

Specification are from code of Federal Regulation
(CRF) 49 Parts 100 to 185

Subpart E

**SPECIFICATIONS FOR MULTI-UNIT TANK CAR TANKS
(Classes DOT-106A and 110AW)**

§179.300 General specifications applicable to multi-unit tank car tanks designed to be removed from car structure for filling and emptying (Classes DOT-106A and 110AW).

§179.300-1 Tanks built under these specifications shall meet the requirements of §179.300, §179.301 and when applicable, §179.302.

§179.300-3 Type and general requirements. (a) Tanks built under this specification shall be cylindrical, circular in cross section, and shall have heads of approved design. All openings shall be located in the heads.

(b) Each tank shall have a water capacity of at least 1500 pounds and not more than 2600 pounds.

(c) For tanks made in foreign countries, a chemical analysis of materials and all tests as specified shall be carried out within the limits of the United States under the supervision of a competent and impartial inspector.

§179.300-4 Insulation. (a) Tanks shall not be insulated.

(b) [Reserved]

§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:

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

Where:

- d* = inside diameter in inches;
- E* = 1.0 welded joint efficiency;
- P* = minimum required bursting pressure in psig;
- S* = minimum tensile strength of plate material in p.s.i. as prescribed in §179.300-7;
- t* = minimum thickness of plate material in inches after forming.

(b) For class DOT-106A tanks, the wall thickness of the cylindrical portion of the tank shall not be less than that specified in §179.301 and shall be such that at the tank test pressure the maximum fiber stress in the wall of the tank will not exceed 15,750 p.s.i. as calculated by the following formula:

$$s = \frac{p(1.3D^2 + 0.4d^2)}{D^2 - d^2}$$

Where:

- d* = inside diameter in inches;
- D* = outside diameter in inches;
- p* = tank test pressure in psig;
- s* = wall stress in psi.

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

§179.300-7 Materials. (a) Steel plate material used to fabricate

tanks must conform with the following specifications with the indicated minimum tensile strength and elongation in the welded condition. However, the maximum allowable carbon content for carbon steel must not exceed 0.31 percent, although the individual ASTM specification may allow for a greater amount of carbon. 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) ¹ weld metal (longitudinal)
ASTM A 240/A 240M type 304	75,000	25
ASTM A 240/A 240M type 304L	70,000	25
ASTM A 240/A 240M type 316	75,000	25
ASTM A 240/A 240M type 316L	70,000	25
ASTM A 240/A 240M type 321	75,000	25
ASTM A 285 Gr. A	45,000	29
ASTM A 285 Gr. B	50,000	20
ASTM A 285 Gr. C	55,000	20
ASTM A 515/A 515M Gr. 65	65,000	20
ASTM A 515/A 515M Gr. 70	70,000	20
ASTM A 516/A 516M Gr. 70	70,000	20

¹Maximum stresses to be used in calculations

²These specifications are incorporated by reference (IBR, see §171.7 of this subchapter)

(b) [Reserved]

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

§179.300-8 Tank heads. (a) Class DOT-110A tanks shall have fusion-welded heads formed concave to pressure. Heads for fusion welding shall be an ellipsoid of revolution 2:1 ratio of major to minor axis. They shall be one piece, hot formed in one heat so as to provide a straight flange at least 1½ inches long. The thickness shall not be less than that calculated by the following formula:

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

where symbols are as defined in §179.300-6(a).

(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 (IBR, see §171.7 of this subchapter).

(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.

(c) Forge-welded joints shall be thoroughly hammered or rolled to insure sound welds. The flanges of the heads shall be forge lapwelded to the shell and then crimped inwardly toward the center line at least

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one inch on the radius. Welding and crimping must be accomplished in one heat.

§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 compliance with the requirements of AAR Specifications for Tank Cars, appendix W (IBR, see §171.7 of this subchapter).

§179.300-12 Protection of fittings. (a) Tanks shall be of such design as will afford maximum protection to any fittings or attachment to the head including the housing referred to in §179.300-12(b). Tank ends shall slope or curve inward toward the axis so that the diameter at each end is at least 2 inches less than the maximum diameter.

(b) Loading and unloading valves shall be protected by a detachable protective housing of approved design which shall not project beyond the end of the tank and shall be securely fastened to the tank head. Pressure relief devices shall not be covered by the housing.

§179.300-13 Venting, loading and unloading valves. (a) Valves shall be of approved type, made of metal not subject to rapid deterioration by lading, and shall withstand tank test pressure without leakage. The valves shall be screwed directly into or attached by other approved methods to one tank head. Provision shall be made for closing outlet connections of the valves.

(b) Threads for openings shall be National Gas Taper Threads (NGT) tapped to gage, clean cut, even and without checks.

§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 valves 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.

§179.300-15 Pressure relief devices. (a) Unless prohibited in part 173 of this subchapter, tanks shall be equipped with one or more relief devices of approved type, made of metal not subject to rapid deterioration by the lading and screwed directly into tank heads or attached to tank heads by other approved methods. The total discharge capacity shall be sufficient to prevent building up pressure in tank in excess of 82.5 percent of the tank test pressure. When relief devices of the fusible plug type are used, the required discharge capacity shall be available in each head. See AAR Specifications for Tank Cars, appendix A (IBR, see §171.7 of this subchapter), for the formula for calculating discharge capacity.

(b) Threads for openings shall be National Gas Taper Threads (NGT) tapped to gage, clean cut, even and without checks.

(c) Pressure relief devices shall be set for start-to-discharge and rupture discs shall burst at a pressure not exceeding that specified in §179.301.

(d) Fusible plugs shall function at a temperature not exceeding 175°F. and shall be vapor-tight at a temperature of not less than 130°F.

§179.300-16 Tests of tanks. (a) After postweld heat treatment, tanks shall be subjected to hydrostatic expansion test in a water jacket, or by other approved methods. No tank shall have been subjected previously to internal pressure within 100 pounds of the test pressure. Each tank shall be tested to the pressure prescribed in §179.301. Pressure shall be maintained for 30 seconds and sufficiently longer to insure complete expansion of tank. Pressure gage shall permit reading to accuracy of one percent. Expansion gage shall permit reading of total expansion to accuracy of one percent. Expansion shall be recorded in cubic centimeters.

(1) No leaks shall appear and permanent volumetric expansion shall not exceed 10 percent of total volumetric expansion at test pressure.

(2) [Reserved].

(b) After all fittings have been installed, each tank shall be subjected to interior air pressure test of at least 100 psig under conditions favorable to detection of any leakage. No leaks shall appear.

(c) Repairs of leaks detected in manufacture or in foregoing tests shall be made by the same process as employed in manufacture of tank. Caulking, soldering, or similar repairing is prohibited.

§179.300-17 Tests of pressure relief devices. (a) Each valve shall be tested by air or gas before being put into service. The valve shall open and be vapor-tight at the pressure prescribed in §179.301.

(b) Rupture disks of non-reclosing pressure relief devices must be tested and qualified as prescribed in appendix A, Paragraph 5, of

the AAR Manual of Standards and Recommended Practices, Section C—Part III, AAR Specifications for Tank Cars (IBR, see §171.7 of this subchapter).

(c) For pressure relief devices of the fusible plug type, a sample of the plug used shall function at the temperatures prescribed in §179.300-15.

(d) The start-to-discharge and vapor-tight pressures shall not be affected by any auxiliary closure or other combination.

§179.300-18 Stamping. (a) To certify that the tank complies with all specification requirements, each tank shall be plainly and permanently stamped in letters and figures $\frac{3}{8}$ inch high into the metal of valve end chime as follows:

(1) DOT Specification number.

(2) Material and cladding material if any (immediately below the specification number).

(3) Owner's or builder's identifying symbol and serial number (immediately below the material identification). The symbol shall be registered with the Bureau of Explosives, duplications are not authorized.

(4) Inspector's official mark (immediately below the owner's or builder's symbol).

(5) Date of original tank test (month and year, such as 1-64 for January 1964). This should be so placed that dates of subsequent tests may easily be added thereto.

(6) Water capacity—0000 pounds.

(b) A copy of the above stamping in letters and figures of the prescribed size stamped on a brass plate secured to one of the tank heads is authorized.

§179.300-19 Inspection. (a) Tank shall be inspected within the United States and Canada by a competent and impartial inspector acceptable to the Bureau of Explosives. For tanks made outside the United States and Canada, the specified inspection shall be made within the United States.

(b) The inspector shall carefully inspect all plates from which tanks are to be made and secure records certifying that plates comply with the specification. Plates which do not comply with §179.300-7 shall be rejected.

(c) The inspector shall make such inspection as may be necessary to see that all the requirements of this specification, including markings, are fully complied with; shall see that the finished tanks are properly stress relieved and tested.

(d) The inspector shall stamp his official mark on each accepted tank as required in §179.300-18, and render the report required in §179.300-20.

§179.300-20 Reports. (a) Before a tank is placed in service, the inspector shall furnish to the builder, tank owner, Bureau of Explosives and the Secretary, Mechanical Division, Association of American Railroads, a report in approved form certifying that the tank and its equipment comply with all the requirements of this specification.

(b) For builder's Certificate of Construction, see §179.5(b), (c), and (d).

§179.301 Individual specification requirements for multi-unit tank car tanks. (a) In addition to §179.300 the individual specification requirements are as follows:

DOT Specifications	106A500-X	106A800-X	110A500-W	110A600-W	110A800-W	110A1000-W
Minimum required bursting pressure, psig	(¹)	(¹)	1250	1500	2000	2500
Minimum thickness shell, inches	$\frac{13}{32}$	$\frac{11}{16}$	$\frac{11}{32}$	$\frac{3}{8}$	$\frac{15}{32}$	$\frac{19}{32}$
Test pressure, psig (see §179.300-16)	500	800	500	600	800	1000
Safety relief devices, psig (see §179.300-15)						
Start-to-discharge, or burst maximum, psig	375	600	375	450	600	700
Vapor-tight, minimum psig	300	480	300	360	480	650

¹None specified

(b) [Reserved]

§179.302 [Reserved]