

(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:

$$s = [p(1.3D^2 + 0.4d^2) / (D^2 - d^2)]$$

where:

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

(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.

[29 FR 18995, Dec. 29, 1964, as amended by Order 71, 31 FR 9083, July 1, 1966. Redesignated at 32 FR 5606, Apr. 5, 1967; 66 FR 45186, 45390, Aug. 28, 2001]

§ 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 ²	Tensile strength (psi) welded condition ¹ (minimum)	Elongation in 2 inches (percent) welded condition ¹ (longitudinal) (minimum)
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

¹ Maximum stresses to be used in calculations.
² These 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.

[Amdt. 179-10, 36 FR 21355, Nov. 6, 1971, as amended by Amdt. 179-42, 54 FR 38798, Sept. 20, 1989; Amdt. 179-43, 55 FR 27642, July 5, 1990; Amdt. 179-52, 61 FR 28682, June 5, 1996; Amdt. 179-52, 61 FR 50255, Sept. 25, 1996; Amdt. 179-53, 61 FR 51342, Oct. 1, 1996; 68 FR 75763, Dec. 31, 2003]

§ 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.

[29 FR 18995, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 179-10, 36 FR 21355, Nov. 6, 1971]

§ 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

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

[29 FR 18995, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and as amended by Amdt. 179-10, 36 FR 21355, Nov. 6, 1971; 68 FR 75763, Dec. 31, 2003]

§ 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).

[68 FR 75763, Dec. 31, 2003]

§ 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.

[29 FR 18995, Dec. 29, 1964, as amended at 68 FR 57634, Oct. 6, 2003]

§ 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. Pro-

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vision 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 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.

[Amdt. 179-10, 36 FR 21355, Nov. 6, 1971]

§ 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.

[29 FR 18995, Dec. 29, 1964, as amended at 64 FR 51920, Sept. 27, 1999; 66 FR 45390, Aug. 28, 2001; 68 FR 75763, Dec. 31, 2003]

§ 179.300-16 Tests of tanks.

(a) After postweld heat treatment, tanks shall be subjected to hydrostatic