

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.

[Amdt. 179-10, 36 FR 21349, Nov. 6, 1971, as amended at 66 FR 45390, Aug. 28, 2001]

§ 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) weld metal (longitudinal)
AAR TC 128, Gr. B	81,000	19
ASTM A 516, Gr. 70	70,000	20

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.) welded condition ^{3,4}	Minimum elongation in 2 inches (percent) 0 temper weld metal (longitudinal)
ASTM B 209, Alloy 5052 ¹	25,000	18
ASTM B 209, Alloy 5083 ²	38,000	16
ASTM B 209, Alloy 5086 ¹	35,000	14
ASTM B 209, Alloy 5154 ¹	30,000	18
ASTM B 209, Alloy 5254 ¹	30,000	18
ASTM B 209, Alloy 5454 ¹	31,000	18
ASTM B 209, Alloy 5652 ¹	25,000	18

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 Maximum stresses to be used in calculations.

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

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM A 240/A 240M (incorporated by reference; see § 171.7 of this subchapter), Type 304	75,000	30
ASTM A 240/A 240M (incorporated by reference; see § 171.7 of this subchapter), Type 304L	70,000	30
ASTM A 240/A 240M (incorporated by reference; see § 171.7 of this subchapter), Type 316	75,000	30
ASTM A 240/A 240M (incorporated by reference; see § 171.7 of this subchapter), Type 316L	70,000	30

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 Practice A of ASTM Specification A 262 titled, 'Standard Practices for Detecting Susceptibility to Intergranular Attack in Austenitic Stainless Steels.' If the specimen does not pass Practice A, Practice B or C must be used and the corrosion rates may not exceed the following:

Test procedure	Material	Corrosion rate i.p.m.
Practice B	Types 304, 304L, 316, and 316L.	0.0040
Practice C	Type 304L0020

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.)

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

Specifications	Minimum tensile strength (p.s.i.) welded condition ¹	Minimum elongation in 2 inches (percent) weld metal (longitudinal)
ASTM B 1622 ²	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) weld metal (longitudinal)
ASTM A 302, 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 an approved specification. See AAR Specifications for Tank Cars, appendix M, M4.05 (See §171.7 of this subchapter) for approved material specifications for castings for fittings.

[Amdt. 179-10, 36 FR 21349, Nov. 9, 1971; 36 FR 21893, Nov. 17, 1971, as amended by Amdt.179-28, 46 FR 49906, Oct. 8, 1981; Amdt. 179-40, 52 FR 13046, Apr. 20, 1987; Amdt. 179-52, 61 FR 28680, June 5, 1996; 66 FR 45186, Aug. 28, 2001; 67 FR 51660, Aug. 8, 2002]

§ 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.

[Amdt. 179-10, 36 FR 21350, Nov. 6, 1971]

§ 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 1½-inches solid pipe plugs having NPT threads.

(b) When the tank is divided into compartments by constructing each compartment as a separate tank, these tanks shall be joined together by a cylinder made of plate, having a thickness not less than that required for the tank shell and applied to the outside surface of tank head flanges. The cylinder shall fit the straight flange portion of the compartment tank head tightly. The cylinder shall contact the head flange for a distance of at least two times the plate thickness, or a minimum of 1 inch, whichever is greater. The cylinder shall be joined to the head flange by a full fillet weld. Distance from head seam to cylinder shall not be less than 1½ inches or three times the plate thickness, whichever is greater. Voids created by the space between heads of tanks joined together to form a compartment tank shall be provided with a tapped drain hole at their lowest point and a tapped hole at top of tank. The top hole shall be closed and the bottom hole may be closed with solid pipe