Dec 31, 2003	Aug 31, 2005
Transportation Equipment Inc. Houston, TX	Aug 24, 2004	AUG 24 2004	Aug 31, 2005
Trinity Industries, Inc. (Trinity Rail Management) Dallas, TX	Sep 23, 2003	Oct 16, 2003	Aug 31, 2005
Union Carbide Company Midland, MI	Oct 22, 2003	Nov 04, 2003	Aug 31, 2005
Union Tank Car Company East Chicago, IL	Oct 27, 2003	Nov 04, 2003	Aug 31, 2005
Vulcan Chemicals Birmingham, AL	Oct 14, 2003	Oct 16, 2003	Aug 31, 2005
Walter Haffner Company Mobile, AL	Dec 05, 2003	Apr 1, 2004	Aug 31, 2005


 Robert A. McGuire
 Associate Administrator for
 Hazardous Materials Safety

AUG 24 2004

Date



**Alternative Tank Car
Qualification Program**

TCQ-1

Appendix B to DOT-E 12095

Alternative Tank Car Qualification Program

This alternative program establishes the minimum acceptable framework for an owner's qualification program for tank cars and components and replaces 49 CFR Subpart F of Part 180 in its entirety. Owner's should follow this alternative program in developing their written procedures (work instructions), as required by 49 CFR 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. Tank car facilities must incorporate the owner's qualification program into their quality assurance program, as required by 49 CFR 179.7(a)(2), (b)(3), and (b)(5).

In order to use this alternative program, an entity must have a valid Department of Transportation (DOT) exemption or be a party to an exemption, issued by the Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, authorizing tank car qualification under this alternative program. For information on obtaining a DOT exemption, see 49 CFR 107.101 *et seq.*

This alternative program is written as though it is part of 49 CFR 100-185, for ease of use and to ensure that the section references are parallel with those in the Federal rule. Technical inquiries into this alternative program should be directed to the Federal Railroad Administration, Office of Safety Assurance and Compliance, Hazardous Materials Division, Washington, D.C..

180.501 Applicability.

(a) This alternative program prescribes requirements, in addition to those contained in 49 CFR Parts 107, 171, 172, 173, 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) Any person who performs a function prescribed in this alternative program shall perform that function in accordance with the alternative program.

180.503 Definitions

In addition to the definitions contained in 49 CFR 171.8 and 179.2 the following definitions apply:

"Bottom shell" means that portion of a tank car tank surface, excluding the head ends of the tank, that lies within two feet, measured circumferentially, of the bottom longitudinal centerline of the tank car tank.

"Corrosive to the tank or service equipment" means a material identified in Attachment A of this alternative program.

"Design level of reliability and safety" means the level of reliability that is built into the tank car. Therefore, it is inherent in its specification, design, and manufacture.

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

"Lining/Coating Owner" means the party responsible for bearing the cost of the maintenance of the lining or coating.

"Tank Car Owner" means the entity identified in UMLER through the owner's marks.

"Maintenance" means inspection, upkeep, or preservation, including ordinary repairs necessary and proper from time to time.

"Qualification" means a careful and critical examination, based on a written program, to verify conformance to a specification followed by a representation of conformance to the specification. For the purposes of this alternative program, the following table indicates the tests and inspections that are required .

Qualification of...	Tests and Inspections	§180.509(*)
Tank	Visual Inspection	d
	Structural Integrity Inspection	e
	Safety System Inspection	h
	Leakage Pressure Test	j
	Thickness ¹	f
Service Equipment	Service Equipment	k
Lining/Coating	Linings and Coatings	i

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

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

"Reinforcing plate" means an attachment welded directly to the tank supporting the 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 a structure to be used in a known environment without failure for a specified period.

"Representation" means certifying in writing or marking on the tank car tank, jacket, or an associated document indicating compliance with the specification.

"Safety system" means 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 by regulation.

"Service equipment" means equipment used for filling, sampling device, emptying, venting, vacuum relief, pressure relief, heating (if internal to the tank), lading temperature measurement, or measuring the amount of lading within the tank.

"Top shell" means the tank car tank surface, excluding the head ends and bottom shell of the tank car tank.

180.505 Quality assurance program.

The quality assurance program requirements of 49 CFR 179.7 apply.

180.507 Qualification of tank cars.

(a) **General.** 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 alternative program or the applicable specification to which the tank was constructed.

(b) **Tank car specifications no longer authorized for construction.** (1) A tank car prescribed in the following table is authorized for service provided such car conforms to all applicable safety requirements of this subchapter:

Tank Cars Authorized by 49 CFR Part 173	Additional Specifications Authorized	Notes
105A200W	105A100W	1
105A200ALW	105A100ALW	1
105A300W	ICC- 105, 105A300	
105A400W	105A400	
105A500W	105A500	
105A600W	105A600	
106A500X	ICC-27, BE-27, 106A500	
106A800X	106A800	
107A	2

Note 1: A tank built to a Specification DOT 105A100W or DOT 105A100ALW may be altered and converted to DOT 105A200W and DOT 105A200ALW, respectively.

Note 2: The test pressure of a tank built in the United States between January 1, 1941, and December 31, 1955, may be increased to conform to Specification 107A. Original and revised test pressure markings must be indicated and may be shown on the tank or on a plate attached to the bulkhead of the car. Tanks built before 1941 are not authorized.

(2) For each tank car conforming to and used under an exemption issued before October 1, 1984, that authorized the transportation of a cryogenic liquid in a tank car, the owner shall remove the exemption number stenciled on the tank car and stamp the tank car with the appropriate Class DOT 113 specification followed by the applicable exemption number. For example: DOT 113D60W E * * * * (asterisks to be replaced by the exemption number). The owner marking a tank car in this manner shall retain on file a copy of the last exemption in effect during the period the tank car is in service. No person may modify a tank car marked under this paragraph unless the modification is in compliance with an applicable requirement or provision of Subchapter C of 49 CFR.

(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.

180.509 Requirements for qualification of specification tank cars.

(a) **General.** Each tank car owner shall ensure that a tank car facility:

(1) Inspects and tests (examines) each item according to the requirements specified in §180.509;

(2) Evaluates each item according to the acceptable results of inspection and test in §180.511;

(3) Marks each tank car as specified in §180.515 for each item that successfully passes a periodic inspection and test; and

(4) Prepares the documentation as required by §180.517 for each item qualified under this section.

(b) **Conditions requiring qualification of tank cars.** Without regard to the qualification compliance date requirements of paragraph (m) of this section, an owner of a tank or a lining or coating shall ensure that a qualification of the tank or lining or coating is performed if:

(1) The tank car was in an accident or shows evidence of structural damage, such as buckling or corrosion, that may adversely affect its capability to retain its contents;

(2) The tank bears evidence of damage caused by fire; or

(3) The Associate Administrator for Safety, FRA, requires it based on the existence of probable cause that a tank car or a class or design of tank cars may be in an unsafe operating condition.

(c) **Frequency of qualification.** Each tank car shall have an inspection and test according to the requirements of this paragraph.

(1) For Class DOT-107 tank cars, the inner container of Class DOT-115 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 Appendix D of the Association of American Railroads Specifications for Tank Cars, or according to the applicable specification in 49 CFR 179.220-23 (DOT-115) or 179.500-14 (DOT-107).

(2) For Class DOT-113 tank cars, see 49 CFR 173.319(e).

(3) Tank cars with fusion welds must be qualified and maintained in accordance with the following table. All qualification requirements need not be done at the same time.

Frequency of Qualification

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	Lining or coating (for materials corrosive to the tank)	See 180.509(i)
j	Leakage pressure test.....	After reassembly
k	Service equipment (including pressure relief devices).....	See 180.509(k)

(d) **Visual inspection.** Each tank car owner shall ensure qualification of the tank through an external and internal inspection. At a minimum, the visual inspection must include the following:

(1) Except in areas where insulation, head protection, thermal protection, internal coatings, or internal linings preclude it, an internal and external inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or other condition that makes the tank car unsafe for transportation, and, for DOT-115 tank cars, an internal inspection of the inner container and external inspection of the outer shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that makes the tank car unsafe for transportation;

(2) When an internal lining or internal coating is removed or applied, an internal inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, and any other condition that makes the tank car unsafe for transportation;

(3) An inspection of the service equipment, including gaskets, for indications of conditions that make the tank car unsafe for transportation;

(4) An inspection for missing or loose bolts, nuts, and other fasteners that make the tank car unsafe for transportation;

(5) An inspection of all bolted, threaded, and quick-disconnect closures on the tank car for conditions that may make the tank car unsafe for transportation, including an inspection of any protective housing for proper condition;

(6) An inspection of excess flow valves with threaded seats for tightness and operability; and

(7) An inspection of the required markings on the tank car for legibility.

(e) **Structural integrity inspection and test.** (1) Each tank car owner shall ensure qualification of the high-stressed structural elements on the tank. At a minimum, the structural integrity inspection and test shall 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 fail within its operational life. The owner must maintain all supporting documentation used to make such determination at its principal place of business and make the data available to FRA upon request.

(2) For Class DOT-115 tanks, paragraphs (e)(1) (i), (ii), and (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) 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 shall inspect and test the elements identified in paragraph (e)(1) above by one or more of the following methods:

- (i) Dye penetrant test
- (ii) Radiography test
- (iii) Magnetic particle test
- (iv) Ultrasonic test, or
- (v) Direct or remote visual inspection

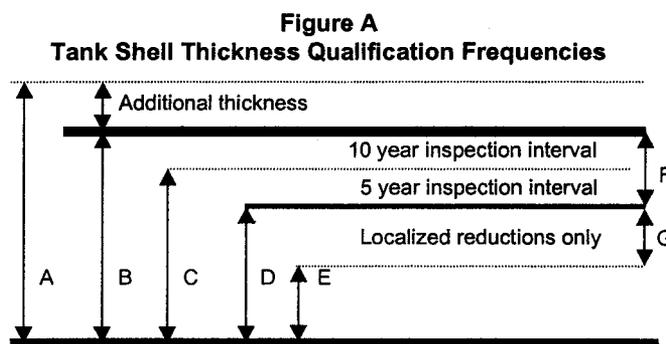
(f) **Thickness tests.** (1) Each tank car facility shall measure the thickness of the shell, heads, sumps, domes, and nozzles on each tank car by using a device capable of accurately measuring the thickness to within ± 0.05 mm (± 0.002 inch).

(2) Each tank car tank shall have a thickness test measurement:

- (i) At the time of an internal lining or internal coating application or replacement; or
- (ii) At least once every 10 years for a tank that does not have an internal lining or internal coating; or
- (iii) At least once every 5 years for a tank that does not have an internal lining or internal coating when:

(A) The tank is used to transport a material listed in Attachment A of this exemption (i.e., materials corrosive to the tank); and

(B) The remaining shell and head thickness is at or below line C in Figure A of this paragraph.



Where:

- A *As-built tank shell thickness, with additional thickness.*
- B *Required minimum tank shell or head thickness after forming per part 179.*
- C *Inspection frequency adjustment point (required minimum shell or head thickness, minus ½ of the table value in paragraph (g) of this section).*
- D *Condemning limit for general corrosion (required minimum shell or head thickness, minus the table 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 (1/16-inch)). See Note 1 in paragraph (g) of this section for diameter limitations and minimum separation distances.*
- F *Allowable shell thickness reduction (table value in paragraph (g) of this section).*
- G *Additional thickness reduction for localized areas.*

(3) For a localized repair of an internal lining or internal coating where a commodity listed in Attachment A of this alternative program has contacted the tank, a qualified individual shall verify 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 non-coated repair area and is not a qualification event. Modification of the tank car stencil is not required.

(4) Each tank car owner shall ensure that a tank car will not operate below the condemning limit for general corrosion, or the condemning limit for localized corrosion, as shown in Figure A of this paragraph.

(5) For sumps, domes, nozzles, and nozzle reinforcements the tank car owner shall determine if any reduction in the wall thickness affects the design levels of reliability and safety built into the sump, dome, tank nozzle, or nozzle reinforcement. Each tank car owner must maintain at its principal place of business documentation describing the allowable thickness reductions for sumps, domes, nozzles, and nozzle reinforcements. This documentation must be available to FRA upon request.

(6) After repairs, alterations, conversions, modifications, or blasting of a tank car that results in a reduction to the tank, a qualified individual shall 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 shell thickness allowance.** If a qualified individual finds a tank with a head or shell thickness below the required minimum thickness (after forming for its specification), as stated in 49 CFR 179, the tank 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 1/8 inch	1.58 mm 1/16 inch
≥ 200 psig	0.79 mm 1/32 inch	0.79 mm 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 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 Section 6.2 of the AAR Specifications for Tank Cars.

Note 3. Shell thickness reductions apply only to the outer shell for Class DOT-115 tank cars. There is no shell or head thickness reduction authorized for the inner tank.

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

(i) **Lining and coating inspection and test.** (1) Each lining or coating owner shall ensure for the qualification of a lining or coating used to protect the tank from a material listed in Attachment A of this alternative program (i.e., materials corrosive to the tank). The owner of the lining or coating shall establish and maintain a record of the service life of the lining or coating and commodity combination. Before July 1, 2006, the owner of the lining shall use their knowledge of the lining or coating and commodity pairing to establish an appropriate inspection interval. After July 1, 2006, the owner of the lining or coating shall use the information in these records to determine the appropriate inspection interval for each lining or coating and commodity pairing. This interval will not exceed 8 years, unless the owner of the lining or coating can establish, document, and show that the service history or scientific analysis for the lining or coating and product pairing supports a longer inspection interval. The owner must maintain at its principal place of business a written procedure for collecting and documenting the life of the lining or coating applied within the tank car. The lining or coating owner must provide written procedures, including inspection and test, repair, removal, and application procedures, to the FRA or car owner upon request. In addition, any person that offers a loaded tank car into transportation must provide commodity information to the car owner upon request.

(2) The owner of the lining or coating shall provide the test method and acceptance criteria for the lining or coating to the tank car owner and to the person responsible for qualifying the lining or coating. The tank car facility inspecting and testing the lining or coating shall follow the inspection and test requirements established by the lining or coating 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 tank car facility shall ensure that tank, service equipment, and closures installed on the tank are leak tested. The test may be conducted with the lading in the tank. The written procedure and test method for leak testing must ensure the sensitivity and reliability of the test method and for the serviceability of components 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, quick-disconnects, etc.).

(k) **Service equipment inspection and test.** (1) Each tank car owner shall ensure for the qualification of tank car service equipment at least once every 10 years. The tank car owner shall 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 upon request.

(2) Each tank car facility shall qualify service equipment, including reclosing pressure relief devices and interior heater systems in accordance with Appendix D of the Association of American Railroads Specifications for Tank Cars.

(l) **Alternative inspection and test procedures.** In lieu of the other requirements of this section, an alternative inspection and test procedure or interval may be determined from a damage-tolerance evaluation (which 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 (which must be supported by analysis of systematically collected data). Any such relief from the requirements of this section must be approved by the Associate Administrator for Safety, FRA.

(m) **Qualification compliance date for tank cars.** (1) After July 1, 2000, each tank car with a metal jacket or with a thermal protection system shall be qualified and maintained in accordance with this section no later than the date the tank car would require a periodic hydrostatic pressure test (i.e., the marked due date on the tank car for the hydrostatic test).

(2) After October 1, 1998, each tank car without a metal jacket and without a thermal protection system shall be qualified and maintained in accordance with this section no later than the date the tank car would require 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 periodic hydrostatic pressure test interval greater than 10 years (i.e., Class DOT-103W, 104W, 111A60W1, 111A100W1, and 111A100W3 tank cars), the qualification date is the midpoint between the compliance date in paragraph (m)(1) or (2) of this section and the remaining years until the tank would have had a hydrostatic pressure test.

(4) Tank cars having an internal lead, glass, or rubber lining, shall be qualified no later than 10 years after the compliance date specified in subparagraphs (m)(1) and (2) of this section, except as specified in subparagraphs (e)(1)(iii) and (f) of this section.

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 following inspections and tests conducted in accordance with this subpart:

(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.

(e) **Lining and coating inspection.** A tank car successfully passes the lining and coating inspection and tests 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 or 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.

180.513 Repairs, alterations, conversions, modifications, and maintenance.

(a) In order to work on tank cars, a tank car facility must comply with the requirements of Appendices A, B, C, D, R, T, and W of the AAR Specifications for Tank Cars.

(b) 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.

(c) Leakage pressure tests as specified in §180.509(j) shall be done when service equipment is replaced.

180.515 Markings.

(a) When a tank car passes the required inspection and test with acceptable results, the tank car facility shall mark the date qualified and the next qualification date (due date) on the tank car in accordance with Appendix C of the AAR Specifications for Tank Cars. When a tank car facility qualifies one or more areas or components on the tank car at the same time (see §180.509(c)(3) of this alternative program), one date may be used to satisfy the requirements of all qualifications.

(b) Converted class DOT 105, 109, 112, 114, or 120 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 pressure relief device is the installation date on the tank car.

180.517 Reporting and record retention requirements.

(a) **Certification and representation.** Each owner of a specification tank car shall 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 marking of the tank with the tank specification, affirms that all of the appropriate inspections and tests were performed to qualify the tank for continued use. The builder must retain the inspection and test reports to affirm that the tests and inspections required under §180.509 were performed. The owner shall retain the documents throughout the period of ownership of the specification tank

car and for one year thereafter. Upon a change of ownership, the requirements of Section 1.3.15 of the AAR Specifications for Tank Cars apply.

(b) **Inspection and test reporting.** Each in-service tank car that is inspected and tested, as specified in §180.509, must have a written or electronic report, in English, according to this paragraph. 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) Reporting mark and number
- (4) Tank 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 of the inspector.

Attachment A
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, have shown to corrode carbon steel tanks or service equipment at a rate that will 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 exemption. (See §180.509(f)(3) of this alternative program).

Based on future thickness tests, this list may 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.

Proper Shipping Names

Acetic acid, glacial
 Arsenic acid
 Bisulphites, aqueous solution
 Butyric acid
 Ferric chloride, solution
 Fluoroboric acid
 Fluorosilicic acid
 Formaldehyde
 Hydrobromic acid, solution
 Hydrochloric acid
 Hydrochloric acid, solution
 Hydrofluoric acid and sulfuric acid mixtures
 Hydrofluoric acid, solution
 Hydrogen peroxide
 Hypochlorite, solution
 Methyl methacrylate
 Nitric acid
 Nitrogen fertilizer solution
 Phenyl phosphorus dichloride
 Phenyl phosphorus thiodichloride
 Phosphoric acid
 Phosphorus trichloride
 Sodium chlorate
 Sodium hydrosulfide
 Sulfur, molten
 Sulfuric acid
 Sulfuric acid, fuming
 Sulfuric acid spent
 Titanium sulfate, solution
 Zinc chloride

Materials transported under an " N.O.S." description

Aluminum chloride
 Ammonium bisulfide
 Benzoic acid
 Black liquor
 Calcium lignosulfonate
 Hexanoic acid
 Lignin liquor
 Lithium chloride
 Sodium polyacrylate
 White liquor



**Alternative Tank Car
Qualification Program**

TCQ-1

Appendix B to DOT-E 12095

Alternative Tank Car Qualification Program

This alternative program establishes the minimum acceptable framework for an owner's qualification program for tank cars and components and replaces 49 CFR Subpart F of Part 180 in its entirety. Owner's should follow this alternative program in developing their written procedures (work instructions), as required by 49 CFR 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. Tank car facilities must incorporate the owner's qualification program into their quality assurance program, as required by 49 CFR 179.7(a)(2), (b)(3), and (b)(5).

In order to use this alternative program, an entity must have a valid Department of Transportation (DOT) exemption or be a party to an exemption, issued by the Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, authorizing tank car qualification under this alternative program. For information on obtaining a DOT exemption, see 49 CFR 107.101 *et seq.*

This alternative program is written as though it is part of 49 CFR 100-185, for ease of use and to ensure that the section references are parallel with those in the Federal rule. Technical inquires into this alternative program should be directed to the Federal Railroad Administration, Office of Safety Assurance and Compliance, Hazardous Materials Division, Washington, D.C..

180.501 Applicability.

(a) This alternative program prescribes requirements, in addition to those contained in 49 CFR Parts 107, 171, 172, 173, 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) Any person who performs a function prescribed in this alternative program shall perform that function in accordance with the alternative program.

180.503 Definitions

In addition to the definitions contained in 49 CFR 171.8 and 179.2 the following definitions apply:

"Bottom shell" means that portion of a tank car tank surface, excluding the head ends of the tank, that lies within two feet, measured circumferentially, of the bottom longitudinal centerline of the tank car tank.

"Corrosive to the tank or service equipment" means a material identified in Attachment A of this alternative program.

"Design level of reliability and safety" means the level of reliability that is built into the tank car. Therefore, it is inherent in its specification, design, and manufacture.

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

"Lining/Coating Owner" means the party responsible for bearing the cost of the maintenance of the lining or coating.

"Tank Car Owner" means the entity identified in UMLER through the owner's marks.

"Maintenance" means inspection, upkeep, or preservation, including ordinary repairs necessary and proper from time to time.

"Qualification" means a careful and critical examination, based on a written program, to verify conformance to a specification followed by a representation of conformance to the specification. For the purposes of this alternative program, the following table indicates the tests and inspections that are required .

Qualification of...	Tests and Inspections	§180.509(*)
Tank	Visual Inspection	d
	Structural Integrity Inspection	e
	Safety System Inspection	h
	Leakage Pressure Test	j
	Thickness ¹	f
Service Equipment	Service Equipment	k
Lining/Coating	Linings and Coatings	i

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

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

"Reinforcing plate" means an attachment welded directly to the tank supporting the 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 a structure to be used in a known environment without failure for a specified period.

"Representation" means certifying in writing or marking on the tank car tank, jacket, or an associated document indicating compliance with the specification.

"Safety system" means 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 by regulation.

"Service equipment" means equipment used for filling, sampling device, emptying, venting, vacuum relief, pressure relief, heating (if internal to the tank), lading temperature measurement, or measuring the amount of lading within the tank.

"Top shell" means the tank car tank surface, excluding the head ends and bottom shell of the tank car tank.

180.505 Quality assurance program.

The quality assurance program requirements of 49 CFR 179.7 apply.

180.507 Qualification of tank cars.

(a) **General.** 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 alternative program or the applicable specification to which the tank was constructed.

(b) **Tank car specifications no longer authorized for construction.** (1) A tank car prescribed in the following table is authorized for service provided such car conforms to all applicable safety requirements of this subchapter:

Tank Cars Authorized by 49 CFR Part 173	Additional Specifications Authorized	Notes
105A200W	105A100W	1
105A200ALW	105A100ALW	1
105A300W	ICC- 105, 105A300	
105A400W	105A400	
105A500W	105A500	
105A600W	105A600	
106A500X	ICC-27, BE-27, 106A500	
106A800X	106A800	
107A.....	2

Note 1: A tank built to a Specification DOT 105A100W or DOT 105A100ALW may be altered and converted to DOT 105A200W and DOT 105A200ALW, respectively.

Note 2: The test pressure of a tank built in the United States between January 1, 1941, and December 31, 1955, may be increased to conform to Specification 107A. Original and revised test pressure markings must be indicated and may be shown on the tank or on a plate attached to the bulkhead of the car. Tanks built before 1941 are not authorized.

(2) For each tank car conforming to and used under an exemption issued before October 1, 1984, that authorized the transportation of a cryogenic liquid in a tank car, the owner shall remove the exemption number stenciled on the tank car and stamp the tank car with the appropriate Class DOT 113 specification followed by the applicable exemption number. For example: DOT 113D60W E * * * * (asterisks to be replaced by the exemption number). The owner marking a tank car in this manner shall retain on file a copy of the last exemption in effect during the period the tank car is in service. No person may modify a tank car marked under this paragraph unless the modification is in compliance with an applicable requirement or provision of Subchapter C of 49 CFR.

(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.

180.509 Requirements for qualification of specification tank cars.

(a) **General.** Each tank car owner shall ensure that a tank car facility:

(1) Inspects and tests (examines) each item according to the requirements specified in §180.509;

(2) Evaluates each item according to the acceptable results of inspection and test in §180.511;

(3) Marks each tank car as specified in §180.515 for each item that successfully passes a periodic inspection and test; and

(4) Prepares the documentation as required by §180.517 for each item qualified under this section.

(b) **Conditions requiring qualification of tank cars.** Without regard to the qualification compliance date requirements of paragraph (m) of this section, an owner of a tank or a lining or coating shall ensure that a qualification of the tank or lining or coating is performed if:

(1) The tank car was in an accident or shows evidence of structural damage, such as buckling or corrosion, that may adversely affect its capability to retain its contents;

- (2) The tank bears evidence of damage caused by fire; or
- (3) The Associate Administrator for Safety, FRA, requires it based on the existence of probable cause that a tank car or a class or design of tank cars may be in an unsafe operating condition.

(c) **Frequency of qualification.** Each tank car shall have an inspection and test according to the requirements of this paragraph.

(1) For Class DOT-107 tank cars, the inner container of Class DOT-115 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 Appendix D of the Association of American Railroads Specifications for Tank Cars, or according to the applicable specification in 49 CFR 179.220-23 (DOT-115) or 179.500-14 (DOT-107).

(2) For Class DOT-113 tank cars, see 49 CFR 173.319(e).

(3) Tank cars with fusion welds must be qualified and maintained in accordance with the following table. All qualification requirements need not be done at the same time.

Frequency of Qualification

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
l	Lining or coating (for materials corrosive to the tank)	See 180.509(i)
j	Leakage pressure test	After reassembly
k	Service equipment (including pressure relief devices).....	See 180.509(k)

(d) **Visual inspection.** Each tank car owner shall ensure qualification of the tank through an external and internal inspection. At a minimum, the visual inspection must include the following:

(1) Except in areas where insulation, head protection, thermal protection, internal coatings, or internal linings preclude it, an internal and external inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or other condition that makes the tank car unsafe for transportation, and, for DOT-115 tank cars, an internal inspection of the inner container and external inspection of the outer shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, or any other condition that makes the tank car unsafe for transportation;

(2) When an internal lining or internal coating is removed or applied, an internal inspection of the tank shell and heads for abrasion, corrosion, cracks, dents, distortions, defects in welds, and any other condition that makes the tank car unsafe for transportation;

(3) An inspection of the service equipment, including gaskets, for indications of conditions that make the tank car unsafe for transportation;

(4) An inspection for missing or loose bolts, nuts, and other fasteners that make the tank car unsafe for transportation;

(5) An inspection of all bolted, threaded, and quick-disconnect closures on the tank car for conditions that may make the tank car unsafe for transportation, including an inspection of any protective housing for proper condition;

(6) An inspection of excess flow valves with threaded seats for tightness and operability; and

(7) An inspection of the required markings on the tank car for legibility.

(e) **Structural integrity inspection and test.** (1) Each tank car owner shall ensure qualification of the high-stressed structural elements on the tank. At a minimum, the structural integrity inspection and test shall 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 center line; and

(iii) The tank shell butt welds within 60.96 cm (2 feet) of the bottom longitudinal center line, 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 fail within its operational life. The owner must maintain all supporting documentation used to make such determination at its principal place of business and make the data available to FRA upon request.

(2) For Class DOT-115 tanks, paragraphs (e)(1) (i), (ii), and (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) 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 shall inspect and test the elements identified in paragraph (e)(1) above by one or more of the following methods:

- (i) Dye penetrant test
- (ii) Radiography test
- (iii) Magnetic particle test
- (iv) Ultrasonic test, or
- (v) Direct or remote visual inspection

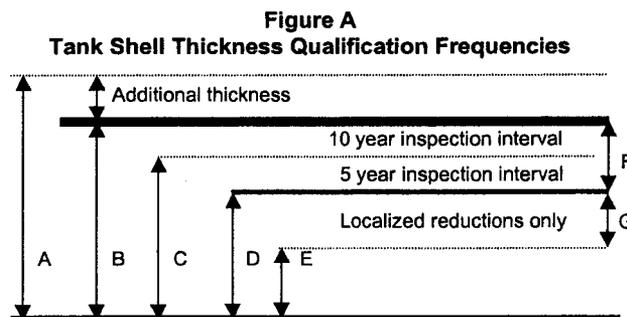
(f) **Thickness tests.** (1) Each tank car facility shall measure the thickness of the shell, heads, sumps, domes, and nozzles on each tank car by using a device capable of accurately measuring the thickness to within ± 0.05 mm (± 0.002 inch).

(2) Each tank car tank shall have a thickness test measurement:

- (i) At the time of an internal lining or internal coating application or replacement; or
- (ii) At least once every 10 years for a tank that does not have an internal lining or internal coating; or
- (iii) At least once every 5 years for a tank that does not have an internal lining or internal coating when:

(A) The tank is used to transport a material listed in Attachment A of this exemption (i.e., materials corrosive to the tank); and

(B) The remaining shell and head thickness is at or below line C in Figure A of this paragraph.



Where:

- A *As-built tank shell thickness, with additional thickness.*
- B *Required minimum tank shell or head thickness after forming per part 179.*
- C *Inspection frequency adjustment point (required minimum shell or head thickness, minus ½ of the table value in paragraph (g) of this section).*
- D *Condemning limit for general corrosion (required minimum shell or head thickness, minus the table 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 (1/16-inch)). See Note 1 in paragraph (g) of this section for diameter limitations and minimum separation distances.*
- F *Allowable shell thickness reduction (table value in paragraph (g) of this section).*
- G *Additional thickness reduction for localized areas.*

(3) For a localized repair of an internal lining or internal coating where a commodity listed in Attachment A of this alternative program has contacted the tank, a qualified individual shall verify 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 non-coated repair area and is not a qualification event. Modification of the tank car stencil is not required.

(4) Each tank car owner shall ensure that a tank car will not operate below the condemning limit for general corrosion, or the condemning limit for localized corrosion, as shown in Figure A of this paragraph.

(5) For sumps, domes, nozzles, and nozzle reinforcements the tank car owner shall determine if any reduction in the wall thickness affects the design levels of reliability and safety built into the sump, dome, tank nozzle, or nozzle reinforcement. Each tank car owner must maintain at its principal place of business documentation describing the allowable thickness reductions for sumps, domes, nozzles, and nozzle reinforcements. This documentation must be available to FRA upon request.

(6) After repairs, alterations, conversions, modifications, or blasting of a tank car that results in a reduction to the tank, a qualified individual shall 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 shell thickness allowance.** If a qualified individual finds a tank with a head or shell thickness below the required minimum thickness (after forming for its specification), as stated in 49 CFR 179, the tank 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 1/8 inch	1.58 mm 1/16 inch
≥ 200 psig	0.79 mm 1/32 inch	0.79 mm 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 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 Section 6.2 of the AAR Specifications for Tank Cars.

Note 3. Shell thickness reductions apply only to the outer shell for Class DOT-115 tank cars. There is no shell or head thickness reduction authorized for the inner tank.

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

(i) **Lining and coating inspection and test.** (1) Each lining or coating owner shall ensure for the qualification of a lining or coating used to protect the tank from a material listed in Attachment A of this alternative program (i.e., materials corrosive to the tank). The owner of the lining or coating shall establish and maintain a record of the service life of the lining or coating and commodity combination. Before July 1, 2006, the owner of the lining shall use their knowledge of the lining or coating and commodity pairing to establish an appropriate inspection interval. After July 1, 2006, the owner of the lining or coating shall use the information in these records to determine the appropriate inspection interval for each lining or coating and commodity pairing. This interval will not exceed 8 years, unless the owner of the lining or coating can establish, document, and show that the service history or scientific analysis for the lining or coating and product pairing supports a longer inspection interval. The owner must maintain at its principal place of business a written procedure for collecting and documenting the life of the lining or coating applied within the tank car. The lining or coating owner must provide written procedures, including inspection and test, repair, removal, and application procedures, to the FRA or car owner upon request. In addition, any person that offers a loaded tank car into transportation must provide commodity information to the car owner upon request.

(2) The owner of the lining or coating shall provide the test method and acceptance criteria for the lining or coating to the tank car owner and to the person responsible for qualifying the lining or coating. The tank car facility inspecting and testing the lining or coating shall follow the inspection and test requirements established by the lining or coating 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 tank car facility shall ensure that tank, service equipment, and closures installed on the tank are leak tested. The test may be conducted with the lading in the tank. The written procedure and test method for leak testing must ensure the sensitivity and reliability of the test method and for the serviceability of components 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, quick-disconnects, etc.).

(k) **Service equipment inspection and test.** (1) Each tank car owner shall ensure for the qualification of tank car service equipment at least once every 10 years. The tank car owner shall 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 upon request.

(2) Each tank car facility shall qualify service equipment, including reclosing pressure relief devices and interior heater systems in accordance with Appendix D of the Association of American Railroads Specifications for Tank Cars.

(l) **Alternative inspection and test procedures.** In lieu of the other requirements of this section, an alternative inspection and test procedure or interval may be determined from a damage-tolerance evaluation (which 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 (which must be supported by analysis of systematically collected data). Any such relief from the requirements of this section must be approved by the Associate Administrator for Safety, FRA.

(m) **Qualification compliance date for tank cars.** (1) After July 1, 2000, each tank car with a metal jacket or with a thermal protection system shall be qualified and maintained in accordance with this section no later than the date the tank car would require a periodic hydrostatic pressure test (i.e., the marked due date on the tank car for the hydrostatic test).

(2) After October 1, 1998, each tank car without a metal jacket and without a thermal protection system shall be qualified and maintained in accordance with this section no later than the date the tank car would require 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 periodic hydrostatic pressure test interval greater than 10 years (i.e., Class DOT-103W, 104W, 111A60W1, 111A100W1, and 111A100W3 tank cars), the qualification date is the midpoint between the compliance date in paragraph (m)(1) or (2) of this section and the remaining years until the tank would have had a hydrostatic pressure test.

(4) Tank cars having an internal lead, glass, or rubber lining, shall be qualified no later than 10 years after the compliance date specified in subparagraphs (m)(1) and (2) of this section, except as specified in subparagraphs (e)(1)(iii) and (f) of this section.

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 following inspections and tests conducted in accordance with this subpart:

(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.

(e) **Lining and coating inspection.** A tank car successfully passes the lining and coating inspection and tests 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 or 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.

180.513 Repairs, alterations, conversions, modifications, and maintenance.

(a) In order to work on tank cars, a tank car facility must comply with the requirements of Appendices A, B, C, D, R, T, and W of the AAR Specifications for Tank Cars.

(b) 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.

(c) Leakage pressure tests as specified in §180.509(j) shall be done when service equipment is replaced.

180.515 Markings.

(a) When a tank car passes the required inspection and test with acceptable results, the tank car facility shall mark the date qualified and the next qualification date (due date) on the tank car in accordance with Appendix C of the AAR Specifications for Tank Cars. When a tank car facility qualifies one or more areas or components on the tank car at the same time (see §180.509(c)(3) of this alternative program), one date may be used to satisfy the requirements of all qualifications.

(b) Converted class DOT 105, 109, 112, 114, or 120 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 pressure relief device is the installation date on the tank car.

180.517 Reporting and record retention requirements.

(a) **Certification and representation.** Each owner of a specification tank car shall 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 marking of the tank with the tank specification, affirms that all of the appropriate inspections and tests were performed to qualify the tank for continued use. The builder must retain the inspection and test reports to affirm that the tests and inspections required under §180.509 were performed. The

owner shall retain the documents throughout the period of ownership of the specification tank car and for one year thereafter. Upon a change of ownership, the requirements of Section 1.3.15 of the AAR Specifications for Tank Cars apply.

(b) Inspection and test reporting. Each in-service tank car that is inspected and tested, as specified in §180.509, must have a written or electronic report, in English, according to this paragraph. 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) Reporting mark and number
- (4) Tank 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 of the inspector.

Attachment A
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, have shown to corrode carbon steel tanks or service equipment at a rate that will 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 exemption. (See §180.509(f)(3) of this alternative program).

Based on future thickness tests, this list may 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.

Proper Shipping Names

Acetic acid, glacial
 Arsenic acid
 Bisulphites, aqueous solution
 Butyric acid
 Ferric chloride, solution
 Fluoroboric acid
 Fluorosilicic acid
 Formaldehyde
 Hydrobromic acid, solution
 Hydrochloric acid
 Hydrochloric acid, solution
 Hydrofluoric acid and sulfuric acid mixtures
 Hydrofluoric acid, solution
 Hydrogen peroxide
 Hypochlorite, solution
 Methyl methacrylate
 Nitric acid
 Nitrogen fertilizer solution
 Phenyl phosphorus dichloride
 Phenyl phosphorus thiodichloride
 Phosphoric acid
 Phosphorus trichloride
 Sodium chlorate
 Sodium hydrosulfide
 Sulfur, molten
 Sulfuric acid
 Sulfuric acid, fuming
 Sulfuric acid spent
 Titanium sulfate, solution
 Zinc chloride

**Materials transported under an " N.O.S."
 description**

Aluminum chloride
 Ammonium bisulfide
 Benzoic acid
 Black liquor
 Calcium lignosulfonate
 Hexanoic acid
 Lignin liquor
 Lithium chloride
 Sodium polyacrylate
 White liquor



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

21343

[Docket No. HM-90; Amdts. Nos. 173-59,
179-10]

PART 173—SHIPPERS

**PART 179—SPECIFICATIONS FOR
TANK CARS**

Miscellaneous Amendments

The purpose of this amendment to the Department's Hazardous Materials Regulations is to update tank car specification requirements and to add new tank car specifications.

On August 25, 1971, the Hazardous Materials Regulations Board published Docket No. HM-90; Notice No. 71-24 (36 F.R. 18680) proposing these changes. A supplemental notice in this docket was published on September 23, 1971 (36 F.R. 18873), concerning bottom outlets on class 114A tank cars. Several comments were received.

Many of the commenters suggested editorial changes to improve on the language or the format proposed by the Board. These comments were very helpful in clarifying the intent of the regulations. The Board adopted a large portion of them.

Several comments appeared to be presented as editorial in nature but actually were not because the changes suggested would have resulted in substantial revision of material or construction requirements. Changes suggested but not adopted were in §§ 179.100-7(a), 197-200-7(b), 179.200-7(f), and 179.300-7(a) concerning elongation criteria for ASTM materials, § 179.102-1 concerning examination of certain fillet welds, § 179.102-4 concerning vinyl fluoride, § 179.102-18 concerning hydrogen chloride, and § 179-200-22(c) concerning testing on other than rubber-lined tanks.

Other commenters suggested changes that were not only substantial but actually introduced new factors for evalua-

tion on which the public should be afforded the opportunity to comment. Such changes concerned §§ 179.101-1(a) and 179.201-1(a) regarding steel and aluminum equivalencies, § 179.202-15 regarding certain tank cars in formic acid service, and § 179.300-7(a) regarding the addition of new materials. If after review of these amendments commenters are of the opinion that further consideration should be given to their comments for inclusion in future rule making, they should advise the Board.

Several comments were received regarding the Board's proposal to remove bottom outlets on class 114A tank cars. These outlets are now authorized in the regulations on DOT-114A340W tank cars. The Board now considers this a matter for separate rule making and intends to reopen the issue in a future rule making action. This will enable the Board to clearly present its reasons and conclusions to the public. Therefore, since the Board wants to be certain that proper consideration is given this subject, it is not changing the present construction requirements for the class 114A tank car.

One commenter specifically proposed that the markings "Ethylene Oxide and Propylene Oxide Only" be authorized as well as the individual marking "Ethylene Oxide Only." The Board has not amended the rule as requested but will give consideration to such a petition upon the submission of detailed data on the safe interchangeability of these products including information on cleaning between changes, if such is the practice.

Another commenter requested to know if cold ammonia would continue to be authorized in class 119A (interim proposed designation for a DOT tank car specification) tank cars under special permit since specification 119A was not covered by this docket. This class car was not a subject of this rule making action. By these amendments the Board

does not intend to preclude consideration of class 119A tank cars in ammonia ice.

In consideration of the foregoing, 49 CFR Parts 173 and 179 are amended as follows:

1. In § 173.119 paragraphs (a)(12), (e)(2), (f)(4), and the introductory text of paragraph (h), tank car 111A60ALW is deleted and 111A60ALW1 is added in place thereof.

2. In § 173.264, paragraph (b)(2) is amended to read as follows:

§ 173.264 Hydrofluoric acid.

(b) * * *

(2) Specification 105A300W, 112A400W, 114A400W, or ARA-V¹ (§§ 179.100, 179.101, 179.102 of this chapter). Tank car equipped with special valves and appurtenances approved (§ 179.3 of this chapter) for this service. The filling density may not exceed 90 percent of the pounds water weight capacity of the tank.

3. In § 173.314 paragraph (c) table, car "114A400W" is inserted after car 112A400W in the third column of the following entries:

Butadiene (pressure not exceeding 300 pounds per square inch at 115° F.), inhibited.
Liquefied petroleum gas (pressure not exceeding 300 pounds per square inch at 115° F.).

In Part 179 Table of Contents, Subpart C and §§ 179.200, 179.300, and 179.302 are amended to read as follows:

Subpart C—Specifications for Pressure Tank Car Tanks (Classes DOT-105, 109, 112, and 114)

- Sec.
179.200 General specifications applicable to nonpressure tank car tanks (Classes DOT-103, 104, 111).
179.300 General specifications applicable to multiunit tank car tanks designed to be removed from car structure for filling and emptying. (Classes DOT-106A and 110A-W).
179.302 Special commodity requirements for multiunit tank car tanks.

5. In § 179.2, paragraph (a)(4) is amended to read as follows:

§ 179.2 Definitions and abbreviations.

(a) * * *

(4) "DOT" and "Department" mean Department of Transportation.

6. Section 179.5 is amended to read as follows:

§ 179.5 Certificate of construction.

(a) Except as provided in paragraph (b) of this section, before a tank car is placed in service, the party assembling the completed car shall furnish a Certificate of Construction, Form AAR 4-2 to the owner, the Bureau of Explosives (as required by § 179.5(d)), and the Secretary, Mechanical Division, AAR, certifying

that the tank, equipment, and car completed comply with all the requirements of the specification.

(b) Before a tank of Class DOT-106A, 107A, or 110A is placed in service, the builder must furnish a Certificate of Construction, Form AAR 4-2 to the owner, the Bureau of Explosives (as required by paragraph (d) of this section), and the Secretary, Mechanical Division, AAR, in addition to a Certificate of Inspector's Report as required in § 179.300-20 and § 179.500-18 in prescribed form certifying that the tank and appurtenances comply with all the requirements of the specifications.

(c) If the owner elects to furnish the appurtenances such as valves and safety devices, the owner shall furnish to the Bureau of Explosives, and to the Secretary, Mechanical Division, AAR, a report in prescribed form, certifying that the appurtenances comply with all the requirements of the specifications.

(d) When cars or tanks which are covered on one application and are identical in all details are built in series,

one certificate shall suffice for each series when submitted to the Secretary. One copy of the Certificate of Construction must be furnished to the Bureau of Explosives for each car number or consecutively numbered group or groups covered by the original application.

7. Section 179.6 is amended to read as follows:

§ 179.6 Repairs and alterations.

For procedure to be followed in making repairs or alterations, see Appendix E of the AAR Specifications for Tank Cars.

8. In § 179.12-2, paragraph (b) is amended to read as follows:

§ 179.12 Interior heater systems.

§ 179.12-2 Materials and dimensions.

(b) Piping must be not less than 2 inches IPS. Tubing must be not less than 2 3/4 inches outside diameter and the wall thickness must be at least equivalent to the corresponding pipe size. Material specifications and nominal wall thickness must be as follows:

Material	Nominal thickness minimum ¹		Specifications ASTM
	2 inches	Over 2 inches	
Carbon steel.....	0.175.....	Schedule 40.....	A53-69; A192-69, A178-70.
Alloy steel.....	Schedule 40S.....	Schedule 40S.....	A312-70, A289-69.
Aluminum.....	Schedule 80.....	Schedule 80.....	B241-69, B210-70, B221-69.
Nickel.....	Schedule 40.....	Schedule 40.....	B161-70.

¹ Thickness must be increased 25 percent or to next higher schedule, whichever is less, when threaded joints are used.

9. Subpart C heading is amended to read as follows:

Subpart C—Specifications for Pressure Tank Car Tanks (Classes DOT-105, 109, 112, and 114)

10. In § 179.100-3 paragraph (a), the last sentence is amended to read as follows: "Other openings in the tank are prohibited, except as provided in Part 173 of this chapter, § 179.100-14, 179.101-1(a) Table Note 10, § 179.102 or § 179.103." In § 179.100-4, paragraph (a) is amended; in § 179.100-6, paragraph (a) is amended; §§ 179.100-7 and 179.100-10 are amended; in § 179.100-12, paragraphs (a) and (c) are amended; in § 179.100-13, paragraph (e) is added; in § 179.100-14, paragraphs (a)(1) and (3) are amended, paragraph (a)(5) is redesignated (a)(6), a new paragraph (a)(5) is added; in § 179.100-15, paragraphs (a), (b), and (c) are amended; in § 179.100-16, the heading is amended, paragraph (a) is redesignated paragraph (b), a new paragraph (a) is added; in § 179.100-20 paragraph (a) Table, the second entry is amended to read: "Material * * * ASTM A515-70"; in § 179.100-21, paragraph (b) is added to read as follows:

§ 179.100 General specification applicable to pressure tank car tanks.

§ 179.100-4 Insulation.

(a) If insulation is applied, the tank shell and manway nozzle must be insulated with an approved material. The

entire insulation must be covered with a metal jacket of a thickness not less than 11 gage (0.1196 inch) nominal (Manufacturers' Standard Gage) and flashed around all openings so as to be weathertight. The exterior surface of a carbon steel tank, and the inside surface of a carbon steel jacket must be given a protective coating except that a protective coating is not required when foam-in-place insulation that adheres to the tank or jacket is applied.

§ 179.100-6 Thickness of plates.

(a) The wall thickness after forming of the tank shell and heads must not be less than that specified in § 179.101, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:

- d=Inside diameter in inches;
E=1.0 welded joint efficiency; except for heads with seams=0.9;
P=Minimum required bursting pressure in p.s.i.;
S=Minimum tensile strength of plate material in p.s.i., as prescribed in § 179.100-7;
t=Minimum thickness of plate in inches after forming.

§ 179.100-7 Materials.

(a) Steel plate: Steel plate materials used to fabricate tank shell and manway nozzle must comply with one of the following specifications with the indicated

¹ Use of existing tank cars authorized, but new construction not authorized.

minimum tensile strength and elongation in the welded condition. The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon greater than this amount. The plates may be clad with other approved materials.

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 515-70, Gr. 55	55,000	28
ASTM A 515-70, Gr. 60	60,000	25
ASTM A 515-70, Gr. 65	65,000	20
ASTM A 515-70, Gr. 70	70,000	20
ASTM A 285-70a, Gr. A	45,000	29
ASTM A 285-70a, Gr. B	50,000	20
ASTM A 285-70a, Gr. C	55,000	20
ASTM A 516-70a, Gr. 55	55,000	25
ASTM A 516-70a, Gr. 60	60,000	25
ASTM A 516-70a, Gr. 65	65,000	20
ASTM A 516-70a, Gr. 70	70,000	20
AAR FC128-70, Gr. A and B	81,000	19
ASTM A 537-70, Gr. A	70,000	23
ASTM A 502-70a, Gr. B	80,000	20

¹ Maximum stresses to be used in calculations.

(b) Aluminum alloy plate: Aluminum alloy plate material used to fabricate tank shell and manway nozzle must be suitable for fusion welding and must comply with one of the following specifications with its indicated minimum tensile strength and elongation in the welded condition:

Specifications	Minimum tensile strength (p.s.i.) 0 temper, welded condition ^{1,2}	Minimum elongation in 2 inches (percent) 0 temper, welded condition (longitudinal)
ASTM B 209-70, Alloy 5052 ¹	25,000	18
ASTM B 209-70, Alloy 5083 ¹	38,000	16
ASTM B 209-70, Alloy 5086 ¹	35,000	14
ASTM B 209-70, Alloy 5154 ¹	30,000	18
ASTM B 209-70, Alloy 5254 ¹	30,000	18
ASTM B 209-70, Alloy 5454 ¹	31,000	18
ASTM B 209-70, Alloy 5652 ¹	25,000	18
ASTM B 209-70, Alloy 6061 ¹	24,000	5

¹ For fabrication, the parent plate material may be 0, H112, or H32 temper, but design calculations must be based on minimum tensile strength shown.

² 0 temper only.

³ Weld filler metal 5556 must not be used.

⁴ Not authorized for tank shells, manways or domes.

⁵ T6 temper only.

⁶ Maximum stress to be used in calculations.

(c) All attachments welded to tank shell must be of approved material which is suitable for welding to the tank.

§ 179.100-10 Postweld heat treatment.

(a) After welding is complete, steel tanks and all attachments welded thereto must be postweld heat treated as a unit in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W.

(b) For aluminum tanks, postweld heat treatment is prohibited.

§ 179.100-12 Manway nozzle, cover and protective housing.

(a) Manway nozzles must be of approved design of forged or rolled steel for steel tanks or of fabricated aluminum alloy for aluminum tanks, with access opening at least 18 inches inside diameter, or at least 14 inches by 18 inches obround or oval. Nozzle must be welded to the tank and the opening reinforced in an approved manner in compliance with the requirements of AAR Specifications for Tank Cars, Appendix E, Figure E10.

(c) Except as provided in § 179.103, protective housing of cast, forged or fabricated approved materials must be bolted to manway cover with not less than twenty 3/4-inch studs. The shearing value of the bolts attaching protective housing to manway cover must not exceed 70 percent of the shearing value of bolts attaching manway cover to manway nozzle. Housing must have steel side-walls not less than three-fourths inch in thickness and must be equipped with a metal cover not less than one-fourth inch in thickness that can be securely closed. Housing cover must have suitable stop to prevent cover striking loading and unloading connections and be hinged on one side only with approved riveted pin or rod with nuts and cotters. Openings in wall of housing must be equipped with screw plugs or other closures.

§ 179.100-13 Venting, loading and unloading valves, measuring and sampling devices.

(a) Bottom of tank shell may be equipped with a sump or siphon bowl, or both, welded or pressed into the shell. Such sumps or siphon bowls, if applied, are not limited in size and must be made of cast, forged or fabricated metal. Each sump or siphon bowl must be of good welding quality in conjunction with the metal of the tank shell. When the sump or siphon bowl is pressed in the bottom of the tank shell, the wall thickness of the pressed section must not be less than that specified for the shell. The section of a circular cross section tank to which a sump or siphon bowl is attached need not comply with the out-of-roundness requirement specified in AAR Specifications for Tank Cars, Appendix W, W14.06. Any portion of a sump or siphon bowl not forming a part of cylinder of revolution must have walls of such thickness and be so reinforced that the stresses in the walls caused by a given internal pressure are no greater than the circumferential stress which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with § 179.100-6(a). In no case less than that specified in § 179.101-1 (a).

§ 179.100-14 Bottom outlets.

(a) * * *

(1) On newly built and empty cars with truck centers through 60 feet, 6 inches, the extreme projection of the bottom washout equipment must be at

least 12 inches above the top of rail on level track. On cars with truck centers greater than 60 feet, 8 inches, the minimum rail clearance must be in accordance with the graph in Appendix E of the AAR Specifications for Tank Cars.

(3) If bottom washout nozzle extends 6 inches or more from shell of tank, a "V" groove must be cut (not cast) in the upper part of the nozzle at a point immediately below the lowest part of inside closure seat or plug to a depth that will leave wall thickness of nozzle at the root of the "V" not over one-fourth inch. Where nozzle is not a single piece, provision must be made for the equivalent of the breakage groove. The nozzle must be of a thickness to insure that accidental breakage will occur at or below the "V" groove or its equivalent. On cars without continuous center sills, the breakage groove or its equivalent must not be more than 15 inches below the tank shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(5) The closure of the washout nozzle must be equipped with a 3/4-inch solid screw plug. Plug must be attached by at least a 1/4-inch chain.

(6) Joints between closures and their seats may be gasketed with suitable material.

§ 179.100-15 Safety relief valves.

(a) The tank must be equipped with one or more safety relief valves of approved design, made of metal not subject to rapid deterioration by the lading. The safety relief valve, or valves, must be mounted on manway cover, except as provided in § 179.105. The total valve discharge capacity must be sufficient to prevent building up pressure in tank in excess of 8 1/2 percent of the tank test pressure or 10 p.s.i. above the start-to-discharge pressure, whichever is higher. The start-to-discharge and vapor-tight pressures must comply with § 179.101 and must not be affected by any auxiliary closure or other combination. For certain commodities, alternate pressures are permitted (see § 179.102-11). See AAR Specifications for Tank Cars, Appendix A, for formula for calculating discharge capacity.

(b) When a safety relief valve is used in combination with a breaking pin device, the breaking pin device must be designed to fail at a pressure of 75 percent of the tank test pressure and safety relief valve must be set for a start-to-discharge pressure of 71 percent of the tank test pressure. However, for spec. DOT-105A500W tanks, the start-to-discharge pressure must be 360 p.s.i. For certain commodities, alternate pressures are permitted (see § 179.102-11).

(c) When a safety relief valve is used in combination with a frangible disc, the frangible disc must be designed to burst at a pressure of 75 percent of the tank test pressure and the safety relief valve

st be set for a start-to-discharge pres- of 71 percent of the tank test pres- as prescribed in § 179.101. Provisions must be made to prevent any accumula- tion of pressure between the frangible disc and safety relief valve. For certain commodities, alternate pressures are permitted (see § 179.102-11).

§ 179.100-16 Attachments.

(a) Reinforcing pads must be used between external brackets and shells if the attachment welds exceed 6 linear inches of 1/4-inch fillet or equivalent

weld per bracket or bracket leg. When reinforcing pads are used, they must not be less than one-fourth inch in thick- ness, have each corner rounded to a 1 inch minimum radius, and be attached to the tank by continuous fillet welds ex- cept for venting provisions. The ulti- mate shear strength of the bracket-to- reinforcing pad weld must not exceed 85 percent of the ultimate shear strength of the reinforcing pad-to-tank weld.

§ 179.100-21 Stenciling.

(b) Water capacity stencil is required.

11. In § 179.101-1 paragraph (a), the table is amended in its entirety to read as follows:

§ 179.101 Individual specification re- quirements applicable to pressure tank car tanks.

§ 179.101-1 Individual specification re- quirements.

(a) * * *

DOT specifications	105A100ALW	105A100W	105A200ALW	105A200F	105A200W	105A300ALW	105A300W	105A400W	105A500W	105A600W	
Material (see 179.100-7)	Al alloy	Steel	Al alloy	Steel	Steel	Al alloy	Steel	Steel	Steel	Steel	
Insulation (see 179.100-4)	Required	Required	Required	Required	Required	Required	Required	Required	Required	Required	
Bursting pressure, p.s.i. (see 179.100-5)	500	500	500	500	500	750	780	1,000	1,250	1,500	
Minimum plate thickness, inches, shell and heads	3/8	3/8	3/8	3/8	3/8	3/8	1 1/16	1 1/16	1 1/16	1 1/16	
Test pressure, p.s.i. (see 179.100-18)	100	100	200	See 179.104	200	300	300	400	500	600	
Safety relief valves, p.s.i.:											
Start-to-discharge pressure, p.s.i.	75	75	150	150	150	225	225	300	375	450	
Tolerance, p.s.i.	±3.0	±3.0	±4.5	±4.5	±4.5	±6.75	±6.75	±9.0	±11.25	±13.5	
Vapor tight (minimum) pressure, p.s.i.	60	60	120	120	120	180	180	240	300	360	
Valve flow rating, pressure (maximum p.s.i.)	85	85	165	165	165	247.5	247.5	330	412.5	495	
Manway cover, thickness, inches (minimum)	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 3/8	2 3/8	2 3/4	2 3/4	2 3/4	
Special references	179.102-3	179.102-3 179.102-6 179.102-12 179.102-20	179.102-3	179.102-3 179.104	179.102-3 179.102-6 179.102-17	179.102-3	179.102-3	179.102-3 179.102-8 179.102-8 179.102-7 179.102-8 179.102-11 179.102-13 179.102-15 179.102-16 179.102-17	179.102-3 179.102-17	179.102-1 179.102-2 179.102-3 179.102-9 179.102-10 179.102-14	179.102-1 179.102-3 179.102-4 179.102-9 179.102-10 179.102-17
Bottom washout	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	

DOT specifications	109A100ALW	109A200ALW	109A300ALW	109A300W	112A200W	112A340W	112A400F ¹¹	112A400W	112A500W	114A340W	114A400W
Material (see 179.100-7)	Al alloy	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Steel	Steel	Steel
Insulation (see 179.100-4)	Optional	Optional	Optional	Optional	None	None	None	None	None	None	None
Bursting pressure, p.s.i. (see 179.100-5)	500	500	750	750	500	850	850	1,000	1,250	800	1,000
Minimum plate thickness, inches, shell and heads	3/8	3/8	3/8	1 1/16	3/8	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16	1 1/16
Test pressure, p.s.i. (see 179.100-18)	100	200	300	300	200	340	340	400	500	340	400
Safety relief valves, p.s.i.:											
Start-to-discharge pressure, p.s.i.	75	150	225	225	150	255	255	300	375	255	300
Tolerance, p.s.i.	±3.0	±4.5	±6.75	±6.75	±4.5	±7.65	±7.65	±9.0	±11.25	±7.65	±9.0
Vapor tight (minimum) pressure, p.s.i.	60	120	180	180	120	204	204	240	300	204	240
Valve flow rating, pressure (maximum p.s.i.)	85	165	247.5	247.5	165	250.5	250.5	330	412.5	280.5	330
Manway cover, thickness, inches, (minimum)	2 1/4	2 1/4	2 1/4	2 1/4	2 1/4	2 3/4	2 3/4	2 3/4	2 3/4	(?)	(?)
Special references					¹⁰ 179.102-3 179.102-17	¹⁰ 179.102-3 179.102-11 179.102-17		¹⁰ 179.102-3 179.102-6 179.102-11 179.102-13 179.102-17	¹⁰ 179.102-3 179.102-17	179.102-11 179.103	(?) 179.102-11 179.102-13 179.102-17
Bottom washout	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional
Bottom outlet	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Prohibited	Optional	Optional

¹ When steel of 65,000 to 81,000 p.s.i. minimum tensile strength is used, the thickness of plates shall be not less than 3/8 inch, and when steel of 81,000 p.s.i. minimum tensile strength is used, the minimum thickness of plate shall be not less than 1/2 inch.

² When approved material other than aluminum alloys are used, the thickness shall be not less than 2 1/4 inches.

³ When steel of 65,000 p.s.i. minimum tensile strength is used, minimum thickness of plates shall be not less than 1/2 inch.

⁴ At least the upper two-thirds of the exterior of the tank, manway nozzle and all appendances in contact with this area of the tank shall have a finish coat of white paint.

⁵ For inside diameter of 87 inches or less, the thickness of plates shall be not less than 1/2 inch.

⁶ See 179.102-11 for optional setting for certain commodities.

⁷ See AAR specifications for tank cars, appendix E, E4.01 and 179.103-2.

⁸ Purposely left blank.

⁹ When the use of nickel is required by the lading, the thickness shall not be less than 2 inches.

¹⁰ Each tank head may be equipped with not more than one opening for use in purging tank interior.

¹¹ Tanks converted to DOT-112A400F from existing forge-welded specification DOT-105A500 tanks by modification using conversion details complying with DOT-112A400W specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

12. In § 179.102-1, the introductory text of paragraph (a) and paragraph (a)(1) are amended; in § 179.102-2, paragraph (a)(4) is amended; in § 179.102-3, paragraph (a) is amended; in § 179.102-5, the introductory text of paragraph (a) is amended; in § 179.102-6, paragraph (a) is amended; in § 179.102-7, the introductory text of paragraph (a) is amended; in § 179.102-8, the heading and the introductory text of paragraph (a) are amended; in § 179.102-9 and § 179.102-10, the introductory text of paragraph (a) is amended; § 179.102-11 is amended; §§ 179.102-12 through 179.102-17 and 179.102-20 are added to read as follows:

§ 179.102 Special commodity requirements for pressure tank cars.

§ 179.102-1 Liquefied carbon dioxide.

(a) Tank cars used to transport liquefied carbon dioxide must comply with the following special requirements:

(1) All plates for tank, manway nozzle and anchorage of tanks used in the transportation of liquid carbon dioxide must be made of carbon steel complying with ASTM Specification A300-68, Class 1. Impact specimens must be Type A Charpy V-notch as shown in ASTM Specification A370-68 and must meet the impact requirements at minus 50° F. using steel meeting requirements of ASTM Specification A516-70a, Grade 55, 60, 65, or 70, or AAR Specification TC-128-70, Grade B. Production-welded test plates prepared as required by W4.00 of AAR Specifications for Tank Cars, Appendix W, must include impact test specimens of weld metal and head-affected zone.

§ 179.102-2 Chlorine.

(a) Tanks must be fabricated from carbon steel complying with ASTM Specification A516-70a, Grade 70, or AAR Specification TC-128-70, Grade A or B.

§ 179.102-3 Liquefied flammable gases.

(a) Any authorized tank car used to transport liquefied flammable gases must comply with the following special requirements:

(1) The interior pipes of the loading and unloading valves and sampling valves, also the gaging device when it provides a means for passage of the lading from the interior to the exterior of the tank, must be equipped with excess flow valves of an approved design. If the opening for passage of lading through the gaging device is not more than 0.060-inch diameter, an excess flow valve is not required.

(2) The protective housing cover must be provided with an opening above each safety relief valve which must be concentric with the discharge of the valve and have an area at least equal to the valve outlet area. Each opening must be provided with a weatherproof cover designed for vertical discharge.

(3) Gaskets for manway cover plates and for mounting of fittings must be asbestos type or approved high-temperature resistant equivalent.

§ 179.102-5 Nitrosyl chloride.

(a) Tank cars used to transport nitrosyl chloride must comply with the following special requirements:

§ 179.102-6 Vinyl chloride or vinyl methyl ether, inhibited.

(a) Tank cars used to transport vinyl chloride, or vinyl methyl ether, inhibited, must comply with the following special requirements:

(1) All parts of valves and safety relief devices in contact with the lading must be of a metal or other material suitably treated, if necessary, which will not cause formation of any acetylides.

(2) The interior pipes of the loading and unloading valves and sampling valve, also the gaging device when it provides a means for passage of the lading from the interior to the exterior of the tank, must be equipped with excess flow valves of an approved design. If the opening for passage of lading through the gaging device is not more than 0.060 inch diameter, an excess flow valve is not required.

(3) For vinyl chloride in spec. DOT-105A200W tank cars, openings in tank heads to facilitate nickel lining are authorized if closed in an approved manner.

(4) For alternate safety relief valve settings, see § 179.102-11.

(5) For gasket requirements, see § 179.102-11(b).

§ 179.102-7 Bromine.

(a) Tank cars used to transport bromine must comply with the following special requirements:

§ 179.102-8 Motor fuel antiknock compound.

(a) Tank cars used to transport motor fuel antiknock compounds must comply with the following special requirements:

§ 179.102-9 Nitrogen tetroxide or nitrogen tetroxide-nitric oxide mixtures.

(a) Tank cars used to transport nitrogen tetroxide or nitrogen tetroxide-nitric oxide mixtures must comply with the following special requirements:

§ 179.102-10 Hydrocyanic acid.

(a) Tank cars used to transport hydrocyanic acid must comply with the following special requirements:

§ 179.102-11 Liquefied petroleum gas, butadiene, anhydrous ammonia, methylacetylene-propadiene, stabilized, or vinyl chloride.

(a) Tank cars used to transport liquefied petroleum gas, butadiene, anhydrous ammonia, methylacetylene-propadiene, stabilized, or vinyl chloride may as an alternate comply with the following special requirements:

(1) Safety relief valves may be set to the following pressures, provided the total valve discharge capacity is sufficient to prevent building up pressure in the tank in excess of 90 percent of the tank test pressure.

Safety relief valves, p.s.i.	DOT specifications		
	105A300W	112A340W, 114A340W	112A400W, 114A400W
Start-to-discharge pressure.....	247.5	280.5	330
Start-to-discharge tolerance.....	±7.5	±8.4	±10
Vapor tight pressure (minimum).....	196	224	264
Flow rating pressure.....	270	306	360

(b) Gaskets for manway covers and for mounting of fittings must be asbestos type or approved high-temperature resistant equivalent.

§ 179.102-12 Ethylene oxide.

Tank cars used to transport ethylene oxide must be registered and jackets stenciled DOT-105A100 or DOT-105A100W and equipped with the safety relief valve required by such specifications. Tanks may have openings in the heads to facilitate nickel lining provided openings are closed in an approved manner. No copper or copper bearing alloys shall be used in any part of the tank or appurtenances if such part is normally in contact with ethylene oxide liquid or vapor. Tank jacket must be stenciled on both sides in letters not less than 1½ inches high "Ethylene Oxide Only."

§ 179.102-13 Hydrofluoric acid, anhydrous.

(a) Tank cars used to transport hydrofluoric acid, anhydrous, must comply with the following special requirements:

(1) Tanks must be equipped with valves and appurtenances approved for this particular service, made of metal not subject to rapid deterioration by the lading. For safety relief valves, see § 179.100-15 (b) and (c).

(2) For spec. DOT-114A400W tanks, valves and fittings must be located on the top of the tank.

(3) Bottom opening in tank prohibited.

§ 179.102-14 Acrolein inhibited.

Tank cars used to transport acrolein inhibited must be spec. DOT-105A300W, or higher rated tanks registered and jackets stenciled DOT-105A200W and must be equipped with the safety relief valve required by that specification. Jackets must be stenciled on both sides in letters not less than 1½ inches high "Acrolein Only."

§ 179.102-15 Sodium, metallic.

Tank cars used to transport metallic sodium must have exterior heater coils fusion welded to tank shell.

§ 179.102-16 Sulfur trioxide stabilized.

Tank cars used to transport sulfur trioxide stabilized must be equipped with

safety relief valves of approved design. Tanks equipped with interior heating not permitted.

9.102-17 Flammable liquids not specifically provided for.

Tank cars used to transport flammable liquids not specifically provided for may be equipped with openings in tank heads to facilitate application of lining provided openings are closed in approved manner.

§ 179.102-20 Dimethyl hydrazine unsymmetrical.

Tank cars used to transport dimethyl hydrazine may have openings in the heads to facilitate nickel lining provided openings are closed in an approved manner. Class DOT-105AW tank cars used to transport dimethyl hydrazine unsymmetrical must be stenciled DOT-105A100W. Tanks must be equipped with steel or stainless steel safety relief valves of the type and size used on spec. DOT-105A100W tank cars.

13. In § 179.103-3, paragraphs (b) and (c) are amended; § 179.103-4 is amended; § 179.103-5 is added to read as follows:

§ 179.103 Special requirements for class 114A tank car tanks.

§ 179.103-3 Venting, loading and unloading valves, measuring and sampling devices.

These valves and appurtenances be grouped in one location and, except as provided in § 179.103-5, must be equipped with a protective housing with cover, or may be recessed into tank shell with cover. An additional set grouped in another location may be provided. Protective housing with cover, when used, must have steel sidewalls not less than three-fourths inch in thickness and a metal cover not less than one-fourth inch in thickness that can be securely closed. Underframe sills are an acceptable alternate to the protective housing cover, provided the arrangement is of approved design. For fittings recessed into tank shell, protective cover must be metal and not less than one-fourth inch in thickness.

(c) When tank car is used to transport liquefied flammable gases, the interior pipes of the loading, unloading, and sampling valves must be equipped with excess flow valves of approved design except when quick closing internal valves of approved design are used. When the interior pipe of the gaging device provides a means for the passage of lading from the interior to the exterior of the tank, it must be equipped with an excess flow valve of approved design or with an orifice not exceeding 0.060 inch.

§ 179.103-4 Safety relief devices and pressure regulators.

(a) Safety relief devices and pressure regulators must be located on top of the tank near the center of the car on a nozzle, mounting plate or recess in the shell.

Through or stud bolts, if used, must not enter the tank.

(b) Metal guard of approved design must be provided to protect safety relief devices and pressure regulators from damage.

§ 179.103-5 Bottom outlets.

(a) In addition to or in place of the venting, loading and unloading valves, measuring and sampling devices as prescribed in § 179.103-3, tanks may be equipped with approved bottom outlet valves. If applied, bottom outlet valves must meet the following requirements:

(1) When external bottom outlet valve without interior pipes is used in liquefied flammable gas service, the valve opening must be closed with an internal bolted or self-energizing closure of approved design. Protective housing is not required. On cars with center sills, a ball valve may be welded to the outside bottom of the tank or mounted on a pad or nozzle with a tongue and groove or male and female flange attachment, but in no case shall the breakage groove or equivalent extend below the bottom flange of the center sill. On cars without continuous center sills, a ball valve may be welded to the outside bottom of the tank or mounted with a tongue and groove or male and female flange attachment on a pad attached to the outside bottom of the tank. The mounting pad must have a maximum thickness of 2½ inches measured on the longitudinal centerline of the tank. The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transit.

(2) When internal bottom outlet valve is used in liquefied flammable gas service, the outlet of the valve must be equipped with an excess flow valve of approved design, except when a quick-closing internal valve of approved design is used. Protective housing is not required.

(3) Bottom outlet valve must be equipped with a liquid tight closure at its lower end.

(b) Bottom outlet equipment must be of approved design and must meet the following requirements:

(1) On newly built empty cars with truck centers through 60 feet, 6 inches, the extreme projection of the bottom outlet equipment must be at least 12 inches above the top of rail on level track. On cars with truck centers greater than 60 feet, 6 inches, the minimum rail clearance must be in accordance with the graph in Appendix E of the AAR Specifications for Tank Cars. All bottom outlet reducers and closures and their attachments must be secured to car by at least ¾-inch chain or its equivalent, except that outlet closure plugs may be attached by ¼-inch chain. When the bottom outlet closure is of the combination cap and valve type, the pipe connection to the valve must be closed by a plug, cap, or approved quick-coupling device.

(2) Bottom outlet must be provided with a liquid tight closure at its lowest end.

(3) The valve operating mechanism must be provided with a suitable locking

arrangement to insure positive closure during transit.

(4) If outlet nozzle extends 6 inches or more from shell of tank, a breakage groove or its equivalent must be provided immediately below the lowest part of the valve. Breakage groove, if used, must consist of a "V" groove cut (not cast) in the nozzle to depth that will leave thickness of nozzle wall at the root of the "V" not over one-fourth inch. On cars without continuous center sills, the breakage groove or its equivalent must not be more than 15 inches below the tank shell. On cars with continuous center sills, the breakage groove or its equivalent must be above the bottom of the center sill construction.

(5) The valve body must be of a thickness which will insure that accidental breakage of the outlet nozzle will occur at or below the "V" groove, or its equivalent, and will not cause distortion of the valve seat or valve.

14. In § 179.104-1, the heading is amended to read as follows:

§ 179.104 Special requirements for spec. 105A200F tank car tanks.

§ 179.104-1 Tanks built under these specifications must meet the requirements of §§ 179.100, 179.101, and when applicable, § 179.102 and § 179.104.

15. In §§ 179.200 and 179.200-1, the headings are amended in § 179.200-3, paragraph (a) is amended; in § 179.200-4, paragraph (a) is amended; in § 179.200-6, paragraphs (a), (b), (c), (d), (e), and (f) are amended; paragraph (g) is added; § 179.200-7 is amended; in § 179.200-8, paragraphs (a) and (b) are amended, paragraph (c) is canceled; in § 179.200-9, paragraph (a) is amended; in § 179.200-10, paragraph (b) is added; § 179.200-11 is amended; in § 179.200-13, the introductory text of paragraph (d) is amended; in § 179.200-14, paragraph (e) (3) is amended; in § 179.200-15, paragraph (c) is amended; in § 179.200-16, paragraphs (c) and (e) are amended, paragraphs (f) and (g) are added; in § 179.200-17, paragraph (a) and paragraphs (b) (1), (3), and (4) are amended, paragraph (b) (5) is redesignated (b) (6), a new paragraph (b) (5) is added; in § 179.200-19, paragraph (b) is added; in § 179.200-24, paragraph (b) is added to read as follows:

§ 179.200 General specifications applicable to nonpressure tank car tanks (Classes DOT-103, 104, and 111).

§ 179.200-1 Tanks built under these specifications must meet the requirements of §§ 179.200, 179.201, and when applicable § 179.202.

§ 179.200-3 Type.

Tank built under these specifications must be circular in cross section, with formed heads designed convex outward. When specified in § 179.201-1, the tank must have at least one manway or one expansion dome with manway, and such

other external projections as are prescribed herein. When the tank is divided into compartments, each compartment must be treated as a separate tank.

§ 179.200-4 Insulation.

(a) If insulation is applied, the tank shell and expansion dome when used must be insulated with an approved material. The entire insulation must be covered with a metal jacket of a thickness not less than 11 gage (0.1196 inch) nominal (Manufacturer's Standard Gage) and flashed around all openings so as to be weather tight. The exterior surface of a carbon steel tank and the inside surface of a carbon steel jacket must be given a protective coating, except that protective coating is not required when foam-in-place insulation that adheres to the tank or jacket is applied.

§ 179.200-6 Thickness of plates.

(a) The wall thickness after forming of the tank shell, dome shell, and of 2:1 ellipsoidal heads must be not less than specified in § 179.201-1, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE}$$

where:

- d = Inside diameter in inches;
- E = 0.9 Welded joint efficiency, except E = 1.0 for seamless heads;
- P = Minimum required bursting pressure in p.s.i.;
- S = Minimum tensile strength of plate material in p.s.i. as prescribed in § 179.200-7;
- t = Minimum thickness of plate in inches after forming.

(b) The wall thickness after forming of 3:1 ellipsoidal heads must be not less than specified in § 179.201-1, nor that calculated by the following formula:

$$t = \frac{Pd}{2SE} \times 1.83$$

where:

- d = Inside diameter in inches;
- E = 0.9 Welded joint efficiency, except E = 1.0 for seamless heads;
- P = Minimum required bursting pressure in p.s.i.;
- S = Minimum tensile strength of plate material in p.s.i. as prescribed in § 179.200-7;
- t = Minimum thickness of plate in inches after forming.

(c) The wall thickness after forming of a flanged and dished head must be not less than specified in § 179.201-1, nor that calculated by the following formula:

$$t = \frac{5PL}{6SE}$$

where:

- E = 0.9 Welded joint efficiency, except E = 1.0 for seamless heads;
- L = Main inside radius to which head is dished, measured on concave side in inches;
- P = Minimum required bursting pressure in p.s.i.;
- S = Minimum tensile strength of plate material in p.s.i. as prescribed in § 179.200-7;
- t = minimum thickness of plate in inches after forming.

(d) If plates are clad with material having tensile strength properties at least equal to the base plate, the cladding may be considered a part of the base plate when determining thickness. If cladding material does not have tensile strength at least equal to the base plate, the base plate alone must meet the thickness requirements.

(e) For a tank constructed of longitudinal sections, the minimum width of bottom sheet of the tank must be 60 inches measured on the arc, but in all cases the width must be sufficient to bring the entire width of the longitudinal welded joint, including welds, above the bolster.

(f) For a tank built of one piece cylindrical sections, the thickness specified for bottom sheet must apply to the entire cylindrical section.

(g) See § 179.200-9 for thickness requirements for a compartmented tank.

§ 179.200-7 Materials.

(a) Plate material used to fabricate the tank and, when used, expansion dome or manway nozzle material, must meet one of the following specifications with the indicated minimum tensile strength and elongation in the welded condition.

(b) Carbon steel plate: The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials:

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 515-70, Gr. 55	55,000	28
ASTM A 515-70, Gr. 60	60,000	28
ASTM A 515-70, Gr. 65	65,000	20
ASTM A 515-70, Gr. 70	70,000	20
ASTM A 285-70a, Gr. A	45,000	21
ASTM A 285-70a, Gr. B	50,000	20
ASTM A 285-70a, Gr. C	55,000	20
ASTM A 285-70a, Gr. 80	55,000	20
ASTM A 285-70a, Gr. 80	60,000	20
ASTM A 515-70a, Gr. 85	65,000	20
ASTM A 515-70a, Gr. 70	70,000	20
AAR TC125-70, Gr. A	51,000	19

¹ Maximum stresses to be used in calculations.

(c) Aluminum alloy plate: Aluminum alloy plate must be suitable for welding and comply with one of the following specifications:

Specifications	Minimum tensile strength (p.s.i.) 0 temper welded condition ¹	Minimum elongation in 2 inches (percent) 0 temper welded condition (longitudinal)
ASTM B 209-70, Alloy 5052 ¹	25,000	18
ASTM B 209-70, Alloy 5083 ²	38,000	16
ASTM B 209-70, Alloy 5086 ¹	35,000	14
ASTM B 209-70, Alloy 5154 ¹	30,000	18
ASTM B 209-70, Alloy 5254 ¹	30,000	18
ASTM B 209-70, Alloy 5454 ¹	21,000	18
ASTM B 209-70, Alloy 5652 ¹	25,000	18
ASTM B 209-70, Alloy 6061 ¹	24,000	15

¹ For fabrication, the parent plate material may be 0, H112, or H32 temper, but design calculations must be based on minimum tensile strength shown.

² 0 temper only.
³ Weld filler metal 5556 must not be used.
⁴ Not authorized for tank shells, manways or domes.
⁵ 0 temper only.
⁶ Maximum stresses to be used in calculations.

(d) High alloy steel plate: High alloy steel plate must comply with one of the following specifications:

Specification ¹	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 240-70, Type 304	75,000	30
ASTM A 240-70, Type 304L	70,000	30
ASTM A 240-70, Type 316	75,000	30
ASTM A 240-70, Type 316L	70,000	30
ASTM A 240-70, Type 430A	65,000	22

¹ Maximum stresses to be used in calculations.
² High alloy steel materials used to fabricate tank and expansion dome, when used, must be tested in accordance with the following procedures in ASTM Specification A 265-68 titled, "Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steels," and must exhibit corrosion rates not exceeding the following:

Test procedure	Material	Corrosion rate (p.a.)
Practice B	Types 304, 304L, 316, and 316L	0.0040
Practice C	Type 304L	0.0020
Practice C	Type 430A	0.0060

Type 304L and Type 316L test specimens must be given a sensitizing treatment prior to testing. (A typical sensitizing treatment is 1 hour at 1250°F.)

(e) Nickel plate: Nickel plate must comply with the following specification:

Specification	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM B 162-60 ¹	40,000	20

¹ Maximum stresses to be used in calculations.
² When used as cladding for carbon steel plate, low carbon nickel is required.

(f) Manganese-molybdenum steel plate: Manganese-molybdenum steel plate must be suitable for fusion welding and comply with the following specification:

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 302-00a, Gr. B	80,000	20

¹ Maximum stresses to be used in calculations.

(g) All parts and items of construction in contact with the lading must be made of material compatible with plate material and not subject to rapid deterioration by the lading, or be coated or lined with suitable corrosion resistant material.

(h) All external projections which may be in contact with the lading and all castings, forgings, or fabrications used for fittings or attachments to tank and expansion dome, when used, in contact with lading must be made of material to

approved specification. See AAR Specifications for Tank Cars, Appendix M, 5 for approved material specifications for castings for fittings.

§ 179.200-8 Tank heads.

(a) All external tank heads must be an ellipsoid of revolution in which the major axis must equal the diameter of the shell and the minor axis must be one-half the major axis.

(b) Internal compartment tank heads may be 2:1 ellipsoidal, 3:1 ellipsoidal, or flanged and dished to thicknesses as specified in § 179.200-6. Flanged and dished heads must have main inside radius not exceeding 10 feet, and inside knuckle radius must not be less than 3/4 inches for steel, alloy steel, or nickel tanks, and not less than 5 inches for aluminum alloy tanks.

(c) [Canceled]

§ 179.200-9 Compartment tanks.

(a) When a tank is divided into compartments, by inserting interior heads, interior heads must be inserted in accordance with AAR Specifications for Tank Cars, Appendix E, E7.00, and must comply with the requirements specified in § 179.201-1. Voids between compartment heads must be provided with at least one tapped drain hole at their lowest point, and a tapped hole at the top of the tank. Top hole must be closed, and the bottom hole may be closed, with not less than three-fourths inch nor more than 1 1/2 inches solid pipe plugs having NPT ends.

§ 179.200-10 Welding.

(b) Welding is not permitted on or to ductile iron or malleable iron fittings.

§ 179.200-11 Postweld heat treatment.

After welding is complete, postweld heat treatment must be in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W, when specified in § 179.201.1.

§ 179.200-13 Manway ring or flange, safety relief device flange, bottom outlet nozzle flange, bottom washout nozzle flange and other attachments and openings.

(d) Rivets, if used, must comply with AAR Specification M-110-64 or its equivalent, must be compatible with plate material, and must meet the following additional requirements:

§ 179.200-14 Expansion capacity.

(e) * * *

(3) The dome head, if dished, must be dished to a radius not exceeding 96 inches. Thickness of dished dome head must be calculated by the formula in § 179.200-6(c).

§ 179.200-15 Closures for manways.

(c) Manway covers must be of approved cast, forged, or fabricated metals. Malleable iron, if used, must comply with ASTM A47-68, Grade 35018. Cast iron manway covers must not be used.

§ 179.200-16 Gaging devices, top loading and unloading devices, venting and air inlet devices.

(c) A tank may be equipped with a vacuum relief valve of an approved design. Protective housing is not required.

(e) Bottom of tank shell may be equipped with a sump or siphon bowl, or both, welded or pressed into the shell. Such sumps or siphon bowls, if applied, are not limited in size and must be made of cast, forged, or fabricated metal. Each sump or siphon bowl must be of good welding quality in conjunction with the metal of the tank shell. When sump or siphon bowl is pressed in the bottom of the tank shell, the wall thickness of the pressed section must not be less than that specified for the shell. The section of a circular cross section tank to which a sump or siphon bowl is attached need not comply with the out-of-roundness requirement specified in Appendix W, W14.06, of the AAR Specifications for Tank Cars. Any portion of a sump or siphon bowl not forming a part of a cylinder of revolution must have walls of such thickness and be so reinforced that the stresses in the walls caused by a given internal pressure are not greater than the circumferential stress which would exist under the same internal pressure in the wall of a tank of circular cross section designed in accordance with § 179.200-6 (a) and (d). In no case shall the wall thickness be less than that specified in § 179.201-1(a).

(f) When top loading and discharge devices, or venting and air inlet devices are installed with exposed piping to a removed location, shutoff valves must be applied directly to reinforcing pads or nozzles at their communication through the tank shell, and must be enclosed in a protective housing with provision for a seal. The piping must include breakage grooves, and suitable bracing. Relief valves must be applied to liquid lines for protection in case lading is trapped. Provision must be made to insure closure of the valves while the car is in transit.

(g) Protective housing, when required, must be fabricated of approved material and have cover and sidewalls not less than 0.119 inch in thickness.

§ 179.200-17 Bottom outlets.

(a) If indicated in § 179.201-1, tank may be equipped with bottom outlet. Bottom outlet, if applied, must comply with the following requirements:

(1) On newly built empty cars with truck centers through 60 feet, 6 inches, the extreme projection of the bottom outlet equipment must be at least 12 inches above the top of rail on level track. On cars with truck centers greater than 60 feet, 6 inches, the minimum rail clear-

ance must be in accordance with the graph in Appendix E of the AAR Specifications for Tank Cars. All bottom outlet reducers and closures and their attachments must be secured to car by at least 3/8-inch chain or its equivalent, except that outlet closure plugs may be attached by 1/4-inch chain. When the bottom outlet closure is of the combination cap and valve type, the pipe connection to the valve must be closed by a plug, cap, or approved quick coupling device.

(2) Bottom outlet must be of approved construction, and be provided with a liquid-tight closure at its lower end.

(3) On cars with center sills, a ball valve may be welded to the outside bottom of the tank or mounted on a pad or nozzle with a tongue and groove or male and female flange attachment. In no case shall the breakage groove or equivalent extend below the bottom flange of the center sill. On cars without continuous center sills, a ball valve may be welded to the outside bottom of the tank or mounted with a tongue and groove or male and female flange attachment on a pad attached to the outside bottom of the tank. The mounting pad must have a maximum thickness of 2 1/2 inches measured on the longitudinal centerline of the tank. The valve operating mechanism must be provided with a suitable locking arrangement to insure positive closure during transit.

(4) The valve operating mechanism for valves applied to the interior of the tank, and outlet nozzle construction, must insure against the unseating of the valve due to stresses or shocks incident to transportation.

(5) Bottom outlet nozzle of interior valves and the valve body of exterior valves, must be of cast, fabricated, or forged metal. If welded to tank, they must be of good weldable quality in conjunction with metal of tank.

(6) To provide for the attachment of unloading connections, the bottom of the main portion of the outlet nozzle or valve body of exterior valves, or some fixed attachment thereto, must be provided with threaded cap closure arrangement or bolted flange closure arrangement having minimum 1-inch threaded pipe plug or approved quick-coupling device. When two piece quick-coupling devices (i.e., adapter and dust cap) are used on bottom outlet extensions, an inline auxiliary valve must be applied between the bottom outlet valve and the quick-coupling closure. The quick-coupling closure (dust cap) or outlet nozzle wall must be fitted with a minimum 1-inch threaded plug. The auxiliary valve and dust cap may be omitted when the quick-coupling adapter is threaded internally and fitted with a minimum 1-inch plug.

(7) If outlet nozzle extends 6 inches or more from shell of tank, a "V" groove must be cut (not cast) in the upper part of outlet nozzle at a point immediately below lowest part of valve to a depth that will leave thickness of nozzle wall at the root of the "V" not over one-fourth of an inch. The outlet nozzle on interior valves or the valve body on exterior valves may be steam jacketed, in

which case the breakage groove or its equivalent must be below the steam chamber but above the bottom of center sill construction. If outlet nozzle is not a single piece, or if exterior valves are applied, provision must be made for the equivalent of the breakage groove. On cars without continuous center sills, the breakage groove or its equivalent must be not more than 15 inches below the tank shell. On cars with continuous center sills the breakage groove or its equivalent must be above the bottom of the center sill construction.

(8) The flange on the outlet nozzle or the valve body of exterior valves must be of a thickness which will prevent distortion of the valve seat or valve by any change in contour of the shell resulting from expansion of lading, or other causes, and which will insure that accidental breakage of the outlet nozzle will occur at or below the "V" groove, or its equivalent.

(9) The valve must have no wings or stem projecting below the "V" groove or its equivalent. The valve and seat must be readily accessible or removable for repairs, including grinding.

(10) The valve operating mechanism on interior valves must have means for compensating for variation in the vertical diameter of the tank produced by expansion, weight of the liquid contents, or other causes, and may operate from the interior of the tank, but in the event the rod is carried through the dome, or tank shell, leakage must be prevented by packing in stuffing box or other suitable seals and a cap.

(b) * * *

(1) On newly built empty cars with truck centers through 60 feet, 6 inches,

the extreme projection of the bottom washout equipment must be at least 12 inches above the top of rail on level track. On cars with truck centers greater than 60 feet, 6 inches, the minimum rail clearance must be in accordance with the graph in Appendix E of the AAR Specifications for Tank Cars.

(3) If washout nozzle extends 6 inches or more from shell of tank, a "V" groove must be cut (not cast) in the upper part of the nozzle at a point immediately below the lowest part of inside closure seat or plug to a depth that will leave wall thickness of nozzle at the root of the "V" not over one-fourth inch. Where nozzle is not a single piece, provision must be made for the equivalent of the breakage groove. The nozzle must be of a thickness to insure that accidental breakage will occur at or below the "V" groove or its equivalent. On cars without continuous center sills, the breakage groove or its equivalent must not be more than 15 inches below the tank shell. On cars with continuous center sills the breakage groove or its equivalent must be above the bottom of the center sill construction.

(4) The closure plug and seat must be readily accessible or removable for repairs, including grinding.

(5) The closure of the washout nozzle must be equipped with a 3/4-inch solid screw plug. Plug must be attached by at least a 1/4-inch chain.

(6) Joints between closures and their seats may be gasketed with suitable material.

§ 179.200-19 Reinforcements, when used, and appurtenances not otherwise specified.

(b) Reinforcing pads must be used between external brackets and shells if the attachment welds exceed 6 lineal inches of 1/4-inch fillet or equivalent weld per bracket or bracket leg. When reinforcing pads are used, they must not be less than one-fourth inch in thickness, have each corner rounded to a 1 inch minimum radius, and be attached to the tank by continuous fillet welds except for venting provisions. The ultimate shear strength of the bracket to reinforcing pad weld must not exceed 85 percent of the ultimate shear strength of the reinforcing pad to tank weld.

§ 179.200-24 Stamping.

(b) On Class DOT-111 tank cars, the last numeral of the specification number may be omitted from the stamping; for example, DOT-111A100W.

16. In § 179.201-1 paragraph (a), the entire table is amended; in § 179.201-2 paragraph (g), the sentence preceding the table is amended; in § 179.201-3, paragraphs (e), (f), and (g) are amended; (h), (i), (j), and (k) are added; § 179.201-4 is amended; §§ 179.201-5 and 179.201-6 are amended; in § 179.201-7 paragraph (a) is amended; § 179.201-9 is amended to read as follows:

§ 179.201 Individual specification requirements applicable to non-pressure tank car tanks.

§ 179.201-1 Individual specifications requirements.

(a) * * *

DOT specifications	103A-ALW	103AW	103ALW	103ANW	103BW	103CWF	103DW	103EW
Material (see 179.200-7)	Al alloy	Steel	Al alloy	Nickel	Steel	Alloy steel	Alloy steel	Alloy steel
Insulation (see 179.200-4)	Optional							
Bursting pressure, p.s.i. (See 179.200-5)	240	240	240	240	240	240	240	240
Minimum Plate thickness inches:								
Shell (see 179.200-6)	14	179.201-2	14	179.201-2	179.201-2	179.201-2	179.201-2	179.201-2
Heads (see 179.200-6 and 179.200-8)	14	179.201-2	14	179.201-2	179.201-2	179.201-2	179.201-2	179.201-2
Dome	Required							
Minimum expansion capacity (see 179.200-14)	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome	1 percent in dome	1 percent in dome	2 percent in dome	1 percent in dome
Test pressure p.s.i. (see 179.200-22)	60	60	60	60	60	60	60	60
Safety relief devices (see 179.200-18)	Valve or vent	179.201-7	Valve or vent	179.201-7	Vent	Valve	Valve or vent	Valve or vent
Valve start-to-discharge pressure p.s.i. (see 179.200-17(a))	35	35	35	35	35	35	35	35
Valve vapor tight pressure (minimum p.s.i.)	28	28	28	28	28	28	28	28
Valve flow rating pressure (maximum p.s.i.)	45	45	45	45	45	45	45	45
Vent bursting pressure (maximum p.s.i.)	45	45	45	45	45	45	45	45
Gaging devices (see 179.200-16)	Optional							
Top loading and unloading devices (see 179.200-16)	Required	Required	Optional	Required	Required	Required	Optional	Optional
	(valves optional)	(valves optional)		(valves optional)				
Bottom outlet (see 179.200-17(a))	Prohibited	Prohibited	Optional	Prohibited	Prohibited	Prohibited	Optional	Prohibited
Bottom washout (see 179.200-17(b))	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional	Optional
Closure for manway (see 179.200-16)			179.201-6(a)	179.201-6(d)	179.201-6(b)	179.201-6(c)	179.201-6(a)	179.201-6(c)
							179.201-6(c)	
Postweld heat treatment (HT) (see 179.200-11)	Prohibited	HT	Prohibited	Not required	HT	HT	HT	HT
		179.202-6				179.201-5	HT 179.201-5	HT 179.201-5
Special references	179.202-10	179.202-7	179.202-1	179.202-8	179.201-3	179.201-4	179.201-4	179.201-4
	179.202-14	179.202-8	179.202-21	179.202-11	179.202-9	179.202-14	179.202-1	179.202-11
				179.202-16	179.202-12	179.202-15		
	179.202-21	179.202-11		179.202-17	179.202-12	179.202-15		179.202-15
		179.202-12				179.202-19		
		179.202-13				179.202-21		
		179.202-16						
		179.202-17						
		179.202-20						
		179.202-22						

DOT specifications	103W	104W	111A60ALW1	111A60ALW2	111A60W1 ¹	111A60W2	111A60W5	111A60W7
Material (see 179.200-7)	Steel	Steel	Al alloy	Al alloy	Steel	Steel	Steel	Alloy steel
Insulation (see 179.200-4)	Optional	Required	Optional	Optional	Optional	Optional	Optional	Optional
Bursting pressure p.s.i. (see 179.200-5)	240	240	240	240	240	240	240	240
Minimum plate thickness inches:								
Shell (see 179.200-6)	179.201-2	179.201-2	1/2	1/2	1/2	1/2	1/2	1/2
Heads (see 179.200-6 and 179.200-8)	179.201-2	179.201-2	1/2	1/2	1/2	1/2	1/2	1/2
Dome	Required	Required	None	None	None	None	None	None
Minimum expansion capacity (see 179.200-14)	2 percent in dome	2 percent in dome	2 percent in tank	1 percent in tank	2 percent in tank	1 percent in tank	1 percent in tank	1 percent in tank
Test pressure p.s.i. (see 179.200-22)	60	60	60	60	60	60	60	60
Safety relief devices (see 179.200-18)	Valve or vent	Valve or vent	179.201-7	Valve or vent				
Valve start-to-discharge pressure p.s.i. (±3 p.s.i.)	35	35	35	35	35	35	35	35
Valve vapor tight pressure (minimum p.s.i.)	28	28	28	28	28	28	28	28
Valve flow rating pressure (maximum p.s.i.)	45	45	45	45	45	45	45	45
Vent bursting pressure (maximum p.s.i.)	45	45	45	45	45	45	45	45
Gaging devices (see 179.200-16)	Optional	Optional	Required	Required	Required	Required	Required	Optional
Top loading and unloading devices (see 179.200-16)	Optional	Optional	Optional	Required	Optional	Optional	Optional	Required
Bottom outlet (see 179.200-17(a))	Optional	Optional	Optional	Prohibited	Optional	Prohibited	Prohibited	Prohibited
Bottom washout (see 179.200-17(b))	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Prohibited
Closure for manway (see 179.200-15)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(b)	179.201-6(c)
Postweld heat treatment (HT) (see 179.200-11)	HT	HT	Prohibited	Prohibited	HT	HT	HT	HT 179.201-5
Special references	179.202-1	179.202-1	179.202-1	179.202-21	179.202-2	179.202-3	179.202-5	179.202-1

DOT specifications	111A100ALW1	111A100ALW2	111A100W1 ¹	111A100W2 ¹	111A100W3	111A100W4	111A100W5	111A100W6	111A100F1 ¹ 111A100F2 ¹
Material (see 179.200-7)	Al alloy	Al alloy	Steel	Steel	Steel	Steel	Steel	Alloy steel	
Insulation (see 179.200-4)	Optional	Optional	Optional	Optional	Required	Required	Optional	Optional	
Bursting pressure p.s.i. (see 179.200-5)	600	600	600	600	600	600	600	600	
Minimum plate thickness inches:									
Shell (see 179.200-6)	3/8	3/8	1/2	1/2	1/2	1/2	1/2	1/2	
Heads (see 179.200-6 and 179.200-8)	3/8	3/8	1/2	1/2	1/2	1/2	1/2	1/2	
Minimum expansion capacity (see 179.200-14)	None	None	None	None	None	None	None	None	
Test pressure p.s.i. (see 179.200-22)	100	100	100	100	100	100	100	100	
Safety relief devices (see 179.200-18)	Valve or vent	Valve or vent	Valve or vent	179.201-7	Valve or vent	Valve	Vent	Valve or vent	
Valve start-to-discharge pressure p.s.i. (±3 p.s.i.)	75	75	75	75	75	75	75	75	
Valve vapor tight pressure (minimum p.s.i.)	60	60	60	60	60	60	60	60	
Valve flow rating pressure (maximum p.s.i.)	85	85	85	85	85	85	85	85	
Vent bursting pressure (maximum p.s.i.)	75	75	75	75	75	75	75	75	
Gaging devices (see 179.200-16)	Required	Required	Required	Required	Optional	Required	Required	Optional	
Top loading and unloading devices (see 179.200-16)	Optional	Required (valves optional)	Optional	Required (valves optional)	Optional (if used, valves required)	Prohibited	Prohibited	Optional (if used, valves required)	
Bottom outlet (see 179.200-17(a))	Optional	Prohibited	Optional	Prohibited	Optional	Prohibited	Prohibited	Optional	
Bottom washout (see 179.200-17(b))	Optional	Optional	Optional	Optional	Optional	Prohibited	Prohibited	Optional	
Closure for manway (see 179.200-15)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(a)	179.201-6(b)	179.201-6(c)	
Postweld heat treatment (HT) (see 179.200-11)	Prohibited	Prohibited	HT	HT	HT	HT	HT	HT 179.201-5	
Special references		179.202-21	179.202-1	179.202-6	179.202-7	179.202-1	179.201-9	179.201-3	179.201-4

¹ Tanks converted to DOT-111A series from existing forge-welded specification DOT-106A300, 400, or 500 tanks, by modification using conversion details complying

with DOT-111A specification requirements, shall be stenciled by substituting the letter "F" for the letter "W" in the specification designation.

§ 179.201-2 Minimum plate thickness.
(a) The minimum plate thickness after forming must be as follows:

§ 179.201-3 Lined tanks.
(a) Rubber-lined tanks.
(1) Each tank or each compartment thereof must be lined with acid-resistant rubber or other approved rubber compound vulcanized or bonded directly to

the metal tank, to provide a nonporous laminated lining, at least 5/32-inch thick, except overall rivets and seams formed by riveted attachments in the lining must be double thickness. The rubber lining must overlap at least 1 1/2 inches at all edges which must be straight and be beveled to an angle of approximately 45°, or butted edges of lining must be sealed with a 3-inch min-

imum strip of lining having 45° beveled edges.
(2) As an alternate method, the lining may be joined with a skived butt seam then capped with a separate strip of lining 3 inches wide having 45° beveled edges. An additional rubber reinforcing pad at least 4 1/2 feet square and at least 1/2-inch thick must be applied by vulcanizing to the lining on

bottom of tank directly under the manway opening. The edges of the rubber pad must be beveled to an angle of approximately 45°. An opening in this pad for sump is permitted. No lining must be under tension when applied except due to conformation over rivet heads. Interior of tank must be free from scale, oxidation, moisture, and all foreign matter during the lining operation.

(3) Other approved lining materials may be used provided the material is resistant to the corrosive or solvent action of the lading in the liquid or gas phase and is suitable for the service temperatures.

(b) Before a tank car tank is lined with rubber, or other rubber compound, a report certifying that the tank and its equipment have been brought into compliance with spec. DOT-103B, 103BW, 111A60W5, or 111A100W5 must be furnished by car owner to the party who is to apply the lining. A copy of this report in approved form, certifying that tank has been lined in compliance with all requirements of one of the above specifications, must be furnished by party lining tank to car owner. Reports of the latest lining application must be retained by the car owner until the next relining has been accomplished and recorded.

(c) All rivet heads on inside of tank must be buttonhead, or similar shape, and of uniform size. The under surface of heads must be driven tight against the plate. All plates, castings and rivet heads on the inside of the tank must be caked. All projecting edges of plates, castings and rivet heads on the inside of the tank must be rounded and free from fins and other irregular projections. Castings must be free from porosity.

(d) All surfaces of attachments or fittings and their closures exposed to the lading must be covered with at least 1/8-inch acid resistant material. Attachments made of metal not affected by the lading need not be covered with rubber or other acid resistant material.

(e) Hard rubber or polyvinyl chloride may be used for pressure retaining parts of safety vents provided the material is resistant to the corrosive or solvent action of the lading in the liquid or gas phase and is suitable for the service temperatures.

(f) Polyvinyl chloride lined tanks. Tank car tanks or each compartment thereof may be lined with elastomeric polyvinyl chloride having a minimum lining thickness of three thirty-seconds inch.

(g) Polyurethane lined tanks. Tank car tanks or each compartment thereof may be lined with elastomeric polyurethane having a minimum lining thickness of one-sixteenth inch.

§ 179.201-4 Material.

All fittings, tubes, and castings and all projections and their closures, except for protective housing, must also meet the requirements specified in AAR Specifications for Tank Cars, Appendix M, M3.03 (b) and M4.05 (d).

§ 179.201-5 Postweld heat treatment and corrosion resistance.

(a) Tanks and attachments welded directly thereto must be postweld heat treated as a unit at the proper temperature except as indicated below. Tanks and attachments welded directly thereto fabricated from ASTM A240-70 Type 430A, Type 304 and Type 316 materials must be postweld heat treated as a unit and must be tested to demonstrate that they possess the corrosion resistance specified in § 179.200-7(d), Footnote 2. Tanks and attachments welded directly thereto, fabricated from ASTM A240-70 Type 304L or Type 316L materials are not required to be postweld heat treated.

(b) Tanks and attachments welded directly thereto, fabricated from ASTM A240-70 Type 304L and Type 316L materials must be tested to demonstrate that they possess the corrosion resistance specified in § 179.200-7(d), Footnote 2.

§ 179.201-6 Manways and manway closures.

(a) The manway cover for spec. DOT 103ALW, 103DW, 103W, 104W, 111A60ALW1, 111A60WL, 111A100ALW1, 111A100WL1, 111A100W3, or 111A100W5 must be designed to make it impossible to remove the cover while the interior of the tank is subjected to pressure.

(b) The manway cover for spec. DOT 103BW, 111A60W5, or 111A100W5 must be made of a suitable metal. The top, bottom and edge of manway cover must be acid resistant material covered as prescribed in § 179.201-3. Through-bolt holes must be lined with acid resistant material at least one-eighth inch in thickness. Cover made of metal not affected by the lading need not be acid resistant material covered.

(c) The manway ring and cover for spec. DOT-103CW, 103DW, 103EW, 111A60W7, or 111A100W6 must be made of the metal and have the same inspection procedures specified in AAR Specifications for Tank Cars Appendix M, M3.03.

(d) The manway ring for DOT 103 ANW must be made of cast, forged or fabricated nickel and be a good weldable quality in conjunction with the metal of the dome. Manway cover must be made of nickel.

§ 179.201-7 Safety relief devices.

(a) Each tank or compartment must be equipped with a safety vent unless characteristics of the lading require a safety relief valve. These devices must comply with § 179.200-18.

§ 179.201-9 Gaging device.

A gaging device of an approved design must be applied to permit determining the liquid level of the lading. The gaging device must be made of materials not subject to rapid deterioration by the lading. When the interior pipe of the gaging device provides a means for passage of the lading from the interior to the exterior of the tank, it must be equipped with an excess flow valve of an approved design. If the opening for passage of lading through the gaging device

is not more than 0.060 inch diameter an excess flow valve is not required. The gaging device must be provided with a protective housing.

17. In §§ 179.202-1, 179.202-2, and 179-202-3, paragraph (a) is amended; in § 179.202-4, paragraph (a) is amended by deleting "Spec. 103-W" at the beginning of the paragraph; in §§ 179.202-5, 179-202-6, 179.202-7, and 179.202-8, paragraph (a) is amended; in § 179.202-9, the heading and paragraph (a) are amended, paragraph (b) is added; in § 179.202-10, paragraph (a) is amended; § 179.202-11 is amended; in § 179.202-12, paragraph (a) is amended, paragraph (b) is added; in § 179.202-13, paragraph (a) is amended; in § 179.202-14, paragraphs (a), (b), and (c) are amended; §§ 179.202-15 through 179.202-19 paragraph (a) is amended; §§ 179.202-20, 179.202-21, and 179.202-22 are added to read as follows:

§ 179.202 Special commodity requirements for nonpressure tank car tanks.

§ 179.202-1 Flammable liquids not specifically provided for.

Tank cars used to transport flammable liquids not specifically provided for must have manway closures so designed that pressure will be released automatically by starting the operation of removing the manway cover. Openings in tank heads to facilitate application of lining are authorized and must be closed in an approved manner. Specifications ARA-III, ARA-IV and ICC-103, DOT-103W, 103ALW, ICC-104, DOT-104W, 111A60ALW1 or 111A100W3, used to transport flammable liquids not specifically provided for, having a vapor pressure exceeding 27 pounds per square inch absolute at 100° F, but not exceeding 40 psia at 100° F, must have their manway closures equipped with approved safeguards making removal of closures from the manway opening practically impossible while car interior is subjected to vapor pressure of lading. These cars must be stenciled on each side of dome in line with the ladders, and in a color contrasting to the color of the dome with the identification mark as prescribed in AAR Specifications for Tank Cars, Appendix C.

§ 179.202-2 Dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, vinyl trichlorosilane, methyl dichlorosilane and trichlorosilane.

Tank cars used to transport dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, vinyl trichlorosilane, methyl dichlorosilane, and Trichlorosilane, must not be equipped with bottom discharge outlet.

§ 179.202-3 Amyl mercaptan, Butyl mercaptan, Ethyl mercaptan, Isopropyl mercaptan, Propyl mercaptan, and Aliphatic mercaptan mixtures.

Tank cars used to transport amyl mercaptan, butyl mercaptan, ethyl mercaptan, isopropyl mercaptan, propyl mercaptan, and aliphatic mercaptan

tures must have bottom outlets effectively sealed. Bottom washout fitted.

* * * * *
§ 179.202-5 Phosphorus, white or yellow.

Tank cars used to transport phosphorus, white or yellow, must be equipped with approved dome fittings, external heater systems and with insulation at least 4 inches in thickness, except that thickness of insulation may be reduced to 2 inches over external heater coils. Bottom washout nozzle of approved design may be applied. Bottom outlet for discharge of lading prohibited.

§ 179.202-6 Cumene hydroperoxide, diisopropylbenzene hydroperoxide and paramenthane hydroperoxide.

Tank cars used to transport cumene hydroperoxide of strength not exceeding 90 percent in a nonvolatile solvent. Paramenthane hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent and diisopropylbenzene hydroperoxide of strength not exceeding 60 percent in a nonvolatile solvent, must have bottom outlets effectively sealed from the inside.

§ 179.202-7 Titanium tetrachloride, anhydrous.

Tank cars used to transport titanium tetrachloride, anhydrous, must be equipped with safety relief valves. Safety vents not permitted.

§ 179.202-8 Chloroacetyl chloride.

Tank cars used to transport chloroacetyl chloride must have a nickel cladding of 1/16-inch minimum thickness. Nickel cladding in tanks must have a minimum nickel content of at least 99 percent pure nickel. Specification DOT-103ANW tank cars used to transport chloroacetyl chloride must be of solid nickel at least 99 percent pure and all cast metal parts of the tank in contact with the lading must have a minimum nickel content of 96.7 percent.

§ 179.202-9 Hydrochloric (muriatic) acid, hydrochloric (muriatic) acid mixtures, hydrochloric (muriatic) acid solution, inhibited; sodium chlorite solution (not exceeding 42 percent sodium chlorite), and cleaning compounds, liquid, containing hydrochloric (muriatic) acid.

(a) For acids not over 38 percent strength by weight, except hydrochloric (muriatic) acid of not over 22° Baume strength, tank cars may be equipped with safety vent of approved design having a frangible disc with 1/8-inch breather hole in the center, or a safety vent of approved design using carbon discs permitting continuous venting.

(b) Sodium chlorite solution. Specification DOT-103CW tank cars having tanks of Type 304L stainless steel authorized for sodium chlorite solution not exceeding 42 percent sodium chlorite only.

§ 179.202-10 Hydrogen peroxide solution in water exceeding 52 percent by weight.

Tank cars used to transport hydrogen peroxide solution in water exceeding 52 percent by weight, must be equipped with a venting arrangement approved by the Bureau of Explosives.

§ 179.202-11 Phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride.

Specification DOT-103ANW tank cars used to transport phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride must be solid nickel at least 99 percent pure and all cast metal parts of the tank in contact with the lading have a minimum nickel content of approximately 96.7 percent. Specification DOT-103A tank cars used to transport phosphorus trichloride must be lead-lined steel, or made of steel at least 10 percent nickel clad. Specifications DOT-103AW, 111A100F2, or 111A100W2 tank cars used to transport phosphorus trichloride must be lead-lined steel or made of steel with a minimum thickness of nickel cladding of one-sixteenth inch. Nickel cladding in tanks must have a minimum nickel content of at least 99 percent pure nickel. Specification DOT-103EW tank cars used to transport phosphorus trichloride and thiophosphoryl chloride must have tanks fabricated from Type 316 stainless steel. Unlined specification DOT-103A, 103AW, 111A100F2, or 111A100W2 tank cars authorized for phosphorus trichloride only.

§ 179.202-12 Sulfuric acid of concentrations 65.23 percent (approximately 1.559 specific gravity) (52° Baume) or greater.

(a) Specifications DOT-103A, 103AW, 111A100F2, or 111A100W2 tank cars used for this service may be equipped with safety vent of approved design having a frangible disc with 1/8-inch breather hole in the center.

(b) Specifications DOT-103A, 103AW, 111A100F2, or 111A100W2 tank cars used in oleum and other fuming acids must be equipped with safety vent of approved design. Breather hole in frangible disc prohibited. Safety valve prohibited.

§ 179.202-13 Sulfur trioxide, stabilized.

Tank cars used to transport sulfur trioxide stabilized must be equipped with safety relief valves of approved design. Tanks equipped with interior heating coils not permitted.

§ 179.202-14 Anhydrous hydrazine and hydrazine solutions containing 50 percent or less of water.

(a) Tank cars used to transport anhydrous hydrazine or hydrazine solutions containing 50 percent or less water, must have tanks fabricated of Type 304L stainless steel with molybdenum content not exceeding one-half of 1 percent. Specification DOT-111A100W6 tanks must not be equipped with bottom outlet.

(b) Safety relief valves for specification DOT-103CW tank cars may have a start-to-discharge pressure of 45 p.s.i. with a tolerance of plus or minus 3 p.s.i. and a vapor tight pressure of 36 p.s.i. Refer to AAR Specifications for Tank Cars Appendix A, A8.05.

(c) Specification 103A-ALW tank cars authorized for transporting anhydrous hydrazine only, may have tanks equipped with a safety relief valve having start-to-discharge pressure of not more than 45 p.s.i. with a tolerance of plus or minus 3 p.s.i. and a vapor tight pressure of 36 p.s.i. Refer to AAR Specifications for Tank Cars Appendix A, A8.05.

§ 179.202-15 Formic acid and formic acid solutions.

Tank cars used to transport formic acid and formic acid solutions must be stenciled "Formic Acid Only." Specification DOT-103EW tank cars must be fabricated from Type 316 stainless steel.

§ 179.202-16 Monochloroacetic acid, liquid.

Tank cars used to transport monochloroacetic acid, liquid, must have tanks nickel clad at least 20 percent.

§ 179.202-17 Benzyl chloride.

Specification DOT-103ANW tank cars used to transport benzyl chloride must have all cast metal parts in contact with the lading made from metal having a minimum nickel content of 96.7 percent.

§ 179.202-18 Ethylene oxide.

Specifications ARA-IVA and DOT-111A100W4 tank cars used to transport ethylene oxide may have openings in the heads to facilitate nickel lining provided openings are closed in an approved manner. No copper or copper bearing alloys must be used in any part of the tank or appurtenances if such part is normally in contact with ethylene oxide liquid or vapor. Tank jacket must be stenciled on both sides in letters not less than 1 1/2-inches high "Ethylene Oxide Only."

§ 179.202-19 Dimethylhydrazine, unsymmetrical.

Tank cars used to transport dimethylhydrazine, unsymmetrical, must be equipped with steel safety valves of approved design. Specification DOT-103W tank cars must not be equipped with bottom outlets.

§ 179.202-20 Hydrofluoric acid.

Breather hole in frangible disc prohibited.

§ 179.202-21 Nitric acid.

(a) Tank cars used to transport nitric acid must comply with the following requirements:

(1) Bottom washout or bottom outlet is prohibited unless effectively sealed with an approved arrangement to prevent use during loading and unloading of acid.

(2) Safety vent is prohibited.

§ 179.202-22 Mixed acid (nitric and sulfuric acid) (nitrating acid).

Specifications DOT-103A, 103AW, 111A100F1, or 111A100W2 tank cars used in nitrating and other fuming acids service must be equipped with safety vent of approved design. Breather hole in frangible disc prohibited. Safety value prohibited.

18. In § 179.300, the heading is amended; in § 179.300-6, the text in paragraph (a) preceding the formula and line "t" of the formula's explanation are amended; § 179.300-7 is amended; in § 179.300-8, paragraph (b) is amended; in § 179.300-9, paragraphs (a) and (b) are amended; § 179.300-10 is amended; in § 179.300-14, paragraph (a) is amended; in § 179.300-16, the first sentence of paragraph (a) is amended by substituting "postweld heat treatment" for "stress relieving" in the first line; in § 179.300-17, paragraph (b) is amended; in § 179.300-20, paragraph (b) is amended to read as follows:

§ 179.300 General specifications applicable to multiunit tank car tanks designed to be removed from car structure for filling and emptying (classes DOT-106A and 110A-W).

§ 179.300-6 Thickness of plates.

(a) For class DOT-110A tanks the wall thickness after forming of the cylindrical portion of the tank must not be less than that specified in § 179.301 nor that calculated by the following formula:

$$t = \frac{P \cdot R}{S \cdot E}$$

Minimum thickness of plate material in inches after forming.

§ 179.300-7 Materials.

(a) Carbon steel plate material used to fabricate tanks having heads fusion welded to tank shell must comply with the following specifications with the indicated minimum tensile strength and elongation in the welded condition. The maximum allowable carbon content must be 0.31 percent when the individual specification allows carbon content greater than this amount. The plates may be clad with other approved materials.

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 285-69 Gr. A	45,000	20
ASTM A 285-69 Gr. B	50,000	20
ASTM A 285-69 Gr. C	55,000	20
ASTM A 515-69 Gr. 65	65,000	20
ASTM A 515-69 Gr. 70	70,000	20

¹ Maximum stresses to be used in calculations.

(b) Carbon steel plate material used to fabricate tanks with forge welded heads must comply with the following specifications:

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) welded condition (longitudinal)
ASTM A 285-69 Gr. A	45,000	20

¹ Maximum stresses to be used in calculations.

(c) All plates must have their heat number and the name or brand of the manufacturer legibly stamped on them at the rolling mill.

§ 173.300-8 Tank heads.

(b) Class DOT-106A tanks must have forged-welded heads, formed convex to pressure. Heads for forge welding must be torispherical with an inside radius not greater than the inside diameter of the shell. They must be one piece, hot formed in one heat so as to provide a straight flange at least 4 inches long. They must have snug drive fit into the shell for forge welding. The wall thickness after forming must be sufficient to meet the test requirements of § 179.300-16 and to provide for adequate threading of openings.

§ 179.300-9 Welding.

(a) Longitudinal joints must be fusion welded. Head-to-shell joints must be forge welded on class DOT-106A tanks and fusion welded on class DOT-110A tanks. Welding procedures, welders and fabricators must be approved in accordance with AAR Specifications for Tank Cars, Appendix W.

(b) Fusion-welded joints must be in compliance with the requirements of AAR Specifications for Tank Cars, Appendix W, except that circumferential welds in tanks less than 36 inches inside diameter need not be radiotaped.

§ 179.300-10 Postweld heat treatment.

After welding is complete, steel tanks and all attachments welded thereto, must be postweld heat treated as a unit in com-

pliance with the requirements of AAR Specifications for Tank Cars, Appendix W.

§ 179.300-14 Attachments not otherwise specified.

Siphon pipes and their couplings on the inside of the tank head and lugs on the outside of the tank head for attaching the valve protective housing must be fusion-welded in place prior to postweld heat treatment. All other fixtures and appurtenances, except as specifically provided for, are prohibited.

§ 179.300-17 Tests of safety relief devices.

(b) Frangible discs of safety vents must be tested as prescribed in AAR Specifications for Tank Cars, Appendix A, A5.03.

§ 179.300-20 Reports.

(b) For builder's Certificate of Construction, see § 179.5 (b), (c), and (d). 19. In § 179.301 paragraph (a) the table is amended by adding "p.s.i." after the following entries:

Start-to-discharge, or burst maximum p.s.i. vapor-tight, minimum p.s.i.

20. Section 179.302 is amended to read as follows:

§ 179.302 Special commodity requirements for multiunit tank car tanks.

(a) In addition to §§ 179.300 and 179.301, the following requirements are applicable:

Commodity	Safety relief device	Valve protective housing	Miscellaneous
Chlorine trifluoride	Prohibited		
Chloroacetylene	Prohibited		
Hydrofluoric acid	Prohibited	Gas tight	
Hydrogen sulfide	Prohibited	Gas tight	
Methyl mercaptan	Prohibited		(1)
Nitrogen dioxide liquid	Prohibited	Gas tight	
Nitrogen peroxide liquid	Prohibited	Gas tight	
Nitrogen tetroxide liquid	Prohibited	Gas tight	
Nitrogen tetraoxide-nitric oxide mixtures	Prohibited	Gas tight	
Nitrosyl chloride	Prohibited	Gas tight	
Phosgene	Fusable plugs required		(1)
Titanium tetrachloride (anhydrous)	Prohibited	Gas tight	
Vinyl chloride	Prohibited		(2)
Vinyl methyl ether	Prohibited		(3)

¹ When safety relief devices are prohibited, containers may be equipped with solid steel plugs in the safety device openings.

² The detachable protective housing for the loading and unloading valves must withstand tank test pressure without leakage and must be approved by the Bureau of Explosives.

³ All parts of valves and safety relief devices in contact with the lading must be of a metal or other material, suitably treated if necessary, which will not cause formation of any acetylides.

⁴ Tanks for nitrosyl chloride must be nickel-clad.

⁵ Valve outlets must have gas tight plugs or caps applied.

This amendment is effective December 31, 1971, however, compliance with the regulations, as amended herein, is authorized immediately.

(Secs. 831-835, title 18, U.S.C.; sec. 9, Department of Transportation Act, 49 U.S.C. 1657)

Issued in Washington, D.C. on October 29, 1971.

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