

tank burst pressure greater than 34.47 Bar (500 psig) and from 110 percent to 130 percent for tanks having a minimum tank burst pressure less than or equal to 34.47 Bar (500 psig).

(5) The tolerance for a reclosing pressure relief valve is  $\pm 3$  psi for valves with a start-to-discharge pressure of 6.89 Bar (100 psig) or less and  $\pm 3$  percent for valves with a start-to-discharge pressure greater than 6.89 Bar (100 psig).

(c) *Flow capacity of pressure relief devices.* The total flow capacity of each reclosing and nonreclosing pressure relief device must conform to appendix A of the AAR Specifications for Tank Cars.

(d) *Flow capacity tests.* The manufacturer of any reclosing or nonreclosing pressure relief device must design and test the device in accordance with appendix A of the AAR Specifications for Tank Cars.

(e) *Combination pressure relief systems.* A non-reclosing pressure relief device may be used in series with a reclosing pressure relief valve. The pressure relief valve must be located outboard of the non-reclosing pressure relief device.

(1) When a breaking pin device is used in combination with a reclosing pressure relief valve, the breaking pin must be designed to fail at the start-to-discharge pressure specified in paragraph (b) of this section, and the reclosing pressure relief valve must be designed to discharge at not greater than 95 percent of the start-to-discharge pressure.

(2) When a rupture disc is used in combination with a reclosing pressure relief valve, the rupture disc must be designed to burst at the pressure specified in paragraph (b) of this section, and the reclosing pressure relief valve must be designed to discharge at not greater than 95 percent of the pressure. A device must be installed to detect any accumulation of pressure between the rupture disc and the reclosing pressure relief valve. The detection device must be a needle valve, trycock, or tell-tale indicator. The detection device must be closed during transportation.

(3) The vapor tight pressure and the start-to-discharge tolerance is based on

the discharge setting of the reclosing pressure relief device.

(f) *Nonreclosing pressure relief device.* In addition to paragraphs (a), (b)(4), (c), and (d) of this section, a nonreclosing pressure relief device must conform to the following requirements:

(1) A non-reclosing pressure relief device must incorporate a rupture disc 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 AAR 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; 68 FR 75759, Dec. 31, 2003]

#### **§ 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/mm<sup>2</sup> (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 in Section 5.3 of the AAR Specifications for Tank Cars (IBR, see §171.7 of this subchapter).

(3) The workmanship must meet the requirements in Section C, Part II, Chapter 5, of the AAR Specifications for Design, Fabrication, and Construction of Freight Cars (IBR, see §171.7 of this subchapter).

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**§ 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 re-

lease 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 jackets, insulation, and thermal protection. A complete record of each analysis shall be made, retained, and upon request, made available for inspection and copying by an authorized representative of the Department. The procedures outlined in “Temperatures, Pressures, and Liquid Levels of Tank Cars Engulfed in Fires,” DOT/FRA/OR&D–84/08.11, (1984), Federal Railroad Administration, Washington, DC (available from the National Technical Information Service, Springfield, VA) shall be deemed acceptable for analyzing the fire effects on the entire surface of the tank car.

(2) When the analysis shows the thermal resistance of the tank car does not conform to paragraph (a) of this section, the thermal resistance of the tank car must be increased by using a system listed by the Department under paragraph (c) of this section or by testing a new or untried system and verifying it according to appendix B of this part.

(c) *Systems that no longer require test verification.* The Department maintains a list of thermal protection systems that comply with the requirements of appendix B of this part and that no longer require test verification. Information necessary to equip tank cars with one of these systems is available in the PHMSA Records Center, Pipeline and Hazardous Materials Safety Administration, East Building, 1200 New Jersey Avenue, SE., Washington, DC 20590–0001.

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