§ 238.215 Rollover strength.

(a) Each passenger car shall be designed to rest on its side and be uniformly supported at the top (‘’roof rail’’), the bottom cords (‘’side sill’’) of the side frame, and, if bi-level, the intermediate floor rail. The allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Local yielding to the outer skin of the passenger car is allowed provided that the resulting deformations in no way intrude upon the occupied volume of the car.

(b) Each passenger car shall also be designed to rest on its roof so that any damage in occupied areas is limited to roof sheathing and framing. Other than roof sheathing and framing, the allowable stress in the structural members of the occupied volumes for this condition shall be one-half yield or one-half the critical buckling stress, whichever is less. Deformation to the roof sheathing and framing is allowed to the extent necessary to permit the vehicle to be supported directly on the top chords of the side frames and end frames.

§ 238.217 Side structure.

Each passenger car shall comply with the following:

(a) Side posts and corner braces. (1) For modified girder, semi-monocoque, or truss construction, the sum of the section moduli in inches$^3$—about a longitudinal axis, taken at the weakest horizontal section between the side sill and side plate—of all posts and braces on each side of the car located between the body corner posts shall be not less than 0.30 multiplied by the distance in feet between the centers of end panels.

(2) For modified girder or semi-monocoque construction only, the sum of the section moduli in inches$^3$—about a transverse axis, taken at the weakest horizontal section between the side sill and
§ 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.

Locomotive fuel tanks shall comply with either the following or an industry standard providing at least an equivalent level of safety if approved by FRA under §238.21:

(a) External fuel tanks. External locomotive fuel tanks shall comply with the requirements contained in Appendix D to this part.

(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 5/16-inch thick steel plate with a yield strength of 25,000 pounds per square inch. 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.