

**§ 178.346-2**

**49 CFR Ch. I (10-1-02 Edition)**

fit-up and test results must be retained at the manufacturers' facility.

(iv) *Weld joint efficiency.* The lower value of stress at failure attained in the two tensile test specimens shall be used to compute the efficiency of the joint as follows: Determine the failure ratio by dividing the stress at failure by the mechanical properties of the adjacent metal; this value, when multiplied by 0.75, is the design weld joint efficiency.

(10) The requirements of paragraph UW-9(d), of Section VIII, Division 1, ASME Code do not apply.

[Amdt. 178-89, 54 FR 25028, June 12, 1989, as amended at 55 FR 37063, Sept. 7, 1990; Amdt. 178-89, 56 FR 27877, June 17, 1991; Amdt. 178-105, 59 FR 55176, Nov. 3, 1994; 65 FR 58631, Sept. 29, 2000; 66 FR 45387, Aug. 28, 2001]

**§ 178.346-2 Material and thickness of material.**

The type and thickness of material for DOT 406 cargo tank motor vehicles must conform to §178.345-2 of this part, but may in no case be less than that indicated in tables I and II below.

**TABLE I—MINIMUM THICKNESS OF HEADS (OR BULKHEADS AND BAFFLES WHEN USED AS TANK REINFORCEMENT) USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) OR ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH AFTER FORMING**

Material	Volume capacity in gallons per inch of length								
	14 or less			Over 14 to 23			Over 23		
	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
Thickness .....	.100	.100	.160	.115	.115	.173	.129	.129	.187

**TABLE II—MINIMUM THICKNESS OF SHELL USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) OR ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH AFTER FORMING <sup>1</sup>**

Cargo tank motor vehicle rated capacity (gallons)	MS	SS/HSLA	AL
More than 0 to at least 4,500	0.100	0.100	0.151
More than 4,500 to at least 8,000 .....	0.115	0.100	0.160
More than 8,000 to at least 14,000 .....	0.129	0.129	0.173
More than 14,000 .....	0.143	0.143	0.187

<sup>1</sup> Maximum distance between bulkheads, baffles, or ring stiffeners shall not exceed 60 inches.

[Amdt. 178-89, 54 FR 25028, June 12, 1989, as amended at 55 FR 37064, Sept. 7, 1990; Amdt. 178-105, 59 FR 55176, Nov. 3, 1994]

**§ 178.346-3 Pressure relief.**

(a) Each cargo tank must be equipped with a pressure relief system in accordance with §178.345-10 and this section.

(b) *Type and construction.* In addition to the pressure relief devices required in §178.345-10:

(1) Each cargo tank must be equipped with one or more vacuum relief devices;

(2) When intended for use only for lading meeting the requirements of

§178.33(c)(1)(iii) of this subchapter, the cargo tank may be equipped with a normal vent. Such vents must be set to open at not less than 1 psig and must be designed to prevent loss of lading through the device in case of vehicle upset; and

(3) Notwithstanding the requirements in §178.345-10(b), after August 31, 1996, each pressure relief valve must be able to withstand a dynamic pressure surge reaching 30 psig above the design set pressure and sustained above the set pressure for at least 60 milliseconds with a total volume of liquid released not exceeding 1 L before the relief valve recloses to a leak-tight condition. This requirement must be met regardless of vehicle orientation. This capability must be demonstrated by testing. TTMA RP No. 81, cited at §178.345-10(b)(3)(i), is an acceptable test procedure.

(c) *Pressure settings of relief valves.* (1) Notwithstanding the requirements in §178.345-10(d), the set pressure of each primary relief valve must be not less than 110 percent of the MAWP or 3.3 psig, whichever is greater, and not more than 138 percent of the MAWP. The valve must close at not less than

the MAWP and remain closed at lower pressures.

(2) Each vacuum relief device must be set to open at no more than 6 ounces vacuum.

(d) *Venting capacities.* (1) Notwithstanding the requirements in §178.345-10 (e) and (g), the primary pressure relief valve must have a venting capacity of at least 6,000 SCFH, rated at not greater than 125 percent of the tank test pressure and not greater than 3 psig above the MAWP. The venting capacity required in §178.345-10(e) may be rated at these same pressures.

(2) Each vacuum relief system must have sufficient capacity to limit the vacuum to 1 psig.

(3) If pressure loading or unloading devices are provided, the relief system must have adequate vapor and liquid capacity to limit the tank pressure to the cargo tank test pressure at maximum loading or unloading rate. The maximum loading and unloading rates must be included on the metal specification plate.

[Amdt. 178-89, 54 FR 25029, June 12, 1989, as amended at 55 FR 37064, Sept. 7, 1990; Amdt. 178-105, 59 FR 55176, Nov. 3, 1994. Redesignated by Amdt. 178-112, 61 FR 18934, Apr. 29, 1996; 66 FR 45389, Aug. 28, 2001]

#### § 178.346-4 Outlets.

(a) All outlets on each tank must conform to §178.345-11 and this section.

(b) External self-closing stop-valves are not authorized as an alternative to internal self-closing stop-valves on loading/unloading outlets.

[Amdt. 178-89, 54 FR 25029, June 12, 1989. Redesignated by Amdt. 178-112, 61 FR 18934, Apr. 29, 1996]

#### § 178.346-5 Pressure and leakage tests.

(a) Each cargo tank must be tested in accordance with §178.345-13 and this section.

(b) *Pressure test.* Test pressure must be as follows:

(1) Using the hydrostatic test method, the test pressure must be the greater of 5.0 psig or 1.5 times the cargo tank MAWP.

(2) Using the pneumatic test method, the test pressure must be the greater of 5.0 psig or 1.5 times the cargo tank MAWP, and the inspection pressure must be the cargo tank MAWP.

(c) *Leakage test.* Cargo tanks equipped with vapor collection equipment may be leakage tested in accordance with the Environmental Protection Agency's "Method 27—Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure-Vacuum Test," as set forth in 40 CFR part 60, appendix A. Acceptance criteria are found at 40 CFR 60.501 and 60.601.

[Amdt. 178-89, 54 FR 25029, June 12, 1989, as amended at 55 FR 37064, Sept. 7, 1990; Amdt. 178-105, 59 FR 55176, Nov. 3, 1994. Redesignated by Amdt. 178-112, 61 FR 18934, Apr. 29, 1996]

#### § 178.347 Specification DOT 407; cargo tank motor vehicle.

##### § 178.347-1 General requirements.

(a) Each specification DOT 407 cargo tank motor vehicle must conform to the general design and construction requirements in §178.345 in addition to the specific requirements contained in this section.

(b) Each tank must be of a circular cross-section and have an MAWP of at least 25 psig.

(c) Any cargo tank built to this specification with a MAWP greater than 35 psig and each tank designed to be loaded by vacuum must be "constructed and certified in accordance with the ASME Code". The external design pressure for a cargo tank loaded by vacuum must be at least 15 psig.

(d) Each cargo tank built to this specification with MAWP of 35 psig or less must be "constructed in accordance with the ASME Code" except as modified herein:

(1) The record-keeping requirements contained in the ASME Code, Section VIII, Division I, do not apply. The inspection requirements of parts UG-90 thru 94 do not apply. Inspection and certification must be made by an inspector registered in accordance with subpart F of part 107.

(2) Loadings must be as prescribed in §178.345-3.

(3) The knuckle radius of flanged heads must be at least three times the material thickness, and in no case less than 0.5 inch. Stuffed (inserted) heads may be attached to the shell by a fillet weld. The knuckle radius and dish radius versus diameter limitations of