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where:

h=the height of the tank or the dimension in the vessel's vertical direction, in meters;
b=the width of the tank or the dimension in the vessel's transverse direction; in meters; and
l=the length of the tank or the dimension in the vessel's longitudinal direction, in meters; and
ρ=the specific gravity of the cargo.

§ 154.452 External pressure.

The design external pressure, P_e, for an independent tank type C must be calculated by the following formula:

$$P_e = P_1 + P_2 + P_3 + P_4$$

where:

P_1=the vacuum relief valve setting for tanks with a vacuum relief valve, or 24.5 kPa gauge (3.55 psig) for tanks without a vacuum relief valve.
P_2=0, or the pressure relief valve setting for an enclosed space containing any portion of a pressure vessel.
P_3=total compressive load in the tank shell from the weight of the tank, including corrosion allowance, weight of insulation, weight of dome, weight of pipe tower and piping, the effect of the partially filled tank, the effect of acceleration and hull deflection, and the local effect of external and internal pressure.
P_4=0, or the external pressure from the head of water from any portion of the pressure vessel on exposed decks.

§ 154.453 Failure to meet independent tank type C standards.

If the Commandant (G–MSO) determines during plan review, that a tank designed as an independent tank type C fails to meet the standards under § 154.450, § 154.451, and 154.452 and can not be redesigned to meet those standards, the tank may be redesigned as an independent tank type A or B.

[CGD 74–289, 44 FR 26009, May 3, 1979, as amended by CGD 82–063b, 48 FR 4782, Feb. 3, 1983]

SECONDARY BARRIER

§ 154.459 General.

(a) Each cargo tank must have a secondary barrier that meets Table 3 and except as allowed in Table 3, the hull must not be the secondary barrier.

(b) If the Commandant (G–MSO) specially approves an integral tank for a design temperature at atmospheric pressure lower than −10° C (14°F), the integral tank must have a complete secondary barrier that meets § 154.460.

(c) If the Commandant (G–MSO) specially approves a semi-membrane tank under the requirements of an independent tank type B, the semi-membrane tank may have a partial secondary barrier specially approved by the Commandant (G–MSO).

(d) If Table 3 allows the hull to be a secondary barrier, the vessel's hull must:

(1) Meet §§ 154.605 through 154.630; and

(2) Be designed for the stresses resulting from the design temperature.

TABLE 3—SECONDARY BARRIERS FOR TANKS

Tank type	Cargo temperature (T) at atmospheric pressure		
	T≥ −10°C (14°F)	T<–10°C (14°F)≥55°C (−67°F)	T< −55°C (−67°F)
Integral	No secondary barrier required	Tank type not usually allowed[1]	Tank type not allowed.
Membrane	...do	Complete secondary barrier[1]	Complete secondary barrier.
Semi-membrane	...do	...do	Do.
Independent:			
Type A	...do	...do	Do.
Type B	...do	Partial secondary barrier[1]	Partial secondary barrier.
Type C	...do	No secondary barrier required	No secondary barrier required.

[1] The hull may be a secondary barrier.

(14 U.S.C. 632; 46 U.S.C. 369, 375, and 416; 49 U.S.C. 1655(b); 49 CFR 1.46(b))
[CGD 74–289, 44 FR 26009, May 3, 1979, as amended by CGD 82–063b, 48 FR 4782, Feb. 3, 1983]