

238.441, 238.445, 238.447, 238.503, 238.505, and 238.603.

### Subpart B—Safety Planning and General Requirements

#### § 238.101 Scope.

This subpart contains safety planning and general safety requirements for all railroad passenger equipment subject to this part.

#### § 238.103 Fire safety.

(a) *Materials.* (1) Materials used in constructing a passenger car or a cab of a locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part, or alternative standards issued or recognized by an expert consensus organization after special approval of FRA under § 238.21.

(2) On or after November 8, 1999, materials introduced in a passenger car or a locomotive cab, as part of any kind of rebuild, refurbishment, or overhaul of the car or cab, shall meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part, or alternative standards issued or recognized by an expert consensus organization after special approval of FRA under § 238.21.

(3) For purposes of complying with the requirements of this paragraph, a railroad may rely on the results of tests of material conducted in accordance with the standards and performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part in effect on July 12, 1999 (*see* 49 CFR parts 200-399, revised as of October 1, 1999), if prior to June 25, 2002 the material is—

- (i) Installed in a passenger car or locomotive;
- (ii) Held in inventory by the railroad;
- or
- (iii) Ordered by the railroad.

(b) *Certification.* A railroad shall require certification that a representative sample of combustible materials to be—

- (1) Used in constructing a passenger car or a locomotive cab, or

- (2) Introduced in a passenger car or a locomotive cab, as part of any kind of rebuild, refurbishment, or overhaul of the car or cab, has been tested by a recognized independent testing laboratory and that the results show the representative sample complies with the requirements of paragraph (a) of this section at the time it was tested.

(c) *Fire safety analysis for procuring new passenger cars and locomotives.* In procuring new passenger cars and locomotives, each railroad shall ensure that fire safety considerations and features in the design of this equipment reduce the risk of personal injury caused by fire to an acceptable level in its operating environment using a formal safety methodology such as MIL-STD-882. To this end, each railroad shall complete a written fire safety analysis for the passenger equipment being procured. In conducting the analysis, the railroad shall—

- (1) Identify, analyze, and prioritize the fire hazards inherent in the design of the equipment.

- (2) Take effective steps to design the equipment and select materials which help provide sufficient fire resistance to reasonably ensure adequate time to detect a fire and safely evacuate the passengers and crewmembers, if a fire cannot be prevented. Factors to consider include potential ignition sources; the type, quantity, and location of the materials; and availability of rapid and safe egress to the exterior of the equipment under conditions secure from fire, smoke, and other hazards.

- (3) Reasonably ensure that a ventilation system in the equipment does not contribute to the lethality of a fire.

- (4) Identify in writing any train component that is a risk of initiating fire and which requires overheat protection. An overheat detector shall be installed in any component when the analysis determines that an overheat detector is necessary.

- (5) Identify in writing any unoccupied train compartment that contains equipment or material that poses a fire hazard, and analyze the benefit provided by including a fire or smoke detection system in each compartment so identified. A fire or smoke detector shall be installed in any unoccupied

compartment when the analysis determines that such equipment is necessary to ensure sufficient time for the safe evacuation of passengers and crewmembers from the train. For purposes of this section, an unoccupied train compartment means any part of the equipment structure that is not normally occupied during operation of the train, including a closet, baggage compartment, food pantry, etc.

(6) Determine whether any occupied or unoccupied space requires a portable fire extinguisher and, if so, the proper type and size of the fire extinguisher for each location. As required by § 239.101 of this chapter, each passenger car is required to have a minimum of one portable fire extinguisher. If the analysis performed indicates that one or more additional portable fire extinguishers are needed, such shall be installed.

(7) On a case-by-case basis, analyze the benefit provided by including a fixed, automatic fire-suppression system in any unoccupied train compartment that contains equipment or material that poses a fire hazard, and determine the proper type and size of the automatic fire-suppression system for each such location. A fixed, automatic fire-suppression system shall be installed in any unoccupied compartment when the analysis determines that such equipment is practical and necessary to ensure sufficient time for the safe evacuation of passengers and crewmembers from the train.

(8) Explain how safety issues are resolved in the design of the equipment and selection of materials to reduce the risk of each fire hazard.

(9) Describe the analysis and testing necessary to demonstrate that the fire protection approach taken in the design of the equipment and selection of materials meets the fire protection requirements of this part.

(d) *Fire safety analysis for existing passenger cars and locomotives.* (1) Not later than January 10, 2001, each passenger railroad shall complete a preliminary fire safety analysis for each category of existing passenger cars and locomotives and rail service.

(2) Not later than July 10, 2001, each such railroad shall—

(i) Complete a final fire safety analysis for any category of existing passenger cars and locomotives and rail service evaluated during the preliminary fire safety analysis as likely presenting an unacceptable risk of personal injury. In conducting the analysis, the railroad shall consider the extent to which materials comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part or alternative standards approved by FRA under this part.

(ii) Take remedial action to reduce the risk of personal injuries to an acceptable level in any such category, if the railroad finds the risk to be unacceptable. In considering remedial action, a railroad is not required to replace material found not to comply with the test performance criteria for flammability and smoke emission characteristics required by this part, if:

(A) The risk of personal injuries from the material is negligible based on the railroad's operating environment and the material's size, or location, or both; or

(B) The railroad takes alternative action which reduces the risk of personal injuries to an acceptable level.

(3) Not later than July 10, 2003, each such railroad shall—

(i) Complete a final fire safety analysis for all categories of existing passenger cars and locomotives and rail service. In completing this analysis, the railroad shall, as far as practicable, determine the extent to which remaining materials comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B to this part or alternative standards approved by FRA under this part.

(ii) Take remedial action to reduce the risk of personal injuries to an acceptable level in any such category, if the railroad finds the risk to be unacceptable. In considering remedial action, a railroad is not required to replace material found not to comply with the test performance criteria for flammability and smoke emission characteristics required by this part, if:

(A) The risk of personal injuries from the material is negligible based on the railroad's operating environment and the material's size, or location, or both; or

(B) The railroad takes alternative action which reduces the risk of personal injuries to an acceptable level.

(4) Where possible prior to transferring existing passenger cars and locomotives to a new category of rail service, but in no case more than 90 days following such a transfer, the passenger railroad shall complete a new fire safety analysis taking into consideration the change in railroad operations and shall effect prompt action to reduce any identified risk to an acceptable level.

(5) As used in this paragraph, a "category of existing passenger cars and locomotives and rail service" shall be determined by the railroad based on relevant fire safety risks, including available ignition sources, presence or absence of heat/smoke detection systems, known variations from the required material test performance criteria or alternative standards approved by FRA, and availability of rapid and safe egress to the exterior of the vehicle under conditions secure from fire, smoke, and other hazards.

(e) *Inspection, testing, and maintenance.* Each railroad shall develop and adopt written procedures for the inspection, testing, and maintenance of all fire safety systems and fire safety equipment on the passenger equipment it operates. The railroad shall comply with those procedures that it designates as mandatory for the safety of the equipment and its occupants.

[64 FR 25660, May 12, 1999, as amended at 67 FR 42909, June 25, 2002]

**§ 238.105 Train electronic hardware and software safety.**

The requirements of this section apply to electronic hardware and software used to control or monitor safety functions in passenger equipment ordered on or after September 8, 2000, and such components implemented or materially modified in new or existing passenger equipment on or after September 9, 2002.

(a) The railroad shall develop and maintain a written hardware and soft-

ware safety program to guide the design, development, testing, integration, and verification of software and hardware that controls or monitors equipment safety functions.

(b) The hardware and software safety program shall be based on a formal safety methodology that includes a Failure Modes, Effects, Criticality Analysis (FMECA); verification and validation testing for all hardware and software components and their interfaces; and comprehensive hardware and software integration testing to ensure that the hardware and software system functions as intended.

(c) The hardware and software safety program shall include a description of how the following will be accomplished, achieved, carried out, or implemented to ensure safety and reliability:

(1) The hardware and software design process;

(2) The hardware and software design documentation;

(3) The hardware and software hazard analysis;

(4) Hardware and software safety reviews;

(5) Hardware and software hazard monitoring and tracking;

(6) Hardware and software integration safety testing; and

(7) Demonstration of overall hardware and software system safety as part of the pre-revenue service testing of the equipment.

(d) (1) Hardware and software that controls or monitors a train's primary braking system shall either:

(i) Fail safely by initiating a full service brake application in the event of a hardware or software failure that could impair the ability of the engineer to apply or release the brakes; or

(ii) Access to direct manual control of the primary braking system (both service and emergency braking) shall be provided to the engineer.

(2) Hardware and software that controls or monitors the ability to shut down a train's main power and fuel intake system shall either:

(i) Fail safely by shutting down the main power and cutting off the intake of fuel in the event of a hardware or software failure that could impair the