

0.20 multiplied by the distance in feet between the centers of end panels.

(3) The center of an end panel is the point midway between the center of the body corner post and the center of the adjacent side post.

(4) The minimum section moduli or thicknesses specified in paragraph (a) of this section may be adjusted in proportion to the ratio of the yield strength of the material used to that of mild open-hearth steel for a car whose structural members are made of a higher strength steel.

(b) *Sheathing.*

(1) Outside sheathing of mild, open-hearth steel when used flat, without reinforcement (other than side posts) in a side frame of modified girder or semi-monocoque construction shall not be less than 1/8 inch nominal thickness. Other metals may be used of a thickness in inverse proportion to their yield strengths.

(2) Outside metal sheathing of less than 1/8 inch thickness may be used only if it is reinforced so as to produce at least an equivalent sectional area at a right angle to reinforcements as that of the flat sheathing specified in paragraph (b)(1) of this section.

(3) When the sheathing used for truss construction serves no load-carrying function, the minimum thickness of that sheathing shall be not less than 40 percent of that specified in paragraph (b)(1) of this section.

**§ 238.219 Truck-to-car-body attachment.**

Passenger equipment shall have a truck-to-car-body attachment with an ultimate strength sufficient to resist without failure a force of 2g vertical on the mass of the truck and a force of 250,000 pounds in any horizontal direction on the truck. For purposes of this section, the mass of the truck includes axles, wheels, bearings, the truck-mounted brake system, suspension system components, and any other components attached to the truck by design.

**§ 238.221 Glazing.**

(a) Passenger equipment shall comply with the applicable Safety Glazing Standards contained in part 223 of this chapter, if required by that part.

(b) Each exterior window on a locomotive cab and a passenger car shall remain in place when subjected to:

(1) The forces described in part 223 of this chapter; and

(2) The forces due to air pressure differences caused when two trains pass at the minimum separation for two adjacent tracks, while traveling in opposite directions, each train traveling at the maximum authorized speed.

**§ 238.223 Locomotive fuel tanks.**

(a) *External fuel tanks.* External locomotive fuel tanks shall comply with the requirements contained in Appendix D to this part, or an industry standard providing at least an equivalent level of safety if approved by FRA under § 238.21.

(b) *Internal fuel tanks.*

(1) Internal locomotive fuel tanks shall be positioned in a manner to reduce the likelihood of accidental penetration from roadway debris or collision.

(2) Internal fuel tank vent systems shall be designed so they do not become a path of fuel loss in any tank orientation due to a locomotive overturning.

(3) Internal fuel tank bulkheads and skin shall at a minimum be equivalent to a 3/8-inch thick steel plate with a 25,000 pounds-per-square-inch yield strength. Material of a higher yield strength may be used to decrease the required thickness of the material provided at least an equivalent level of strength is maintained. Skid plates are not required.

**§ 238.225 Electrical system.**

All passenger equipment shall comply with the following:

(a) *Conductors.* Conductor sizes shall be selected on the basis of current-carrying capacity, mechanical strength, temperature, flexibility requirements, and maximum allowable voltage drop. Current-carrying capacity shall be derated for grouping and for operating temperature.

(b) *Main battery system.*

(1) The main battery compartment shall be isolated from the cab and passenger seating areas by a non-combustible barrier.