

designed to burst at a pressure equal to the greater of 100% of the tank test pressure, or 33% of the tank burst pressure.

(2) The approach channel and the discharge channel may not reduce the required minimum flow capacity of the pressure relief device.

(3) The non-reclosing pressure relief device must be designed to prevent interchange with other fittings installed on the tank car, must have a structure that encloses and clamps the rupture disc in position (preventing any distortion or damage to the rupture disc when properly applied), and must have a cover, with suitable means of preventing misplacement, designed to direct any discharge of the lading downward.

(4) The non-reclosing pressure relief device must be closed with a rupture disc that is compatible with the lading and manufactured in accordance with Appendix A of the AAR Specifications for Tank Cars. The tolerance for a rupture disc is +0 to –15 percent of the burst pressure marked on the disc.

(g) *Location of relief devices.* Each pressure relief device must communicate with the vapor space above the lading as near as practicable on the longitudinal center line and center of the tank.

(h) *Marking of pressure relief devices.* Each pressure relief device and rupture disc must be permanently marked in accordance with the Appendix A of the Association of American Railroads Specifications for Tank Cars.

[Amdt. 179–52, 61 FR 28678, June 5, 1996, as amended by Amdt. 179–52, 61 FR 50255, Sept. 25, 1996; 62 FR 51561, Oct. 1, 1997; 64 FR 51919, Sept. 27, 1999; 66 FR 45390, Aug. 28, 2001]

§ 179.16 Tank-head puncture-resistance systems.

(a) *Performance standard.* When the regulations in this subchapter require a tank-head puncture-resistance system, the system shall be capable of sustaining, without any loss of lading, coupler-to-tank-head impacts at relative car speeds of 29 km/hour (18 mph) when:

(1) The weight of the impact car is at least 119,295 kg (263,000 pounds);

(2) The impacted tank car is coupled to one or more backup cars that have a

total weight of at least 217,724 kg (480,000 pounds) and the hand brake is applied on the last “backup” car; and

(3) The impacted tank car is pressurized to at least 6.9 Bar (100 psig).

(b) *Verification by testing.* Compliance with the requirements of paragraph (a) of this section shall be verified by full-scale testing according to appendix A of this part.

(c) *Alternative compliance by other than testing.* As an alternative to requirements prescribed in paragraph (b) of this section, compliance with the requirements of paragraph (a) of this section may be met by installing full-head protection (shields) or full tank-head jackets on each end of the tank car conforming to the following:

(1) The full-head protection (shields) or full tank-head jackets must be at least 1.27 cm (0.5 inch) thick, shaped to the contour of the tank head and made from steel having a tensile strength greater than 379.21 N/mm² (55,000 psi).

(2) The design and test requirements of the full-head protection (shields) or full tank-head jackets must meet the impact test requirements of Section 5.3 of the AAR Specifications for Tank Cars.

(3) The workmanship must meet the requirements of Section C, Part II, Chapter 5 of the AAR Specifications for Design, Fabrication, and Construction of Freight Cars.

[Amdt. 179–50, 60 FR 49077, Sept. 21, 1995, as amended by Amdt. 179–50, 61 FR 33255, June 26, 1996; 66 FR 45390, Aug. 28, 2001]

§ 179.18 Thermal protection systems.

(a) *Performance standard.* When the regulations in this subchapter require thermal protection on a tank car, the tank car must have sufficient thermal resistance so that there will be no release of any lading within the tank car, except release through the pressure release device, when subjected to:

(1) A pool fire for 100 minutes; and

(2) A torch fire for 30 minutes.

(b) *Thermal analysis.* (1) Compliance with the requirements of paragraph (a) of this section shall be verified by analyzing the fire effects on the entire surface of the tank car. The analysis must consider the fire effects on and heat flux through tank discontinuities, protective housings, underframes, metal