(2) Performed on longitudinal specimens of the material;

(3) Conducted at the tank design service temperature or colder; and

(4) Performed on test plate welds and materials used for inner tanks and appurtenances and which will be subjected to cryogenic temperatures.

(d) Impact test values must be equal to or greater than those specified in AAR Specifications for Tank Cars, appendix W. The report of impact tests must include the test values and lateral expansion data.

§ 179.400–6 Bursting and buckling pressure.

(a) [Reserved]

(b) The outer jacket of the required evacuated insulation system must be designed in accordance with § 179.400–8(d) and in addition must comply with the design loads specified in Section 6.2 of the AAR Specifications for Tank Cars. The designs and calculations must provide for the loadings transferred to the outer jacket through the support system.

[Amdt. 179–32, 48 FR 27708, June 16, 1983, as amended by Amdt. 179–51, 61 FR 18934, Apr. 29, 1996; 65 FR 58632, Sept. 29, 2000]

§ 179.400–7 Tank heads.

(a) Tank heads of the inner tank and outer jacket must be flanged and dished, or ellipsoidal.

(b) Flanged and dished heads must have—

(1) A main inside dish radius not greater than the outside diameter of the straight flange;

(2) An inside knuckle radius of not less than 6 percent of the outside diameter of the straight flange; and

(3) An inside knuckle radius of at least three times the head thickness.

§ 179.400–8 Thickness of plates.

(a) The minimum wall thickness, after forming, of the inner shell and any 2:1 ellipsoidal head for the inner tank must be that specified in § 179.401–1, or that calculated by the following formula, whichever is greater:

$$t = Pd / 2SE$$

Where:

t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure in psig;
d = inside diameter, in inches;
S = minimum tensile strength of the plate material, as prescribed in AAR Specifications for Tank Cars, appendix M, table M1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, E = 1.0.

(b) The minimum wall thickness, after forming, of any 3:1 ellipsoidal head for the inner tank must be that specified in § 179.401–1, or that calculated by the following formula, whichever is greater:

$$t = 1.83 Pd / 2SE$$

Where:

t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure in psig;
d = inside diameter, in inches;
S = minimum tensile strength of the plate material, as prescribed in AAR Specifications for Tank Cars, Appendix M, Table M1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, E=1.0.

(c) The minimum wall thickness, after forming, of a flanged and dished head for the inner tank must be that specified in § 179.401–1, or that calculated by the following formula, whichever is greater:

$$t = [PL(3 + \sqrt{(L/r)})] / (8SE)$$

Where:

t = minimum thickness of plate, after forming, in inches;
P = minimum required bursting pressure in psig;
L = main inside radius of dished head, in inches;
r = inside knuckle radius, in inches;
S = minimum tensile strength of plate material, as prescribed in AAR Specifications for Tank Cars, appendix M, table M1, in psi;
E = 0.9, a factor representing the efficiency of welded joints, except that for seamless heads, E = 1.0.

(d) The minimum wall thickness, after forming, of the outer jacket shell may not be less than 7/16 inch. The minimum wall thickness, after forming, of the outer jacket heads may not be less than ½ inch and they must be made from steel specified in § 179.16(c). The annular space is to be evacuated, and