

## § 179.401

pipings, and other appurtenances inside the tank, in letters and figures at least 1½ inches high.

(d) Both sides of the tank car, in letters at least 1½ inches high, with the statement “Do Not Hump or Cut Off While in Motion.”

(e) The outer jacket, below the tank classification stencil, in letters at least 1½ inches high, with the statement, “vacuum jacketed.”

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 66 FR 45391, Aug. 28, 2001; 68 FR 75763, Dec. 31, 2003]

### § 179.401 Individual specification requirements applicable to inner tanks for cryogenic liquid tank car tanks.

#### § 179.401-1 Individual specification requirements.

In addition to § 179.400, the individual specification requirements for the inner tank and its appurtenances are as follows:

DOT specification	113A60W	113C120W
Design service temperature, °F.	– 423 .....	– 260.
Material .....	§ 179.400-5 .....	§ 179.400-5.
Impact test (weld and plate material).	§ 179.400-5(c) ..	§ 179.400-5(c).
Impact test values .....	§ 179.400-5(d) ..	§ 179.400-5(d).
Standard heat transfer rate. (Btu per day per lb. of water capacity, max.) (see § 179.400-4).	0.097 .....	0.4121.
Bursting pressure, min. psig.	240 .....	300.
Minimum plate thickness shell, inches (see § 179.400-7(a)).	¾ .....	¾.
Minimum head thickness, inches (see § 179.400-8 (a), (b), and (c)).	¾ .....	¾.
Test pressure, psig (see § 179.400-16).	60 .....	120.
Safety vent bursting pressure, max. psig.	60 .....	120.
Pressure relief valve start-to-discharge pressure, psig (±3 psi).	30 .....	75.
Pressure relief valve vapor tight pressure, min. psig.	24 .....	60.
Pressure relief valve flow rating pressure, max. psig.	40 .....	85.
Alternate pressure relief valve start to-discharge pressure, psig (±3 psi).	.....	90.

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DOT specification	113A60W	113C120W
Alternate pressure relief valve vapor tight pressure, min. psig.	.....	72.
Alternate pressure relief valve flow rating pressure, max. psig.	.....	100.
Pressure control valve Start-to-vent, max. psig (see § 179.400-20(c)(4)).	17 .....	Not required.
Relief device discharge restrictions.	§ 179.400-20 .....	179.400-20.
Transfer line insulation	§ 179.400-17 .....	Not required.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 49 FR 24318, June 12, 1984; 65 FR 58632, Sept. 29, 2000; 66 FR 45390, Aug. 28, 2001]

### § 179.500 Specification DOT-107A \* \* \* \* \* seamless steel tank car tanks.

#### § 179.500-1 Tanks built under these specifications shall meet the requirements of § 179.500.

#### § 179.500-3 Type and general requirements.

(a) Tanks built under this specification shall be hollow forged or drawn in one piece. Forged tanks shall be machined inside and outside before ends are necked-down and, after necking-down, the ends shall be machined to size on the ends and outside diameter. Machining not necessary on inside or outside of seamless steel tubing, but required on ends after necking-down.

(b) For tanks made in foreign countries, chemical analysis of material and all tests as specified must be carried out within the limits of the United States under supervision of a competent and disinterested inspector; in addition to which, provisions in § 179.500-18 (b) and (c) shall be carried out at the point of manufacture by a recognized inspection bureau with principal office in the United States.

(c) The term “marked end” and “marked test pressure” used throughout this specification are defined as follows:

(1) “Marked end” is that end of the tank on which marks prescribed in § 179.500-17 are stamped.

(2) “Marked test pressure” is that pressure in psig which is indicated by the figures substituted for the \*\*\*\* in the marking DOT-107A \*\*\*\* stamped on the marked end of tank.

(d) The gas pressure at 130 °F in the tank shall not exceed  $\frac{7}{10}$  of the marked test pressure of the tank.

[Amdt. 179-32, 48 FR 27708, June 16, 1983, as amended at 66 FR 45186, 45391, Aug. 28, 2001]

#### § 179.500-4 Thickness of wall.

(a) Minimum thickness of wall of each finished tank shall be such that at a pressure equal to  $\frac{7}{10}$  of the marked test pressure of the tank, the calculated fiber stress in psi at inner wall of tank multiplied by 3.0 will not exceed the tensile strength of any specimen taken from the tank and tested as prescribed in § 179.500-7(b). Minimum wall thickness shall be  $\frac{1}{4}$  inch.

(b) Calculations to determine the maximum marked test pressure permitted to be marked on the tank shall be made by the formula:

$$P = [10S(D^2 - d^2)] / [7(D^2 + d^2)]$$

Where:

$P$  = Maximum marked test pressure permitted;

$$S = U / 3.0$$

Where:

$U$  = Tensile strength of that specimen which shows the lower tensile strength of the two specimens taken from the tank and tested as prescribed in § 179.500-7(b).

3 = Factor of safety.

$(D^2 - d^2)/(D^2 + d^2)$  = The smaller value obtained for this factor by the operations specified in § 179.500-4(c).

(c) Measure at one end, in a plane perpendicular to the longitudinal axis of the tank and at least 18 inches from that end before necking-down:

$d$  = Maximum inside diameter (inches) for the location under consideration; to be determined by direct measurement to an accuracy of 0.05 inch.

$t$  = Minimum thickness of wall for the location under consideration; to be determined by direct measurement to an accuracy of 0.001 inch.

Take  $D = d + 2t$ .

Calculate the value of  $(D^2 - d^2)/(D^2 + d^2)$

(1) Make similar measurements and calculation for a corresponding location at the other end of the tank.

(2) Use the smaller result obtained, from the foregoing, in making calculations

prescribed in paragraph (b) of this section.

[29 FR 18995, Dec. 29, 1964. Redesignated at 32 FR 5606, Apr. 5, 1967, and amended by Amdt. 179-31, 47 FR 43067, Sept. 30, 1982; 66 FR 45391, Aug. 28, 2001]

#### § 179.500-5 Material.

(a) Tanks shall be made from open-hearth or electric steel of uniform quality. Material shall be free from seams, cracks, laminations, or other defects injurious to finished tank. If not free from such defects, the surface may be machined or ground to eliminate these defects. Forgings and seamless tubing for bodies of tanks shall be stamped with heat numbers.

(b) Steel (see Note 1) must conform to the following requirements as to chemical composition:

Designation	Class I (percent)	Class II (percent)	Class III (percent)
Carbon, maximum .....	0.50	0.50	0.53
Manganese, maximum ..	1.65	1.65	1.85
Phosphorus, maximum ..	.05	.05	.05
Sulphur, maximum .....	.06	.05	.05
Silicon, maximum .....	.35	.30	.37
Molybdenum, maximum .....	.....	.25	.30
Chromium, maximum ....	.....	.30	.30
Sum of manganese and carbon not over .....	2.10	2.10	.....

NOTE 1: Alternate steel containing other alloying elements may be used if approved.

(1) For instructions as to the obtaining and checking of chemical analysis, see § 179.500-18(b)(3).

(2) [Reserved]

#### § 179.500-6 Heat treatment.

(a) Each necked-down tank shall be uniformly heat treated. Heat treatment shall consist of annealing or normalizing and tempering for Class I, Class II and Class III steel or oil quenching and tempering for Class III steel. Tempering temperatures shall not be less than 1000 °F. Heat treatment of alternate steels shall be approved. All scale shall be removed from outside of tank to an extent sufficient to allow proper inspection.

(b) To check uniformity of heat treatment, Brinell hardness tests shall be made at 18 inch intervals on the entire longitudinal axis. The hardness shall not vary more than 35 points in the length of the tank. No hardness tests need be taken within 12 inches from point of head to shell tangency.