AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

(x) Design all visual displays to meet human performance criteria under monochrome conditions and add color only if it will help the user in performing a task, and use color coding as a redundant coding technique;

(xi) Limit the number of colors over a group of displays to no more than seven;

(xii) Design warnings to match the level of risk or danger with the alerting nature of the signal;

(xiii) With respect to information entry, avoid full QWERTY keyboards for data entry; and

(xiv) Use digital communications for safety-critical messages between the locomotive engineer and the dispatcher.

(e) *What kinds of HMI design elements must a designer consider with respect to problem management?* (1) HMI design must enhance an operator's situation awareness. An operator must have access to:

(i) Knowledge of the operator's train location relative to relevant entities;

(ii) Knowledge of the type and importance of relevant entities;

(iii) Understanding of the evolution of the situation over time;

(iv) Knowledge of the roles and responsibilities of relevant entities; and

(v) Knowledge of expected actions of relevant entities.

(2) HMI design must support response selection and scheduling.

(3) HMI design must support contingency planning.

[70 FR 11107, Mar. 7, 2005]

PART 238—PASSENGER EQUIPMENT SAFETY STANDARDS

Subpart A—General

Sec.
238.1 Purpose and scope.
238.3 Applicability.
238.5 Definitions.
238.7 Waivers.
238.9 Responsibility for compliance.
238.11 Penalties.
238.13 Preemptive effect.
238.15 Movement of passenger equipment with power brake defects.
238.17 Movement of passenger equipment with other than power brake defects.
238.19 Reporting and tracking of repairs to defective passenger equipment.
238.21 Special approval procedure.
238.23 Information collection.

Subpart B—Safety Planning and General Requirements

238.101 Scope.
238.103 Fire safety.
238.105 Train electronic hardware and software safety.
238.107 Inspection, testing, and maintenance plan.
238.109 Training, qualification, and designation program.
238.111 Pre-revenue service acceptance testing plan.
238.113 Emergency window exits.
238.114 Rescue access windows.
238.115 Emergency lighting.
238.117 Protection against personal injury.
238.119 Rim-stamped straight-plate wheels.
238.121 Emergency communication.
238.123 Emergency roof access.
FIGURE 1 TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND STAGGERING OF EMERGENCY WINDOW EXITS—§ 238.113
FIGURE 1A TO SUBPART B OF PART 238—EXAMPLE OF LOCATION OF RESCUE ACCESS WINDOWS—§ 238.114
FIGURE 1B TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND STAGGERING OF EMERGENCY WINDOW EXITS AND LOCATION OF RESCUE ACCESS WINDOWS—§§ 238.113 AND 238.114
FIGURE 1C TO SUBPART B OF PART 238—EXAMPLE OF A PASSENGER COMPARTMENT INCLUDING A VESTIBULE CONNECTED BY AN OPEN PASSAGEWAY AND EXCLUDING A VESTIBULE SEPARATED BY AN INTERIOR DOOR—§§ 238.113 AND 238.114
FIGURE 2 TO SUBPART B OF PART 238—EXAMPLE OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION AND STAGGERING REQUIREMENTS—§§ 238.113 AND 238.114
FIGURE 2A TO SUBPART B OF PART 238—EXAMPLE OF AN INTERMEDIATE LEVEL SEATING AREA OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION REQUIREMENTS—§§ 238.113 AND 238.114
FIGURE 2B TO SUBPART B OF PART 238—EXAMPLE OF AN INTERMEDIATE LEVEL SEATING AREA OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION REQUIREMENTS—§§ 238.113 AND 238.114
FIGURE 3 TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND MARKING OF STRUCTURAL WEAK POINTS ON ROOF OF PASSENGER CAR—§ 238.123

Subpart C—Specific Requirements for Tier I Passenger Equipment

238.201 Scope/alternative compliance.
238.203 Static end strength.
238.205 Anti-climbing mechanism.
238.207 Link between coupling mechanism and car body.
238.209 Forward-facing end structure of locomotives.
238.211 Collision posts.
238.213 Corner posts.
238.215 Rollover strength.
238.217 Side structure.
238.219 Truck-to-car-body attachment.
238.221 Glazing.

238.223 Locomotive fuel tanks.
238.225 Electrical system.
238.227 Suspension system.
238.229 Safety appliances—general.
238.230 Safety appliances—new equipment.
238.231 Brake system.
238.233 Interior fittings and surfaces.
238.235 Doors.
238.237 Automated monitoring.

Subpart D—Inspection, Testing, and Maintenance Requirements for Tier I Passenger Equipment

238.301 Scope.
238.303 Exterior calendar day mechanical inspection of passenger equipment.
238.305 Interior calendar day mechanical inspection of passenger cars.
238.307 Periodic mechanical inspection of passenger cars and unpowered vehicles used in passenger trains.
238.309 Periodic brake equipment maintenance.
238.311 Single car test.
238.313 Class I brake test.
238.315 Class IA brake test.
238.317 Class II brake test.
238.319 Running brake test.
238.321 Out-of-service credit.

Subpart E—Specific Requirements for Tier II Passenger Equipment

238.401 Scope.
238.403 Crash energy management.
238.405 Longitudinal static compressive strength.
238.407 Anti-climbing mechanism.
238.409 Forward end structures of power car cabs.
238.411 Rear end structures of power car cabs.
238.413 End structures of trailer cars.
238.415 Rollover strength.
238.417 Side loads.
238.419 Truck-to-car-body and truck component attachment.
238.421 Glazing.
238.423 Fuel tanks.
238.425 Electrical system.
238.427 Suspension system.
238.429 Safety appliances.
238.431 Brake system.
238.433 Draft system.
238.435 Interior fittings and surfaces.
238.437 [Reserved]
238.439 Doors.
238.441 Emergency roof access.
238.443 Headlights.
238.445 Automated monitoring.
238.447 Train operator's controls and power car cab layout.
FIGURE 1 TO SUBPART E—POWER CAR CAB FORWARD END STRUCTURE CONCEPTUAL IMPLEMENTATION
FIGURE 2 TO SUBPART E—POWER CAR CAB REAR END STRUCTURE CONCEPTUAL IMPLEMENTATION
FIGURE 3 TO SUBPART E—TRAILER CAR END STRUCTURE CONCEPTUAL IMPLEMENTATION
FIGURE 4 TO SUBPART E—TRAILER CAR INBOARD VESTIBULE END STRUCTURE CONCEPTUAL IMPLEMENTATION

Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment

238.501 Scope.
238.503 Inspection, testing, and maintenance requirements.
238.505 Program approval procedure.

Subpart G—Specific Safety Planning Requirements for Tier II Passenger Equipment

238.601 Scope.
238.603 Safety planning requirements.
APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES
APPENDIX B TO PART 238—TEST METHODS AND PERFORMANCE CRITERIA FOR THE FLAMMABILITY AND SMOKE EMISSION CHARACTERISTICS OF MATERIALS USED IN PASSENGER CARS AND LOCOMOTIVE CABS
APPENDIX C TO PART 238—SUSPENSION SYSTEM SAFETY PERFORMANCE STANDARDS
APPENDIX D TO PART 238—REQUIREMENTS FOR EXTERNAL FUEL TANKS ON TIER I LOCOMOTIVES
APPENDIX E TO PART 238—GENERAL PRINCIPLES OF RELIABILITY-BASED MAINTENANCE PROGRAMS

AUTHORITY: 49 U.S.C. 20103, 20107, 20133, 20141, 20302–20303, 20306, 20701–20702, 21301–21302, 21304; 28 U.S.C. 2461, note; and 49 CFR 1.49.

SOURCE: 64 FR 25660, May 12, 1999, unless otherwise noted.

Subpart A—General

§ 238.1 Purpose and scope.

(a) The purpose of this part is to prevent collisions, derailments, and other occurrences involving railroad passenger equipment that cause injury or death to railroad employees, railroad passengers, or the general public; and to mitigate the consequences of such occurrences to the extent they cannot be prevented.

(b) This part prescribes minimum Federal safety standards for railroad passenger equipment. This part does not restrict a railroad from adopting

and enforcing additional or more stringent requirements not inconsistent with this part.

(c) Railroads to which this part applies shall be responsible for compliance with all of the requirements contained in §§ 238.15, 238.17, 238.19, 238.107, 238.109, and subpart D of this part effective January 1, 2002.

(1) A railroad may request earlier application of the requirements contained in §§ 238.15, 238.17, 238.19, 238.107, 238.109, and subpart D upon written notification to FRA's Associate Administrator for Safety. Such a request shall indicate the railroad's readiness and ability to comply with all of the provisions referenced in paragraph (c) introductory text of this section.

(2) Except for paragraphs (b) and (c) of § 238.309, a railroad may specifically request earlier application of the maintenance and testing provisions contained in §§ 238.309 and 238.311 simultaneously. In order to request earlier application of these two sections, the railroad shall indicate its readiness and ability to comply with all of the provisions contained in both of those sections.

(3) Paragraphs (b) and (c) of § 238.309 apply beginning September 9, 1999.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41305, July 3, 2000; 67 FR 19989, Apr. 23, 2002]

§ 238.3 Applicability.

(a) Except as provided in paragraph (c) of this section, this part applies to all:

(1) Railroads that operate intercity or commuter passenger train service on standard gage track which is part of the general railroad system of transportation; and

(2) Railroads that provide commuter or other short-haul rail passenger train service in a metropolitan or suburban area as described by 49 U.S.C. 20102(1), including public authorities operating passenger train service.

(b) Railroads that permit to be used or hauled on their lines passenger equipment subject to this part, in violation of a power brake provision of this part or a safety appliance provision of this part, are subject to the power brake and safety appliance provisions of this part with respect to such operations.

(c) This part does not apply to:

(1) Rapid transit operations in an urban area that are not connected to the general railroad system of transportation;

(2) A railroad that operates only on track inside an installation that is not part of the general railroad system of transportation;

(3) Tourist, scenic, historic, or excursion operations, whether on or off the general railroad system of transportation; or

(4) Circus trains.

§ 238.5 Definitions.

As used in this part—

AAR means the Association of American Railroads.

APTA means the American Public Transit Association.

Actuator means a self-contained brake system component that generates the force to apply the brake shoe or brake pad to the wheel or disc. An actuator typically consists of a cylinder, piston, and piston rod.

Administrator means the Administrator of the Federal Railroad Administration or the Administrator's delegate.

Alerter means a device or system installed in the locomotive cab to promote continuous, active locomotive engineer attentiveness by monitoring select locomotive engineer-induced control activities. If fluctuation of a monitored locomotive engineer-induced control activity is not detected within a predetermined time, a sequence of audible and visual alarms is activated so as to progressively prompt a response by the locomotive engineer. Failure by the locomotive engineer to institute a change of state in a monitored control, or acknowledge the alerter alarm activity through a manual reset provision, results in a penalty brake application that brings the locomotive or train to a stop.

Anti-climbing mechanism means the parts at the ends of adjoining vehicles in a train that are designed to engage when subjected to large buff loads to prevent the override of one vehicle by another.

Bind means restrict the intended movement of one or more brake system components by obstruction, increased friction, or reduced clearance.

Block of cars means one car or multiple cars in a solid unit coupled together for the purpose of being added to, or removed from, a train as a solid unit.

Brake, air or *power brake* means a combination of devices operated by compressed air, arranged in a system, and controlled manually, electrically, or pneumatically, by means of which the motion of a rail car or locomotive is retarded or arrested.

Brake, disc means a retardation system used on some rail vehicles, primarily passenger equipment, that utilizes flat metal discs as the braking surface instead of the wheel tread.

Brake, dynamic means a train braking system whereby the kinetic energy of a moving train is used to generate electric current at the locomotive traction motors, which is then dissipated through banks of resistor grids or back into the catenary or third rail system.

Brake, effective means a brake that is capable of producing its required designed retarding force on the train. A brake is not effective if its piston travel is in excess of the maximum prescribed limits. On vehicles equipped with nominal 12-inch stroke brake cylinders, the brake is not effective if its piston travel exceeds 10½ inches.

Brake indicator means a device, actuated by brake cylinder pressure, which indicates whether brakes are applied or released.

Brake, inoperative means a primary brake that, for any reason, no longer applies or releases as intended or is otherwise ineffective.

Brake, on-tread friction means a braking system that uses a brake shoe that acts on the tread of the wheel to retard the vehicle.

Brake, parking or *hand brake* means a brake that can be applied and released by hand to prevent movement of a stationary rail car or locomotive.

Brake pipe means the system of piping (including branch pipes, angle cocks, cutout cocks, dirt collectors, hoses, and hose couplings) used for connecting locomotives and all rail cars for the passage of air to control the locomotive and car brakes.

Brake, power means ''air brake'' as that term is defined in this section.

Brake, primary means those components of the train brake system necessary to stop the train within the signal spacing distance without thermal damage to friction braking surfaces.

Brake, secondary means those components of the train brake system which develop supplemental brake retarding force that is not needed to stop the train within signal spacing distances or to prevent thermal damage to friction braking surfaces.

Brake shoes or pads aligned with tread or disc means that the surface of the brake shoe or pad, respectively, engages the surface of the wheel tread or disc, respectively, to prevent localized thermal stress.

Braking system, blended means a braking system where the primary brake and one or more secondary brakes are automatically combined to stop the train. If the secondary brakes are unavailable, the blended brake uses the primary brake alone to stop the train.

Calendar day means a time period running from one midnight to the next midnight on a given date.

Class I brake test means a complete passenger train brake system test and inspection (as further specified in § 238.313) performed by a qualified maintenance person to ensure that the air brake system is 100 percent effective.

Class IA brake test means a test and inspection (as further specified in § 238.315) performed by a qualified person of the air brake system on each car in a passenger train to ensure that the brakes apply and release on each car in the train in response to train line commands.

Class II brake test means a test and inspection (as further specified in § 238.317) performed by a qualified person of brake pipe integrity and continuity from the controlling locomotive to the rear unit of a passenger train.

Collision posts means structural members of the end structures of a vehicle that extend vertically from the underframe to which they are securely attached and that provide protection

to occupied compartments from an object penetrating the vehicle during a collision.

Control valves means that part of the air brake equipment on each rail car or locomotive that controls the charging, application, and release of the air brakes, in response to train line commands.

Corner posts means structural members located at the intersection of the front or rear surface with the side surface of a rail vehicle and which extend vertically from the underframe to the roof. Corner posts may be combined with collision posts to become part of the end structure.

Crack means a fracture without complete separation into parts, except that, in a casting, a shrinkage crack or hot tear that does not significantly diminish the strength of the member is not a crack.

Crash energy management means an approach to the design of rail passenger equipment which controls the dissipation of energy during a collision to protect the occupied volumes from crushing and to limit the decelerations on passengers and crewmembers in those volumes. This may be accomplished by designing energy-absorbing structures of low strength in the unoccupied volumes of a rail vehicle or passenger train to collapse in a controlled manner, while providing higher structural strength in the occupied volumes. Energy deflection can also be part of a crash energy management approach. Crash energy management can be used to help provide anti-climbing resistance and to reduce the risk of train buckling during a collision.

Crash refuge means a volume with structural strength designed to maximize the survivability of crewmembers stationed in the locomotive cab during a collision.

Crewmember means a railroad employee called to perform service covered by the Federal hours of service laws at 49 U.S.C. 21103 and subject to the railroad's operating rules and program of operational tests and inspections required in § 217.9 and § 217.11 of this chapter.

Critical buckling stress means the minimum stress necessary to initiate buckling of a structural member.

Dual-function window means a window that is intended to serve as both an emergency window exit and a rescue access window and that meets the applicable requirements set forth in both §§ 238.113 and 238.114.

Emergency brake application means an irretrievable brake application resulting in the maximum retarding force available from the train brake system.

Emergency responder means a member of a police or fire department, or other organization involved with public safety charged with providing or coordinating emergency services, who responds to a passenger train emergency.

Emergency window means the segment of a side-facing glazing panel that has been designed to permit rapid and easy removal from inside a passenger car in an emergency situation.

End structure means the main support structure projecting upward from the underframe of a locomotive, passenger car, or other rail vehicle. The end structure is securely attached to the underframe at each end of a rail vehicle.

50th-percentile adult male means a person weighing 164 pounds (plus or minus 3 pounds) and possessing the following dimensions: erect sitting height: 35.7 inches (plus or minus 0.1 inch); hip breadth (sitting): 14.7 inches (plus or minus 0.7 inch); hip circumference (sitting): 42 inches; waist circumference (sitting): 32 inches (plus or minus 0.6 inch); chest depth: 9.3 inches (plus or minus 0.2 inch); and chest circumference: 37.4 inches (plus or minus 0.6 inch).

Foul means restrict the intended movement of one or more brake system components because the component is snagged, entangled, or twisted.

FRA means the Federal Railroad Administration.

Fuel tank, external means a fuel containment vessel that extends outside the car body structure of a locomotive.

Fuel tank, internal means a fuel containment vessel that does not extend outside the car body structure of a locomotive.

Full-height collision post, corner post, or side frame post means any vertical framing member in the rail car body structure that spans the distance between the underframe and the roof at

the car body section where the post is located. For collision posts located at the approximate third points laterally of an end frame, the term ''full-height'' applies to posts that extend and connect to supporting structural members in the roof at the location of the posts, or to a beam connected to the top of the end-frame and supported by the roof rails (or anti-telescoping plate), or to both.

Full service application means a brake application which results in a brake cylinder pressure at the service limiting valve setting or equivalent.

Glazing, end-facing means a glazing panel located where a line perpendicular to the exterior surface of the panel makes an angle of 50 degrees or less with the longitudinal center line of the rail vehicle in which the panel is installed. A glazing panel that curves so as to meet the definition for both side-facing and end-facing glazing is considered end-facing glazing.

Glazing, exterior means a glazing panel that is an integral part of the exterior skin of a rail vehicle and has a surface exposed to the outside environment.

Glazing, side-facing means a glazing panel located where a line perpendicular to the exterior surface of the panel makes an angle of more than 50 degrees with the longitudinal center line of the rail vehicle in which the panel is installed.

Handrails means safety appliances installed on either side of a rail vehicle's exterior doors to assist passengers and crewmembers to safely board and depart the vehicle.

Head end power means power generated on board the locomotive of a passenger train used for purposes other than propelling the train, such as cooking, heating, illumination, ventilation and air conditioning.

In passenger service/in revenue service means a train or passenger equipment that is carrying, or available to carry, passengers. Passengers need not have paid a fare in order for the equipment to be considered in passenger or in revenue service.

In service, when used in connection with passenger equipment, means:

(1) Passenger equipment subject to this part that is in passenger or revenue service in the United States; and

(2) All other passenger equipment subject to this part in the United States, unless the passenger equipment:

(i) Is being handled in accordance with §§ 238.15, 238.17, 238.305(d), or 238.503(f), as applicable;

(ii) Is in a repair shop or on a repair track;

(iii) Is on a storage track and is not carrying passengers; or

(iv) Has been delivered in interchange but has not been accepted by the receiving railroad.

Intercom means a device through which voice communication is transmitted and received.

Intercom system means a two-way, voice communication system.

Interior fitting means any component in the passenger compartment which is mounted to the floor, ceiling, sidewalls, or end walls and projects into the passenger compartment more than 25 mm (1 in.) from the surface or surfaces to which it is mounted. Interior fittings do not include side and end walls, floors, door pockets, or ceiling lining materials, for example.

Intermediate level means a level of a multi-level passenger car that is used for passenger seating and is normally located between two main levels. An intermediate level normally contains two, separate seating areas, one at each end of the car, and is normally connected to each main level by stairs.

Lateral means the horizontal direction perpendicular to the direction of travel.

Locomotive means a piece of on-track rail equipment, other than hi-rail, specialized maintenance, or other similar equipment, which may consist of one or more units operated from a single control stand with one or more propelling motors designed for moving other passenger equipment; with one or more propelling motors designed to transport freight or passenger traffic, or both; or without propelling motors but with one or more control stands. This term does not include a locomotive propelled by steam power unless it is used to haul an intercity or commuter

passenger train. Nor does this term include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Locomotive cab means the compartment or space on board a locomotive where the control stand is located and which is normally occupied by the engineer when the locomotive is operated.

Locomotive, cab car means rail rolling equipment intended to provide transportation for members of the general public that is without propelling motors but equipped with one or more control stands.

Locomotive, controlling means the locomotive from which the locomotive engineer exercises control over the train.

Locomotive, MU means rail rolling equipment self-propelled by any power source and intended to provide transportation for members of the general public; however, this term does not include an MU locomotive propelled by steam power unless it is used to haul an intercity or commuter passenger train.

Longitudinal means in a direction parallel to the normal direction of travel.

Luminescent material means material that absorbs light energy when ambient levels of light are high and emits this stored energy when ambient levels of light are low, making the material appear to glow in the dark.

L/V ratio means the ratio of the lateral force that any wheel exerts on an individual rail to the vertical force exerted by the same wheel on the rail.

Main level means a level of a passenger car that contains a passenger compartment whose length is equal to or greater than half the length of the car.

MIL-STD–882 means a military standard issued by the United States Department of Defense to provide uniform requirements for developing and implementing a system safety plan and program to identify and then eliminate the hazards of a system or reduce the associated risk to an acceptable level.

Mph means miles per hour.

95th-percentile adult male means, except as used in § 238.447(f)(2), a person weighing 215 pounds and possessing the following dimensions: erect sitting height: 38 inches; hip breadth (sitting): 16.5 inches; hip circumference (sitting): 47.2 inches; waist circumference (sitting): 42.5 inches; chest depth: 10.5 inches; and chest circumference 44.5 inches.

Occupied volume means the volume of a rail vehicle or passenger train where passengers or crewmembers are normally located during service operation, such as the operating cab and passenger seating and sleeping areas. The entire width of a vehicle's end compartment that contains a control stand is an occupied volume. A vestibule is typically not considered occupied, except when it contains a control stand for use as a control cab.

Ordered, as applied to acquisition of equipment, means that the acquiring entity has given a notice to proceed to manufacture the equipment that represents a firm financial commitment to compensate the manufacturer for the contract price of the equipment or for damages if the order is nullified. Equipment is not ordered if future exercise of a contract option is required to place the remanufacturing process in motion.

Override means to climb over the normal coupling or side buffers and linking mechanism and impact the end of the adjoining rail vehicle or unit above the underframe.

PA system (or *public address system*) means a one-way, voice communication system.

Passenger car means rail rolling equipment intended to provide transportation for members of the general public and includes a self-propelled car designed to carry passengers, baggage, mail, or express. This term includes a passenger coach, cab car, and an MU locomotive. In the context of articulated equipment, ''passenger car'' means that segment of the rail rolling equipment located between two trucks. This term does not include a private car.

Passenger coach means rail rolling equipment intended to provide transportation for members of the general public that is without propelling motors and without a control stand.

Passenger compartment means an area of a passenger car that consists of a

seating area and any vestibule that is connected to the seating area by an open passageway.

Passenger equipment—means

(1) All powered and unpowered passenger cars, locomotives used to haul a passenger car, and any other rail rolling equipment used in a train with one or more passenger cars. Passenger equipment includes—

(i) A passenger coach,

(ii) A cab car,

(iii) A MU locomotive,

(iv) A locomotive not intended to provide transportation for a member of the general public that is used to power a passenger train, and

(v) Any non-self-propelled vehicle used in a passenger train, including an express car, baggage car, mail car, freight car, or a private car.

(2) In the context of articulated equipment, ''passenger equipment'' means a segment of rail rolling equipment located between two trucks that is used in a train with one or more passenger cars. This term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Passenger station means a location designated in a railroad's timetable where passengers are regularly scheduled to get on or off any train.

Permanent deformation means the undergoing of a permanent change in shape of a structural member of a rail vehicle.

Person means an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor.

Piston travel means the amount of linear movement of the air brake hollow rod (or equivalent) or piston rod when forced outward by movement of the piston in the brake cylinder or actuator and limited by the brake shoes being forced against the wheel or disc.

Piston travel indicator means a device directly activated by the movement of the brake cylinder piston, the disc brake actuator, or the tread brake unit cylinder piston that provides an indication of the piston travel.

Power car means a rail vehicle that propels a Tier II passenger train or is the lead vehicle in a Tier II passenger train, or both.

Pre-revenue service acceptance testing plan means a document, as further specified in § 238.111, prepared by a railroad that explains in detail how pre-revenue service tests of passenger equipment demonstrate that the equipment meets Federal safety standards and the railroad's own safety requirements.

Primary responsibility means the task that a person performs during at least 50 percent of the time that the person is working. The totality of the circumstances will be considered on a case-by-case basis in circumstances where an individual does not spend 50 percent of his or her workday engaged in any one readily identifiable type of activity. Time spent supervising employees engaged in the functions of troubleshooting, inspection, testing, maintenance, or repair of train brake and mechanical components and systems covered by this part shall be considered work which is generally consistent with the function of troubleshooting of such systems and components for the purpose of the definition of this term and the definition of ''Qualified Maintenance Person.''

Private car means rail rolling equipment that is used only for excursion, recreational, or private transportation purposes. A private car is not a passenger car.

Public highway-rail grade crossing means a location where a public highway, road or street, including associated sidewalks or pathways, crosses one or more active railroad tracks at grade.

Qualified maintenance person means a qualified person who has received, as a part of the training, qualification, and designation program required under § 238.109, instruction and training that includes ''hands-on'' experience (under appropriate supervision or apprenticeship) in one or more of the following functions: troubleshooting, inspection, testing, maintenance, or repair of the

specific train brake and other components and systems for which the person is assigned responsibility. This person shall also possess a current understanding of what is required to properly repair and maintain the safety-critical brake or mechanical components for which the person is assigned responsibility. Further, the qualified maintenance person shall be a person whose primary responsibility includes work generally consistent with the above-referenced functions and is designated to:

(1) Conduct Class I brake tests under this part;

(2) Conduct exterior calendar day mechanical inspections on MU locomotives or other passenger cars and unpowered vehicles under this part; or

(3) Determine whether equipment not in compliance with this part may be moved as required by § 238.17.

Qualified person means a person who has received, as a part of the training, qualification, and designation program required under § 238.109, instruction and training necessary to perform one or more functions required under this part. The railroad is responsible for determining that the person has the knowledge and skills necessary to perform the required function for which the person is assigned responsibility. The railroad determines the qualifications and competencies for employees designated to perform various functions in the manner set forth in this part. Although the rule uses the term ''qualified person'' to describe a person responsible for performing various functions required under this part, a person may be deemed qualified to perform some functions but not qualified to perform other functions. For example, although a person may be deemed qualified to perform the Class II brake test required by this part, that same person may or may not be qualified to perform the Class IA brake test or authorize the movement of defective equipment under this part. The railroad will determine the required functions for which an individual will be deemed a ''qualified person'' based upon the instruction and training the individual has received pursuant to § 238.109 on a particular function.

Railroad means any form of non-highway ground transportation that runs on rails or electromagnetic guideways and any entity providing such transportation, including—

(i) Commuter or other short-haul railroad passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979; and

(ii) High speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads; but does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

Refresher training means periodic retraining required by a railroad for employees or contractors to remain qualified to perform specific equipment inspection, testing, or maintenance functions.

Repair point means a location designated by a railroad where repairs of the type necessary occur on a regular basis. A repair point has, or should have, the facilities, tools, and personnel qualified to make the necessary repairs. A repair point need not be staffed continuously.

Rescue access window means a side-facing exterior window intended for use by emergency responders to gain access to passengers in an emergency situation.

Respond as intended means to produce the result that a device or system is designed to produce.

Retroreflective material means a material that is capable of reflecting light rays back to the light source and that conforms to the specifications for Type I Sheeting as specified in ASTM International Standard D 4956–07, ''Standard Specification for Retroreflective Sheeting for Traffic Control.'' The Director of the Federal Register approves the incorporation by reference of this standard in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959. You may inspect a copy of the incorporated

standard at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal-register/cfr/ibr-locations.html*.

Rollover strength means the strength provided to protect the structural integrity of a rail vehicle in the event the vehicle leaves the track and impacts the ground on its side or roof.

Roof rail means the longitudinal structural member at the intersection of the side wall and the roof sheathing.

Running brake test means a test (as further specified in § 238.319) performed by a qualified person of a train system or component while the train is in motion to verify that the system or component functions as intended.

Running gear defect means any condition not in compliance with this part which involves a truck component, a draft system component, a wheel, or a wheel component.

Safety appliance means an appliance required under 49 U.S.C. chapter 203, excluding power brakes. The term includes automatic couplers, hand brakes, sill steps, handholds, handrails, or ladder treads made of steel or a material of equal or greater mechanical strength used by the traveling public or railroad employees that provide a means for safely coupling, uncoupling, or ascending or descending passenger equipment.

Safety-critical means a component, system, or task that, if not available, defective, not functioning, not functioning correctly, not performed, or not performed correctly, increases the risk of damage to passenger equipment or injury to a passenger, crewmember, or other person.

Seating area means an area of a passenger car that normally contains passenger seating.

Semi-permanently coupled means coupled by means of a drawbar or other coupling mechanism that requires tools to perform the uncoupling operation. Coupling and uncoupling of each semi-permanently coupled unit in a train can be performed safely only while at a maintenance or shop location where personnel can safely get under a unit or between units.

Semi-monocoque means a type of rail vehicle construction where the shell or skin acts as a single unit with the supporting frame to resist and transmit the loads acting on the rail vehicle.

Shear strength means the ability of a structural member to resist forces or components of forces acting perpendicular to compression or tension forces, or both, in the member.

Shock absorbent material means material designed to prevent or mitigate injuries due to impact by yielding and absorbing much of the energy of impact.

Side posts means main vertical structural elements in the sides of a rail vehicle.

Side sill means that portion of the underframe or side at the bottom of the rail vehicle side wall.

Single car test means a comprehensive test (as further specified in § 238.311) of the functioning of all critical brake system components installed on an individual passenger car or unpowered vehicle, other than a self-propelled passenger car, used or allowed to be used in a passenger train.

Single car test device means a device capable of controlling the application and release of the brakes on an individual passenger car or an unpowered vehicle, other than a self-propelled passenger car, through pneumatic or electrical means.

Skin means the outer covering of a fuel tank and a rail vehicle. The skin may be covered with another coating of material such as fiberglass.

Spall, glazing means small pieces of glazing that fly off the back surface of the glazing when an object strikes the front surface.

Switching service means the classification of freight cars according to commodity or destination; assembling of cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing; placing of locomotives and cars for repair or storage; or moving of rail equipment in connection with work service that does not constitute a train movement.

Telescope means override an adjoining rail vehicle or unit and penetrate into

the interior of that adjoining vehicle or unit because of compressive forces.

Terminal means a starting point or ending point of a single scheduled trip for a train, where passengers may get on or off a train. Normally, this location is a point where the train would reverse direction or change destinations.

Tier I means operating at speeds not exceeding 125 mph.

Tier II means operating at speeds exceeding 125 mph but not exceeding 150 mph.

Tourist, scenic, historic, or excursion operations means railroad operations that carry passengers, often using antiquated equipment, with the conveyance of the passengers to a particular destination not being the principal purpose. Train movements of new passenger equipment for demonstration purposes are not tourist, scenic, historic, or excursion operations.

Trailer car means a rail vehicle that neither propels a Tier II passenger train nor is the leading unit in a Tier II passenger train. A trailer car is normally without a control stand and is normally occupied by passengers.

Train means a locomotive unit or locomotive units coupled, with or without cars. For the purposes of the provisions of this part related to power brakes, the term ''train'' does not include such equipment when being used in switching service.

Train brake communication line means the communication link between the locomotive and passenger equipment in a train by which the brake commands are transmitted. This may be a pneumatic pipe, electrical line, or radio signal.

Train, commuter means a passenger train providing commuter service within an urban, suburban, or metropolitan area. The term includes a passenger train provided by an instrumentality of a State or a political subdivision of a State.

Train, long-distance intercity passenger means a passenger train that provides service between large cities more than 125 miles apart and is not operated exclusively in the National Railroad Passenger Corporation's Northeast Corridor.

Train, passenger means a train that transports or is available to transport members of the general public. If a train is composed of a mixture of passenger and freight equipment, that train is a passenger train for purposes of this part.

Train, short-distance intercity passenger means a passenger train that provides service exclusively on the National Railroad Passenger Corporation's Northeast Corridor or between cities that are not more than 125 miles apart.

Train, Tier II passenger means a short-distance or long-distance intercity passenger train providing service at speeds that include those exceeding 125 mph but not exceeding 150 mph.

Trainset, passenger means a passenger train.

Transverse means in a direction perpendicular to the normal direction of travel.

Ultimate strength means the load at which a structural member fractures or ceases to resist any load.

Uncoupling mechanism means the arrangement for operating the coupler by any means.

Underframe means the lower horizontal support structure of a rail vehicle.

Unit means passenger equipment of any type, except a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Unoccupied volume means the volume of a rail vehicle or passenger train which does not contain seating and is not normally occupied by passengers or crewmembers.

Vehicle, rail means passenger equipment of any type and includes a car, trailer car, locomotive, power car, tender, or similar vehicle. This term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

Vestibule means an area of a passenger car that normally does not contain seating and is used in passing from the seating area to the side exit doors.

Witness plate means a thin foil placed behind a piece of glazing undergoing an impact test. Any material spalled or

broken from the back side of the glazing will dent or mark the witness plate.

Yard means a system of tracks within defined limits provided for the making up of trains, storing of cars, or other purposes.

Yard air test means a train brake system test conducted using a source of compressed air other than a locomotive.

Yield strength means the ability of a structural member to resist a change in length caused by a heavy load. Exceeding the yield strength may cause permanent deformation of the member.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41305, July 3, 2000; 67 FR 19989, Apr. 23, 2002; 71 FR 36916, June 28, 2006; 71 FR 61857, Oct. 19, 2006; 73 FR 6400, Feb. 1, 2008]

§ 238.7 Waivers.

(a) A person subject to a requirement of this part may petition the Administrator for a waiver of compliance with such requirement. The filing of such a petition does not affect the person's responsibility for compliance with that requirement while the petition is being considered.

(b) Each petition for waiver under this section shall be filed in the manner and contain the information required by part 211 of this chapter.

(c) If the Administrator finds that a waiver of compliance is in the public interest and is consistent with railroad safety, the Administrator may grant the waiver subject to any conditions the Administrator deems necessary.

§ 238.9 Responsibility for compliance.

(a) A railroad subject to this part shall not—

(1) Use, haul, permit to be used or hauled on its line, offer in interchange, or accept in interchange any train or passenger equipment, while in service,

(i) That has one or more conditions not in compliance with a safety appliance or power brake provision of this part; or

(ii) That has not been inspected and tested as required by a safety appliance or power brake provision of this part; or

(2) Use, haul, offer in interchange, or accept in interchange any train or passenger equipment, while in service,

(i) That has one or more conditions not in compliance with a provision of this part, other than the safety appliance and power brake provisions of this part, if the railroad has actual knowledge of the facts giving rise to the violation, or a reasonable person acting in the circumstances and exercising reasonable care would have that knowledge; or

(ii) That has not been inspected and tested as required by a provision of this part, other than the safety appliance and power brake provisions of this part, if the railroad has actual knowledge of the facts giving rise to the violation, or a reasonable person acting in the circumstances and exercising reasonable care would have that knowledge; or

(3) Violate any other provision of this part.

(b) For purposes of this part, passenger equipment will be considered in use prior to departure but after it has received, or should have received, the inspection required under this part for movement and is deemed ready for passenger service.

(c) Although the duties imposed by this part are generally stated in terms of the duty of a railroad, any person as defined in § 238.5, including a contractor for a railroad, who performs any function covered by this part must perform that function in accordance with this part.

§ 238.11 Penalties.

(a) Any person, as defined in § 238.5, who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least $650 and not more than $25,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed $100,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix A to this part for a statement of agency civil penalty policy.

(b) Any person who knowingly and willfully falsifies a record or report required by this part may be subject to criminal penalties under 49 U.S.C. 21311.

[64 FR 25660, May 12, 1999, as amended at 69 FR 30595, May 28, 2004; 72 FR 51198, Sept. 6, 2007; 73 FR 79704, Dec. 30, 2008]

§ 238.13 Preemptive effect.

Under 49 U.S.C. 20106, issuance of the regulations in this part preempts any State law, regulation, or order covering the same subject matter, except an additional or more stringent law, regulation, or order that is necessary to eliminate or reduce an essentially local safety hazard; that is not incompatible with a law, regulation, or order of the United States Government; and that does not unreasonably burden interstate commerce.

§ 238.15 Movement of passenger equipment with power brake defects.

Beginning on January 1, 2002, the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part.

(a) *General.* This section contains the requirements for moving passenger equipment with a power brake defect without liability for a civil penalty under this part. Railroads remain liable for the movement of passenger equipment under 49 U.S.C. 20303(c). For purposes of this section, § 238.17, and § 238.503, a ''power brake defect'' is a condition of a power brake component, or other primary brake component, that does not conform with this part. (Passenger cars and other passenger equipment classified as locomotives under part 229 of this chapter are also covered by the movement restrictions contained in § 229.9 of this chapter for those defective conditions covered by part 229 of this chapter.)

(b) *Limitations on movement of passenger equipment containing a power brake defect at the time a Class I or IA brake test is performed.* Except as provided in paragraph (c) of this section (which addresses brakes that become defective en route after a Class I or IA brake test was performed), a commuter or passenger train that has in its consist passenger equipment containing a power brake defect at the time that a Class I or IA brake test (or, for Tier II trains, the equivalent) is performed may only be moved, without civil penalty liability under this part—

(1) If all of the following conditions are met:

(i) The train is moved for purposes of repair, without passengers;

(ii) The applicable operating restrictions in paragraphs (d) and (e) of this section are observed; and

(iii) The passenger equipment is tagged, or information is recorded, as prescribed in paragraph (c)(2) of this section; or

(2) If the train is moved for purposes of scrapping or sale of the passenger equipment that has the power brake defect and all of the following conditions are met:

(i) The train is moved without passengers;

(ii) The movement is at a speed of 15 mph or less; and

(iii) The movement conforms with the railroad's air brake or power brake instructions.

(c) *Limitations on movement of passenger equipment in passenger service that becomes defective en route after a Class I or IA brake test.* Passenger equipment hauled or used in service in a commuter or passenger train that develops inoperative or ineffective power brakes or any other power brake defect while en route to another location after receiving a Class I or IA brake test (or, for Tier II trains, the equivalent) may be hauled or used by a railroad for repair, without civil penalty liability under this part, if the applicable operating restrictions set forth in paragraphs (d) and (e) of this section are complied with and all of the following requisites are satisfied:

(1) *En route defect.* At the time of the train's Class I or IA brake test, the passenger equipment in the train was properly equipped with power brakes that comply with this part. The power brakes on the passenger equipment become defective while it is en route to another location.

(2) *Record.* A tag or card is placed on both sides of the defective passenger equipment, or an automated tracking system is provided, with the following information about the defective passenger equipment:

(i) The reporting mark and car or locomotive number;

(ii) The name of the inspecting railroad;

(iii) The name of the inspector;

(iv) The inspection location and date;

(v) The nature of each defect;

(vi) The destination of the equipment where it will be repaired; and

(vii) The signature, if possible, and job title of the person reporting the defective condition.

(3) *Automated tracking system.* Automated tracking systems used to meet the tagging requirements contained in paragraph (c)(2) of this section may be reviewed and monitored by FRA at any time to ensure the integrity of the system. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of tagging if FRA finds that the automated tracking system is not properly secure, is inaccessible to FRA or a railroad's employees, or fails to adequately track or monitor the movement of defective equipment. Such a determination will be made in writing and will state the basis for such action.

(4) *Conditional requirement.* In addition, if an en route failure causes power brakes to be cut out or renders the brake inoperative on passenger equipment, the railroad shall:

(i) Determine the percentage of operative power brakes in the train based on the number of brakes known to be cut out or otherwise inoperative, using the formula specified in paragraph (d)(1) of this section;

(ii) Notify the person responsible for the movement of trains of the percent of operative brakes and movement restrictions on the train imposed by paragraph (d) of this section;

(iii) Notify the mechanical department of the failure; and

(iv) Confirm the percentage of operative brakes by a walking inspection at the next location where the railroad reasonably judges that it is safe to do so.

(d) *Operating restrictions based on percent operative power brakes in train*—(1) *Computation of percent operative power brakes.* (i) Except as specified in paragraphs (d)(1)(ii) and (iii) of this section, the percentage of operative power brakes in a train shall be determined by dividing the number of axles in the train with operative power brakes by the total number of axles in the train.

(ii) For trains equipped with only tread brake units (TBUs), the percentage of operative power brakes shall be determined by dividing the number of operative TBUs by the total number of TBUs in the train.

(iii) Each cut-out axle on a locomotive that weighs more than 200,000 pounds shall be counted as two cut-out axles for the purposes of calculating the percentage of operative brakes. Unless otherwise specified by the railroad, the friction braking effort over all other axles shall be considered uniform.

(iv) The following brake conditions not in compliance with this part do not render power brakes inoperative for purposes of this calculation:

(A) Failure or cutting out of secondary brake systems;

(B) Inoperative or otherwise defective handbrakes or parking brakes;

(C) Piston travel that is in excess of the Class I brake test limits required in § 238.313 but that does not exceed the maximum prescribed limits for considering the brakes to be effective; and

(D) Power brakes overdue for inspection, testing, maintenance, or stenciling under this part.

(2) *All passenger trains developing 50–74 percent operative power brakes.* A passenger train that develops inoperative power brake equipment resulting in at least 50 percent but less than 75 percent operative power brakes may be used only as follows:

(i) The train may be moved in passenger service only to the next forward passenger station;

(ii) The speed of the train shall be restricted to 20 mph or less; and

(iii) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(3) *Commuter, short-distance intercity, and short-distance Tier II passenger*

trains developing 75–99 percent operative power brakes. (i) *75–84 percent operative brakes.* Commuter, short-distance intercity, and short-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 75 percent but less than 85 percent operative brakes may be used only as follows:

(A) The train may be moved in passenger service only to the next forward location where the necessary repairs can be made; however, if the next forward location where the necessary repairs can be made does not have the facilities to handle the safe unloading of passengers, the train may be moved past the repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) The speed of the train shall be restricted to 50 percent of the train's maximum allowable speed or 40 mph, whichever is less; and

(C) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(ii) *85–99 percent operative brakes.* Commuter, short-distance intercity, and short-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 85 percent but less than 100 percent operative brakes may only be used as follows:

(A) The train may be moved in passenger service only to the next forward location where the necessary repairs can be made; however, if the next forward location where the necessary repairs can be made does not have the facilities to handle the safe unloading of passengers, the train may be moved past the repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(4) *Long-distance intercity and long-distance Tier II passenger trains developing 75–99 operative power brakes.* (i) *75–84 percent operative brakes.* Long-distance intercity and long-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 75 percent but less than 85 percent operative brakes may be used only if all of the following restrictions are observed:

(A) The train may be moved in passenger service only to the next forward repair location identified for repair of that equipment by the railroad operating the equipment in the list required by §238.19(d); however, if the next forward repair location does not have the facilities to handle the safe unloading of passengers, the train may be moved past the designated repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) The speed of the train shall be restricted to 50 percent of the train's maximum allowable speed or 40 mph, whichever is less; and

(C) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(ii) *85–99 percent operative brakes.* Long-distance intercity and long-distance Tier II passenger trains which develop inoperative power brake equipment resulting in at least 85 percent but less than 100 percent operative brakes may be used only if all of the following restrictions are observed:

(A) The train may be moved in passenger service only to the next forward repair location identified for repair of that equipment by the railroad operating the equipment in the list required by §238.19(d); however, if the next forward repair location does not have the facilities to handle the safe unloading of passengers, the train may be moved past the designated repair location in service only to the next forward passenger station in order to facilitate the unloading of passengers; and

(B) After all passengers are discharged, the defective equipment shall be moved to the nearest location where the necessary repairs can be made.

(e) *Operating restrictions on passenger trains with inoperative power brakes on the front or rear unit.* If the power brakes on the front or rear unit in any passenger train are completely inoperative the following shall apply:

(1) If the handbrake is located inside the interior of the car:

(i) A qualified person shall be stationed at the handbrake on the unit;

(ii) The car shall be locked-out and empty except for the railroad employee manning the handbrake; and

(iii) Appropriate speed restrictions shall be placed on the train by a qualified person;

(2) If the handbrake is located outside the interior of the car or is inaccessible to a qualified person:

(i) The car shall be locked-out and empty;

(ii) The speed of the train shall be restricted to 20 mph or less; and

(iii) The car shall be removed from the train or repositioned in the train at the first location where it is possible to do so.

(f) *Special Notice for Repair*. Nothing in this section authorizes the movement of passenger equipment subject to a Special Notice for Repair under part 216 of this chapter unless the movement is made in accordance with the restrictions contained in the Special Notice.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41306, July 3, 2000; 67 FR 19990, Apr. 23, 2002]

§ 238.17 Movement of passenger equipment with other than power brake defects.

Beginning on January 1, 2002, the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part.

(a) *General*. This section contains the requirements for moving passenger equipment with other than a power brake defect. (Passenger cars and other passenger equipment classified as locomotives under part 229 of this chapter are also covered by the movement restrictions contained in § 229.9 of this chapter for those defective conditions covered by part 229 of this chapter.)

(b) *Limitations on movement of passenger equipment containing defects found at time of calendar day inspection*. Except as provided in §§ 238.303(e)(15), (e)(17) and (e)(18), 238.305(c) and (d), and 238.307(c)(1), passenger equipment containing a condition not in conformity with this part at the time of its calendar day mechanical inspection may be moved from that location for repair if all of the following conditions are satisfied:

(1) If the condition involves a running gear defect, the defective equipment is not used in passenger service and is moved in a non-revenue train;

(2) If the condition involves a non-running gear defect, the defective equipment may be used in passenger service in a revenue train provided that a qualified maintenance person determines that it is safe to do so, and if so, the car is locked out and empty, and all movement restrictions are observed except that the car may be occupied by a member of the train crew or a railroad employee to the extent necessary to safely operate the train;

(3) The requirements of paragraphs (c)(3) and (c)(4) of this section are met; and

(4) The special requirements of paragraph (e) of this section, if applicable, are met.

(c) *Limitations on movement of passenger equipment that develops defects en route*. Except as provided in §§ 238.303(e)(15), (e)(17) and (e)(18), 238.305(c), 238.307(c)(1), and 238.503(f), passenger equipment that develops en route to its destination, after its calendar day mechanical inspection is performed and before its next calendar day mechanical inspection is performed, any condition not in compliance with this part, other than a power brake defect, may be moved only if the railroad complies with all of the following requirements or, if applicable, the specified requirements in paragraph (e) of this section:

(1) Prior to movement of equipment with a potential running gear defect, a qualified maintenance person shall determine if it is safe to move the equipment in passenger service and, if so, the maximum speed and other restrictions necessary for safely conducting the movement. If appropriate, these determinations may be made based upon a description of the defective condition

provided by a crewmember. If the determinations required by this paragraph are made by an off-site qualified maintenance person based on a description of the defective condition by on-site personnel, then a qualified maintenance person shall perform a physical inspection of the defective equipment, at the first location possible, to verify the description of the defect provided by the on-site personnel.

(2) Prior to movement of equipment with a non-running gear defect, a qualified person or a qualified maintenance person shall determine if it is safe to move the equipment in passenger service and, if so, the maximum speed and other restrictions necessary for safely conducting the movement. If appropriate, these determinations may be made based upon a description of the defective condition provided by the on-site personnel.

(3) Prior to movement of any defective equipment, the qualified person or qualified maintenance person shall notify the crewmember in charge of the movement of the defective equipment, who in turn shall inform all other crewmembers of the presence of the defective condition(s) and the maximum speed and other restrictions determined under paragraph (c)(1) or (c)(2) of this section. The movement shall be made in conformance with such restrictions.

(4) The railroad shall maintain a record of all defects reported and their subsequent repair in the defect tracking system required in § 238.19. In addition, prior to movement of the defective equipment, a tag or card placed on both sides of the defective equipment, or an automated tracking system, shall record the following information about the defective equipment:

(i) The reporting mark and car or locomotive number;

(ii) The name of the inspecting railroad;

(iii) The name of the inspector, inspection location, and date;

(iv) The nature of each defect;

(v) Movement restrictions and safety restrictions, if any;

(vi) The destination of the equipment where it will be repaired; and

(vii) The signature, if possible, as well as the job title and location of the person making the determinations required by this section.

(5) *Automated tracking system.* Automated tracking systems used to meet the tagging requirements contained in paragraph (c)(4) of this section may be reviewed and monitored by FRA at any time to ensure the integrity of the system. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of tagging if FRA finds that the automated tracking system is not properly secure, is inaccessible to FRA or a railroad's employees, or fails to adequately track or monitor the movement of defective equipment. Such a determination will be made in writing and will state the basis for such action.

(6) After a qualified maintenance person or a qualified person verifies that the defective equipment is safe to remain in service as required in paragraphs (c)(1) and (c)(2) of this section, the defective equipment that develops a condition not in compliance with this part while en route may continue in passenger service not later than the next calendar day mechanical inspection, if the requirements of this paragraph are otherwise fully met.

(d) *Inspection of roller bearings on equipment involved in a derailment.* (1) A railroad shall not continue passenger equipment in service that has a roller bearing whose truck was involved in a derailment unless the bearing has been inspected and tested in accordance with the railroad's procedures for handling defective equipment.

(2) The roller bearing shall be disassembled from the axle and inspected internally if:

(i) It shows any external sign of damage;

(ii) It makes any unusual noise when its wheel set is spun freely (an on-track rolling test is acceptable) or when the bearing is manually rotated;

(iii) Its truck was involved in a derailment at a speed of more than 10 miles per hour; or

(iv) Its truck was dragged on the ground for more than 100 feet.

(e) *Special requisites for movement of passenger equipment with safety appliance defects.* Consistent with 49 U.S.C.

20303, passenger equipment with a safety appliance not in compliance with this part or with part 231 of this chapter, if applicable, may be moved—

(1) If necessary to effect repair of the safety appliance;

(2) From the point where the safety appliance defect was first discovered by the railroad to the nearest available location on the railroad where the necessary repairs required to bring the passenger equipment into compliance can be made or, at the option of the receiving railroad, the equipment may be received and hauled for repair to a point on the receiving railroad's line that is no farther than the point on the delivering railroad's line where the repair of the defect could have been made;

(3) If a tag placed on both sides of the passenger equipment or an automated tracking system contains the information required under paragraph (c)(4) of this section; and

(4) After notification of the crewmember in charge of the movement of the defective equipment, who in turn shall inform all other crewmembers of the presence of the defective condition(s).

(f) *Special Notice for Repair*. Nothing in this section authorizes the movement of equipment subject to a Special Notice for Repair under part 216 of this chapter unless the movement is made in accordance with the restrictions contained in the Special Notice.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41306, July 3, 2000; 71 FR 61857, Oct. 19, 2006; 73 FR 6400, Feb. 1, 2008]

§ 238.19 Reporting and tracking of repairs to defective passenger equipment.

(a) *General*. Beginning on January 1, 2002, each railroad shall have in place a reporting and tracking system for passenger equipment with a defect not in conformance with this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c) of this part. The reporting and tracking system shall record the following information:

(1) The identification number of the defective equipment;

(2) The date the defect was discovered;

(3) The nature of the defect;

(4) The determination made by a qualified person or qualified maintenance person on whether the equipment is safe to run;

(5) The name of the qualified person or qualified maintenance person making such a determination;

(6) Any operating restrictions placed on the equipment; and

(7) Repairs made and the date that they were made.

(b) *Retention of records*. At a minimum, each railroad shall keep the records described in paragraph (a) of this section for one periodic maintenance interval for each specific type of equipment as described in the railroad's inspection, testing, and maintenance plan required by § 238.107. FRA strongly encourages railroads to keep these records for longer periods of time because they form the basis for future reliability-based decisions concerning test and maintenance intervals that may be developed pursuant to § 238.307(b).

(c) *Availability of records*. Railroads shall make defect reporting and tracking records available to FRA upon request.

(d) *List of power brake repair points*. Railroads operating long-distance intercity and long-distance Tier II passenger equipment shall designate locations, in writing, where repairs to passenger equipment with a power brake defect will be made and shall provide the list to FRA's Associate Administrator for Safety and make it available to FRA for inspection and copying upon request. Railroads operating these trains shall designate a sufficient number of repair locations to ensure the safe and timely repair of passenger equipment. These designations shall not be changed without at least 30 days' advance written notice to FRA's Associate Administrator for Safety.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41306, July 3, 2000]

§ 238.21 Special approval procedure.

(a) *General*. The following procedures govern consideration and action upon requests for special approval of alternative standards under § 238.103,

§ 238.223, § 238.229, § 238.309, § 238.311, § 238.405, or § 238.427; for approval of alternative compliance under § 238.201, § 238.229, or § 238.230; and for special approval of pre-revenue service acceptance testing plans as required by § 238.111. (Requests for approval of programs for the inspection, testing, and maintenance of Tier II passenger equipment are governed by § 238.505.)

(b) *Petitions for special approval of alternative standard.* Each petition for special approval of an alternative standard shall contain—

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition;

(2) The alternative proposed, in detail, to be substituted for the particular requirements of this part;

(3) Appropriate data or analysis, or both, establishing that the alternative will provide at least an equivalent level of safety; and

(4) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.

(c) *Petitions for special approval of alternative compliance.* Each petition for special approval of alternative compliance shall contain—

(1) The name, title, address, and telephone number of the primary person to be contacted with regard to the petition;

(2) The elements prescribed in §§ 238.201(b), 238.229(j)(2), and 238.230(d); and

(3) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.

(d) *Petitions for special approval of pre-revenue service acceptance testing plan.* (1) Each petition for special approval of a pre-revenue service acceptance testing plan shall contain—

(i) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the petition; and

(ii) The elements prescribed in § 238.111.

(2) Each petition for special approval of the pre-revenue service acceptance testing plan shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Mail Stop 25, Washington, DC 20590.

(e) *Federal Register notice.* FRA will publish a notice in the FEDERAL REGISTER concerning each petition under paragraphs (b) and (c) of this section.

(f) *Comment.* Not later than 30 days from the date of publication of the notice in the FEDERAL REGISTER concerning a petition under paragraphs (b) and (c) of this section, any person may comment on the petition.

(1) Each comment shall set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Each comment shall be submitted to the U.S. Department of Transportation, Docket Operations (M–30), West Building Ground Floor, Room W12–140, 1200 New Jersey Avenue, SE., Washington, DC 20590, and shall contain the assigned docket number for that proceeding. The form of such submission may be in written or electronic form consistent with the standards and requirements established by the Federal Docket Management System and posted on its web site at *http://www.regulations.gov.*

(g) *Disposition of petitions.* (1) FRA will conduct a hearing on a petition in accordance with the procedures provided in § 211.25 of this chapter.

(2) If FRA finds that the petition complies with the requirements of this section or that the proposed plan is acceptable or changes are justified, or both, the petition will be granted, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may attach special conditions to the approval of the petition. Following the approval of a petition, FRA may reopen consideration of the petition for cause stated.

(3) If FRA finds that the petition does not comply with the requirements of this section, or that the proposed plan is not acceptable or that the proposed changes are not justified, or

both, the petition will be denied, normally within 90 days of its receipt.

(4) When FRA grants or denies a petition, or reopens consideration of the petition, written notice is sent to the petitioner and other interested parties.

[64 FR 25660, May 12, 1999, as amended at 64 FR 70196, Dec. 16, 1999; 71 FR 61858, Oct. 19, 2006; 74 FR 25174, May 27, 2009]

§ 238.23 Information collection.

(a) The information collection requirements of this part were reviewed by the Office of Management and Budget pursuant to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et. seq.*) and are assigned OMB control number 2130–0544.

(b) The information collection requirements are found in the following sections: §§ 238.1, 238.7, 238.11, 238.15, 238.17, 238.19, 238.21, 238.103, 238.105, 238.107, 238.109, 238.111, 238.201, 238.203, 238.211, 238.223, 238.231, 238.237, 238.301, 238.303, 238.305, 238.307, 238.309, 238.311, 238.313, 238.315, 238.317, 238.403, 238.405, 238.421, 238.423, 238.427, 238.431, 238.437, 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 flammabilitiy 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 software 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 ability of the train crew to command that electronic function; or

(ii) The ability to shut down the main power and fuel intake by non-electronic means shall be provided to the train crew.

(e) The railroad shall comply with the elements of its hardware and software safety program that affect the safety of the passenger equipment.

[67 FR 19990, Apr. 23, 2002]

§ 238.107 Inspection, testing, and maintenance plan.

(a) *General.* Beginning on January 1, 2002, the following provisions of this section apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c).

(b) Each railroad shall develop, and provide to FRA upon request, a detailed inspection, testing, and maintenance plan consistent with the requirements of this part. This plan shall include a detailed description of the following:

(1) Inspection procedures, intervals, and criteria;

(2) Test procedures and intervals;

(3) Scheduled preventive maintenance intervals;

(4) Maintenance procedures; and

(5) Special testing equipment or measuring devices required to perform inspections and tests.

(c) The inspection, testing, and maintenance plan required by this section is not intended to address and should not include procedures to address employee working conditions that arise in the course of conducting the inspections, tests, and maintenance set forth in the plan. When requesting a copy of the railroad's plan, FRA does not intend to review any portion of the plan that relates to employee working conditions.

(d) The inspection, testing, and maintenance plan required by this section shall be reviewed by the railroad annually.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41307, July 3, 2000]

§ 238.109 Training, qualification, and designation program.

(a) Beginning on January 1, 2002, each railroad shall have adopted a training, qualification, and designation program for employees and contractors that perform any of the inspections, tests, or maintenance required by this part, and shall have trained such employees and contractors in accordance with the program. A railroad may request earlier application of these requirements upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c). For purposes of this section, a ''contractor'' is defined as a person under contract with the railroad or an employee of a person under contract with the railroad to perform any of the tasks required by this part.

(b) As part of this program, the railroad shall, at a minimum:

(1) Identify the tasks related to the inspection, testing, and maintenance required by this part that must be performed on each type of equipment that the railroad operates;

(2) Develop written procedures for the performance of the tasks identified in paragraph (b)(1) of this section;

(3) Identify the skills and knowledge necessary to perform each task identified in paragraph (b)(1) of this section;

(4) Adopt a training curriculum that includes classroom and ''hands-on'' lessons designed to impart the skills and knowledge identified as necessary to perform each task identified in paragraph (b)(1) of this section. The training curriculum shall specifically address the Federal regulatory requirements contained in this part that are related to the performance of the tasks identified;

(5) Require all employees and contractors to successfully complete the training course that covers the equipment and tasks for which they are responsible that are required by this part as well as the specific Federal regulatory requirements contained in this part related to equipment and tasks for which they are responsible;

(6) Require all employees and contractors to pass either a written or an oral examination covering the equipment and tasks for which they are responsible that are required by this part as well as the specific Federal regulatory requirements contained in this part related to equipment and tasks for which they are responsible;

(7) Require all employees and contractors to individually demonstrate ''hands-on'' capability to successfully perform the tasks required by this part that must be performed as part of their duties on the type equipment to which they are assigned;

(8) Require supervisors to complete the program that covers the employees whom they supervise, including refresher training;

(9) Require supervisors to exercise oversight to ensure that all the identified tasks are performed in accordance with the railroad's written procedures;

(10) Designate in writing that each employee and contractor has the knowledge and skills necessary to perform the safety-related tasks that are part of his or her job;

(11) Require periodic refresher training, at an interval not to exceed three years, that includes classroom and ''hands-on'' training, as well as testing; except, employees and contractors that have completed their initial training under this part prior to January 1, 2002, shall not be required to complete their first periodic refresher training until four years after the completion of their initial training, and every three years thereafter;

(12) Add new equipment to the qualification and designation program prior to its introduction to revenue service; and

(13) Maintain records adequate to demonstrate that each employee and contractor performing safety-related tasks on passenger equipment is currently qualified to do so. These records shall be adequate to distinguish the qualifications of the employee or contractor as a qualified person or as a qualified maintenance person.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41307, July 3, 2000; 67 FR 19990, Apr. 23, 2002]

§ 238.111 Pre-revenue service acceptance testing plan.

(a) *Passenger equipment that has previously been used in revenue service in the United States.* For passenger equipment that has previously been used in revenue service in the United States, each railroad shall test the equipment on its system prior to placing such equipment in revenue service for the first time on its railroad to ensure the compatibility of the equipment with the railroad's operating system (including the track, and signal system). A description of such testing shall be retained by the railroad and made available to FRA for inspection and copying upon request. For purposes of this paragraph, passenger equipment that has previously been used in revenue service in the United States means:

(1) The actual equipment used in such service;

(2) Equipment manufactured identically to that actual equipment; and

(3) Equipment manufactured similarly to that actual equipment with no material differences in safety-critical components or systems.

(b) *Passenger equipment that has not been used in revenue service in the United States.* Before using passenger equipment for the first time on its system that has not been used in revenue service in the United States, each railroad shall:

(1) Prepare a pre-revenue service acceptance testing plan for the equipment which contains the following elements:

(i) An identification of any waivers of FRA or other Federal safety regulations required for the testing or for revenue service operation of the equipment;

(ii) A clear statement of the test objectives. One of the principal test objectives shall be to demonstrate that the equipment meets the safety requirements specified in this part when operated in the environment in which it is to be used;

(iii) A planned schedule for conducting the testing;

(iv) A description of the railroad property or facilities to be used to conduct the testing;

(v) A detailed description of how the testing is to be conducted, including a description of the criteria to be used to evaluate the equipment's performance;

(vi) A description of how the test results are to be recorded;

(vii) A description of any special instrumentation to be used during the tests;

(viii) A description of the information or data to be obtained;

(ix) A description of how the information or data obtained is to be analyzed or used;

(x) A description of any criteria to be used as safety limits during the testing;

(xi) A description of the criteria to be used to measure or determine the success or failure of the tests. If acceptance is to be based on extrapolation of less than full-level testing results, the analysis to be done to justify the validity of the extrapolation shall be described;

(xii) Quality control procedures to ensure that the inspection, testing, and maintenance procedures are followed;

(xiii) Criteria to be used for the revenue service operation of the equipment; and

(xiv) A description of any testing of the equipment that has previously been performed.

(2) Submit a copy of the plan to FRA at least 30 days prior to testing the equipment and include with that submission notification of the times and places of the pre-revenue service tests to permit FRA observation of such tests. For Tier II passenger equipment, the railroad shall obtain FRA approval of the plan under the procedures specified in § 238.21.

(3) Comply with the plan, including fully executing the tests required by the plan.

(4) Document in writing the results of the tests. For Tier II passenger equipment, the railroad shall report the results of the tests to the FRA Associate Administrator for Safety at least 90 days prior to its intended operation of the equipment in revenue service.

(5) Correct any safety deficiencies identified in the design of the equipment or in the inspection, testing, and maintenance procedures, uncovered during the testing. If safety deficiencies cannot be corrected by design changes, the railroad shall impose operational limitations on the revenue service operation of the equipment that are designed to ensure that the equipment can operate safely. For Tier II passenger equipment, the railroad shall comply with any operational limitations imposed by the FRA Associate Administrator for Safety on the revenue service operation of the equipment for cause stated following FRA review of the results of the test program. This section does not restrict a railroad from petitioning FRA for a waiver of a safety regulation under the procedures specified in part 211 of this chapter.

(6) Make the plan and documentation kept pursuant to that plan available for inspection and copying by FRA upon request.

(7) For Tier II passenger equipment, obtain approval from the FRA Associate Administrator for Safety prior to placing the equipment in revenue service. The Associate Administrator grants such approval upon a showing of the railroad's compliance with the applicable requirements of this part.

(c) If a railroad plans a major upgrade or introduction of new technology on Tier II passenger equipment that has been used in revenue service in the United States and that affects a safety system on such equipment, the railroad shall follow the procedures

specified in paragraph (b) of this section prior to placing the equipment in revenue service with such a major upgrade or introduction of new technology.

§ 238.113 Emergency window exits.

(a) Number and location. Except as provided in paragraph (a)(3) of this section, the following requirements in this paragraph (a) apply on or after April 1, 2008—

(1) *Single-level passenger cars*. Each single-level passenger car shall have a minimum of four emergency window exits. At least one emergency window exit shall be located in each side of each end (half) of the car, in a staggered configuration where practical. (*See* Figure 1 to this subpart; *see also* Figures 1b and 1c to this subpart.)

(2) *Multi-level passenger cars—main levels*. Each main level in a multi-level passenger car is subject to the same requirements specified for single-level passenger cars in paragraph (a)(1) of this section.

(3) *Multi-level passenger cars—levels with seating areas other than main levels*.

(i) Except as provided in paragraphs (a)(3)(ii) and (iii) of this section, on or after August 1, 2009, any level other than a main level used for passenger seating in a multi-level passenger car, such as an intermediate level, shall have a minimum of two emergency window exits in each seating area. The emergency window exits shall be accessible to passengers in the seating area without requiring movement through an interior door or to another level of the car. At least one emergency window exit shall be located in each side of the seating area. An emergency window exit may be located within an exterior side door in the passenger compartment if it is not practical to place the window exit in the side of the seating area. (*See* Figures 2 and 2a to this subpart.)

(ii) Only one emergency window exit is required in a seating area in a passenger compartment if:

(A) It is not practical to place an emergency window exit in a side of the passenger compartment due to the need to provide accessible accommodations under the Americans with Disabilities Act of 1990;

(B) There are no more than four seats in the seating area; and

(C) A suitable, alternate arrangement for emergency egress is provided.

(iii) For passenger cars ordered prior to April 1, 2009, and placed in service prior to April 1, 2011, only one emergency window exit is required in a seating area in a passenger compartment if—

(A) It is not practicable to place a window exit in a side of the passenger compartment (due to the presence of a structure such as a bathroom, electrical locker, or kitchen); and

(B) There are no more than eight seats in the seating area.

(4) *Cars with a sleeping compartment or similar private compartment*. Each level of a passenger car with a sleeping compartment or a similar private compartment intended to be occupied by a passenger or train crewmember shall have at least one emergency window exit in each such compartment. For purposes of this paragraph (a)(4), a bathroom, kitchen, or locomotive cab is not considered a ''compartment.''

(b) *Ease of operability*. On or after November 8, 1999, each emergency window exit shall be designed to permit rapid and easy removal from the inside of the car during an emergency situation without requiring the use of a tool or other implement.

(c) *Dimensions*. Except as provided in paragraphs (c)(1) and (c)(2) of this section, each emergency window exit in a passenger car, including a sleeping car, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have an unobstructed opening with minimum dimensions of 26 inches horizontally by 24 inches vertically. A seatback is not an obstruction if it can be moved away from the window opening without using a tool or other implement.

(1) *Emergency window exits in exterior side doors*. An emergency window exit located within an exterior side door, in accordance with the requirements of paragraph (a)(3)(i) of this section, may have an unobstructed opening with minimum dimensions of 24 inches horizontally by 26 inches vertically.

(2) *Additional emergency window exits.* Any emergency window exit in addition to the minimum number required by paragraph (a) of this section that has been designated for use by the railroad need not comply with the minimum dimension requirements in paragraph (c) of this section, but must otherwise comply with all requirements in this part applicable to emergency window exits.

(d) *Marking and instructions.* (1) Each emergency window exit shall be conspicuously and legibly marked with luminescent material on the inside of each car to facilitate passenger egress.

(2) Legible and understandable operating instructions, including instructions for removing the window, shall be posted at or near each such window exit. If window removal may be hindered by the presence of a seatback, headrest, luggage rack, or other fixture, the instructions shall state the method for allowing rapid and easy removal of the window, taking into account the fixture(s), and this portion of the instructions may be in written or pictorial format.

[73 FR 6401, Feb. 1, 2008]

§ 238.114 Rescue access windows.

(a) *Number and location.* Except as provided in paragraph (a)(1)(ii) of this section, the following requirements in this paragraph (a) apply on or after April 1, 2008—

(1) *Single-level passenger cars.* Except as provided in this paragraph (a)(1) and in paragraphs (a)(1)(i), (a)(1)(ii), and (a)(5) of this section, each single-level passenger car shall have a minimum of two rescue access windows. At least one rescue access window shall be located in each side of the car entirely within 15 feet of the car's centerline, or entirely within 7½ feet of the centerline if the car does not exceed 45 feet in length. (*See* Figure 1a to this subpart; *see also* Figures 1b and 1c to this subpart.) If the seating level is obstructed by an interior door or otherwise partitioned into separate seating areas, each separate seating area shall have a minimum of one rescue access window in each side of the seating area, located as near to the center of the car as practical.

(i) For a single-level passenger car ordered prior to April 1, 2009, and placed in service prior to April 1, 2011, rescue access windows may be located farther than the above prescribed distances from the car's centerline, or located within exterior side doors, or both, if at least one rescue access window is located within each side of each end (half) of the same passenger compartment.

(ii) For a single-level passenger car ordered prior to September 8, 2000, and placed in service prior to September 9, 2002, the requirements of paragraph (a)(1) apply on or after August 1, 2009 if the car has at least two exterior side doors (or door leaves), each with a manual override device, and such doors (or door leaves) are located one on each side of the car, in opposite ends (halves) of the car (*i.e.*, in diagonally-opposite quadrants). The manual override device shall be—

(A) Capable of releasing the door (or door leaf) to permit it to be opened without power from outside the car;

(B) Located adjacent to the door (or door leaf) that it controls; and

(C) Designed and maintained so that a person can access the override device from outside the car without using a tool or other implement.

(2) *Multi-level passenger cars—main levels.* Each main level in a multi-level passenger car is subject to the same requirements specified for single-level passenger cars in paragraph (a)(1) of this section, with the exception of paragraph (a)(1)(ii), which is not applicable.

(3) *Multi-level passenger cars—levels with seating areas other than main levels.* (i) Except as provided in paragraphs (a)(3)(ii) and (a)(3)(iii) of this section, any level other than a main level used for passenger seating in a multi-level passenger car, such as an intermediate level, shall have a minimum of two rescue access windows in each seating area. The rescue access windows shall permit emergency responders to gain access to passengers in the seating area without requiring movement through an interior door or to another level of the car. At least one rescue access window shall be located in each side of the seating area. A rescue access window may be located within an exterior side

door in the passenger compartment if it is not practical to place the access window in the side of the seating area. (*See* Figures 2 and 2a of this subpart.)

(ii) Only one rescue access window is required in a seating area in a passenger compartment if—

(A) It is not practical to place a rescue access window in a side of the passenger compartment due to the need to provide accessible accommodations under the Americans with Disabilities Act of 1990;

(B) There are no more than four seats in the seating area; and

(C) A suitable, alternate arrangement for rescue access is provided.

(iii) For passenger cars ordered prior to April 1, 2009, and placed in service prior to April 1, 2011, only one rescue access window is required in a seating area in a passenger compartment if—

(A) It is not practicable to place an access window in a side of the passenger compartment (due to the presence of a structure such as a bathroom, electrical locker, or kitchen); and

(B) There are no more than eight seats in the seating area.

(4) *Cars with a sleeping compartment or similar private compartment*. Each level of a passenger car with a sleeping compartment or a similar private compartment intended to be occupied by a passenger or train crewmember shall have a minimum of one rescue access window in each such compartment. For purposes of this paragraph, a bathroom, kitchen, or locomotive cab is not considered a ''compartment.''

(5) *Dual-function windows*. If, on any level of a passenger car, the emergency window exits installed to meet the minimum requirements of § 238.113 are also intended to function as rescue access windows, the minimum requirements for the number and location of rescue access windows in paragraphs (a)(1) through (a)(4) of this section are also met for that level.

(b) *Ease of operability*. On or after April 1, 2008, each rescue access window must be capable of being removed without unreasonable delay by an emergency responder using either—

(1) A provided external mechanism; or

(2) Tools or implements that are commonly available to the responder in a passenger train emergency.

(c) *Dimensions*. Each rescue access window in a passenger car, including a sleeping car, ordered on or after April 1, 2009, or placed in service for the first time on or after April 1, 2011, shall have an unobstructed opening with minimum dimensions of 26 inches horizontally by 24 inches vertically. A rescue access window located within an exterior side door, in accordance with the requirements of paragraph (a)(3)(i) of this section, may have an unobstructed opening with minimum dimensions of 24 inches horizontally by 26 inches vertically. A seatback is not an obstruction if it can be moved away from the window opening without using a tool or other implement.

(d) *Marking and instructions*. Each rescue access window shall be marked with retroreflective material. A unique and easily recognizable symbol, sign, or other conspicuous marking shall also be used to identify each such window. Legible and understandable window-access instructions, including instructions for removing the window, shall be posted at or near each rescue access window.

[73 FR 6401, Feb. 1, 2008]

§ 238.115 Emergency lighting.

(a) This section applies to each passenger car ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. This section applies to each level of a multi-level passenger car.

(b) Emergency lighting shall be provided in each passenger car and shall include the following:

(1) A minimum, average illumination level of 1 foot-candle measured at floor level adjacent to each exterior door and each interior door providing access to an exterior door (such as a door opening into a vestibule);

(2) A minimum, average illumination level of 1 foot-candle measured 25 inches above floor level along the center of each aisle and passageway;

(3) A minimum illumination level of 0.1 foot-candle measured 25 inches above floor level at any point along the center of each aisle and passageway; and

(4) A back-up power system capable of:

(i) Operating in all equipment orientations within 45 degrees of vertical;

(ii) Operating after the initial shock of a collision or derailment resulting in the following individually applied accelerations:

(A) Longitudinal: 8g;

(B) Lateral: 4g; and

(C) Vertical: 4g; and

(iii) Operating all emergency lighting for a period of at least 90 minutes without a loss of more than 40% of the minimum illumination levels specified in this paragraph (b).

§ 238.117 Protection against personal injury.

On or after November 8, 1999, all moving parts, high voltage equipment, electrical conductors and switches, and pipes carrying hot fluids or gases on all passenger equipment shall be appropriately equipped with interlocks or guards to minimize the risk of personal injury. This section does not apply to the interior of a private car.

§ 238.119 Rim-stamped straight-plate wheels.

(a)(1) Except as provided in paragraph (a)(2) of this section, on or after November 8, 1999, no railroad shall place or continue in service any vehicle, other than a private car, that is equipped with a rim-stamped straight-plate wheel if a brake shoe acts on the tread of the wheel for the purpose of slowing the vehicle.

(2) A commuter railroad may continue in service a vehicle equipped with a Class A, rim-stamped straight-plate wheel mounted on an inboard-bearing axle until the railroad exhausts its replacement stock of wheels held as of May 12, 1999, provided the railroad does not modify the operation of the vehicle in any way that would result in increased thermal input to the wheel during braking.

(b) A rim-stamped straight-plate wheel shall not be used as a replacement wheel on a private car that operates in a passenger train if a brake shoe acts on the tread of the wheel for the purpose of slowing the car.

(c) The requirements of this section do not apply to a wheel that is periodically tread-braked for a short duration by automatic circuitry for the sole purpose of cleaning the wheel tread surface.

§ 238.121 Emergency communication.

(a) *PA system (public address system).* (1) *Existing Tier I passenger cars.* On or after January 1, 2012, each Tier I passenger car shall be equipped with a PA system that provides a means for a train crewmember to communicate by voice to passengers of his or her train in an emergency situation.

(2) *New Tier I and all Tier II passenger cars.* Each Tier I passenger car ordered on or after April 1, 2008, or placed in service for the first time April 1, 2010, and all Tier II passenger cars shall be equipped with a PA system that provides a means for a train crewmember to communicate by voice to passengers of his or her train in an emergency situation. The PA system shall also provide a means for a train crewmember to communicate by voice in an emergency situation to persons in the immediate vicinity of his or her train (*e.g.*, persons on the station platform). The PA system may be part of the same system as the intercom system.

(b) *Intercom system.* (1) *New Tier I and all Tier II passenger cars.* Each Tier I passenger car ordered on or after April 1, 2008, or placed in service for the first time on or after April 1, 2010, and all Tier II passenger cars shall be equipped with an intercom system that provides a means for passengers and crewmembers to communicate by voice with each other in an emergency situation. Except as further specified, at least one intercom that is accessible to passengers without using a tool or other implement shall be located in each end (half) of each car. If any passenger car does not exceed 45 feet in length, or if a Tier II passenger car was ordered prior to May 12, 1999, only one such intercom is required. The intercom system may be part of the same system as the PA system.

(2) *Marking and instructions.* The following requirements apply to each Tier I passenger car on or after April 1, 2010 and to all Tier II passenger cars:

(i) The location of each intercom intended for passenger use shall be conspicuously marked with luminescent material; and

(ii) Legible and understandable operating instructions shall be posted at or near each such intercom.

(c) *Back-up power*. PA and intercom systems shall have a back-up power system capable of—

(1) Operating in all equipment orientations within 45 degrees of vertical;

(2) Operating after the initial shock of a collision or derailment resulting in the following individually applied accelerations:

(i) Longitudinal: 8g;

(ii) Lateral: 4g; and

(iii) Vertical: 4g; and

(3) Powering each system to allow intermittent emergency communication for a minimum period of 90 minutes. Intermittent communication shall be considered equivalent to continuous communication during the last 15 minutes of the 90-minute minimum period.

[73 FR 6402, Feb. 1, 2008]

§ 238.123 Emergency roof access.

Except as provided in § 238.441 of this chapter—

(a) *Number and dimensions*. Each passenger car ordered on or after April 1, 2009, or placed in service for the first time on or after April 1, 2011, shall have a minimum of two emergency roof access locations, each with a minimum opening of 26 inches longitudinally (*i.e.*, parallel to the longitudinal axis of the car) by 24 inches laterally.

(b) *Means of access*. Emergency roof access shall be provided by means of a hatch, or a conspicuously marked structural weak point in the roof for access by properly equipped emergency response personnel.

(c) *Location*. Emergency roof access locations shall be situated as practical so that when a car is on its side—

(1) One emergency access location is wholly within each half of the roof as divided top from bottom; and

(2) One emergency access location is wholly within each half of the roof as divided left from right. (*See* Figure 3 to this subpart.)

(d) *Obstructions*. The ceiling space below each emergency roof access location shall be free from wire, cabling, conduit, and piping. This space shall also be free of any rigid secondary structure (*e.g.*, a diffuser or diffuser support, lighting back fixture, mounted PA equipment, or luggage rack) where practicable. If emergency roof access is provided by means of a hatch, it shall be possible to push interior panels or liners out of their retention devices and into the interior of the vehicle after removing the hatch. If emergency roof access is provided by means of a structural weak point, it shall be permissible to cut through interior panels, liners, or other non-rigid secondary structures after making the cutout hole in the roof, provided any such additional cutting necessary to access the interior of the vehicle permits a minimum opening of the dimensions specified in paragraph (a) to be maintained.

(e) *Marking and instructions*. Each emergency roof access location shall be conspicuously marked with retroreflective material of contrasting color. As further specified, legible and understandable instructions shall be posted at or near each such location. If emergency roof access is provided by means of a structural weak point—

(1) The retroreflective material shall conspicuously mark the line along which the roof skin shall be cut; and

(2) A sign plate with a retroreflective border shall also state as follows:

CAUTION—DO NOT USE FLAME CUTTING DEVICES

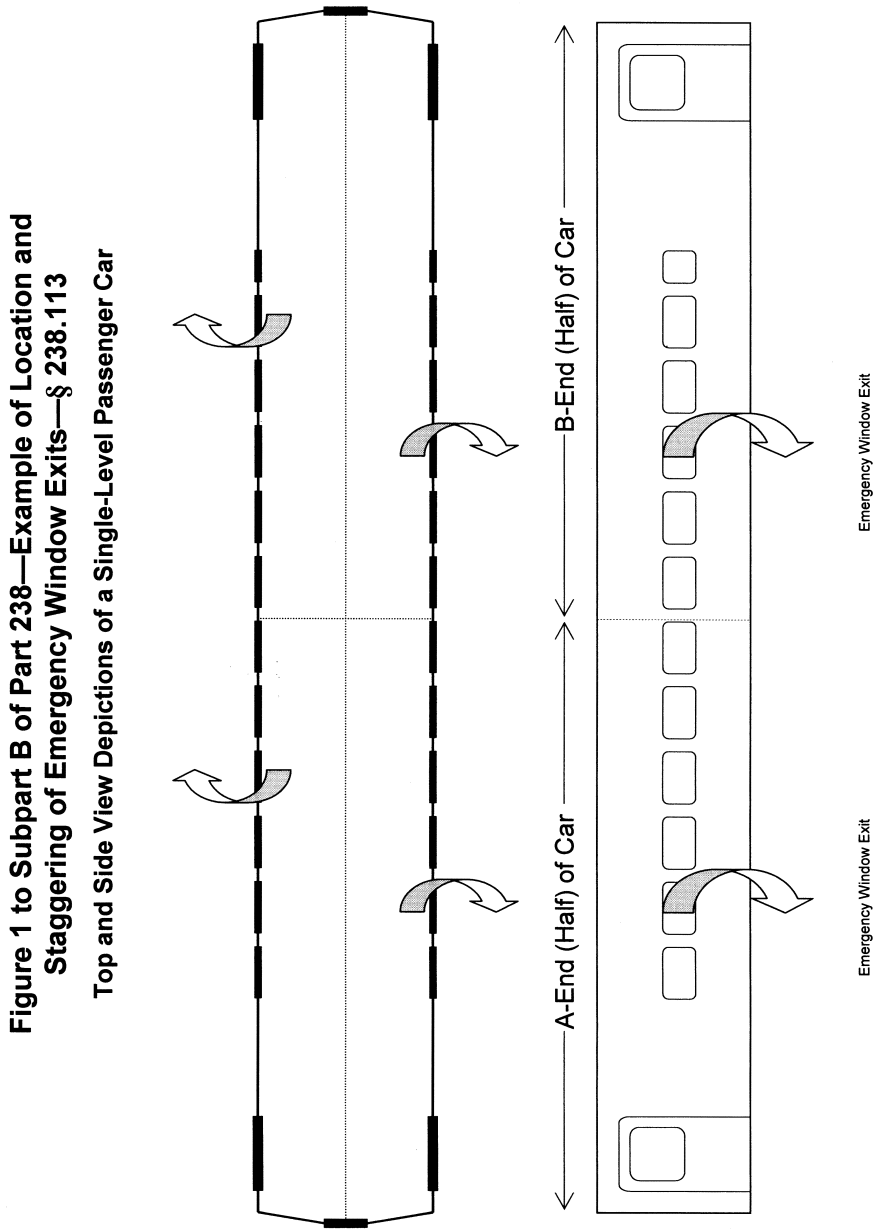
CAUTION—WARN PASSENGERS BEFORE CUTTING

CUT ALONG DASHED LINE TO GAIN ACCESS

ROOF CONSTRUCTION—[STATE RELEVANT DETAILS]

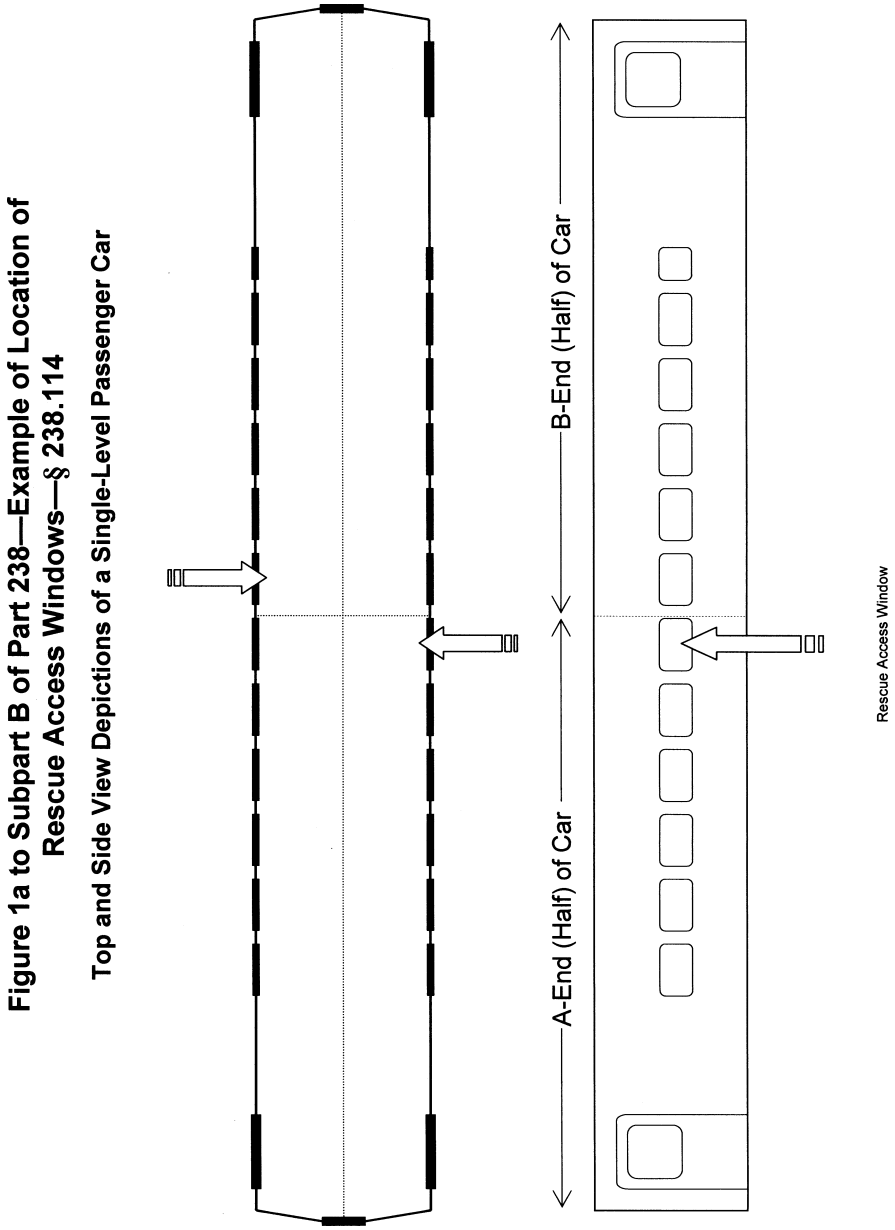
[73 FR 6403, Feb. 1, 2008]

FIGURE 1 TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND STAGGERING OF EMERGENCY WINDOW EXITS—§ 238.113



[73 FR 6403, Feb. 1, 2008]

FIGURE 1A TO SUBPART B OF PART 238—EXAMPLE OF LOCATION OF RESCUE ACCESS WINDOWS—§ 238.114

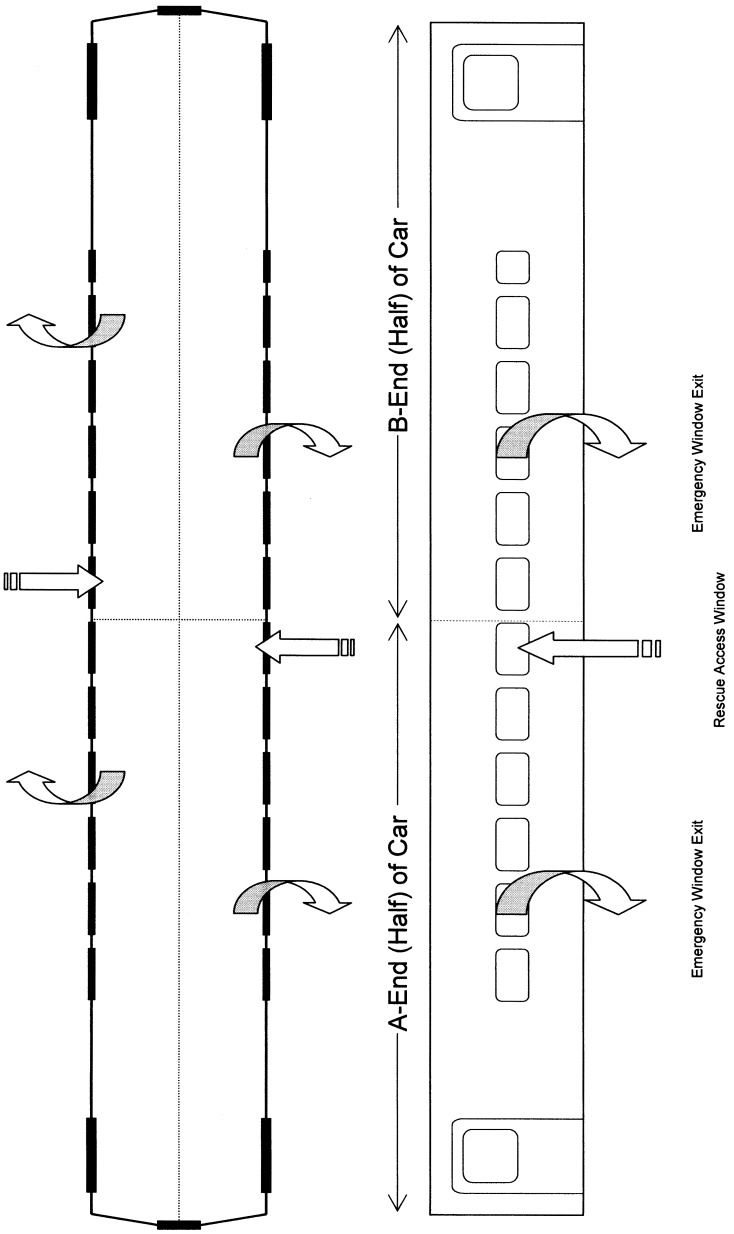


[73 FR 6403, Feb. 1, 2008]

FIGURE 1B TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND STAGGERING OF EMERGENCY WINDOW EXITS AND LOCATION OF RESCUE ACCESS WINDOWS—§§ 238.113 AND 238.114

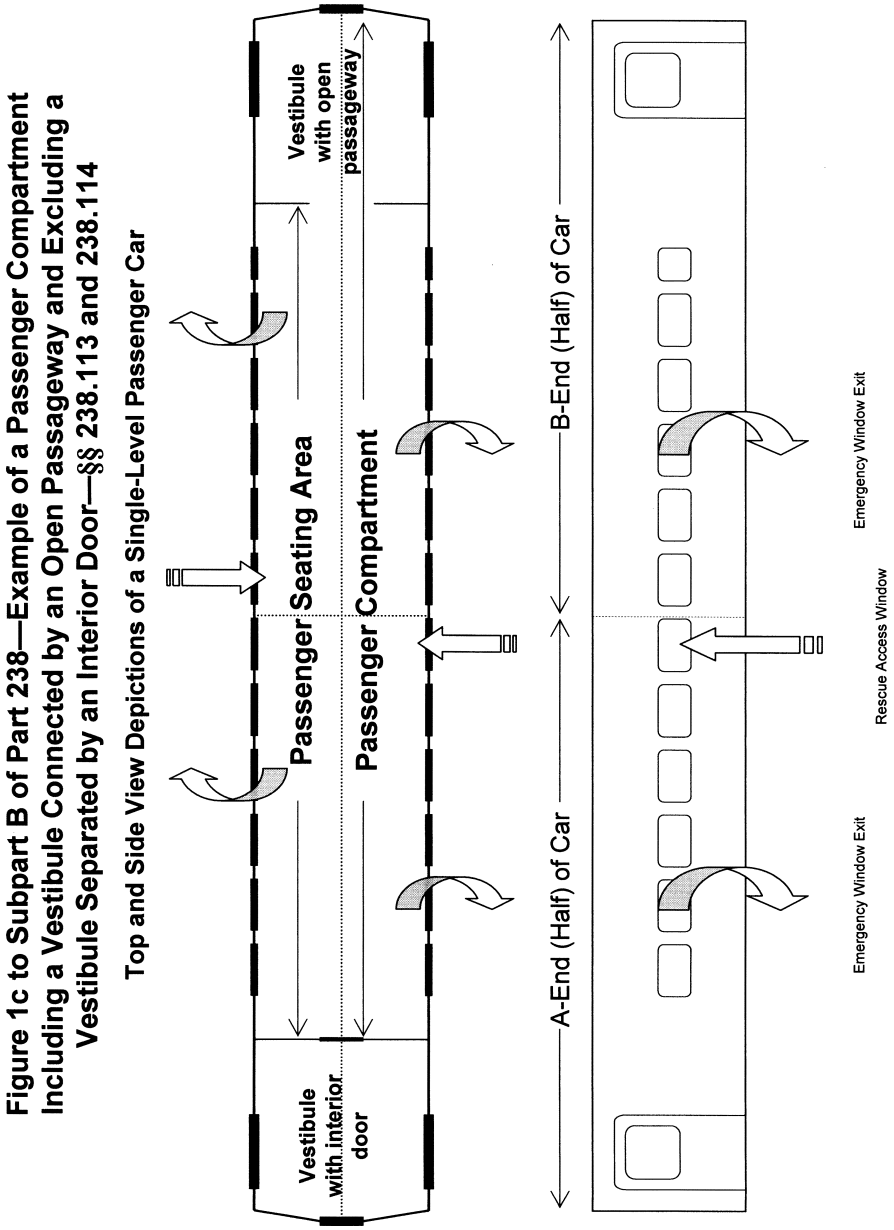
Figure 1b to Subpart B of Part 238—Example of Location and Staggering of Emergency Window Exits and Location of Rescue Access Windows—§§ 238.113 and 238.114

Top and Side View Depictions of a Single-Level Passenger Car



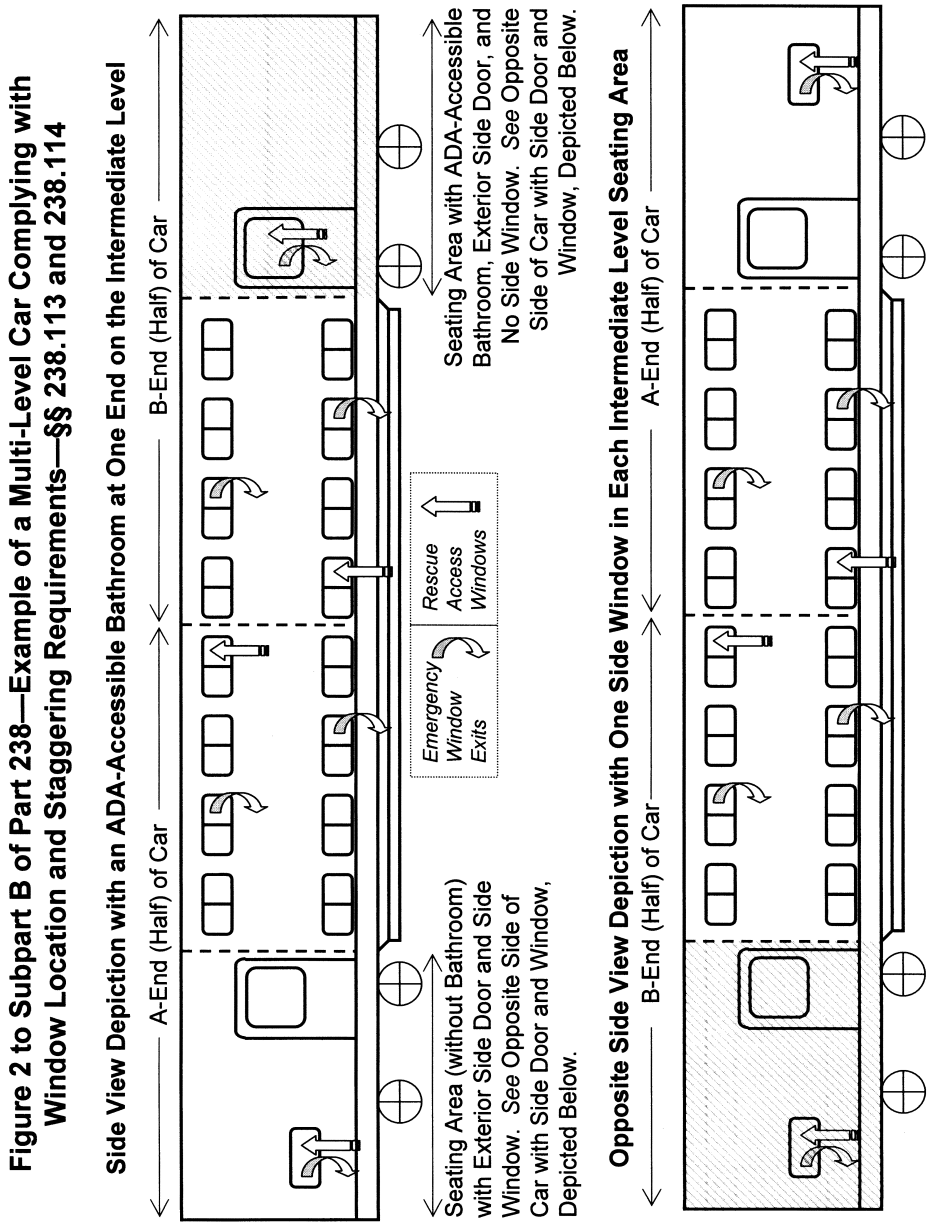
[73 FR 6403, Feb. 1, 2008]

FIGURE 1C TO SUBPART B OF PART 238—EXAMPLE OF A PASSENGER COMPARTMENT INCLUDING A VESTIBULE CONNECTED BY AN OPEN PASSAGEWAY AND EXCLUDING A VESTIBULE SEPARATED BY AN INTERIOR DOOR—§§ 238.113 AND 238.114



[73 FR 6403, Feb. 1, 2008]

FIGURE 2 TO SUBPART B OF PART 238—EXAMPLE OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION AND STAGGERING REQUIREMENTS—§§ 238.113 AND 238.114

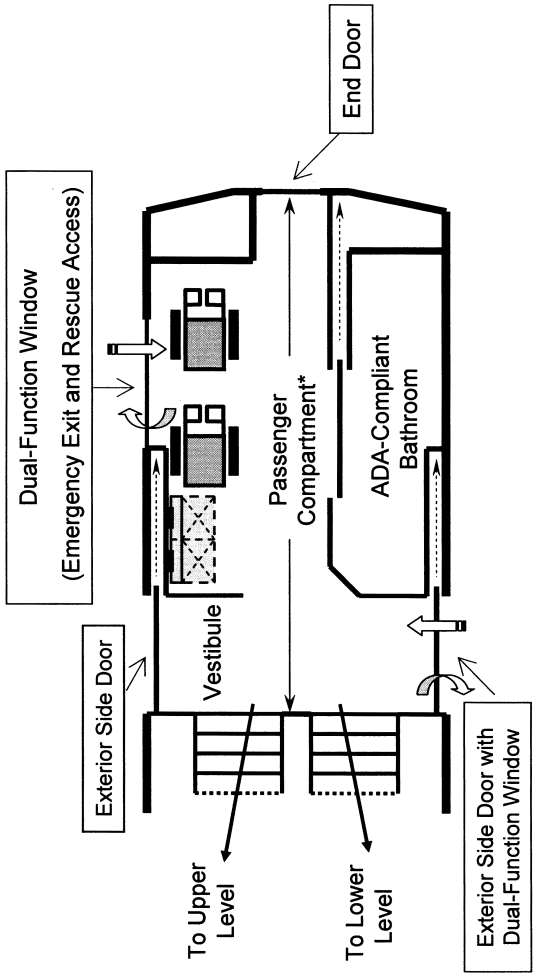


[73 FR 6403, Feb. 1, 2008]

FIGURE 2A TO SUBPART B OF PART 238—EXAMPLE OF AN INTERMEDIATE LEVEL SEATING AREA OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION REQUIREMENTS—§§ 238.113 AND 238.114

Figure 2a to Subpart B of Part 238—Example of an Intermediate Level Seating Area of a Multi-Level Car Complying with Window Location Requirements—§§ 238.113 and 238.114

Top View Depiction of an Intermediate Level Seating Area with an ADA-Accessible Bathroom



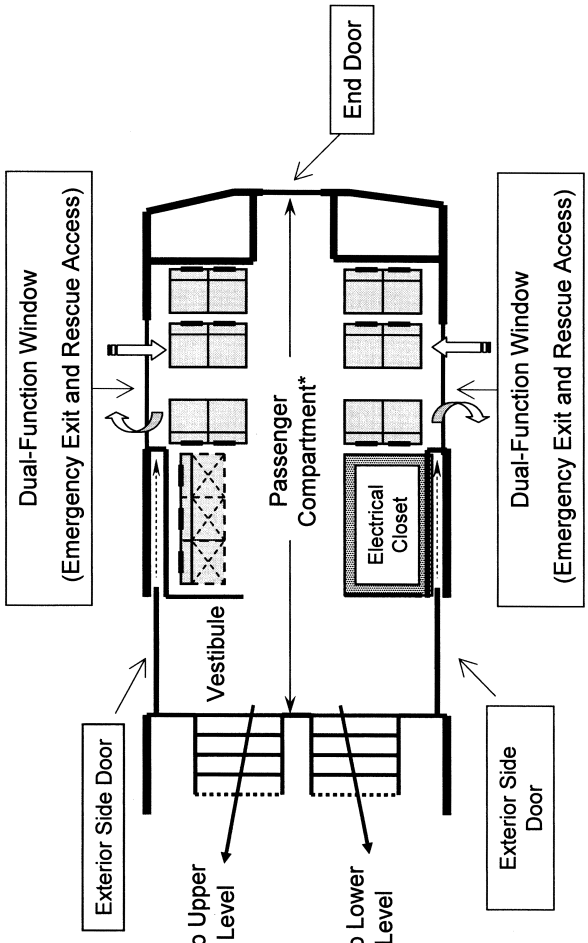
* The passenger compartment in this example includes the vestibule and extends to the point where the stairs begin because there is an open passageway leading to the vestibule. If an interior door separates the vestibule from the seating area, the passenger compartment would only extend to the interior vestibule door.

[73 FR 6403, Feb. 1, 2008]

FIGURE 2B TO SUBPART B OF PART 238—EXAMPLE OF AN INTERMEDIATE LEVEL SEATING AREA OF A MULTI-LEVEL CAR COMPLYING WITH WINDOW LOCATION REQUIREMENTS—§§ 238.113 AND 238.114

Figure 2b to Subpart B of Part 238—Example of an Intermediate Level Seating Area of a Multi-Level Car Complying with Window Location Requirements—§§ 238.113 and 238.114

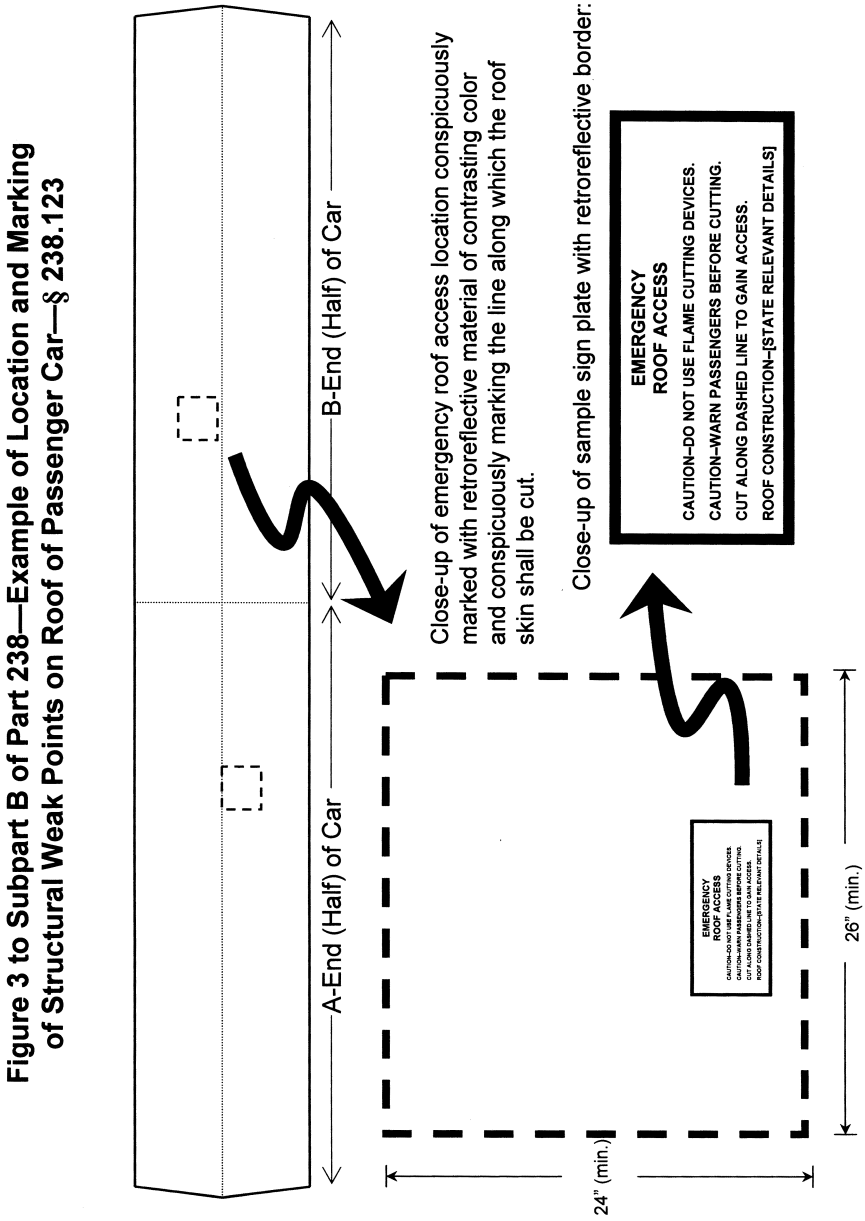
Top View Depiction of an Intermediate Level Seating Area with Two Side Windows



* The passenger compartment in this example includes the vestibule and extends to the point where the stairs begin because there is an open passageway leading to the vestibule. If an interior door separates the vestibule from the seating area, the passenger compartment would only extend to the interior vestibule door.

[73 FR 6403, Feb. 1, 2008]

FIGURE 3 TO SUBPART B OF PART 238—EXAMPLE OF LOCATION AND MARKING OF STRUCTURAL WEAK POINTS ON ROOF OF PASSENGER CAR—§ 238.123



[73 FR 6403, Feb. 1, 2008]

Subpart C—Specific Requirements for Tier I Passenger Equipment

§ 238.201 Scope/alternative compliance.

(a) *Scope*. (1) This subpart contains requirements for railroad passenger equipment operating at speeds not exceeding 125 miles per hour. As stated in § 238.229, all such passenger equipment remains subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter. Unless otherwise specified, these requirements only apply to passenger equipment ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002.

(2) The structural standards of this subpart (§ 238.203—static end strength; § 238.205—anti-climbing mechanism; § 238.207—link between coupling mechanism and car body; § 238.209—forward-facing end structure of locomotives; § 238.211—collision posts; § 238.213—corner posts; § 238.215—rollover strength; § 238.217—side structure; § 238.219—truck-to-car-body attachment; and § 238.223—locomotive fuel tanks) do not apply to passenger equipment if used exclusively on a rail line:

(i) With no public highway-rail grade crossings;

(ii) On which no freight operations occur at any time;

(iii) On which only passenger equipment of compatible design is utilized; and

(iv) On which trains operate at speeds not exceeding 79 mph. Any such passenger equipment remains subject to the requirements of § 229.141 of this chapter, as applicable.

(b) *Alternative compliance*. Passenger equipment of special design shall be deemed to comply with this subpart, other than § 238.203, for the service environment in which the petitioner proposes to operate the equipment if the FRA Associate Administrator for Safety determines under paragraph (c) of this section that the equipment provides at least an equivalent level of safety in such environment with respect to the protection of its occupants from serious injury in the case of a derailment or collision. In making a determination under paragraph (c) the Associate Administrator shall consider, as a whole, all of those elements of casualty prevention or mitigation relevant to the integrity of the equipment that are addressed by the requirements of this subpart.

(c)(1) The Associate Administrator may only make a finding of equivalent safety and compliance with this subpart, other than § 238.203, based upon a submission of data and analysis sufficient to support that determination. The petition shall include:

(i) The information required by § 238.21(c);

(ii) Information, including detailed drawings and materials specifications, sufficient to describe the actual construction of the equipment of special design;

(iii) Engineering analysis sufficient to describe the likely performance of the equipment in derailment and collision scenarios pertinent to the safety requirements for which compliance is required and for which the equipment does not conform to the specific requirements of this subpart; and

(iv) A quantitative risk assessment, incorporating the design information and engineering analysis described in this paragraph, demonstrating that the equipment, as utilized in the service environment for which recognition is sought, presents no greater hazard of serious personal injury than equipment that conforms to the specific requirements of this subpart.

(2) Any petition made under this paragraph is subject to the procedures set forth in § 238.21, and will be disposed of in accordance with § 238.21(g).

[64 25660, May 12, 1999, as amended at 67 FR 19990, Apr. 23, 2002; 71 FR 36916, June 28, 2006]

§ 238.203 Static end strength.

(a)(1) Except as further specified in this paragraph or in paragraph (d), on or after November 8, 1999 all passenger equipment shall resist a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure.

(2) For a passenger car or a locomotive, the static end strength of unoccupied volumes may be less than 800,000 pounds if:

(i) Energy absorbing structures are used as part of a crash energy management design of the passenger car or locomotive, and

(ii) The passenger car or locomotive resists a minimum static end load of 800,000 pounds applied on the line of draft at the ends of its occupied volume without permanent deformation of the body structure.

(3) For a locomotive placed in service prior to November 8, 1999, as an alternative to resisting a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure, the locomotive shall resist a horizontal load of 1,000,000 pounds applied along the longitudinal center line of the locomotive at a point on the buffer beam construction 12 inches above the center line of draft without permanent deformation of the body structure. The application of this load shall not be distributed over an area greater than 6 inches by 24 inches. The alternative specified in this paragraph is not applicable to a cab car or an MU locomotive.

(4) The requirements of this paragraph do not apply to:

(i) A private car; or

(ii) Unoccupied passenger equipment operating at the rear of a passenger train.

(b) Passenger equipment placed in service before November 8, 1999 is presumed to comply with the requirements of paragraph (a)(1) of this section, unless the railroad operating the equipment has knowledge, or FRA makes a showing, that such passenger equipment was not built to the requirements specified in paragraph (a)(1).

(c) When overloaded in compression, the body structure of passenger equipment shall be designed, to the maximum extent possible, to fail by buckling or crushing, or both, of structural members rather than by fracture of structural members or failure of structural connections.

(d) *Grandfathering of non-compliant equipment for use on a specified rail line or lines*—(1) *Grandfathering approval is equipment and line specific.* Grandfathering approval of non-compliant equipment under this paragraph is limited to usage of the equipment on a particular rail line or lines. Before grandfathered equipment can be used on another rail line, a railroad must file and secure approval of a grandfathering petition under paragraph (d)(3) of this section.

(2) *Temporary usage of non-compliant equipment.* Any passenger equipment placed in service on a rail line or lines before November 8, 1999 that does not comply with the requirements of paragraph (a)(1) may continue to be operated on that particular line or (those particular lines) if the operator of the equipment files a petition seeking grandfathering approval under paragraph (d)(3) before November 8, 1999. Such usage may continue while the petition is being processed, but in no event later than May 8, 2000, unless the petition is approved.

(3) *Petitions for grandfathering.* Petitions for grandfathering shall include:

(i) The name, title, address, and telephone number of the primary person to be contacted with respect to the petition;

(ii) Information, including detailed drawings and material specifications, sufficient to describe the actual construction of the equipment;

(iii) Engineering analysis sufficient to describe the likely performance of the static end strength of the equipment and the likely performance of the equipment in derailment and collision scenarios pertinent to the equipment's static end strength;

(iv) A description of risk mitigation measures that will be employed in connection with the usage of the equipment on a specified rail line or lines to decrease the likelihood of accidents involving the use of the equipment; and

(v) A quantitative risk assessment, incorporating the design information, engineering analysis, and risk mitigation measures described in this paragraph, demonstrating that the use of the equipment, as utilized in the service environment for which recognition is sought, is in the public interest and is consistent with railroad safety.

(e) *Service.* Each petition shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Mail Stop 25, Washington, DC 20590.

(f) *Federal Register notice.* FRA will publish a notice in the FEDERAL REGISTER concerning each petition under paragraph (d) of this section.

(g) *Comment.* Not later than 30 days from the date of publication of the notice in the FEDERAL REGISTER concerning a petition under paragraph (d) of this section, any person may comment on the petition.

(1) Each comment shall set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Each comment shall be submitted to the U.S. Department of Transportation, Docket Operations (M–30), West Building Ground Floor, Room W12B140, 1200 New Jersey Avenue, SE., Washington, DC 20590, and shall contain the assigned docket number for that proceeding. The form of such submission may be in written or electronic form consistent with the standards and requirements established by the Federal Docket Management System and posted on its web site at *http://www.regulations.gov*.

(h) *Disposition of petitions* (1) If the Administrator finds it necessary or desirable, FRA will conduct a hearing on a petition in accordance with the procedures provided in § 211.25 of this chapter.

(2) If FRA finds that the petition complies with the requirements of this section and that the proposed usage is in the public interest and consistent with railroad safety, the petition will be granted, normally within 90 days of its receipt. If the petition is neither granted nor denied within 90 days, the petition remains pending for decision. FRA may attach special conditions to the approval of the petition. Following the approval of a petition, FRA may reopen consideration of the petition for cause stated.

(3) If FRA finds that the petition does not comply with the requirements of this section or that the proposed usage is not in the public interest and consistent with railroad safety, the petition will be denied, normally within 90 days of its receipt.

(4) When FRA grants or denies a petition, or reopens consideration of the petition, written notice is sent to the petitioner and other interested parties.

[64 FR 25660, May 12, 1999, as amended at 64 FR 70196, Dec. 16, 1999; 67 FR 19991, Apr. 23, 2002; 74 FR 25174, May 27, 2009]

§ 238.205 Anti-climbing mechanism.

(a) Except as provided in paragraph (b) of this section, all passenger equipment placed in service for the first time on or after September 8, 2000 shall have at both the forward and rear ends an anti-climbing mechanism capable of resisting an upward or downward vertical force of 100,000 pounds without failure. When coupled together in any combination to join two vehicles, AAR Type H and Type F tight-lock couplers satisfy this requirement.

(b) Except for a cab car or an MU locomotive, each locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have an anti-climbing mechanism at its forward end capable of resisting both an upward and downward vertical force of 200,000 pounds without failure. Locomotives required to be constructed in accordance with subpart D of part 229 of this chapter shall have an anti-climbing mechanism in compliance with § 229.206 of this chapter, in lieu of the requirements of this paragraph.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19991, Apr. 23, 2002; 71 FR 36916, June 28, 2006]

§ 238.207 Link between coupling mechanism and car body.

All passenger equipment placed in service for the first time on or after September 8, 2000 shall have a coupler carrier at each end designed to resist a vertical downward thrust from the coupler shank of 100,000 pounds for any normal horizontal position of the coupler, without permanent deformation. For passenger equipment that is connected by articulated joints that comply with the requirements of § 238.205(a), such passenger equipment also complies with the requirements of this section.

§ 238.209 Forward-facing end structure of locomotives.

The skin covering the forward-facing end of each locomotive shall be:

(a) Equivalent to a ½ inch 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;

(b) Designed to inhibit the entry of fluids into the occupied cab area of the equipment; and

(c) Affixed to the collision posts or other main vertical structural members of the forward end structure so as to add to the strength of the end structure.

(d) As used in this section, the term ''skin'' does not include forward-facing windows and doors.

§ 238.211 Collision posts.

(a) Except as further specified in this paragraph and paragraphs (b) and (c) of this section—

(1) All passenger equipment placed in service for the first time on or after September 8, 2000 shall have either:

(i) Two full-height collision posts, located at approximately the one-third points laterally, at each end. Each collision post shall have an ultimate longitudinal shear strength of not less than 300,000 pounds at a point even with the top of the underframe member to which it is attached. If reinforcement is used to provide the shear value, the reinforcement shall have full value for a distance of 18 inches up from the underframe connection and then taper to a point approximately 30 inches above the underframe connection; or

(ii) An equivalent end structure that can withstand the sum of forces that each collision post in paragraph (a)(1)(i) of this section is required to withstand. For analysis purposes, the required forces may be assumed to be evenly distributed at the end structure at the underframe joint.

(2) The requirements of this paragraph do not apply to unoccupied passenger equipment operating in a passenger train, or to the rear end of a locomotive if the end is unoccupied by design.

(b) Each locomotive, including a cab car and an MU locomotive, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall have at its forward end, in lieu of the structural protection described in paragraph (a) of this section, either:

(1) Two forward collision posts, located at approximately the one-third points laterally, each capable of withstanding:

(i) A 500,000-pound longitudinal force at the point even with the top of the underframe, without exceeding the ultimate strength of the joint; and

(ii) A 200,000-pound longitudinal force exerted 30 inches above the joint of the post to the underframe, without exceeding the ultimate strength; or

(2) An equivalent end structure that can withstand the sum of the forces that each collision post in paragraph (b)(1)(i) of this section is required to withstand.

(c) The end structure requirements in paragraphs (a) and (b) of this section apply only to the ends of a semi-permanently coupled consist of articulated units, provided that:

(1) The railroad submits to the FRA Associate Administrator for Safety under the procedures specified in § 238.21 a documented engineering analysis establishing that the articulated connection is capable of preventing disengagement and telescoping to the same extent as equipment satisfying the anti-climbing and collision post requirements contained in this subpart; and

(2) FRA finds the analysis persuasive.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19991, Apr. 23, 2002]

§ 238.213 Corner posts.

(a) Each passenger car shall have at each end of the car, placed ahead of the occupied volume, two full-height corner posts capable of resisting:

(1) A horizontal load of 150,000 pounds at the point of attachment to the underframe without failure;

(2) A horizontal load of 20,000 pounds at the point of attachment to the roof structure without failure; and

(3) A horizontal load of 30,000 pounds applied 18 inches above the top of the floor without permanent deformation.

(b) For purposes of this section, the orientation of the applied horizontal loads shall range from longitudinal inward to transverse inward.

§ 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 side plate—of all posts, braces and pier panels, to the extent available, on each side of the car located between body corner posts shall be not less than 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 ⅛ 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 the following individually applied loads: 2g vertically on the mass of the truck; and 250,000 pounds in any horizontal direction on the truck, along with the resulting vertical reaction to this load. 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 component attached to the truck by design.

[67 FR 19991, Apr. 23, 2002]

§ 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.

[67 FR 19991, Apr. 23, 2002]

§ 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.

(2) Battery chargers shall be designed to protect against overcharging.

(3) If batteries are of the type to potentially vent explosive gases, the battery compartment shall be adequately ventilated to prevent the accumulation of explosive concentrations of these gases.

(c) *Power dissipation resistors.* (1) Power dissipating resistors shall be adequately ventilated to prevent overheating under worst-case operating conditions as determined by the railroad.

(2) Power dissipation grids shall be designed and installed with sufficient isolation to prevent combustion.

(3) Resistor elements shall be electrically insulated from resistor frames, and the frames shall be electrically insulated from the supports that hold them.

(d) *Electromagnetic interference and compatibility.* (1) The operating railroad shall ensure electromagnetic compatibility of the safety-critical equipment systems with their environment. Electromagnetic compatibility may be achieved through equipment design or changes to the operating environment.

(2) The electronic equipment shall not produce electrical noise that affects the safe performance of train line control and communications or wayside signaling systems.

(3) To contain electromagnetic interference emissions, suppression of transients shall be at the source wherever possible.

(4) All electronic equipment shall be self-protected from damage or improper operation, or both, due to high voltage transients and long-term overvoltage or under-voltage conditions. This includes protection from both power frequency and harmonic effects as well as protection from radio frequency signals into the microwave frequency range.

§ 238.227 Suspension system.

On or after November 8, 1999—

(a) All passenger equipment shall exhibit freedom from hunting oscillations at all operating speeds. If hunting oscillations do occur, a railroad shall immediately take appropriate action to prevent derailment. For purposes of this paragraph, hunting oscillations shall be considered lateral oscillations

of trucks that could lead to a dangerous instability.

(b) All passenger equipment intended for service above 110 mph shall demonstrate stable operation during prerevenue service qualification tests at all operating speeds up to 5 mph in excess of the maximum intended operating speed under worst-case conditions—including component wear—as determined by the operating railroad.

(c) Nothing in this section shall affect the requirements of part 213 of this chapter as they apply to passenger equipment as provided in that part.

§ 238.229 Safety appliances—general.

(a) Except as provided in this part, all passenger equipment continues to be subject to the safety appliance requirements contained in Federal statute at 49 U.S.C. chapter 203 and in Federal regulations at part 231 of this chapter.

(b) Except as provided in this part, FRA interprets the provisions in part 231 of this chapter that expressly mandate that the manner of application of a safety appliance be a bolt, rivet, or screw to mean that the safety appliance and any related bracket or support used to attach that safety appliance to the equipment shall be so affixed to the equipment. Specifically, FRA prohibits the use of welding as a method of attachment of any such safety appliance or related bracket or support. A ''safety appliance bracket or support'' means a component or part attached to the equipment for the sole purpose of securing or attaching of the safety appliance. FRA does allow the welded attachment of a brace or stiffener used in connection with a mechanically fastened safety appliance. In order to be considered a ''brace'' or ''stiffener,'' the component or part shall not be necessary for the attachment of the safety appliance to the equipment and is used solely to provide extra strength or steadiness to the safety appliance.

(c) *Welded safety appliances.* (1) Passenger equipment placed in service prior to January 1, 2007, that is equipped with a safety appliance, required by the ''manner of application'' provisions in part 231 of this chapter to be attached by a mechanical fastener (*i.e.*, bolts, rivets, or screws), and the safety appliance is mechanically fastened to a bracket or support that is attached to the equipment by welding may continue to be used in service provided all of the requirements in paragraphs (e) through (k) of this section are met. The welded safety appliance bracket or support only needs to receive the initial visual inspection required under paragraph (g)(1) of this section if all of the following conditions are met:

(i) The welded safety appliance bracket or support meets all of the conditions contained in § 238.230(b)(1) for being considered part of the car body;

(ii) The weld on the safety appliance bracket or support does not contain any defect as defined in paragraph (d) of this section; and

(iii) The railroad submits a written list to FRA identifying each piece of passenger equipment equipped with a welded safety appliance bracket or support as described in paragraph (c)(1)(i) and (c)(1)(ii) of this section and provides a description of the specific safety appliance bracket or support.

(2) Passenger equipment placed in service prior to January 1, 2007, that is equipped with a safety appliance that is directly attached to the equipment by welding (*i.e.*, no mechanical fastening of any kind) shall be considered defective and immediately handled for repair pursuant to the requirements contained in § 238.17(e) unless the railroad meets the following:

(i) The railroad submits a written list to FRA that identifies each piece of passenger equipment equipped with a welded safety appliance as described in paragraph (c)(2) of this section and provides a description of the specific safety appliance; and

(ii) The involved safety appliance(s) on such equipment are inspected and handled pursuant to the requirements contained in paragraphs (g) through (k) of this section.

(d) *Defective welded safety appliance or welded safety appliance bracket or support.* Passenger equipment with a welded safety appliance or a welded safety appliance bracket or support will be considered defective and shall be handled in accordance with § 238.17(e) if

any part or portion of the weld contains a defect. Any repairs made to such equipment shall be in accordance with the inspection plan required in paragraph (g) of this section and the remedial actions identified in paragraph (j) of this section. A defect for the purposes of this section means a crack or fracture of any visibly discernible length or width. When appropriate, civil penalties for improperly using or hauling a piece of equipment with a defective welded safety appliance or safety appliance bracket or support addressed in this section will be assessed as an improperly applied safety appliance pursuant to the penalty schedule contained in Appendix A to part 231 of this chapter under the appropriate defect code contained therein.

(e) *Identification of equipment.* The railroad shall submit a written list to FRA that identifies each piece of passenger equipment equipped with a welded safety appliance bracket or support by January 1, 2007. Passenger equipment placed in service prior to January 1, 2007, but not discovered until after January 1, 2007, shall be immediately added to the railroad's written list and shall be immediately inspected in accordance with paragraph (g) through (k) of this section. The written list submitted by the railroad shall contain the following:

(1) The equipment number;

(2) The equipment type;

(3) The safety appliance bracket(s) or support(s) affected;

(4) Any equipment and any specific safety appliance bracket(s) or supports(s) on the equipment that will not be subject to the inspection plan required in paragraph (g) of this section;

(5) A detailed explanation for any such exclusion recommended in paragraph (e)(4) of this section;

(f) FRA's Associate Administrator for Safety reserves the right to disapprove any exclusion recommended by the railroad in paragraphs (c)(2)(i) and (d)(4) of this section and will provide written notification to the railroad of any such determination.

(g) *Inspection plans.* The railroad shall adopt and comply with and submit to FRA upon request a written safety appliance inspection plan. At a minimum, the plan shall include the following:

(1) Except as provided in paragraph (c)(1) of this section, an initial visual inspection (within 1 year of date of publication) and periodic re-inspections (at intervals not to exceed 6 years) of each welded safety appliance bracket or support identified in paragraph (e) of this section. If significant disassembly of a car is necessary to visually inspect the involved safety appliance bracket or support, the initial visual inspection may be conducted at the equipment's first periodic brake equipment maintenance interval pursuant to § 238.309 occurring after January 1, 2007.

(2) Identify the personnel that will conduct the initial and periodic inspections and any training those individuals are required to receive in accordance with the criteria contained in paragraph (h) of this section.

(3) Identify the specific procedures and criteria for conducting the initial and periodic safety appliance inspections in accordance with the requirements and criteria contained in paragraph (i) of this section.

(4) Identify when and what type of potential repairs or potential remedial action will be required for any defective welded safety appliance bracket or support discovered during the initial or periodic safety appliance inspection in accordance with paragraph (j) of this section.

(5) Identify the records that will be maintained that are related to the initial and periodic safety appliance inspections in accordance with the requirements contained in paragraph (k) of this section.

(h) *Inspection personnel.* The initial and periodic safety appliance inspections shall be performed by individuals properly trained and qualified to identify defective weld conditions. At a minimum, these personnel include the following:

(1) A qualified maintenance person (QMP) with at least 4 hours of training specific to the identification of weld defects and the railroad's weld inspection procedures;

(2) A current certified welding inspector (CWI) pursuant to American Welding Society Standard—AWS QC–1,

Standard for AWS Certification of Welding Inspectors (1996) or its current revised equivalent;

(3) A person possessing a current Canadian Welding Bureau (CWB) certification pursuant to the Canadian Standards Association Standard W59 (2003) or its current revised equivalent;

(4) A person possessing a current level II or level III visual inspector certification from the American Society for Non-destructive Testing pursuant to Recommended Practice SNT–TC–1A—Personnel Qualification and Certification in Nondestructive Testing (2001) or its current revised equivalent; or

(5) A person possessing a current certification under any other nationally or internationally recognized welding qualification standard that is equivalent to those identified in paragraphs (h)(2) through (h)(4) of this section.

(i) *Inspection procedures.* The initial and periodic safety appliance inspections shall be conducted in accordance with the procedures and criteria established in the railroad's inspection plan. At a minimum, these procedures and criteria shall include:

(1) A complete visual inspection of the entire welded surface of any safety appliance bracket or support identified in paragraph (e) of this section.

(2) The visual inspection shall occur after the complete removal of any dirt, grease, rust, or any other foreign matter from the welded portion of the involved safety appliance bracket or support. Removal of paint is not required.

(3) The railroad shall disassemble any equipment necessary to permit full visual inspection of the involved weld.

(4) Any materials necessary to conduct a complete inspection must be made available to the inspection personnel throughout the inspection process. These include but are not limited to such items as mirrors, magnifying glasses, or other location specific inspection aids. Remote viewing aids possessing equivalent sensitivity are permissible for restricted areas.

(5) Any weld found with a defect as defined in paragraph (d) of this section during the initial or periodic safety appliance inspection shall be inspected by either a certified weld inspector identified in paragraphs (h)(2) through (h)(5) of this section or a welding or materials engineer possessing a professional engineer's license for a final determination. No car with a defect in the weld of a safety appliance or its attachment may continue in use until a final determination as to the existence of a defect is made by the personnel identified in this paragraph.

(6) A weld finally determined to contain a defect shall be handled for repair in accordance with § 238.17(e) and repaired in accordance with the remedial action criteria contained in paragraph (j) of this section.

(j) *Remedial action.* Unless a defect in a weld is known to have been caused by crash damage, the railroad shall conduct a failure and engineering analysis of any weld identified in paragraph (e) of this section determined to have a break or crack either during the initial or periodic safety appliance inspection or while otherwise in service to determine if the break or crack is the result of crash damage, improper construction, or inadequate design. Based on the results of the analysis, the repair of the involved safety appliance bracket or support shall be handled as follows:

(1) A defect in a weld due to crash damage (*i.e.*, impact of the safety appliance by an outside force during service or an accident) or improper construction (*i.e.*, the weld did not conform to the engineered design) shall be reattached by either mechanically fastening the safety appliance or the safety appliance bracket or support to the equipment or welding the safety appliance bracket or support to the equipment in a manner that is at least as strong as the original design or at least twice the strength of a bolted mechanical attachment, whichever is greater. If welding is used to repair the damaged appliance, bracket, or support the following requirements shall be met:

(i) The repair shall be conducted in accordance with the welding procedures contained in APTA Standard SS–C&S–020–03—Standard for Passenger Rail Vehicle Structural Repair (September 2003); or an alternative procedure approved by FRA pursuant to § 238.21. The Director of the Federal Register approves incorporation by reference of the APTA Standard SS–C&S–

020–03 (September 2003), ''Standard for Passenger Rail Vehicle Structural Repair,'' in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American Public Transportation Association, 1666 K Street, Washington, DC 20006. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC 20590 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html;*

(ii) A qualified individual under paragraph (h) of this section shall inspect the weld to ensure it is free of any cracks or fractures prior to the equipment being placed in-service;

(iii) The welded safety appliance bracket or support shall receive a periodic safety appliance inspection pursuant to the requirements contained in paragraphs (g) through (i) of this section; and

(iv) A record of the welded repair pursuant to the requirements of paragraph (k) of this section shall be maintained by the railroad.

(2) A defect in the weld that is due to inadequate design (*i.e.*, unanticipated stresses or loads during service) shall be handled in accordance with the following:

(i) The railroad must immediately notify FRA's Associate Administrator for Safety in writing of its discovery of a defective weld that is due to inadequate design;

(ii) The involved safety appliance or the safety appliance bracket or support shall be reattached to the equipment by mechanically fastening the safety appliance or the safety appliance bracket or support to the equipment unless such mechanical fastening is impractical due to the design of the equipment;

(iii) The railroad shall develop and comply with a written plan submitted to and approved by FRA's Associate Administrator for Safety detailing a schedule for all passenger equipment in that series of cars with a similar welded safety appliance bracket or support to have the involved safety appliance or the safety appliance bracket or support mechanically fastened to the equipment; and

(iv) If a railroad determines that the design of the equipment makes it impractical to mechanically fasten the safety appliance or the safety appliance bracket or support to the equipment, then the railroad shall submit a request to FRA for special approval of alternative compliance pursuant to § 238.21. Such a request shall explain the necessity for any relief sought and shall contain appropriate data and analysis supporting its determination that any alternative method of attachment provides at least an equivalent level of safety.

(k) *Records.* Railroads shall maintain written or electronic records of the inspection and repair of the welded safety appliance brackets or supports on any equipment identified in paragraph (e) of this section. The records shall be made available to FRA upon request. At a minimum, these records shall include all of the following:

(1) Training or certification records for any person performing any of the inspections or repairs required in this section.

(2) The date, time, location, and identification of the person performing the initial and periodic safety appliance inspections for each piece of equipment identified in paragraph (e) of this section. This includes the identification of the person making any final determination as to the existence of a defect under paragraph (i)(5) of this section.

(3) A record of all passenger equipment found with a safety appliance weldment that is defective either during the initial or periodic safety appliance inspection or while the equipment is in-service. This record shall also identify the cause of the crack or fracture.

(4) The date, time, location, identification of the person making the repair, and the nature of the repair to any welded safety appliance bracket or support identified in paragraph (e) of this section.

[71 FR 61858, Oct. 19, 2006, as amended at 74 FR 25174, May 27, 2009]

§ 238.230 Safety appliances—new equipment.

(a) *Applicability*. This section applies to passenger equipment placed in service on or after January 1, 2007.

(b) *Welded safety sppliances*. Except as provided in this section, all passenger equipment placed into service on or after January 1, 2007, that is equipped with a safety appliance, required by the ''manner of application'' provisions in part 231 of this chapter to be attached by a mechanical fastener (*i.e.*, bolts, rivets, or screws), shall have the safety appliance and any bracket or support necessary to attach the safety appliance to the piece of equipment mechanically fastened to the piece of equipment.

(1) *Safety appliance brackets or supports considered part of the car body*. Safety appliance brackets or supports will be considered part of the car body and will not be required to be mechanically fastened to the piece of passenger equipment if all of the following are met:

(i) The bracket or support is welded to a surface of the equipment's body that is at a minimum 3/16-inch sheet steel or structurally reinforced to provide the equivalent strength and rigidity of 3/16-inch sheet steel;

(ii) The area of the weld is sufficient to ensure a minimum weld strength, based on yield, of three times the strength of the number of SAE grade 2, ½ inch diameter bolts that would be required for each attachment;

(iii) Except for any access required for attachment of the safety appliance, the weld is continuous around the perimeter of the surface of the bracket or support;

(iv) The attachment is made with fillet welds at least 3/16-inch in size;

(v) The weld is designed for infinite fatigue life in the application that it will be placed;

(vi) The weld is performed in accordance with the welding process and the quality control procedures contained in the current American Welding Society (AWS) Standard, the Canadian Welding Bureau (CWB) Standard, or an equivalent nationally or internationally recognized welding standard;

(vii) The weld is performed by an individual possessing the qualifications to be certified under the current AWS Standard, CWB Standard, or any equivalent nationally or internationally recognized welding qualification standard;

(viii) The weld is inspected by an individual qualified to determine that all of the conditions identified in paragraph (b)(1)(i) through (b)(1)(vii) of this section are met prior to the equipment being placed in service; and

(ix) A written or electronic record of the inspection required in paragraph (b)(1)(viii) of this section shall be retained by the railroad operating the equipment and shall be provided to FRA upon request. At a minimum, this record shall include the date, time, location, identification of the person performing the inspection, and the qualifications of the person performing the inspection.

(2) *Directly welded safety appliances*. Passenger equipment that is equipped with a safety appliance that is directly attached to the equipment by welding (*i.e.*, no mechanical fastening of any kind) may be placed in service only if the railroad meets the following:

(i) The railroad submits a written list to FRA that identifies each piece of new passenger equipment equipped with a welded safety appliance as described in paragraph (b)(2) of this section and provides a description of the specific safety appliance;

(ii) The railroad provides a detailed basis as to why the design of the vehicle or placement of the safety appliance requires that the safety appliance be directly welded to the equipment; and

(iii) The involved safety appliance(s) on such equipment are inspected and handled pursuant to the requirements contained in § 238.229(g) through (k).

(3) *Other welded safety appliances and safety appliance brackets and supports*. Except for safety appliance brackets and supports identified in paragraph (b)(1) of this section, safety appliance brackets and supports on passenger equipment shall not be welded to the car body unless the design of the equipment makes it impractical to mechanically fasten the safety appliance and it is impossible to meet the conditions for considering the bracket or support part of the car body contained in paragraph (b)(1) of this section. Prior to

placing a piece of passenger equipment in service with a welded safety appliance bracket or support as described in this paragraph, the railroad shall submit documentation to FRA, for FRA's review and approval, containing all of the following information:

(i) Identification of the equipment by number, type, series, operating railroad, and other pertinent data;

(ii) Identification of the safety appliance bracket(s) or support(s) not mechanically fastened to the equipment and not considered part of the car body under paragraph (b)(1) of this section;

(iii) A detailed analysis describing the necessity to attach the safety appliance bracket or support to the equipment by a means other than mechanical fastening;

(iv) A detailed analysis describing the inability to make the bracket or support part of the car body as provided for in paragraph (b)(1) of this section; and

(v) A copy and description of the consensus or other appropriate industry standard used to ensure the effectiveness and strength of the attachment;

(c) *Inspection and repair*. Passenger equipment with a welded safety appliance or a welded safety appliance bracket or support will be considered defective and shall be handled in accordance with § 238.17(e) if any part or portion of the weld is defective as defined in § 238.229(d). When appropriate, civil penalties for improperly using or hauling a piece of equipment with a defective welded safety appliance or safety appliance bracket or support addressed in this section will be assessed pursuant to the penalty schedule contained in Appendix A to part 231 of this chapter under the appropriate defect code contained therein.

(1) Any safety appliance bracket or support approved by FRA pursuant to paragraph (b)(3) of this section shall be inspected and handled in accordance with the requirements contained in § 238.229(g) through (k).

(2) Any repair to a safety appliance bracket or support considered to be part of the car body under paragraph (b)(1) of this section shall be conducted in accordance with APTA Standard SS–C&S–020–03—Standard for Passenger Rail Vehicle Structural Repair (September 2003), or an alternative procedure approved by FRA pursuant to § 238.21, and shall ensure that the repair meets the requirements contained in paragraphs (b)(1)(i) through (b)(1)(vii) of this section. The Director of the Federal Register approves incorporation by reference of the APTA Standard SS–C&S–020–03 (September 2003), ''Standard for Passenger Rail Vehicle Structural Repair,'' in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American Public Transportation Association, 1666 K Street, Washington, DC 20006. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC 20590 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*.

(d) *Passenger cars of special construction*. A railroad or a railroad's recognized representative may submit a request for special approval of alternative compliance pursuant to § 238.21 relating to the safety appliance arrangements on any passenger car considered a car of special construction under § 231.18 of this chapter. Any such petition shall be in the form of an industry-wide standard and at a minimum shall:

(1) Identify the type(s) of car to which the standard would be applicable;

(2) As nearly as possible, based upon the design of the equipment, ensure that the standard provides for the same complement of handholds, sill steps, ladders, hand or parking brakes, running boards, and other safety appliances as are required for a piece of equipment of the nearest approximate type already identified in part 231 of this chapter;

(3) Comply with all statutory requirements relating to safety appliances contained at 49 U.S.C. 20301 and 20302;

(4) Specifically address the number, dimension, location, and manner of application of each safety appliance contained in the standard;

(5) Provide specific analysis regarding why and how the standard was developed and specifically discuss the need or benefit of the safety appliance arrangement contained in the standard;

(6) Include drawings, sketches, or other visual aids that provide detailed information relating to the design, location, placement, and attachment of the safety appliances; and

(7) Demonstrate the ergonomic suitability of the proposed arrangements in normal use.

(e) Any industry standard approved pursuant to § 238.21 will be enforced against any person who violates any provision of the approved standard or causes the violation of any such provision. Civil penalties will be assessed under part 231 of this chapter by using the applicable defect code contained in appendix A to part 231 of this chapter.

[71 FR 61860, Oct. 19, 2006, as amended at 74 FR 25174, May 27, 2009]

§ 238.231 Brake system.

Except as otherwise provided in this section, on or after September 9, 1999 the following requirements apply to all passenger equipment and passenger trains.

(a) A passenger train's primary brake system shall be capable of stopping the train with a service application from its maximum authorized operating speed within the signal spacing existing on the track over which the train is operating.

(b) Where practicable, the design of passenger equipment ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, shall not require an inspector to place himself or herself on, under, or between components of the equipment to observe brake actuation or release. Passenger equipment not designed in this manner shall be equipped and handled in accordance with one of the following:

(1) Equipped with piston travel indicators as defined in § 238.5 or devices of similar design and inspected pursuant to the requirements contained in § 238.313 (j); or

(2) Equipped with brake indicators as defined in § 238.5, designed so that the pressure sensor is placed in a location so that nothing may interfere with the air flow to brake cylinder and inspected pursuant to the requirements contained in § 238.313 (j).

(c) Passenger equipment shall be provided with an emergency brake application feature that produces an irretrievable stop, using a brake rate consistent with prevailing adhesion, passenger safety, and brake system thermal capacity. An emergency brake application shall be available at any time, and shall be initiated by an unintentional parting of the train.

(d) A passenger train brake system shall respond as intended to signals from a train brake control line or lines. Control lines shall be designed so that failure or breakage of a control line will cause the brakes to apply or will result in a default to control lines that meet this requirement.

(e) Introduction of alcohol or other chemicals into the air brake system of passenger equipment is prohibited.

(f) The operating railroad shall require that the design and operation of the brake system results in wheels that are free of condemnable cracks.

(g) Disc brakes shall be designed and operated to produce a surface temperature no greater than the safe operating temperature recommended by the disc manufacturer and verified by testing or previous service.

(h) *Hand brakes and parking brakes.* (1) Except for a locomotive that is ordered before September 8, 2000 or placed in service for the first time before Sepbember 9, 2002, and except for MU locomotives, all locomotives shall be equipped with a hand or parking brake that can:

(i) Be applied or activated by hand;

(ii) Be released by hand; and

(iii) Hold the loaded unit on the maximum grade anticipated by the operating railroad.

(2) Except for a private car and locomotives addressed in paragraph (h)(1) of this section, all other passenger equipment, including MU locomotives, shall be equipped with a hand brake that meets the requirements for hand

brakes contained in part 231 of this chapter and that can:

(i) Be applied or activated by hand;

(ii) Be released by hand; and

(iii) Hold the loaded unit on the maximum grade anticipated by the operating railroad.

(3) Except for MU locomotives, on locomotives so equipped, the hand or parking brake as well as its parts and connections shall be inspected, and necessary repairs made, as often as service requires but no less frequently than every 368 days. The date of the last inspection shall be either entered on Form FRA F 6180–49A, suitably stenciled or tagged on the equipment, or maintained electronically provided FRA has access to the record upon request.

(4) A train's air brake shall not be depended upon to hold unattended equipment (including a locomotive, a car, or a train whether or not locomotive is attached). For purposes of this section, ''unattended equipment'' means equipment left standing and unmanned in such a manner that the brake system of the equipment cannot be readily controlled by a qualified person. Unattended equipment shall be secured in accordance with the following requirements:

(i) A sufficient number of hand or parking brakes shall be applied to hold the equipment. Railroads shall develop and implement a process or procedure to verify that the applied hand or parking brakes will sufficiently hold the equipment with the air brakes released;

(ii) Except for equipment connected to a source of compressed air (e.g., locomotive or ground air source), prior to leaving equipment unattended, the brake pipe shall be reduced to zero at a rate that is no less than a service rate reduction;

(iii) At a minimum, the hand or parking brake shall be fully applied on at least one locomotive or vehicle in an unattended locomotive consist or train;

(iv) A railroad shall develop, adopt, and comply with procedures for securing any unattended locomotive required to have a hand or parking brake applied when the locomotive is not equipped with an operative hand or parking brake;

(v) A railroad shall adopt and comply with instructions to address throttle position, status of the reverser lever, position of the generator field switch, status of the independent brakes, position of the isolation switch, and position of the automatic brake valve, or the functional equivalent of these items, on all unattended locomotives. The procedures and instruction shall take into account weather conditions as they relate to throttle position and reverser handle; and

(vi) Any hand or parking brakes applied to hold unattended equipment shall not be released until it is known that the air brake system is properly charged.

(i) Passenger cars shall be equipped with a means to apply the emergency brake that is accessible to passengers and located in the vestibule or passenger compartment. The emergency brake shall be clearly identified and marked.

(j) Locomotives ordered after September 8, 2000, or placed in service for the first time after September 9, 2002, that are equipped with blended brakes shall be designed so that:

(1) The blending of friction and dynamic brake to obtain the correct retarding force is automatic;

(2) Loss of power or failure of the dynamic brake does not result in exceeding the allowable stopping distance;

(3) The friction brake alone is adequate to safely stop the train under all operating conditions; and

(4) Operation of the friction brake alone does not result in thermal damage to wheels or disc rotor surface temperatures exceeding the manufacturer's recommendation.

(k) For new designs of braking systems, the design process shall include computer modeling or dynamometer simulation of train braking that shows compliance with paragraphs (f) and (g) of this section over the range of equipment operating speeds. A new simulation is required prior to implementing a change in operating parameters.

(l) Locomotives ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002, shall be equipped with effective

air coolers or dryers that provide air to the main reservoir with a dew point at least 10 degrees F. below ambient temperature.

(m) When a passenger train is operated in either direct or graduated release—

(1) All the cars in the train consist shall be set up in the same operating mode or

(2) Up to two cars may be operated in direct release mode when the rest of the cars in the train are operated in graduated release mode, provided that the cars operated in direct release mode are hauled at the rear of the train consist.

(n) Before adjusting piston travel or working on brake rigging, the cutout cock in the brake pipe branch must be closed and the air reservoirs must be voided of all compressed air. When cutout cocks are provided in brake cylinder pipes, these cutout cocks may be closed, and air reservoirs need not be voided of all compressed air.

(o) All passenger trains to which this part applies shall comply with the requirements covering the use of two-way end-of-train devices contained in part 232 of this chapter.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41307, July 3, 2000; 71 FR 61861, Oct. 19, 2006]

§ 238.233 Interior fittings and surfaces.

(a) Each seat in a passenger car shall—

(1) Be securely fastened to the car body so as to withstand an individually applied acceleration of 4g acting in the lateral direction and 4g acting in the upward vertical direction on the deadweight of the seat or seats, if held in tandem; and

(2) Have an attachment to the car body of an ultimate strength capable of resisting simultaneously:

(i) The longitudinal inertial force of 8g acting on the mass of the seat; and

(ii) The load associated with the impact into the seatback of an unrestrained 95th-percentile adult male initially seated behind the seat, when the floor to which the seat is attached decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds.

(b) Overhead storage racks in a passenger car shall provide longitudinal and lateral restraint for stowed articles. Overhead storage racks shall be attached to the car body with sufficient strength to resist loads due to the following individually applied accelerations acting on the mass of the luggage stowed as determined by the railroad:

(1) Longitudinal: 8g;

(2) Vertical: 4g; and

(3) Lateral: 4g.

(c) Other interior fittings within a passenger car shall be attached to the car body with sufficient strength to withstand the following individually applied accelerations acting on the mass of the fitting:

(1) Longitudinal: 8g;

(2) Vertical: 4g; and

(3) Lateral: 4g.

(d) To the extent possible, all interior fittings in a passenger car, except seats, shall be recessed or flush-mounted.

(e) Sharp edges and corners in a locomotive cab and a passenger car shall be either avoided or padded to mitigate the consequences of an impact with such surfaces.

(f) Locomotives required to be constructed in accordance with subpart D of part 229 of this chapter shall have cab seat attachment in compliance with § 229.206 of this chapter, in lieu of the following requirements of this paragraph. Each seat provided for a crewmember regularly assigned to occupy the cab of a locomotive and each floor-mounted seat in the cab shall be secured to the car body with an attachment having an ultimate strength capable of withstanding the loads due to the following individually applied accelerations acting on the combined mass of the seat and a 95th-percentile adult male occupying it:

(1) Longitudinal: 8g;

(2) Lateral: 4g; and

(3) Vertical: 4g.

(g) If, for purposes of showing compliance with the requirements of this section, the strength of a seat attachment is to be demonstrated through sled testing, the seat structure and seat attachment to the sled that is used in such testing must be representative of the actual seat structure in, and seat

attachment to, the rail vehicle subject to the requirements of this section. If the attachment strength of any other interior fitting is to be demonstrated through sled testing, for purposes of showing compliance with the requirements of this section, such testing shall be conducted in a similar manner.

[64 FR 25660, May 12, 1999, as amended at 71 FR 36917, June 28, 2006]

§ 238.235 Doors.

(a) By December 31, 1999, each powered, exterior side door in a vestibule that is partitioned from the passenger compartment of a passenger car shall have a manual override device that is:

(1) Capable of releasing the door to permit it to be opened without power from inside the car;

(2) Located adjacent to the door which it controls; and

(3) Designed and maintained so that a person may readily access and operate the override device from inside the car without requiring the use of a tool or other implement. If the door is dual-leafed, only one of the door leafs is required to respond to the manual override device.

(b) Each passenger car ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002 shall have a minimum of two exterior side doors, each door providing a minimum clear opening with dimensions of 30 inches horizontally by 74 inches vertically.

NOTE: The Americans with Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles also contain requirements for doorway clearance (See 49 CFR part 38).

Each powered, exterior side door on each such passenger car shall have a manual override device that is:

(1) Capable of releasing the door to permit it to be opened without power from both inside and outside the car;

(2) Located adjacent to the door which it controls; and

(3) Designed and maintained so that a person may access the override device from both inside and outside the car without requiring the use of a tool or other implement.

(c) A railroad may protect a manual override device used to open a powered, exterior door with a cover or a screen capable of removal without requiring the use of a tool or other implement.

(d) Door exits shall be marked, and instructions provided for their use, as required by § 239.107(a) of this chapter.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19991, Apr. 23, 2002]

§ 238.237 Automated monitoring.

(a) Except as further specified in this paragraph, on or after November 8, 1999 a working alerter or deadman control shall be provided in the controlling locomotive of each passenger train operating in other than cab signal, automatic train control, or automatic train stop territory. If the controlling locomotive is ordered on or after September 8, 2000, or placed into service for the first time on or after September 9, 2002, a working alerter shall be provided.

(b) Alerter or deadman control timing shall be set by the operating railroad taking into consideration maximum train speed and capabilities of the signal system. The railroad shall document the basis for setting alerter or deadman control timing and make this documentation available to FRA upon request.

(c) If the train operator does not respond to the alerter or maintain proper contact with the deadman control, it shall initiate a penalty brake application.

(d) The following procedures apply if the alerter or deadman control fails en route and causes the locomotive to be in non-compliance with paragraph (a):

(1)(i) A second person qualified on the signal system and trained to apply the emergency brake shall be stationed in the locomotive cab; or

(ii) The engineer shall be in constant communication with a second crewmember until the train reaches the next terminal.

(2)(i) A tag shall be prominently displayed in the locomotive cab to indicate that the alerter or deadman control is defective, until such device is repaired; and

(ii) When the train reaches its next terminal or the locomotive undergoes its next calender day inspection, whichever occurs first, the alerter or deadman control shall be repaired or

the locomotive shall be removed as the controlling locomotive in the train.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19991, Apr. 23, 2002]

Subpart D—Inspection, Testing, and Maintenance Requirements for Tier I Passenger Equipment

§ 238.301 Scope.

(a) This subpart contains requirements pertaining to the inspection, testing, and maintenance of passenger equipment operating at speeds not exceeding 125 miles per hour. The requirements in this subpart address the inspection, testing, and maintenance of the brake system as well as other mechanical and electrical components covered by this part.

(b) Beginning on January 1, 2002, the requirements contained in this subpart shall apply to railroads operating Tier I passenger equipment covered by this part. A railroad may request earlier application of the requirements contained in this subpart upon written notification to FRA's Associate Administrator for Safety as provided in § 238.1(c).

(c) Paragraphs (b) and (c) of § 238.309 shall apply beginning September 9, 1999.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41307, July 3, 2000]

§ 238.303 Exterior calendar day mechanical inspection of passenger equipment.

(a) *General.* (1) Except as provided in paragraph (f) of this section, each passenger car and each unpowered vehicle used in a passenger train shall receive an exterior mechanical inspection at least once each calendar day that the equipment is placed in service.

(2) Except as provided in paragraph (f) of this section, all passenger equipment shall be inspected as required in this section at least once each calendar day that the equipment is placed in service to ensure that the equipment conforms with the requirement contained in paragraph (e)(15) of this section.

(3) If a passenger care is also classified as a locomotive under part 229 of this chapter, the passenger car shall also receive a daily inspection pursuant to the requirements of § 229.21 of this chapter.

(b) Each passenger car and each unpowered vehicle added to a passenger train shall receive an exterior calendar day mechanical inspection in accordance with the following:

(1) Except as provided in paragraph (b)(2) of this section, each passenger car and each unpowered vehicle added to a passenger train shall receive an exterior calendar day mechanical inspection at the time it is added to the train unless notice is provided to the train crew that an exterior mechanical inspection was performed on the car or vehicle on the last day it was used in passenger service. The notice required by this section shall contain the date, time, and location of the last exterior mechanical inspection;

(2) Each express car, freight car, and each unit of intermodal equipment (*e.g.,* RoadRailers®) added to a passenger train shall receive an exterior calendar day mechanical inspection at the time it is added to the train, unless notice is provided to the train crew that an exterior mechanical inspection was performed on the car within the previous calendar day. The notice required by this section shall contain the date, time, and location of the last exterior mechanical inspection.

(c) The exterior calendar day mechanical inspection shall be performed by a qualified maintenance person.

(d) The exterior calendar day mechanical inspection required by this section shall be conducted to the extent possible without uncoupling the trainset and without placing the equipment over a pit or on an elevated track.

(e) As part of the exterior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the passenger car or unpowered vehicle used in a passenger train defective whenever discovered in service:

(1) Products of combustion are released entirely outside the cab and other compartments.

(2) Each battery container is vented and each battery is kept from gassing excessively.

(3) Each coupler is in the following condition:

(i) Sidewall or pin bearing bosses and the pulling face of the knuckles are not broken or cracked;

(ii) The coupler assembly is equipped with anti-creep protection;

(iii) The coupler carrier is not broken or cracked; and

(iv) The yoke is not broken or cracked.

(4) A device is provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

(5) The suspension system, including the spring rigging, is in the following condition:

(i) Protective construction or safety hangers are provided to prevent spring planks, spring seats, or bolsters from dropping to the track structure in event of a hanger or spring failure;

(ii) The top (long) leaf or any of the other three leaves of the elliptical spring is not broken, except when a spring is part of a nest of three or more springs and none of the other springs in the nest has its top leaf or any of the other three leaves broken;

(iii) The outer coil spring or saddle is not broken;

(iv) The equalizers, hangers, bolts, gibs, or pins are not cracked or broken;

(v) The coil spring is not fully compressed when the car is at rest;

(vi) The shock absorber is not broken or leaking oil or other fluid; and

(vii) Each air bag or other pneumatic suspension system component inflates or deflates, as applicable, correctly and otherwise operates as intended.

(6) Each truck is in the following condition:

(i) Each tie bar is not loose;

(ii) Each motor suspension lug, equalizer, hanger, gib, or pin is not cracked or broken; and

(iii) The truck frame is not broken and is not cracked in a stress area that may affect its structural integrity.

(7) Each side bearing is in the following condition:

(i) Each friction side bearing with springs designed to carry weight does not have more than 25 percent of the springs in any one nest broken;

(ii) Each friction side bearing does not run in contact unless designed to operate in that manner; and

(iii) The maximum clearance of each side bearing does not exceed the manufacturer's recommendation.

(8) Each wheel does not have any of the following conditions:

(i) A single flat spot that is 2½ inches or more in length, or two adjoining spots that are each two or more inches in length;

(ii) A gouge or chip in the flange that is more than 1½ inches in length and ½ inch in width;

(iii) A broken rim, if the tread, measured from the flange at a point ⅝ of an inch above the tread, is less than 3¾ inches in width;

(iv) A shelled-out spot 2½ inches or more in length, or two adjoining spots that are each two or more inches in length;

(v) A seam running lengthwise that is within 3¾ inches of the flange;

(vi) A flange worn to a ⅞ inch thickness or less, gauged at a point ⅜ of an inch above the tread;

(vii) A tread worn hollow 5⁄16 of an inch or more;

(viii) A flange height of 1½ inches or more measured from the tread to the top of the flange;

(ix) A rim less than 1 inch thick;

(x) Except as provided in paragraph (e)(8)(iii) of this section, a crack or break in the flange, tread, rim, plate, or hub;

(xi) A loose wheel; or

(xii) A weld.

(9) No part or appliance of a passenger coach, except the wheels, is less than 2½ inches above the top of the rail.

(10) Each unguarded, noncurrent-carrying metal part subject to becoming charged is grounded or thoroughly insulated.

(11) Each jumper and cable connection is in the following condition:

(i) Each jumpers and cable connection between coaches, between locomotives, or between a locomotive and a coach is located and guarded in a manner that provides sufficient vertical clearance. Jumpers and cable connections may not hang with one end free;

(ii) The insulation is not broken or badly chafed;

(iii) No plug, receptacle, or terminal is broken; and

(iv) No strand of wire is broken or protruding.

(12) Each door and cover plate guarding high voltage equipment is marked ''Danger—High Voltage'' or with the word ''Danger'' and the normal voltage carried by the parts so protected.

(13) Each buffer plate is in place.

(14) Each diaphragm, if any, is in place and properly aligned.

(15) Each secondary braking system is in operating mode and does not have any known defective condition which prevents its proper operation. If the dynamic brakes on a locomotive are found not to be in operating mode or are known to have a defective condition which prevents their proper operation at the time that the exterior mechanical inspection is performed or at any other time while the locomotive is in service, the following requirements shall be met in order to continue the locomotive in service:

(i) MU locomotives equipped with dynamic brakes found not to be in operating mode or containing a defective condition which prevents the proper operation of the dynamic brakes shall be handled in accordance with the following requirements:

(A) A tag bearing the words ''inoperative dynamic brakes'' shall be securely displayed in a conspicuous location in the cab of the locomotive and contain the locomotive number, the date and location where the condition was discovered, and the signature of the individual who discovered the condition;

(B) The locomotive engineer shall be informed in writing that the dynamic brakes on the locomotive are inoperative at the location where the locomotive engineer first takes charge of the train; and

(C) The inoperative or defective dynamic brakes shall be repaired or removed from service by or at the locomotive's next exterior calendar day mechanical inspection.

(ii) Conventional locomotives equipped with dynamic brakes found not to be in operating mode or containing a defective condition which prevents the proper operation of the dynamic brakes shall be handled in accordance with the following:

(A) A tag bearing the words ''inoperative dynamic brakes'' shall be securely displayed in a conspicuous location in the cab of the locomotive and contain the locomotive number, the date and location where the condition was discovered, and the signature of the person discovering the condition;

(B) The locomotive engineer shall be informed in writing that the dynamic brakes on the locomotive are inoperative at the location where the locomotive engineer first takes charge of the train; and

(C) The inoperative or defective dynamic brakes shall be repaired within 3 calendar days of being found in defective condition or at the locomotive's next periodic inspection pursuant to § 229.23 of this chapter, whichever occurs first.

(16) All roller bearings do not have any of the following conditions:

(i) A sign of having been overheated as evidenced by discoloration or other telltale sign of overheating, such as damage to the seal or distortion of any bearing component;

(ii) A loose or missing cap screw;

(iii) A broken, missing, or improperly applied cap screw lock; or

(iv) A seal that is loose or damaged or permits leakage of lubricant in clearly formed droplets.

(17) Each air compressor, on passenger equipment so equipped, shall be in effective and operative condition. MU passenger equipment found with an inoperative or ineffective air compressor at the time of its exterior calendar day mechanical inspection may remain in passenger service until the equipment's next exterior calendar day mechanical inspection where it must be repaired or removed from passenger service; provided, all of the following requirements are met:

(i) The equipment has an inherent redundancy of air compressors, due to either the make-up of the train consist or the design of the equipment;

(ii) The railroad demonstrates through verifiable data, analysis, or actual testing that the safety and integrity of a train is not compromised in

any manner by the inoperative or ineffective air compressor. The data, analysis, or test shall establish the maximum number of air compressors that may be inoperative based on size of the train consist, the type of passenger equipment in the train, and the number of service and emergency brake applications typically expected in the run profile for the involved train;

(iii) The involved train does not exceed the maximum number of inoperative or ineffective air compressors established in accordance with paragraph (e)(17)(ii) of this section;

(iv) A qualified maintenance person determines and verifies that the inoperative or ineffective air compressor does not compromise the safety or integrity of the train and that it is safe to move the equipment in passenger service;

(v) The train crew is informed in writing of the number of units in the train consist with inoperative or ineffective air compressors at the location where the train crew first takes charge of the train;

(vi) A record is maintained of the inoperative or ineffective air compressor pursuant to the requirements contained in § 238.17(c)(4); and

(vii) Prior to operating equipment under the provisions contained in this paragraph, the railroad shall provide in writing to FRA's Associate Administrator for Safety the maximum number of inoperative or ineffective air compressors identified in accordance with paragraph (e)(17)(ii) of this section.

(viii) The data, analysis, or testing developed and conducted under paragraph (e)(17)(ii) of this section shall be made available to FRA upon request. FRA's Associate Administrator for Safety may revoke a railroad's ability to utilize the flexibility provided in this paragraph if the railroad fails to comply with the maximum limits established under paragraph (e)(17)(ii) or if such maximum limits are not supported by credible data or do not provide adequate safety assurances.

(18) All rescue-access-related exterior markings, signage, and instructions required by § 238.114 and § 239.107(a) of this chapter shall be in place and, as applicable, conspicuous or legible, or both.

(i) Except as provided in paragraphs (e)(18)(ii) and (iii) of this section, passenger equipment that has any required rescue-access-related exterior marking, signage, or instruction that is missing, illegible, or inconspicuous may remain in passenger service until no later than the equipment's fourth exterior calendar day mechanical inspection or next periodic mechanical inspection required under § 238.307, whichever occurs first, after the noncomplying condition is discovered, where the car shall be repaired or removed from service.

(ii) A passenger car having more than 50 percent of the windows on a side of a level of the car designated and properly marked for rescue access that has any required rescue-access-related exterior marking, signage, or instruction that is missing, illegible, or inconspicuous on any of the other windows on that side and level of the car may remain in passenger service until no later than the car's next periodic mechanical inspection required under § 238.307, where the car shall be repaired or removed from service.

(iii) A passenger car that is a sleeping car that has more than two consecutive windows with any required rescue access-related exterior marking, signage, or instruction at or near their locations that is missing, illegible, or inconspicuous may remain in passenger service until no later than the car's next periodic mechanical inspection required under § 238.307, where the car shall be repaired or removed from service.

(iv) A record shall be maintained of any noncomplying marking, signage, or instruction described in paragraphs (e)(18)(i) through (iii) of this section that contains the date and time that the defective condition was first discovered. This record shall be retained until all necessary repairs are completed.

(f) *Exception.* A long-distance intercity passenger train that misses a scheduled exterior calendar day mechanical inspection due to a delay en route may continue in service to the location where the inspection was scheduled to be performed. At that point, an exterior calendar day mechanical inspection shall be performed

prior to returning the equipment to service. This flexibility applies only to the exterior mechanical safety inspections required by this section, and does not relieve the railroad of the responsibility to perform a calendar day inspection on a unit classified as a ''locomotive'' under part 229 of this chapter as required by § 229.21 of this chapter.

(g) *Records.* A record shall be maintained of each exterior calendar day mechanical inspection performed.

(1) This record may be maintained in writing or electronically provided FRA has access to the record upon request.

(2) The written or electronic record must contain the following information:

(i) The identification number of the unit;

(ii) The place, date, and time of the inspection;

(iii) Any non-complying conditions found; and

(iv) The signature or electronic identification of the inspector.

(3) This record may be part of a single master report covering an entire group of cars and equipment.

(4) This record shall be maintained at the place where the inspection is conducted or at one central location and shall be retained for at least 92 days.

(h) Cars requiring a single car test in accordance with § 238.311 that are being moved in service to a location where the single car test can be performed shall have the single car test completed prior to, or as a part of, the exterior calendar day mechanical inspection.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41307, July 3, 2000; 71 FR 61862, Oct. 19, 2006; 73 FR 6412, Feb. 1, 2008]

§ 238.305 Interior calendar day mechanical inspection of passenger cars.

(a) Except as provided in paragraph (d) of this section, each passenger car shall receive an interior mechanical inspection at least once each calendar day that it is placed in service.

(b) The interior calendar day mechanical inspection shall be performed by a qualified person or a qualified maintenance person.

(c) As part of the interior calendar day mechanical inspection, the railroad shall verify conformity with the following conditions, and nonconformity with any such condition renders the car defective whenever discovered in service, except as provided in paragraphs (c)(8) through (c)(12) and paragraph (d) of this section.

(1) All fan openings, exposed gears and pinions, exposed moving parts of mechanisms, pipes carrying hot gases and high-voltage equipment, switches, circuit breakers, contactors, relays, grid resistors, and fuses are installed in non-hazardous locations or equipped with guards to prevent personal injury.

(2) Floors of passageways and compartments are free from oil, water, waste, or any obstruction that creates a slipping, tripping, or fire hazard, and floors are properly treated to provide secure footing.

(3) All D rings, pull handles, or other means to access manual door releases are in place based on a visual inspection.

(4) All emergency equipment, including a fire extinguisher, pry bar, auxiliary portable lighting, and first aid kits, as applicable, are in place.

(5) The words ''Emergency Brake Valve'' are legibly stenciled or marked near each brake pipe valve or shown on an adjacent badge plate.

(6) All doors and cover plates guarding high voltage equipment are marked ''Danger—High Voltage'' or with the word ''Danger'' and the normal voltage carried by the parts so protected.

(7) All safety-related signage is in place and legible.

(8) All trap doors safely operate and securely latch in place in both the up and down position. A non-complying car may continue in passenger service pursuant to paragraph (d) of this section, if the trap door can be secured by locking out the door for which it is used.

(9) All vestibule steps are illuminated. A non-complying car may continue in passenger service pursuant to paragraph (d) of this section, if the car will be used solely in high-platform service.

(10) All end doors and side doors operate safely and as intended. A noncomplying car may continue in passenger

service pursuant to paragraph (d) of this section—

(i) If at least one operative and accessible door is available on each side of the car;

(ii) The train crew is provided written notification of the noncomplying condition; and

(iii) A notice is prominently displayed directly on the defective door indicating that the door is defective.

(11) [Reserved]

(12) On passenger cars so equipped, public address and intercom systems shall be operative and function as intended. A passenger car with an inoperative or nonfunctioning public address or intercom system may remain in passenger service until no later than the car's fourth interior calendar day mechanical inspection or next periodic mechanical inspection required under § 238.307, whichever occurs first, or for a passenger car used in long-distance intercity train service until the eighth interior calendar day mechanical inspection or next periodic mechanical inspection required under § 238.307, whichever occurs first, after the noncomplying condition is discovered, where it shall be repaired or removed from service; provided, the train crew is given written notification of the noncomplying condition, and all of the requirements contained in paragraph (d)(3) of this section are met.

(d) Any passenger car found not to be in compliance with the requirements contained in paragraphs (c)(5) through (c)(10) of this section at the time of its interior calendar day mechanical inspection may remain in passenger service until the car's next interior calendar day mechanical inspection where it must be repaired or removed from passenger service; provided, all of the specific conditions contained in paragraphs (c)(8) through (c)(10) of this section are met and all of the following requirements are met:

(1) A qualified person or a qualified maintenance person determines that the repairs necessary to bring the car into compliance cannot be performed at the time that the current day's interior mechanical inspection is conducted;

(2) A qualified person or a qualified maintenance person determines that it is safe to move the equipment in passenger service; and

(3) A record is maintained of the noncomplying condition with the date and time that the condition was first discovered.

(e) A long-distance intercity passenger train that misses a scheduled calendar day interior mechanical inspection due to a delay en route may continue in service to the location where the inspection was scheduled to be performed. At that point, an interior calendar day mechanical inspection shall be performed prior to returning the equipment to service.

(f) *Records*. A record shall be maintained of each interior calendar day mechanical inspection performed.

(1) This record may be maintained in writing or electronically provided FRA has access to the record upon request.

(2) The written or electronic record must contain the following information:

(i) The identification number of the unit;

(ii) The place, date, and time of the inspection;

(iii) Any non-complying conditions found; and

(iv) The signature or electronic identification of the inspector.

(3) This record may be part of a single master report covering an entire group of cars and equipment.

(4) This record shall be maintained at the place where the inspection is conducted or at one central location and shall be retained for at least 92 days.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41308, July 3, 2000; 73 FR 6412, Feb. 1, 2008]

§ 238.307 Periodic mechanical inspection of passenger cars and unpowered vehicles used in passenger trains.

(a) *General*. (1) Railroads shall conduct periodic mechanical inspections of all passenger cars and all unpowered vehicles used in a passenger train as required by this section or as warranted and justified by data developed pursuant to paragraph (a)(2) of this section. A periodic inspection conducted under part 229 of this chapter satisfies the requirement of this section with respect to the features inspected.

(2) A railroad may, upon written notification to FRA's Associate Administrator for Safety, adopt and comply with alternative periodic mechanical inspection intervals for specific components or equipment in lieu of the requirements of this section. Any alternative interval must be based upon a documented reliability assessment conducted under a system safety plan subject to periodic peer audit. (See Appendix E to this part for a discussion of the general principles of reliability-based maintenance programs.) The periodic inspection intervals provided in this section may be changed only when justified by accumulated, verifiable data that provides a high level of confidence that the component(s) will not fail in a manner resulting in harm to persons. FRA may monitor and review a railroad's implementation and compliance with any alternative interval adopted. FRA's Associate Administrator for Safety may prohibit or revoke a railroad's ability to utilize an alternative inspection interval if FRA determines that the adopted interval is not supported by credible data or does not provide adequate safety assurances. Such a determination will be made in writing and will state the basis for such action.

(b) Each periodic mechanical inspection required by this section shall be performed by a qualified maintenance person.

(c) The periodic mechanical inspection shall specifically include the following interior and exterior mechanical components, which shall be inspected not less frequently than every 184 days. At a minimum, this inspection shall determine that:

(1) Seats and seat attachments are not broken or loose. If a car is found with a seat that is not in compliance with this requirement while being used between periodic mechanical inspections, the equipment may continue to be used in passenger service until the performance of an interior calendar day mechanical inspection pursuant to § 238.305 on the day following the discovery of the defective condition provided the seat is rendered unuseable, a notice is prominently displayed on the seat, and a record is maintained with the date and time that the non-complying condition was discovered.

(2) Luggage racks are not broken or loose.

(3) All beds and bunks are not broken or loose, and all restraints or safety latches and straps are in place and function as intended.

(4) A representative sample of emergency window exits on the railroad's passenger cars properly operate, in accordance with the requirements of § 239.107 of this chapter.

(5) With regard to the following emergency systems:

(i) Emergency lighting systems required under § 238.115 are in place and operational; and

(ii) [Reserved]

(6) With regard to switches:

(i) All hand-operated switches carrying currents with a potential of more than 150 volts that may be operated while under load are covered and are operative from the outside of the cover;

(ii) A means is provided to display whether the switches are open or closed; and

(iii) Switches not designed to be operated safely while under load are legibly marked with the voltage carried and the words ''must not be operated under load''.

(7) Each coupler is in the following condition:

(i) The distance between the guard arm and the knuckle nose is not more than 5⅛ inches on standard type couplers (MCB contour 1904), or not more than 5⁵⁄₁₆ inches on D&E couplers;

(ii) The free slack in the coupler or drawbar not absorbed by friction devices or draft gears is not more than ½ inch; and

(iii) The draft gear is not broken, to the extent possible without dropping cover plates.

(8) All trucks are equipped with a device or securing arrangement to prevent the truck and car body from separating in case of derailment.

(9) All center castings on trucks are not cracked or broken, to the extent possible without jacking the car and rolling out the trucks. However, an extensive inspection of all center castings shall be conducted by jacking the equipment and rolling out the trucks

at each COT&S cycle provided in § 238.309 for the equipment.

(10) All mechanical systems and components of the equipment are free of all the following general conditions that endanger the safety of the crew, passengers, or equipment:

(i) A continuous accumulation of oil or grease;

(ii) Improper functioning of a component;

(iii) A crack, break, excessive wear, structural defect, or weakness of a component;

(iv) A leak;

(v) Use of a component or system under a condition that exceeds that for which the component or system is designed to operate; and

(vi) Insecure attachment of a component.

(11) All of the items identified in the exterior calendar day mechanical inspection contained at § 238.303 are in conformity with the conditions prescribed in that section.

(12) All of the items identified in the interior calendar day mechanical inspection contained at § 238.305 are in conformity with the conditions prescribed in that section.

(13) The hand or parking brake shall be applied and released to determine that it functions as intended.

(d) At an interval not to exceed 368 days, the periodic mechanical inspection shall specifically include inspection of the following:

(1) Manual door releases, to determine that all manual door releases operate as intended;

(2) The hand or parking brake as well as its parts and connections, to determine that they are in proper condition and operate as intended. The date of the last inspection shall be either entered on Form FRA F 6180–49A, suitably stenciled or tagged on the equipment, or maintained electronically provided FRA has access to the record upon request; and

(3) Emergency roof access markings and instructions required under § 238.123(e), to determine that they are in place and, as applicable, conspicuous or legible, or both.

(e) *Records.* (1) A record shall be maintained of each periodic mechanical inspection required to be performed by this section. This record may be maintained in writing or electronically, provided FRA has access to the record upon request. The record shall be maintained either in the railroad's files, the cab of the locomotive, or a designated location in the passenger car. The record shall be retained until the next periodic mechanical inspection of the same type is performed and shall contain the following information:

(i) The date of the inspection;

(ii) The location where the inspection was performed;

(iii) The signature or electronic identification of the inspector; and

(iv) The signature or electronic identification of the inspector's supervisor.

(2) Detailed documentation of any reliability assessments depended upon for implementing an alternative inspection interval under paragraph (a)(2) of this section, including underlying data, shall be retained during the period that the alternative inspection interval is in effect. Data documenting inspections, tests, component replacement and renewals, and failures shall be retained for not less than three (3) inspection intervals.

(f) Nonconformity with any of the conditions set forth in this section renders the car or vehicle defective whenever discovered in service.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41308, July 3, 2000; 71 FR 61862, Oct. 19, 2006; 73 FR 6412, Feb. 1, 2008]

§ 238.309 Periodic brake equipment maintenance.

(a) *General.* (1) This section contains the minimum intervals at which the brake equipment on various types of passenger equipment shall be periodically cleaned, repaired, and tested. This maintenance procedure requires that all of the equipment's brake system pneumatic components that contain moving parts and are sealed against air leaks be removed from the equipment, disassembled, cleaned, and lubricated and that the parts that can deteriorate with age be replaced.

(2) A railroad may petition FRA's Associate Administrator for Safety to approve alternative maintenance procedures providing equivalent safety, in lieu of the requirements of this section.

The petition shall be filed as provided in § 238.21.

(b) *MU locomotives*. The brake equipment of each MU locomotive shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 736 days if the MU locomotive is part of a fleet that is not 100 percent equipped with air dryers;

(2) Every 1,104 days if the MU locomotive is part of a fleet that is 100 percent equipped with air dryers and is equipped with PS–68, 26–C, 26–L, PS–90, CS–1, RT–2, RT–5A, GRB–1, CS–2, or 26–R brake systems. (This listing of brake system types is intended to subsume all brake systems using 26 type, ABD, or ABDW control valves and PS68, PS–90, 26B–1, 26C, 26CE, 26–B1, 30CDW, or 30ECDW engineer's brake valves.); and

(3) Every 736 days for all other MU locomotives.

(c) *Conventional locomotives*. The brake equipment of each conventional locomotive shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 1,104 days for a locomotive equipped with a 26–L or equivalent brake system; and

(2) Every 736 days for a locomotive equipped with other than a 26–L or equivalent brake system.

(d) *Passenger coaches and other unpowered vehicles*. The brake equipment on each passenger coach and each unpowered vehicle used in a passenger train shall be cleaned, repaired, and tested at intervals in accordance with following schedule:

(1) Every 2,208 days for a coach or vehicle equipped with an AB-type brake system.

(2) Every 1,476 days for a coach or vehicle equipped with a 26–C or equivalent brake system; and

(3) Every 1,104 days for a coach or vehicle equipped with other than an AB, ABD, ABDX, 26–C, or equivalent brake system.

(e) *Cab cars*. The brake equipment of each cab car shall be cleaned, repaired, and tested at intervals in accordance with the following schedule:

(1) Every 1,476 days for that portion of the cab car brake system using brake valves that are identical to the passenger coach 26–C brake system;

(2) Every 1,104 days for that portion of the cab car brake system using brake valves that are identical to the locomotive 26–L brake system; and

(3) Every 736 days for all other types of cab car brake valves.

(f) *Records of periodic maintenance*. (1) The date and place of the cleaning, repairing, and testing required by this section shall be recorded on Form FRA 6180–49A or a similar form developed by the railroad containing the same information, and the person performing the work and that person's supervisor shall sign the form, if possible. Alternatively, the railroad may stencil the vehicle with the date and place of the cleaning, repairing, and testing and maintain an electronic record of the person performing the work and that person's supervisor.

(2) A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in the railroad's files, the cab of the locomotive, or a designated location in the passenger car until the next such periodic test is performed.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41309, July 3, 2000]

§ 238.311 Single car test.

(a) Except for self-propelled passenger cars, single car tests of all passenger cars and all unpowered vehicles used in passenger trains shall be performed in accordance with either APTA Standard SS-M-005-98, ''Code of Tests for Passenger Car Equipment Using Single Car Testing Device,'' published March, 1998; or an alternative procedure approved by FRA pursuant to § 238.21. The incorporation by reference of this APTA standard was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated document from the American Public Transit Association, 1201 New York Avenue, NW., Washington, DC 20005. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://*

www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(b) Each single car test required by this section shall be performed by a qualified maintenance person.

(c) A railroad shall perform a single car test of the brake system of a car or vehicle described in paragraph (a) of this section if the car or vehicle is found with one or more of the following wheel defects:

(1) Built-up tread;

(2) Slid flat wheel;

(3) Thermal crack;

(4) Overheated wheel; or

(5) Shelling.

(d) A railroad need not perform the single car test required in paragraph (c) of this section, if the railroad can establish that the wheel defect is other than built-up tread and is due to a cause other than a defective brake system on the car.

(e) Except as provided in paragraph (f) of this section, a railroad shall perform a single car test of the brake system of a car or vehicle described in paragraph (a) of this section when:

(1) Except for private cars, a car or vehicle is placed in service after having been out of service for 30 days or more; or

(2) One or more of the following conventional air brake equipment items is removed, repaired, or replaced:

(i) Relay valve;

(ii) Service portion;

(iii) Emergency portion; or

(iv) Pipe bracket.

(f) *Exception.* If the single car test cannot be made at the point where repairs are made, the car may be moved in passenger service to the next forward location where the test can be made. A railroad may move a car in this fashion only after visually verifying an application and release of the brakes on both sides of the car that was repaired, and provided that the car is appropriately tagged to indicate the need to perform a single car test. The single car test shall be completed prior to, or as a part of, the car's next calendar day mechanical inspection.

(g) If one or more of the following conventional air brake equipment items is removed, repaired, or replaced only that portion which is renewed or replaced must be tested to satisfy the provisions of this section:

(1) Brake reservoir;

(2) Brake cylinder;

(3) Piston assembly;

(4) Vent valve;

(5) Quick service valve;

(6) Brake cylinder release valve;

(7) Modulating valve or slack adjuster; or

(8) Angle cock or cutout cock.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41309, July 3, 2000; 74 FR 25174, May 27, 2009]

§ 238.313 Class I brake test.

(a) Each commuter and short-distance intercity passenger train shall receive a Class I brake test once each calendar day that the train is placed or continues in passenger service.

(b) Except as provided in paragraph (i) of this section, each long-distance intercity passenger train shall receive a Class I brake test:

(1) Prior to the train's departure from an originating terminal; and

(2) Every 1,500 miles or once each additional calendar day, whichever occurs first, that the train remains in continuous passenger service.

(c) Each passenger car and each unpowered vehicle added to a passenger train shall receive a Class I or Class IA brake test at the time it is added to the train unless notice is provided to the train crew that a Class I brake test was performed on the car within the previous calendar day and the car has not been disconnected from a source of compressed air for more than four hours prior to being added to the train. The notice required by this section shall contain the date, time, and location of the last Class I brake test.

(d) Each Class I brake test shall be performed by a qualified maintenance person.

(e) Each Class I brake test may be performed either separately or in conjunction with the exterior calendar day mechanical inspection required under § 238.303.

(f) Except as provided in § 238.15(b), a railroad shall not use or haul a passenger train in passenger service from a location where a Class I brake test has been performed, or was required by

this part to have been performed, with less than 100 percent operative brakes.

(g) A Class I brake test shall be performed at the air pressure at which the train's air brakes will be operated, but not less than 90 psi, and shall be made to determine and ensure that:

(1) The friction brakes apply and remain applied on each car in the train until a release of the brakes has been initiated on each car in response to train line electric, pneumatic, or other signals. This test shall include a verification that each side of each car's brake system responds properly to application and release signals;

(2) The brake shoes or pads are firmly seated against the wheel or disc with the brakes applied;

(3) Piston travel is within prescribed limits, either by direct observation, observation of a piston travel indicator, or in the case of tread or disc brakes by determining that the brake shoe or pad provides pressure to the wheel. For vehicles equipped with 8½-inch or 10-inch diameter brake cylinders, piston travel shall be within 7 to 9 inches. If piston travel is found to be less than 7 inches or more than 9 inches, it must be adjusted to nominally 7½ inches. Proper release of the brakes can be determined by observation of the clearance between the brake shoe and the wheel or between the brake pad and the brake disc.

(4) The communicating signal system is tested and known to be operating as intended; a tested and operating two-way radio system meets this requirement;

(5) Each brake shoe or pad is securely fastened and correctly aligned in relation to the wheel or to the disc;

(6) The engineer's brake valve or controller will cause the proper train line commands for each position or brake level setting;

(7) Brake pipe leakage does not exceed 5 pounds per square inch per minute if leakage will affect service performance;

(8) The emergency brake application and deadman pedal or other emergency control devices function as intended;

(9) Each brake shoe or pad is not below the minimum thickness established by the railroad. This thickness shall not be less than the minimum thickness necessary to safely travel the maximum distance allowed between Class I brake tests;

(10) Each angle cock and cutout cock is properly positioned;

(11) The brake rigging or the system mounted on the car for the transmission of the braking force operates as intended and does not bind or foul so as to impede the force delivered to a brake shoe, impede the release of a brake shoe, or otherwise adversely affect the operation of the brake system;

(12) If the train is equipped with electropneumatic brakes, an electropneumatic application of the brakes is made and the train is walked to determine that the brakes on each car in the train properly apply;

(13) Each brake disc is free of any crack in accordance with the manufacturer's specifications or, if no specifications exist, free of any crack to the extent that the design permits;

(14) If the equipment is provided with a brake indicator, the brake indicator operates as intended; and

(15) The communication of brake pipe pressure changes at the rear of the train is verified, which may be accomplished by observation of an application and release of the brakes on the last car in the train.

(h) *Records*. A record shall be maintained of each Class I brake test performed.

(1) This record may be maintained in writing or electronically, provided FRA has access to the record upon request.

(2) The written or electronic record must contain the following information:

(i) The date and time that the Class I brake test was performed;

(ii) The location where the test was performed;

(iii) The identification number of the controlling locomotive of the train;

(iv) The total number of cars inspected during the test; and

(v) The signature or electronic identification of the inspector.

(3) This record shall be maintained at the place where the inspection is conducted or at one central location and shall be retained for at least 92 days.

(i) A long-distance, intercity passenger train that misses a scheduled

calendar day Class I brake test due to a delay en route may proceed to the point where the Class I brake test was scheduled to be performed. A Class I brake test shall be completed at that point prior to placing the train back in service.

(j) In addition to complying with all the Class I brake test requirements performed by a qualified maintenance person as contained in paragraphs (a) through (i) of this section, railroads operating passenger equipment that is not designed to permit the visual observation of the brake actuation and release without the inspector going on, under, or between the equipment in accordance with § 238.231(b) shall perform an additional inspection. At a minimum, the additional inspection requirement for such equipment shall include all of the following:

(1) An additional inspection by a qualified maintenance person of all items and components contained in paragraphs (g)(1) through (g)(15) of this section;

(2) The additional inspection shall be conducted at an interval not to exceed five (5) in-service days and shall be conducted while the equipment is over an inspection pit or on a raised inspection track; and

(3) A record of the additional inspection shall be maintained pursuant to the requirements contained in paragraph (h) of this section. This record can be combined with the Class I brake test record.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41309, July 3, 2000; 71 FR 61862, Oct. 19, 2006]

§ 238.315 Class IA brake test.

(a) Except as provided in paragraph (b) of this section, either a Class I or a Class IA brake test shall be performed:

(1) Prior to the first morning departure of each commuter or short-distance intercity passenger train, unless all of the following conditions are satisfied:

(i) A Class I brake test was performed within the previous twelve (12) hours;

(ii) The train has not been used in passenger service since the performance of the Class I brake test; and

(iii) The train has not been disconnected from a source of compressed air for more than four hours since the performance of the Class I brake test; and

(2) Prior to placing a train in service that has been off a source of compressed air for more than four hours.

(b) A commuter or short-distance intercity passenger train that provides continuing late night service that began prior to midnight may complete its daily operating cycle after midnight without performing another Class I or Class IA brake test. A Class I or Class IA brake test shall be performed on such a train before it starts a new daily operating cycle.

(c) A Class IA brake test may be performed at a shop or yard site and is not required to be repeated at the first passenger terminal if the train remains on a source of compressed air and:

(1) The train remains in the custody of the train crew; or

(2) The train crew receives notice that the Class IA brake test has been performed.

(d) The Class IA brake test shall be performed by either a qualified person or a qualified maintenance person.

(e) Except as provided in § 238.15(b), a railroad shall not use or haul a passenger train in passenger service from a location where a Class IA brake test has been performed, or was required by this part to have been performed, with less than 100 percent operative brakes.

(f) A Class IA brake test shall be performed at the air pressure at which the train's air brakes will be operated and shall determine and ensure that:

(1) Brake pipe leakage does not exceed 5 pounds per square inch per minute if brake pipe leakage will affect service performance;

(2) Each brake sets and releases by inspecting in the manner described in paragraph (g) of this section;

(3) For MU locomotives that utilize an electric signal to communicate a service brake application and only a pneumatic signal to propagate an emergency brake application, the emergency brake application functions as intended.

(4) Each angle cock and cutout cock is properly set;

(5) The communication of brake pipe pressure changes at the rear of the

train is verified, which may be accomplished by observation of an application and release of the brakes on the last car in the train; and

(6) The communicating signal system is tested and known to be operating as intended; a tested and operating two-way radio system meets this requirement.

(g) In determining whether each brake sets and releases—

(1) The inspection of the set and release of the brakes shall be completed by walking the train to directly observe the set and release of each brake, if the railroad determines that such a procedure is safe.

(2) If the railroad determines that operating conditions pose a safety hazard to an inspector walking the brakes, brake indicators may be used to verify the set and release on cars so equipped. However, the observation of the brake indicators shall not be made from the cab of the locomotive. The inspector shall walk the train in order to position himself or herself to accurately observe each indicator.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41310, July 3, 2000; 67 FR 19991, Apr. 23, 2002]

§ 238.317 Class II brake test.

(a) A Class II brake test shall be performed on a passenger train when any of the following events occurs:

(1) Whenever the control stand used to control the train is changed; except if the control stand is changed to facilitate the movement of a passenger train from one track to another within a terminal complex while not in passenger service. In these circumstances, a Class II brake test shall be performed prior to the train's departure from the terminal complex with passengers;

(2) Prior to the first morning departure of each commuter or short-distance intercity passenger train where a Class I brake test remains valid as provided in § 238.315(a)(1);

(3) When previously tested units (i.e., cars that received a Class I brake test within the previous calendar day and have not been disconnected from a source of compressed air for more than four hours) are added to the train;

(4) When cars or equipment are removed from the train; and

(5) When an operator first takes charge of the train, except for face-to-face relief.

(b) A Class II brake test shall be performed by a qualified person or a qualified maintenance person.

(c) Except as provided in § 238.15, a railroad shall not use or haul a passenger train in passenger service from a terminal or yard where a Class II brake test has been performed, or was required by this part to have been performed, with any of the brakes cut-out, inoperative, or defective.

(d) In performing a Class II brake test on a train, a railroad shall determine that:

(1) The brakes on the rear unit of the train apply and release in response to a signal from the engineer's brake valve or controller of the leading or controlling unit, or a gauge or similar device located at the rear of the train or in the cab of the rear unit indicates that brake pipe pressure changes are properly communicated at the rear of the train;

(2) For MU locomotives that utilize an electric signal to communicate a service brake application and only a pneumatic signal to propagate an emergency brake application, the emergency brake application functions as intended.

(3) The communicating signal system is tested and known to be operating as intended; a tested and operating two-way radio system meets this requirement.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41310, July 3, 2000; 67 FR 19991, Apr. 23, 2002]

§ 238.319 Running brake test.

(a) As soon as conditions safely permit, a running brake test shall be performed on each passenger train after the train has received, or was required under this part to have received, either a Class I, Class IA, or Class II brake test.

(b) A running brake test shall be performed whenever the control stand used to control the train is changed to facilitate the movement of a passenger train from one track to another within a terminal complex while not in passenger service.

(c) The running brake test shall be conducted in accordance with the railroad's established operating rules, and shall be made by applying brakes in a manner that allows the engineer to ascertain whether the brakes are operating properly.

(d) If the engineer determines that the brakes are not operating properly, the engineer shall stop the train and follow the procedures provided in § 238.15.

§ 238.321 Out-of-service credit.

When a passenger car is out of service for 30 or more consecutive days or is out of service when it is due for any test or inspection required by § 238.307 or § 238.309 an out of use notation showing the number of out of service days shall be made in the records required under § 238.307(e) and § 238.309(f). If the passenger car is out of service for one or more periods of at least 30 consecutive days, the interval prescribed for any test or inspection required by § 238.307 and § 238.309 may be extended by the number of days in each period the passenger car is out of service since the last test or inspection in question. A movement made in accordance with § 229.9 of this chapter or § 238.17 is not considered service for the purposes of determining the out-of-service credit.

[71 FR 61862, Oct. 19, 2006]

Subpart E—Specific Requirements for Tier II Passenger Equipment

§ 238.401 Scope.

This subpart contains specific requirements for railroad passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph. The requirements of this subpart apply beginning on September 9, 1999. As stated in § 238.433(b), all such passenger equipment remains subject to the requirements concerning couplers and uncoupling devices contained in Federal statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter.

§ 238.403 Crash energy management.

(a) Each power car and trailer car shall be designed with a crash energy management system to dissipate kinetic energy during a collision. The crash energy management system shall provide a controlled deformation and collapse of designated sections within the unoccupied volumes to absorb collision energy and to reduce the decelerations on passengers and crewmembers resulting from dynamic forces transmitted to occupied volumes.

(b) The design of each unit shall consist of an occupied volume located between two normally unoccupied volumes. Where practical, sections within the unoccupied volumes shall be designed to be structurally weaker than the occupied volume. During a collision, the designated sections within the unoccupied volumes shall start to deform and eventually collapse in a controlled fashion to dissipate energy before any structural damage occurs to the occupied volume.

(c) At a minimum, each Tier II passenger train shall be designed to meet the following requirements:

(1) Thirteen megajoules (MJ) shall be absorbed at each end of the train through the controlled crushing of unoccupied volumes, and of this amount a minimum of 5 MJ shall be absorbed ahead of the operator's cab in each power car;

(2) A minimum of an additional 3 MJ shall be absorbed by the power car structure between the operator's cab and the first trailer car; and

(3) The end of the first trailer car adjacent to each power car shall absorb a minimum of 5 MJ through controlled crushing.

(d) For a 30-mph collision of a Tier II passenger train on tangent, level track with an identical stationary train:

(1) When seated anywhere in a trailer car, the velocity at which a 50th-percentile adult male contacts the seat back ahead of him shall not exceed 25 mph; and

(2) The deceleration of the occupied volumes of each trailer car shall not exceed 8g. For the purpose of demonstrating compliance with this paragraph, deceleration measurements may be processed through a low-pass filter having a bandwidth of 50 Hz.

(e) Compliance with paragraphs (a) through (d) of this section shall be

demonstrated by analysis using a dynamic collision computer model. For the purpose of demonstrating compliance, the following assumptions shall be made:

(1) The train remains upright, in line, and with all wheels on the track throughout the collision; and

(2) Resistance to structural crushing follows the force-versus-displacement relationship determined during the structural analysis required as part of the design of the train.

(f) Passenger seating shall not be permitted in the leading unit of a Tier II passenger train.

§ 238.405 Longitudinal static compressive strength.

(a) To form an effective crash refuge for crewmembers occupying the cab of a power car, the underframe of the cab of a power car shall resist a minimum longitudinal static compressive force of 2,100,000 pounds without permanent deformation to the cab, unless equivalent protection to crewmembers is provided under an alternate design approach, validated through analysis and testing, and approved by FRA under the provisions of § 238.21.

(b) The underframe of the occupied volume of each trailer car shall resist a minimum longitudinal static compressive force of 800,000 pounds without permanent deformation to the car. To demonstrate compliance with this requirement, the 800,000-pound load shall be applied to the underframe of the occupied volume as it would be transmitted to the underframe by the full structure of the vehicle.

(c) Unoccupied volumes of a power car or a trailer car designed to crush as part of the crash energy management design are not subject to the requirements of this section.

§ 238.407 Anti-climbing mechanism.

(a) Each power car shall have an anti-climbing mechanism at its forward end capable of resisting an ultimate upward or downward static vertical force of 200,000 pounds. A power car constructed with a crash energy management design is permitted to crush in a controlled manner before the anti-climbing mechanism fully engages.

(b) Interior train coupling points between units, including between units of articulated cars or other permanently joined units of cars, shall have an anti-climbing mechanism capable of resisting an upward or downward vertical force of 100,000 pounds without yielding.

(c) The forward coupler of a power car shall be attached to the car body to resist a vertical downward force of 100,000 pounds for any horizontal position of the coupler without yielding.

§ 238.409 Forward end structures of power car cabs.

This section contains requirements for the forward end structure of the cab of a power car. (A conceptual implementation of this end structure is provided in Figure 1 to this subpart.)

(a) *Center collision post.* The forward end structure shall have a full-height center collision post, or its structural equivalent, capable of withstanding the following:

(1) A shear load of 500,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint;

(2) A shear load of 150,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint; and

(3) A horizontal, longitudinal force of 300,000 pounds, applied at a point on level with the bottom of the windshield, without exceeding its ultimate strength.

(b) *Side collision posts.* The forward end structure shall have two side collision posts, or their structural equivalent, located at approximately the one-third points laterally, each capable of withstanding the following:

(1) A shear load of 500,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal force of 300,000 pounds, applied at a point on level with the bottom of the windshield, without exceeding its ultimate strength.

(c) *Corner posts.* The forward end structure shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal or lateral shear load of 300,000 pounds at its joint with the underframe, without exceeding the ultimate strength of the joint;

(2) A horizontal, lateral force of 100,000 pounds applied at a point 30 inches up from the underframe attachment, without exceeding the yield or the critical buckling stress; and

(3) A horizontal, longitudinal or lateral shear load of 80,000 pounds at its joint with the roof, without exceeding the ultimate strength of the joint.

(d) *Skin*. The skin covering the forward-facing end of each power car shall be:

(1) Equivalent to a ½-inch 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;

(2) Securely attached to the end structure; and

(3) Sealed to prevent the entry of fluids into the occupied cab area of the equipment. As used in paragraph (d), the term ''skin'' does not include forward-facing windows and doors.

§ 238.411 Rear end structures of power car cabs.

The rear end structure of the cab of a power car shall be designed to include the following elements, or their structural equivalent. (A conceptual implementation of this end structure is provided in Figure 2 to this subpart.)

(a) *Corner posts*. The rear end structure shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal or lateral shear load of 300,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal or lateral shear load of 80,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(b) *Collision posts*. The rear end structure shall have two full-height collision posts, or their structural equivalent, each capable of withstanding the following:

(1) A horizontal, longitudinal shear load of 500,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(2) A horizontal, longitudinal shear load of 75,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19991, Apr. 23, 2002]

§ 238.413 End structures of trailer cars.

(a) Except as provided in paragraph (b) of this section, the end structure of a trailer car shall be designed to include the following elements, or their structural equivalent. (A conceptual implementation of this end structure is provided in Figure 3 to this subpart.)

(1) *Corner posts*. Two full-height corner posts, each capable of withstanding the following:

(i) A horizontal, longitudinal shear load of 150,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint;

(ii) A horizontal, longitudinal or lateral force of 30,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress; and

(iii) A horizontal, longitudinal or lateral shear load of 20,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(2) *Collision posts*. Two full-height collision posts each capable of withstanding the following:

(i) A horizontal, longitudinal shear load of 300,000 pounds at its joint with the underframe without exceeding the ultimate strength of the joint; and

(ii) A horizontal, longitudinal shear load of 60,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

(b) If the trailer car is designed with an end vestibule, the end structure inboard of the vestibule shall have two full-height corner posts, or their structural equivalent, each capable of withstanding the following (A conceptual implementation of this end structure is provided in Figure 4 to this subpart):

(1) A horizontal, longitudinal shear load of 200,000 pounds at its joint with

the underframe without exceeding the ultimate strength of the joint;

(2) A horizontal, lateral force of 30,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress;

(3) A horizontal, longitudinal force of 50,000 pounds applied at a point 18 inches up from the underframe attachment without exceeding the yield or the critical buckling stress; and

(4) A horizontal, longitudinal or lateral shear load of 20,000 pounds at its joint with the roof without exceeding the ultimate strength of the joint.

§ 238.415 Rollover strength.

(a) Each passenger car and power car shall be designed to rest on its side and be uniformly supported at the top (''roof rail'') and the bottom chords (''side sill'') of the side frame. 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. Minor localized deformations to the outer side skin of the passenger car or power car is allowed provided such deformations in no way intrude upon the occupied volume of each car.

(b) Each passenger car and power car shall also be designed to rest on its roof so that any damage in occupied areas is limited to 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.

§ 238.417 Side loads.

(a) Each passenger car body structure shall be designed to resist an inward transverse load of 80,000 pounds of force applied to the side sill and 10,000 pounds of force applied to the belt rail (horizontal members at the bottom of the window opening in the side frame).

(b) These loads shall be considered to be applied separately over the full vertical dimension of the specified member for any distance of 8 feet in the direction of the length of the car.

(c) The allowable stress shall be the lesser of the yield stress, except as otherwise allowed by this paragraph, or the critical buckling stress. In calculating the stress to show compliance with this requirement, local yielding of the side skin adjacent to the side sill and belt rail, and local yielding of the side sill bend radii at the crossbearer and floor-beam connections is allowed. For purposes of this paragraph, local yielding is allowed provided the resulting deformations in no way intrude upon the occupied volume of the car.

(d) The connections of the side frame to the roof and underframe shall support the loads specified in this section.

§ 238.419 Truck-to-car-body and truck component attachment.

(a) The ultimate strength of the truck-to-car-body attachment for each unit in a train shall be sufficient to resist without failure the following individually applied loads: a vertical force equivalent to 2g acting on the mass of the truck; and a force of 250,000 pounds acting in any horizontal direction on the truck, along with the resulting vertical reaction to this load.

(b) Each component of a truck (which include axles, wheels, bearings, the truck-mounted brake system, suspension system components, and any other components attached to the truck by design) shall remain attached to the truck when a force equivalent to 2g acting on the mass of the component is exerted in any direction on that component.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19992, Apr. 23, 2002]

§ 238.421 Glazing.

(a) *General.* Except as provided in paragraphs (b) and (c) of this section, each exterior window on a passenger car and a power car cab shall comply with the requirements contained in part 223 of this chapter.

(b) *Particular end-facing exterior glazing requirements.* Each end-facing exterior window in a passenger car and a power car cab shall also, in the orientation in which it is installed in the car:

(1) Resist the impact of a 12-pound solid steel sphere traveling (i) at the

maximum speed at which the car will operate (ii) at an impact angle no less severe than horizontal to the car, with no penetration or spall. An impact angle that is perpendicular (90 degrees) to the window's surface shall be considered the most severe impact angle for purposes of this requirement; and

(2) Demonstrate anti-spalling performance by the use of a 0.001-inch thick aluminum witness plate, placed 12 inches from the window's surface during all impact tests. The witness plate shall contain no marks from spalled glazing particles after any impact test; and

(3) Be permanently marked, prior to installation, in such a manner that the marking is clearly visible after the material has been installed. The marking shall include:

(i) The words ''FRA TYPE IHP'' to indicate that the material has successfully passed the testing requirements specified in this paragraph;

(ii) The name of the manufacturer; and

(iii) The type or brand identification of the material.

(c) *Passenger equipment ordered prior to May 12, 1999*. Each exterior window in passenger equipment ordered prior to May 12, 1999, may comply with the following glazing requirements in lieu of the requirements specified in paragraphs (a) and (b) of this section:

(1) Each end-facing exterior window shall, in the orientation in which it is installed in the vehicle, resist the impact of a 12-pound solid steel sphere traveling (i) at the maximum speed at which the vehicle will operate (ii) at an impact angle no less severe than horizontal to the vehicle, with no penetration or spall. An impact angle that is perpendicular to the window's surface shall be considered the most severe impact angle for purposes of this requirement.

(2) Each side-facing exterior window shall resist the impact of a:

(i) 12-pound solid steel sphere at 15 mph, at an angle of 90 degrees to the window's surface, with no penetration or spall; and

(ii) A granite ballast stone weighing a minimum of 0.5 pounds, traveling at 75 mph and impacting at a 90-degree angle to the window's surface, with no penetration or spall.

(3) All exterior windows shall:

(i) Resist a single impact of a 9-mm, 147-grain bullet traveling at an impact velocity of 900 feet per second, with no bullet penetration or spall; and

(ii) Demonstrate anti-spalling performance by the use of a 0.002-inch thick aluminum witness plate, placed 12 inches from the window's surface during all impact tests. The witness plate shall contain no marks from spalled glazing particles after any impact test; and

(iii) Be permanently marked, prior to installation, in such a manner that the marking is clearly visible after the material has been installed. The marking shall include:

(A) The words ''FRA TYPE IH'' for end-facing glazing or ''FRA TYPE IIH'' for side-facing glazing, to indicate that the material has successfully passed the testing requirements of this section;

(B) The name of the manufacturer; and

(C) The type or brand identification of the material.

(d) *Glazing securement*. Each exterior window on a passenger car and a power car cab shall remain in place when subjected to:

(1) 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; and

(2) The impact forces that the glazed window is required to resist as specified in this section.

(e) *Stenciling*. Each car that is fully equipped with glazing materials that meet the requirements of this section shall be stenciled on an interior wall as follows: ''Fully Equipped with FRA Part 238 Glazing'' or similar words conveying that meaning, in letters at least ⅜ of an inch high.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19992, Apr. 23, 2002]

§ 238.423 Fuel tanks.

(a) *External fuel tanks*. Each type of external fuel tank must be approved by FRA's Associate Administrator for Safety upon a showing that the fuel

tank provides a level of safety at least equivalent to a fuel tank that complies with the external fuel tank requirements in § 238.223(a).

(b) *Internal fuel tanks.* Internal fuel tanks shall comply with the requirements specified in § 238.223(b).

§ 238.425 Electrical system.

(a) *Circuit protection.* (1) The main propulsion power line shall be protected with a lightning arrestor, automatic circuit breaker, and overload relay. The lightning arrestor shall be run by the most direct path possible to ground with a connection to ground of not less than No. 6 AWG. These overload protection devices shall be housed in an enclosure designed specifically for that purpose with the arc chute vented directly to outside air.

(2) Head end power, including trainline power distribution, shall be provided with both overload and ground fault protection.

(3) Circuits used for purposes other than propelling the equipment shall be connected to their power source through circuit breakers or equivalent current-limiting devices.

(4) Each auxiliary circuit shall be provided with a circuit breaker located as near as practical to the point of connection to the source of power for that circuit; however, such protection may be omitted from circuits controlling safety-critical devices.

(b) *Main battery system.* (1) The main batteries shall be isolated from the cab and passenger seating areas by a noncombustible barrier.

(2) Battery chargers shall be designed to protect against overcharging.

(3) Battery circuits shall include an emergency battery cut-off switch to completely disconnect the energy stored in the batteries from the load.

(4) If batteries are of the type to potentially vent explosive gases, the batteries shall be adequately ventilated to prevent accumulation of explosive concentrations of these gases.

(c) *Power dissipation resistors.* (1) Power dissipating resistors shall be adequately ventilated to prevent overheating under worst-case operating conditions.

(2) Power dissipation grids shall be designed and installed with sufficient isolation to prevent combustion between resistor elements and combustible material.

(3) Power dissipation resistor circuits shall incorporate warning or protective devices for low ventilation air flow, over-temperature, and short circuit failures.

(4) Resistor elements shall be electrically insulated from resistor frames, and the frames shall be electrically insulated from the supports that hold them.

(d) *Electromagnetic interference and compatibility.* (1) The operating railroad shall ensure electromagnetic compatibility of the safety-critical equipment systems with their environment. Electromagnetic compatibility can be achieved through equipment design or changes to the operating environment.

(2) The electronic equipment shall not produce electrical noise that interferes with trainline control and communications or with wayside signaling systems.

(3) To contain electromagnetic interference emissions, suppression of transients shall be at the source wherever possible.

(4) Electrical and electronic systems of equipment shall be capable of operation in the presence of external electromagnetic noise sources.

(5) All electronic equipment shall be self-protected from damage or improper operation, or both, due to high voltage transients and long-term overvoltage or under-voltage conditions.

§ 238.427 Suspension system.

(a) *General requirements.* (1) Suspension systems shall be designed to reasonably prevent wheel climb, wheel unloading, rail rollover, rail shift, and a vehicle from overturning to ensure safe, stable performance and ride quality. These requirements shall be met:

(i) In all operating environments, and under all track conditions and loading conditions as determined by the operating railroad; and

(ii) At all track speeds and over all track qualities consistent with the Track Safety Standards in part 213 of this chapter, up to the maximum operating speed and maximum cant deficiency of the equipment.

(2) Passenger equipment shall meet the safety performance standards for suspension systems contained in appendix C to this part, or alternative standards providing at least equivalent safety if approved by FRA under the provisions of § 238.21.

(b) *Car body accelerations.* (1) A passenger car shall not operate under conditions that result in a steady-state lateral acceleration greater than 0.12g as measured parallel to the car floor inside the passenger compartment. During pre-revenue service acceptance testing of the equipment under § 238.111 and § 213.345 of this chapter, a passenger car shall demonstrate that steady-state lateral acceleration does not exceed 0.1g at the maximum intended cant deficiency.

(2) While traveling at the maximum operating speed over the intended route, the train suspension system shall be designed to:

(i) Limit the vertical acceleration, as measured by a vertical accelerometer mounted on the car floor, to no greater than 0.55g single event, peak-to-peak over a one second period;

(ii) Limit lateral acceleration, as measured by a lateral accelerometer mounted on the car floor, to no greater than 0.3g single event, peak-to-peak over a one second period; and

(iii) Limit the combination of lateral acceleration (a_L) and vertical acceleration (a_V) occurring over a one second period as expressed by the square root of ($a_L^2 + a_V^2$) to no greater than 0.6g, where a_L may not exceed 0.3g and a_V may not exceed 0.55g. Compliance with the requirements of paragraph (b)(2) shall be demonstrated during the pre-revenue service acceptance testing of the equipment required under § 238.111 and § 213.345 of this chapter.

(3) For purposes of this paragraph:

(i) Car body acceleration measurements shall be processed through a filter having a cut-off frequency of 10 Hz; and

(ii) Steady-state lateral acceleration shall be computed as the mathematical average of the accelerations in the body of a curve, between the spiral/curve points. In a compound curve, steady-state lateral acceleration shall be measured separately for each curve segment.

(c) *Truck (hunting) acceleration.* Each truck shall be equipped with a permanently installed lateral accelerometer mounted on the truck frame. The accelerometer output signals shall be processed through a filter having a band pass of 0.5 to 10 Hz to determine if hunting oscillations of the truck are occurring. If hunting oscillations are detected, the train monitoring system shall provide an alarm to the operator, and the train shall be slowed to a speed at least 5 mph less than the speed at which the hunting oscillations stopped. For purposes of this paragraph, hunting oscillations are considered a sustained cyclic oscillation of the truck which is evidenced by lateral accelerations in excess of 0.4g root mean square (mean-removed) for 2 seconds.

(d) *Overheat sensors.* Overheat sensors for each wheelset journal bearing shall be provided. The sensors may be placed either onboard the equipment or at reasonable intervals along the railroad's right-of-way.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19992, Apr. 23, 2002]

§ 238.429 Safety appliances.

(a) *Couplers.* (1) The leading and the trailing ends of a semi-permanently coupled trainset shall each be equipped with an automatic coupler that couples on impact and uncouples by either activation of a traditional uncoupling lever or some other type of uncoupling mechanism that does not require a person to go between the equipment units.

(2) The automatic coupler and uncoupling device on the leading and trailing ends of a semi-permanently coupled trainset may be stored within a removable shrouded housing.

(3) If the units in a train are not semi-permanently coupled, both ends of each unit shall be equipped with an automatic coupler that couples on impact and uncouples by either activation of a traditional uncoupling lever or some other type of uncoupling mechanism that does not require a person to go between the equipment units.

(b) *Hand brakes.* Except as provided in paragraph (f) of this section, Tier II trains shall be equipped with a parking or hand brake that can be applied and released manually and that is capable

of holding the train on a 3-percent grade.

(c) *Safety appliance mechanical strength and fasteners.* (1) All handrails, handholds, and sill steps shall be made of 1-inch diameter steel pipe, ⅝-inch thickness steel, or a material of equal or greater mechanical strength.

(2) All safety appliances shall be securely fastened to the car body structure with mechanical fasteners that have mechanical strength greater than or equal to that of a ½-inch diameter SAE grade steel bolt mechanical fastener.

(i) Safety appliance mechanical fasteners shall have mechanical strength and fatigue resistance equal to or greater than a ½-inch diameter SAE steel bolt.

(ii) Mechanical fasteners shall be installed with a positive means to prevent unauthorized removal. Self-locking threaded fasteners do not meet this requirement.

(iii) Mechanical fasteners shall be installed to facilitate inspection.

(d) *Handrails and handholds.* Except as provided in paragraph (f) of this section:

(1) Handrails shall be provided for passengers on both sides of all steps used to board or depart the train.

(2) Exits on a power vehicle shall be equipped with handrails and handholds so that crewmembers can get on and off the vehicle safely.

(3) Throughout their entire length, handrails and handholds shall be a color that contrasts with the color of the vehicle body to which they are fastened.

(4) The maximum distance above the top of the rail to the bottom of vertical handrails and handholds shall be 51 inches, and the minimum distance shall be 21 inches.

(5) Vertical handrails and handholds shall be installed to continue to a point at least equal to the height of the top edge of the control cab door.

(6) The minimum hand clearance distance between a vertical handrail or handhold and the vehicle body shall be 2½ inches for the entire length.

(7) All vertical handrails and handholds shall be securely fastened to the vehicle body.

(8) If the length of the handrail exceeds 60 inches, it shall be securely fastened to the power vehicle body with two fasteners at each end.

(e) *Sill steps.* Except as provided in paragraph (f) of this section, each power vehicle shall be equipped with a sill step below each exterior door as follows:

(1) The sill step shall have a minimum cross-sectional area of ½ by 3 inches;

(2) The sill step shall be made of steel or a material of equal or greater strength and fatigue resistance;

(3) The minimum tread length of the sill step shall be 10 inches;

(4) The minimum clear depth of the sill step shall be 8 inches;

(5) The outside edge of the tread of the sill step shall be flush with the side of the car body structure;

(6) Sill steps shall not have a vertical rise between treads exceeding 18 inches;

(7) The lowest sill step tread shall be not more than 24, preferably not more than 22, inches above the top of the track rail;

(8) Sill steps shall be a color that contrasts with the color of the power vehicle body to which they are fastened;

(9) Sill steps shall be securely fastened;

(10) At least 50 percent of the tread surface area of each sill step shall be open space; and

(11) The portion of the tread surface area of each sill step which is not open space and is normally contacted by the foot shall be treated with an anti-skid material.

(f) *Exceptions.* (1) If the units of the equipment are semi-permanently coupled, with uncoupling done only at maintenance facilities, the equipment units that are not required by paragraph (a) of this section to be equipped with automatic couplers need not be equipped with sill steps or end or side handholds that would normally be used to safely perform coupling and uncoupling operations.

(2) If the units of the equipment are not semi-permanently coupled, the units shall be equipped with hand brakes, sill steps, end handholds, and

side handholds that meet the requirements contained in § 231.14 of this chapter.

(3) If two trainsets are coupled to form a single train that is not semi-permanently coupled (i.e., that is coupled by an automatic coupler), the automatically coupled ends shall be equipped with an end handhold that is located and installed so that an individual can safely couple and uncouple the trainsets. The end handhold shall be not more than 16 inches from each side of the car and shall extend the remaining length of the end of the car. (If the equipment is designed with a tapered nose, the side of the car shall be determined based on the outer dimension of the tapered nose where the end handhold is attached.) The end handhold shall also meet the mechanical strength and design requirements contained in paragraphs (c), (d)(3), and (d)(6) of this section. If the trainsets are semi-permanently coupled, this safety appliance is not required.

(g) *Optional safety appliances.* Safety appliances installed at the option of the railroad shall be firmly attached with mechanical fasteners and shall meet the design and installation requirements provided in this section.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19992, Apr. 23, 2002]

§ 238.431 Brake system.

(a) A passenger train's brake system shall be capable of stopping the train from its maximum operating speed within the signal spacing existing on the track over which the train is operating under worst-case adhesion conditions.

(b) The brake system shall be designed to allow an inspector to determine that the brake system is functioning properly without having to place himself or herself in a dangerous position on, under, or between the equipment.

(c) Passenger equipment shall be provided with an emergency brake application feature that produces an irretrievable stop, using a brake rate consistent with prevailing adhesion, passenger safety, and brake system thermal capacity. An emergency brake application shall be available at any time, and shall be initiated by an unintentional parting of the train. A means to initiate an emergency brake application shall be provided at two locations in each unit of the train; however, where a unit of the train is 45 feet or less in length a means to initiate an emergency brake application need only be provided at one location in the unit.

(d) The brake system shall be designed to prevent thermal damage to wheels and brake discs. The operating railroad shall demonstrate through analysis and testing that no thermal damage results to the wheels or brake discs under conditions resulting in maximum braking effort being exerted on the wheels or discs.

(e) The following requirements apply to blended braking systems:

(1) Loss of power or failure of the dynamic brake does not result in exceeding the allowable stopping distance;

(2) The friction brake alone is adequate to safely stop the train under all operating conditions;

(3) The operational status of the electric portion of the brake system shall be displayed for the train operator in the control cab; and

(4) The operating railroad shall demonstrate through analysis and testing the maximum operating speed for safe operation of the train using only the friction brake portion of the blended brake with no thermal damage to wheels or discs.

(f) The brake system design shall allow a disabled train's pneumatic brakes to be controlled by a conventional locomotive, during a rescue operation, through brake pipe control alone.

(g) An independent failure-detection system shall compare brake commands with brake system output to determine if a failure has occurred. The failure detection system shall report brake system failures to the automated train monitoring system.

(h) Passenger equipment shall be equipped with an adhesion control system designed to automatically adjust the braking force on each wheel to prevent sliding during braking. In the event of a failure of this system to prevent wheel slide within preset parameters, a wheel slide alarm that is visual or audible, or both, shall alert the

train operator in the cab of the controlling power car to wheel-slide conditions on any axle of the train.

§ 238.433 Draft system.

(a) Leading and trailing automatic couplers of trains shall be compatible with standard AAR couplers with no special adapters used.

(b) All passenger equipment continues to be subject to the requirements concerning couplers and uncoupling devices contained in Federal Statute at 49 U.S.C. chapter 203 and in FRA regulations at part 231 and § 232.2 of this chapter.

§ 238.435 Interior fittings and surfaces.

(a) Each seat back and seat attachment in a passenger car shall be designed to withstand, with deflection but without total failure, the load associated with the impact into the seat back of an unrestrained 95th-percentile adult male initially seated behind the seat back, when the floor to which the seat is attached decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds.

(b) Each seat back in a passenger car shall include shock-absorbent material to cushion the impact of occupants with the seat ahead of them.

(c) The ultimate strength of each seat attachment to a passenger car body shall be sufficient to withstand the following individually applied accelerations acting on the mass of the seat plus the mass of a seat occupant who is a 95th-percentile adult male:

(1) Lateral: 4g; and

(2) Vertical: 4g.

(d)(1) Other interior fittings shall be attached to the passenger car body with sufficient strength to withstand the following individually applied accelerations acting on the mass of the fitting:

(i) Longitudinal: 8g;

(ii) Lateral: 4g; and

(iii) Vertical: 4g.

(2) Fittings that can be expected to be impacted by a person during a collision, such as tables between facing seats, shall be designed for the mass of the fitting plus the mass of the number of occupants who are 95th-percentile adult males that could be expected to strike the fitting, when the floor of the passenger car decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds.

(e) The ultimate strength of the interior fittings and equipment in power car control cabs shall be sufficient to resist without failure loads due to the following individually applied accelerations acting on the mass of the fitting or equipment:

(1) Longitudinal: 12g;

(2) Lateral: 4g; and

(3) Vertical: 4g.

(f) To the extent possible, interior fittings, except seats, shall be recessed or flush-mounted. Corners and sharp edges shall be avoided or otherwise padded.

(g) Energy-absorbent material shall be used to pad surfaces likely to be impacted by occupants during collisions or derailments.

(h) Luggage stowage compartments shall be enclosed, and have an ultimate strength sufficient to resist loads due to the following individually applied accelerations acting on the mass of the luggage that the compartments are designed to accommodate:

(1) Longitudinal: 8g;

(2) Lateral: 4g; and

(3) Vertical: 4g.

(i) If, for purposes of showing compliance with the requirements of this section, the strength of a seat attachment is to be demonstrated through sled testing, the seat structure and seat attachment to the sled that are used in such testing must be representative of the actual seat structure in, and seat attachment to, the rail vehicle subject to the requirements of this section. If the attachment strength of any other interior fitting is to be demonstrated through sled testing, for purposes of showing compliance with the requirements of this section, such testing shall be conducted in a similar manner.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19992, Apr. 23, 2002]

§ 238.437 [Reserved]

§ 238.439 Doors.

(a) Each passenger car shall have a minimum of two exterior side doors, each door providing a minimum clear opening with dimensions of 30 inches horizontally by 74 inches vertically.

NOTE: The Americans with Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles also contain requirements for doorway clearance (See 49 CFR part 38).

(b) Each passenger car shall be equipped with a manual override feature for each powered, exterior side door. Each manual override must be:

(1) Capable of releasing the door to permit it to be opened, without power, from both inside and outside the car;

(2) Located adjacent to the door which it controls; and

(3) Designed and maintained so that a person may readily access and operate the override device from both inside and outside the car without the use of any tool or other implement.

(c) The status of each powered, exterior side door in a passenger car shall be displayed to the crew in the operating cab. If door interlocks are used, the sensors used to detect train motion shall be nominally set to operate at 3 mph.

(d) Each powered, exterior side door in a passenger car shall be connected to an emergency back-up power system.

(e) A railroad may protect a manual override device used to open a powered, exterior door with a cover or a screen capable of removal without requiring the use of a tool or other implement.

(f) A passenger compartment end door (other than a door providing access to the exterior of the trainset) shall be equipped with a kick-out panel, pop-out window, or other similar means of egress in the event the door will not open, or shall be so designed as to pose a negligible probability of becoming inoperable in the event of car body distortion following a collision or derailment.

(g) Door exits shall be marked, and instructions provided for their use, as required by § 239.107(a) of this chapter.

[64 FR 25660, May 12, 1999, as amended at 67 FR 19993, Apr. 23, 2002]

§ 238.441 Emergency roof access.

(a) *Existing passenger cars and power cars.* Each passenger car and power car ordered prior to April 1, 2009 and placed in service for the first time prior to April 1, 2011, shall have a minimum of one roof hatch emergency access location with a minimum opening of 26 inches by 24 inches, or at least one structural weak point in the roof providing a minimum opening of the same dimensions, to provide access for properly equipped emergency response personnel. Each emergency roof access location shall be conspicuously marked, and legible and understandable operating instructions shall be posted at or near each such location.

(b) *New passenger cars.* Each passenger car ordered on or after April 1, 2009 or placed in service for the first time on or after April 1, 2011, shall comply with the emergency roof access requirements specified in § 238.123.

(c) *New power cars.* Each power car ordered on or after April 1, 2009, or placed in service for the first time on or after April 1, 2011, shall have a minimum of one emergency roof access location, with a minimum opening of 26 inches longitudinally by 24 inches laterally, and comply with the emergency roof access requirements specified in §§ 238.123(b), (d), and (e).

[73 FR 6412, Feb. 1, 2008]

§ 238.443 Headlights.

(a) Each power car shall be equipped with at least two headlights. Each headlight shall produce no less than 200,000 candela. One headlight shall be arranged to illuminate a person standing between the rails 800 feet ahead of the power car under clear weather conditions. The other headlight shall be arranged to illuminate a person standing between the rails 1,500 feet ahead of the power car under clear weather conditions.

(b) A power car with a headlight not in compliance with the requirements of paragraph (a) of this section shall be moved in accordance with the following:

(1) If one of the headlights is defective, the defect shall be considered a non-running gear defect subject to the provisions contained in § 238.17 of this part.

(2) If both headlights are defective, the power car shall be inspected and tagged in accordance with the requirements contained in § 238.17(c) relating to non-running gear defects. The power

car may continue to be used in passenger service only to the nearest forward location where the repairs necessary to bring the power car into compliance can be made or to the power car's next calendar day mechanical inspection, whichever occurs first.

[67 FR 19993, Apr. 23, 2002]

§ 238.445 Automated monitoring.

(a) Each passenger train shall be equipped to monitor the performance of the following systems or components:

(1) Reception of cab signals and train control signals;

(2) Truck hunting;

(3) Dynamic brake status;

(4) Friction brake status;

(5) Fire detection systems;

(6) Head end power status;

(7) Alerter or deadman control;

(8) Horn and bell;

(9) Wheel slide;

(10) Tilt system, if so equipped; and

(11) On-board bearing-temperature sensors, if so equipped.

(b) When any such system or component is operating outside of its predetermined safety parameters:

(1) The train operator shall be alerted; and

(2) Immediate corrective action shall be taken, if the system or component defect impairs the train operator's ability to safely operate the train. Immediate corrective action includes limiting the speed of the train.

(c) The monitoring system shall be designed with an automatic self-test feature that notifies the train operator that the monitoring capability is functioning correctly and alerts the train operator when a system failure occurs.

§ 238.447 Train operator's controls and power car cab layout.

(a) Train operator controls in the power car cab shall be arranged so as to minimize the chance of human error, and be comfortably within view and within easy reach when the operator is seated in the normal train control position.

(b) The train operator's control panel buttons, switches, levers, knobs, and the like shall be distinguishable by sight and by touch.

(c) An alerter shall be provided in the power car cab. If not acknowledged, the alerter shall cause a brake application to stop the train.

(d) Power car cab information displays shall be designed with the following characteristics:

(1) Simplicity and standardization shall be the driving criteria for design of formats for the display of information in the cab;

(2) Essential, safety-critical information shall be displayed as a default condition;

(3) Operator selection shall be required to display other than default information;

(4) Cab or train control signals shall be displayed for the operator; and

(5) Displays shall be readable from the operators's normal position under all lighting conditions.

(e) The power car cab shall be designed so at to permit the crew to have an effective field of view in the forward direction, as well as to the right and left of the direction of travel to observe objects approaching the train from either side. Field-of-view obstructions due to required structural members shall be minimized.

(f) Each seat provided for an employee regularly assigned to occupy a power car cab and any floor-mounted seat in the cab shall be:

(1) Secured to the car body with an attachment having an ultimate strength capable of withstanding the loads due to the following individually applied accelerations acting on the combined mass of the seat and the mass of a seat occupant who is a 95th-percentile adult male:

(i) Longitudinal: 12g;

(ii) Lateral: 4g; and

(iii) Vertical: 4g;

(2) Designed so that all adjustments have the range necessary to accommodate a person ranging from a 5th-percentile adult female to a 95th-percentile adult male, as persons possessing such characteristics are specified, correcting for clothing as appropriate, in any recognized survey after 1958 of weight, height, and other body dimensions of U.S. adults;

(3) Equipped with lumbar support that is adjustable from the seated position;

(4) Equipped with force-assisted, vertical-height adjustment, operated from the seated position;

(5) Equipped with a manually reclining seat back, adjustable from the seated position;

(6) Equipped with an adjustable headrest; and

(7) Equipped with folding, padded armrests.

(g) Sharp edges and corners shall be eliminated from the interior of the power car cab, and interior surfaces of the cab likely to be impacted by an employee during a collision or derailment shall be padded with shock-absorbent material.

FIGURE 1 TO SUBPART E OF PART 238—POWER CAR CAB FORWARD END STRUCTURE CONCEPTUAL IMPLEMENTATION

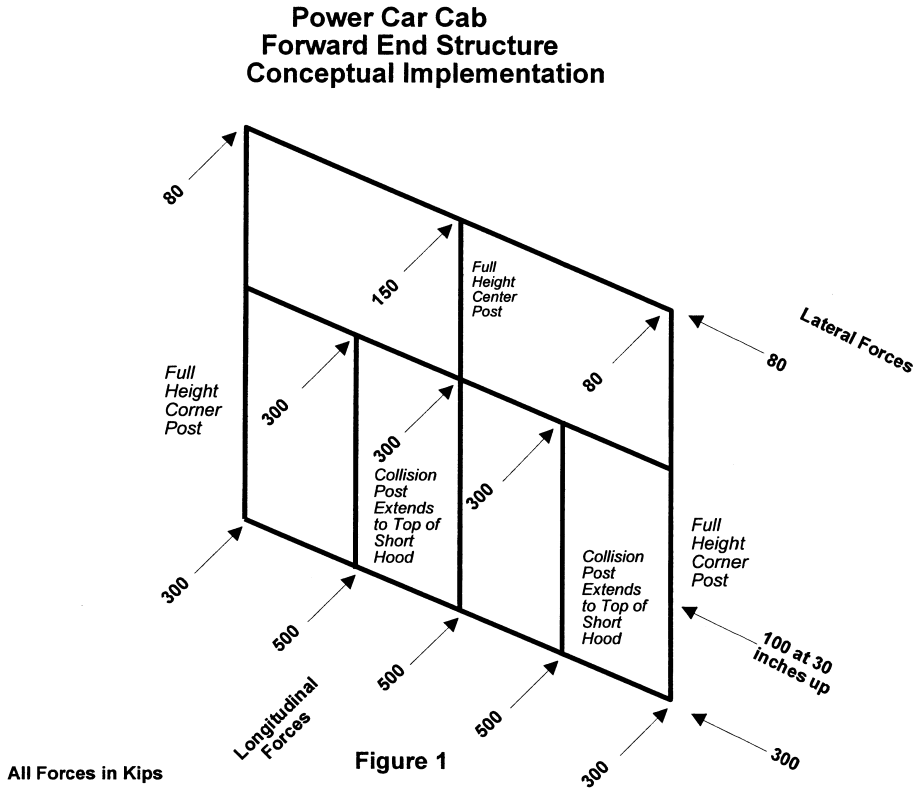


FIGURE 2 TO SUBPART E OF PART 238—POWER CAR CAB REAR END STRUCTURE CONCEPTUAL IMPLEMENTATION 1—TO SUBPART E

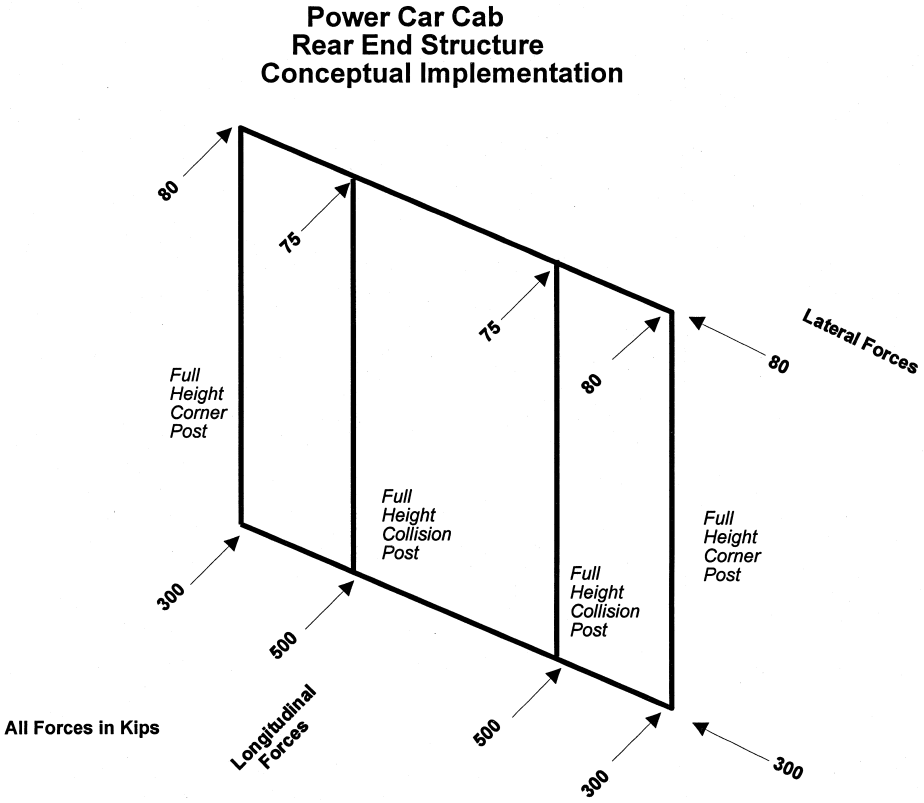


Figure 2

FIGURE 3 TO SUBPART E OF PART 238—TRAILER CAR END STRUCTURE CONCEPTUAL IMPLEMENTATION 1—TO SUBPART E

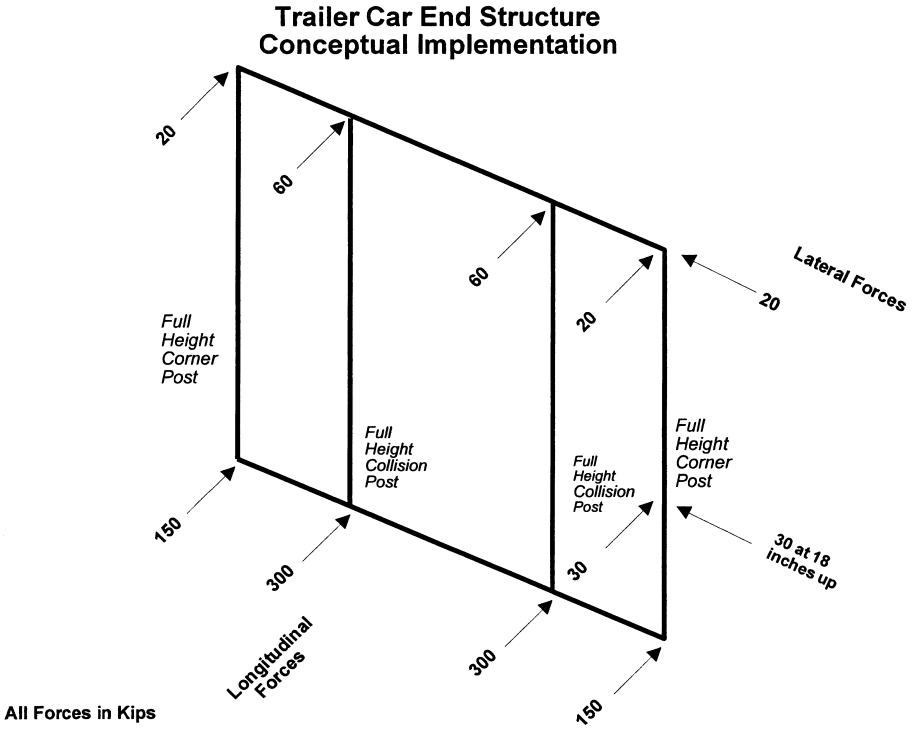


Figure 3

FIGURE 4 TO SUBPART E OF PART 238—TRAILER CAR IN-BOARD VESTIBULE END STRUCTURE CONCEPTUAL IMPLEMENTATION 1—TO SUBPART E

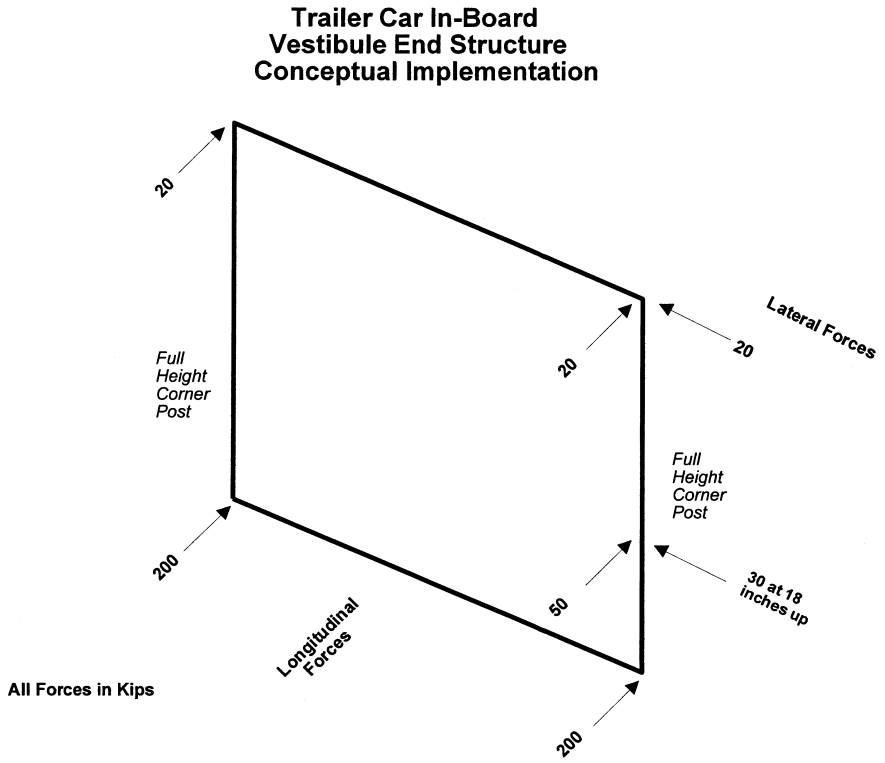


Figure 4

Subpart F—Inspection, Testing, and Maintenance Requirements for Tier II Passenger Equipment

§ 238.501 Scope.

This subpart contains inspection, testing, and maintenance requirements for railroad passenger equipment that operates at speeds exceeding 125 mph but not exceeding 150 mph.

§ 238.503 Inspection, testing, and maintenance requirements.

(a) *General.* Under the procedures provided in § 238.505, each railroad shall obtain FRA approval of a written inspection, testing, and maintenance program for Tier II passenger equipment prior to implementation of that program and prior to commencing passenger operations using that equipment. As further specified in this section, the program shall describe in detail the procedures, equipment, and other means necessary for the safe operation of the passenger equipment, including:

(1) Inspection procedures, intervals, and criteria;

(2) Testing procedures and intervals;

(3) Scheduled preventive-maintenance intervals;

(4) Maintenance procedures;

(5) Special testing equipment or measuring devices required to perform inspections, tests, and maintenance; and

(6) The training, qualification, and designation of employees and contractors to perform inspections, tests, and maintenance.

(b) *Compliance*. After the railroad's inspection, testing, and maintenance program is approved by FRA under § 238.505, the railroad shall adopt the program and shall perform—

(1) The inspections and tests of power brakes and other primary brakes as described in the program;

(2) The other inspections and tests described in the program in accordance with the procedures and criteria that the railroad identified as safety-critical; and

(3) The maintenance tasks described in the program in accordance with the procedures and intervals that the railroad identified as safety-critical.

(c) *General safety inspection, testing, and maintenance procedures*. The inspection, testing, and maintenance program under paragraph (a) of this section shall contain the railroad's written procedures to ensure that all systems and components of in service passenger equipment are free of any general condition that endangers the safety of the crew, passengers, or equipment. These procedures shall protect against:

(1) A continuous accumulation of oil or grease;

(2) Improper functioning of a component;

(3) A crack, break, excessive wear, structural defect, or weakness of a component;

(4) A leak;

(5) Use of a component or system under a condition that exceeds that for which the component or system is designed to operate; and

(6) Insecure attachment of a component.

(d) *Specific inspections*. The program under paragraph (a) of this section shall specify that all Tier II passenger equipment shall receive thorough inspections in accordance with the following standards:

(1) Except as provided in paragraph (d)(3) of this section, the equivalent of a Class I brake test contained in § 238.313 shall be conducted prior to a train's departure from an originating terminal and every 1,500 miles or once each calendar day, whichever comes first, that the train remains in continuous service.

(i) Class I equivalent brake tests shall be performed by a qualified maintenance person.

(ii) Except as provided in § 238.15(b), a railroad shall not use or haul a Tier II passenger train in passenger service from a location where a Class I equivalent brake test has been performed, or was required by this part to have been performed, with less than 100 percent operative brakes.

(2) Except as provided in paragraph (d)(3) of this section, a complete exterior and interior mechanical inspection, in accordance with the railroad's inspection program, shall be conducted by a qualified maintenance person at least once during each calendar day the equipment is used in service.

(3) Trains that miss a scheduled Class I brake test or mechanical inspection due to a delay en route may proceed to the point where the Class I brake test or mechanical inspection was scheduled to be performed.

(e) *Movement of trains with power brake defects*. Movement of trains with a power brake defect as defined in § 238.15 (any primary brake defect) shall be governed by § 238.15.

(f) *Movement of trains with other defects*. The movement of a train with a defect other than a power brake defect shall be conducted in accordance with § 238.17, with the following exceptions:

(1) The movement of a Tier II power car with a non-complying headlight shall be conducted in accordance with § 238.443(b) of this part; and

(2) When a failure of a secondary brake on a Tier II passenger train occurs en route, that train may remain in service until its next scheduled calendar day Class I brake test equivalent at a speed no greater than the maximum safe operating speed demonstrated through analysis and testing for braking with the friction brake alone. The brake system shall be restored to 100 percent operation before the train departs that inspection location.

(g) *Maintenance intervals*. The program under paragraph (a) of this section shall include the railroad's initial scheduled maintenance intervals for

Tier II equipment based on an analysis completed pursuant to the railroad's safety plan. The maintenance interval of a safety-critical component shall be changed only when justified by accumulated, verifiable operating data and approved by FRA under § 238.505 before the change takes effect.

(h) *Training, qualification, and designation program.* The program under paragraph (a) of this section shall describe the training, qualification, and designation program, as defined in the training program plan under § 238.109, established by the railroad to qualify individuals to inspect, test, and maintain the equipment.

(1) If the railroad deems it safety-critical, then only qualified individuals shall inspect, test, and maintain the equipment.

(2) Knowledge of the procedures described in paragraph (a) of this section shall be required to qualify an employee or contractor to perform an inspection, testing, or maintenance task under this part.

(i) *Standard procedures.* The program under paragraph (a) of this section shall include the railroad's written standard procedures for performing all safety-critical equipment inspection, testing, maintenance, and repair tasks necessary to ensure the safe and proper operation of the equipment. The inspection, testing, and maintenance program required by this section is not intended to address and should not include procedures to address employee working conditions that arise in the course of conducting the inspections, tests, and maintenance set forth in the program. When reviewing the railroad's program, FRA does not intend to review any portion of the program that relates to employee working conditions.

(j) *Annual review.* The inspection, testing, and maintenance program required by this section shall be reviewed by the railroad annually.

(k) *Quality control program.* Each railroad shall establish an inspection, testing, and maintenance quality control program enforced by railroad or contractor supervisors to reasonably ensure that inspections, tests, and maintenance are performed in accordance with Federal safety standards and the procedures established by the railroad.

(l) *Identification of safety-critical items.* In the program under paragraph (a) of this section, the railroad shall identify all inspection and testing procedures and criteria as well as all maintenance intervals that the railroad deems to be safety-critical.

[64 25660, May 12, 1999, as amended at 67 FR 19994, Apr. 23, 2002]

§ 238.505 Program approval procedure.

(a) *Submission.* Not less than 90 days prior to commencing passenger operations using Tier II passenger equipment, each railroad to which this subpart applies shall submit for approval an inspection, testing, and maintenance program for that equipment meeting the requirements of this subpart with the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Mail Stop 25, Washington, DC 20590. If a railroad seeks to amend an approved program, the railroad shall file with FRA's Associate Administrator for Safety a petition for approval of such amendment not less than 60 days prior to the proposed effective date of the amendment. A program responsive to the requirements of this subpart or any amendment to the program shall not be implemented prior to FRA approval.

(1) Each program or amendment under § 238.503 shall contain:

(i) The information prescribed in § 238.503 for such program or amendment;

(ii) The name, title, address, and telephone number of the primary person to be contacted with regard to review of the program or amendment; and

(iii) A statement affirming that the railroad has served a copy of the program or amendment on designated representatives of railroad employees, together with a list of the names and addresses of persons served.

(2) Each railroad shall serve a copy of each submission to FRA on designated representatives of railroad employees responsible for the equipment's operation, inspection, testing, and maintenance under this subpart.

(b) *Comment.* Not later than 45 days from the date of filing the program or

amendment, any person may comment on the program or amendment.

(1) Each comment shall set forth specifically the basis upon which it is made, and contain a concise statement of the interest of the commenter in the proceeding.

(2) Each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Mail Stop 25, Washington, DC 20590.

(3) The commenter shall certify that a copy of the comment was served on the railroad.

(c) *Approval.* (1) Within 60 days of receipt of each initial inspection, testing, and maintenance program, FRA will conduct a formal review of the program. FRA will then notify the primary railroad contact person and the designated employee representatives in writing whether the inspection, testing, and maintenance program is approved and, if not approved, the specific points in which the program is deficient. If a program is not approved by FRA, the railroad shall amend its program to correct all deficiencies and resubmit its program with the required revisions not later than 45 days prior to commencing passenger operations.

(2) FRA will review each proposed amendment to the program within 45 days of receipt. FRA will then notify the primary railroad contact person and the designated employee representatives in writing whether the proposed amendment has been approved by FRA and, if not approved, the specific points in which the proposed amendment is deficient. The railroad shall correct any deficiencies and file the corrected amendment prior to implementing the amendment.

(3) Following initial approval of a program or amendment, FRA may reopen consideration of the program or amendment for cause stated.

[64 FR 25660, May 12, 1999, as amended at 74 FR 25174, May 27, 2009]

Subpart G—Specific Safety Planning Requirements for Tier II Passenger Equipment

§ 238.601 Scope.

This subpart contains specific safety planning requirements for the operation of Tier II passenger equipment, procurement of Tier II passenger equipment, and the introduction or major upgrade of new technology in existing Tier II passenger equipment that affects a safety system on such equipment.

§ 238.603 Safety planning requirements.

(a) Prior to commencing revenue service operation of Tier II passenger equipment, each railroad shall prepare and execute a written plan for the safe operation of such equipment. The plan may be combined with any other plan required under this part. The plan shall be updated at least every 365 days. At a minimum, the plan shall describe the approaches and processes to:

(1) Identify all requirements necessary for the safe operation of the equipment in its operating environment;

(2) Identify all known or potential hazards to the safe operation of the equipment;

(3) Eliminate or reduce the risk posed by each hazard identified to an acceptable level using a formal safety methodology such as MIL-STD–882; and

(4) Impose operational limitations, as necessary, on the operation of the equipment if the equipment cannot meet safety requirements.

(b) For the procurement of Tier II passenger equipment, and for each major upgrade or introduction of new technology in existing Tier II passenger equipment that affects a safety system on such equipment, each railroad shall prepare and execute a written safety plan. The plan may be combined with any other plan required under this part. The plan shall describe the approaches and processes to:

(1) Identify all safety requirements governing the design of the passenger equipment and its supporting systems;

(2) Evaluate the total system, including hardware, software, testing, and support activities, to identify known or

potential safety hazards over the life cycle of the equipment;

(3) Identify safety issues during design reviews;

(4) Eliminate or reduce the risk posed by each hazard identified to an acceptable level using a formal safety methodology such as MIL-STD-882;

(5) Monitor the progress in resolving safety issues, reducing hazards, and meeting safety requirements;

(6) Develop a program of testing or analysis, or both, to demonstrate that safety requirements have been met; and

(7) Impose operational limitations, as necessary, on the operation of the equipment if the equipment cannot meet safety requirements.

(c) Each railroad shall maintain sufficient documentation to demonstrate how the operation and design of its Tier II passenger equipment complies with safety requirements or, as appropriate, addresses safety requirements under paragraphs (a)(4) and (b)(7) of this section. Each railroad shall maintain sufficient documentation to track how safety issues are raised and resolved.

(d) Each railroad shall make available to FRA for inspection and copying upon request each safety plan required by this section and any documentation required pursuant to such plan.

[64 25660, May 12, 1999, as amended at 67 FR 19994, Apr. 23, 2002]

APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES [1]

Section	Violation	Willful violation
SUBPART A—GENERAL		
238.15 Movement of power brake defects:		
(b) Improper movement from Class I or IA brake test	5,000	7,500
(c) Improper movement of en route defect	2,500	5,000
(2), (3) Insufficient tag or record	1,000	2,000
(4) Failure to determine percent operative brake	2,500	5,000
(d) Failure to follow operating restrictions	5,000	7,500
(e) Failure to follow restrictions for inoperative front or rear unit	2,500	5,000
238.17 Movement of other than power brake defects: [1]		
(c)(4), (5) Insufficient tag or record	1,000	2,000
(d) Failure to inspect or improper use of roller bearings	2,500	5,000
(e) Improper movement of defective safety appliances	(1)	
238.19 Reporting and tracking defective equipment:		
(a) Failure to have reporting or tracking system	7,500	11,000
(b) Failure to retain records	2,000	4,000
(c) Failure to make records available	1,000	2,000
(d) Failure to list power brake repair points	2,000	4,000
SUBPART B—SAFETY PLANNING AND GENERAL REQUIREMENTS		
238.103 Fire protection plan/fire safety:		
(a) Failure to use proper materials	5,000	7,500
(b) Improper certification	1,000	2,000
(c) Failure to consider fire safety on new equipment	5,000	7,500
(d) Failure to perform fire safety analysis	5,000	7,500
(e) Failure to develop, adopt or comply with procedures	5,000	7,500
238.105 Train electronic hardware and software safety:		
(a), (b), (c) Failure to develop and maintain hardware and software safety	7,500	11,000
(d) Failure to include required design features	5,000	7,500
(e) Failure to comply with hardware and software safety program	5,000	7,500
238.107 Inspection, testing, and maintenance plan:		
(b) Failure to develop plan	7,500	11,000
(b)(1)–(5) Failure of plan to address specific item	3,000	6,000
(d) Failure to conduct annual review	5,000	7,500
238.109 Training, qualification, and designation program:		
(a) Failure to develop or adopt program	7,500	11,000
(b)(1)–(4) Failure of plan to address specific item	3,000	6,000
(b)(5)–(12) Failure to comply with specific required provision of the program	5,000	7,500
(b)(13) Failure to maintain adequate records	2,500	5,000
238.111 Pre-revenue service acceptance testing plan:		
(a) Failure to properly test previously used equipment	7,500	11,000
(b)(1) Failure to develop plan	7,500	11,000
(b)(2) Failure to submit plan to FRA	5,000	7,500
(b)(3) Failure to comply with plan	5,000	7,500
(b)(4) Failure to document results of testing	5,000	7,500

Section	Violation	Willful violation
(b)(5) Failure to correct safety deficiencies or impose operating limits	5,000	7,500
(b)(6) Failure to maintain records	3,000	6,000
(b)(7) Failure to obtain FRA approval	5,000	7,500
238.113 Emergency window exits	2,500	5,000
238.114 Rescue access windows	2,500	5,000
238.115 Emergency lighting	2,500	5,000
238.117 Protection against personal injury	2,500	5,000
238.119 Rim-stamped straight plate wheels	2,500	5,000
238.121 Emergency communication	2,500	5,000
238.123 Emergency roof access	2,500	5,000
SUBPART C—SPECIFIC REQUIREMENTS FOR TIER I EQUIPMENT		
238.203 Static end strength	2,500	5,000
238.205 Anti-climbing mechanism	2,500	5,000
238.207 Link between coupling mechanism and car body	2,500	5,000
238.209 Forward-facing end structure of locomotives	2,500	5,000
238.211 Collision posts	2,500	5,000
238.213 Corner posts	2,500	5,000
238.215 Rollover strength	2,500	5,000
238.217 Side structure	2,500	5,000
238.219 Truck-to-car-body attachment	2,500	5,000
238.221 Glazing	2,500	5,000
238.223 Fuel tanks	2,500	5,000
238.225 Electrical System	2,500	5,000
238.227 Suspension system	2,500	5,000
238.229 Safety appliances—general:.		
(e) Failure to properly identify equipment (per car)	2,500	5,000
(g) Failure to adopt or comply with inspection plan	2,500	5,000
(h) Failure to use qualified person (per car)	2,500	5,000
(i) Failure to properly conduct initial or periodic inspection (per car)	2,500	5,000
(j) Failure to take proper remedial action (per car)	2,500	5,000
(k) Failure to maintain records (per car)	2,000	4,000
238.230 Safety appliances—new equipment:.		
(b)(2) Failure to identify welded appliance (per car)	2,500	5,000
(b)(3) Failure to receive approval for use (per car)	2,500	5,000
(c)(2) Failure to make proper repair (per car)	2,500	5,000
238.231 Brake System (a)–(g), (i)–(n)	2,500	5,000
(h)(1), (2) Hand or parking brake missing or inoperative	5,000	7,500
(h)(3) Hand or parking brake inspection or record (per car)	2,500	5,000
(h)(4) Hand or parking brake not applied to hold unattended equipment or prematurely released	5,000	7,500
238.233 Interior fittings and surfaces	2,500	7,500
238.235 Doors	2,500	5,000
238.237 Automated monitoring	2,500	5,000
SUBPART D—INSPECTION, TESTING, AND MAINTENANCE REQUIREMENTS FOR TIER I EQUIPMENT		
238.303 Exterior mechanical inspection of passenger equipment:		
(a)(1) Failure to perform mechanical inspection	[1] 2,000	4,000
(a)(2) Failure to inspect secondary brake system	2,500	5,000
(b) Failure to perform inspection on car added to train	[1] 2,000	4,000
(c) Failure to utilize properly qualified personnel	2,000	4,000
(e)(1) Products of combustion not released outside cab	2,500	5,000
(e)(2) Battery not vented or gassing excessively	2,500	5,000
(e)(3) Coupler not in proper condition	2,500	5,000
(e)(4) No device under drawbar pins or connection pins	2,500	5,000
(e)(5) Suspension system and spring rigging not in proper condition	2,500	5,000
(e)(6) Truck not in proper condition	2,500	5,000
(e)(7) Side bearing not in proper condition	2,500	5,000
(e)(8) Wheel not in proper condition:		
(i), (iv) Flat spot(s) and shelled spot(s):		
(A) One spot 2½″ or more but less than 3″ in length	2,500	5,000
(B) One spot 3″ or more in length	5,000	7,500
(C) Two adjoining spots each of which is 2″ or more in length but less than 2½″ in length	2,500	5,000
(D) Two adjoining spots each of which are at least 2″ in length, if either spot is 2½7″ or more in length	5,000	7,500
(ii) Gouge or chip in flange:		
(A) More than 1½″ but less than 1⅝″ in length; and more than ½″ but less than ⅝″ in width	2,500	5,000
(B) 1⅝″ or more in length and ⅝″ or more in width	5,000	7,500
(iii) Broken rim	5,000	7,500
(v) Seam in tread	2,500	5,000

Section	Violation	Willful violation
(vi) Flange thickness of:	2,500	5,000
(A) 7/8″ or less but more than.		
(B) 13/16″ or less	5,000	7,500
(vii) Tread worn hollow	2,500	5,000
(viii) Flange height of:		
(A) 1½″ or greater but less than 1⅝″	2,500	5,000
(B) 1⅝″ or more	5,000	7,500
(ix) Rim thickness:		
(A) Less than 1″	2,500	5,000
(B) 15/16″ or less	5,000	7,500
(x) Crack or break in flange, tread, rim, plate, or hub:		
(A) Crack of less than 1″	2,500	5,000
(B) Crack of 1″ or more	5,000	7,500
(C) Break	5,000	7,500
(xi) Loose wheel	5,000	7,500
(xii) Welded wheel	5,000	7,500
(e)(10) Improper grounding or insulation	5,000	7,500
(e)(11) Jumpers or cable connections not in proper condition	2,500	5,000
(e)(12) Door or cover plate not properly marked	2,500	5,000
(e)(13) Buffer plate not properly placed	2,500	5,000
(e)(14) Diaphragm not properly placed or aligned	2,500	5,000
(e)(15) Secondary braking system not in operating mode or contains known defect	2,500	5,000
(e)(16) Roller bearings:		
(i) Overheated	5,000	7,500
(ii) Cap screw loose or missing	2,500	5,000
(iii) Cap screw lock broken or missing	1,000	2,000
(iv) Seal loose, damaged, or leaks lubricant	2,500	5,000
(e)(17) Air compressor inoperative	2,500	5,000
(g) Record of inspection:		
(1), (4) Failure to maintain record of inspection	5,000	4,000
(2) Record contains insufficient information	1,000	2,000
238.305 Interior mechanical inspection of passenger cars:		
(a) Failure to perform inspection	[1] 1,000	2,000
(b) Failure to utilize properly qualified personnel	1,000	2,000
(c)(1) Failure to protect against personal injury	2,500	5,000
(c)(2) Floors not free of condition that creates hazard	2,500	5,000
(c)(3) Access to manual door release not in place	2,000	4,000
(c)(4) Emergency equipment not in place	1,000	2,000
(c)(5) Emergency brake valve not stenciled or marked	2,500	5,000
(c)(6) Door or cover plates not properly marked	2,500	5,000
(c)(7) Safety signage not in place or legible	1,000	2,000
(c)(8) Trap door unsafe or improperly secured	2,500	5,000
(c)(9) Vestibule steps not illuminated	2,000	4,000
(c)(10) Door not safely operate as intended	2,500	5,000
(c)(11) Seat broken, loose, or not properly attached	2,500	5,000
(e) Record of inspection:		
(1), (4) Failure to maintain record of inspection	2,000	4,000
(2) Record contains insufficient information	1,000	1,000
(f) Record of inspection:		
(1), (4) Failure to maintain record of inspection	2,000	4,000
(2) Record contains insufficient information	1,000	2,000
238.307 Periodic mechanical inspection of passenger cars and unpowered vehicles:		
(a) Failure to perform periodic mechanical inspection	[1] 2,500	5,000
(b) Failure to utilize properly qualified personnel	2,500	5,000
(c)(1) Seat or seat attachment broken or loose	2,500	5,000
(c)(2) Luggage rack broken or loose	2,500	5,000
(c)(3) Bed, bunks, or restraints broken or loose	2,500	5,000
(c)(4) Emergency window exit not properly operate	2,500	5,000
(c)(5) Emergency lighting not operational	2,500	5,000
(c)(6) Switches not in proper condition	2,500	5,000
(c)(7) Coupler not in proper condition	2,500	5,000
(c)(8) Truck not equipped with securing arrangement	2,500	5,000
(c)(9) Truck center casting cracked or broken	5,000	7,500
(c)(10) General conditions endangering crew, passengers	2,500	5,000
(c)(13) Hand or parking brake test not performed	2,500	5,000
(d)(1) Manual door release not operate as intended	2,500	5,000
(d)(2) Hand or parking brake inspection not performed	2,500	5,000
(e)(1) Failure to maintain record of inspection	2,000	4,000
(i)–(iv) Record contains insufficient information	1,000	2,000
(f)(1) Record of inspection:		
(i) Failure to maintain record of inspection	2,000	4,000
(ii) Record contains insufficient information	1,000	2,000
238.309 Periodic brake equipment maintenance:		

Section	Violation	Willful violation
(b) Failure to perform on MU locomotive	2,500	5,000
(c) Failure to perform on conventional locomotive	2,500	5,000
(d) Failure to perform on passenger coaches or other unpowered vehicle	2,500	5,000
(e) Failure to perform on cab car	2,500	5,000
(f) Record of periodic maintenance:		
(1), (2) Failure to maintain record or stencil	2,000	4,000
238.311 Single car tests:		
(a) Failure to test in accord with required procedure	2,500	5,000
(b) Failure to utilize properly qualified personnel	2,500	5,000
(c), (e) Failure to perform single car test	2,500	5,000
(f) Improper movement of car for testing	2,000	4,000
(g) Failure to test after repair or replacement of component	2,000	4,000
238.313 Class I brake test:		
(a) Failure to perform on commuter or short distance intercity passenger train	[1] 10,000	15,000
(b) Failure to perform on long-distance intercity passenger train	[1] 10,000	15,000
(c) Failure to perform on cars added to passenger train	[1] 5,000	7,500
(d) Failure to utilized properly qualified personnel	5,000	7,500
(f) Passenger train used from Class I brake test with less than 100% operative brakes	5,000	7,500
(g) Partial failure to perform inspection on a passenger train	5,000	7,500
(3) Failure to adjust piston travel (per car)	2,500	5,000
(h) Failure to maintain record	2,000	4,000
(j) Failure to perform additional Class I brake test	5,000	7,500
(j)(3) Failure to maintain record	2,000	4,000
238.315 Class IA brake test:		
(a) Failure to perform inspection	[1] 5,000	7,500
(d) Failure to utilize properly qualified personnel	2,500	5,000
(e) Passenger train used from Class IA brake test with improper percentage of operative brakes	5,000	7,500
(f) Partial failure to perform inspection on passenger train	2,500	5,000
238.317 Class II brake test:		
(a) Failure to perform inspection	[1] 2,500	5,000
(b) Failure to utilize properly qualified personnel	2,500	5,000
(c) Improper use of defective equipment from Class II brake test	2,500	5,000
238.319 Running brake tests:		
(a), (b) Failure to perform test	2,000	4,000
238.321 Out-of-service credit	1,000	2,000
SUBPART E—SPECIFIC REQUIREMENTS FOR TIER II PASSENGER EQUIPMENT		
238.403 Crash energy management	2,500	5,000
238.405 Longitudinal static compressive strength	2,500	5,000
238.407 Anti-climbing mechanism	2,500	5,000
238.409 Forward end structures of power car cabs:		
(a) Center collision post	2,500	5,000
(b) Side collision posts	2,500	5,000
(c) Corner posts	2,500	5,000
(d) Skin	2,500	5,000
238.411 Rear end structures of power car cabs:		
(a) Corner posts	2,500	5,000
(b) Collision posts	2,500	5,000
238.413 End structures of trailer cars	2,500	5,000
238.415 Rollover strength	2,500	5,000
238.417 Side loads	2,500	5,000
238.419 Truck-to-car-body and truck component attachment	2,500	5,000
238.421 Glazing:		
(b) End-facing exterior glazing	2,500	5,000
(c) Alternate glazing requirements	2,500	5,000
(d) Glazing securement	1,000	2,000
(e) Stenciling	2,500	5,000
238.423 Fuel tanks:		
(a) External fuel tanks	2,500	5,000
(b) Internal fuel tanks	2,500	5,000
238.425 Electrical system:		
(a) Circuit protection	2,500	5,000
(b) Main battery system	2,500	5,000
(c) Power dissipation resistors	2,500	5,000
(d) Electromagnetic interference and compatibility	2,500	5,000
238.427 Suspension system	2,500	5,000
238.429 Safety Appliances:		
(a) Couplers	5,000	7,500
(b) Hand/parking brakes	5,000	7,500
(d) Handrail and handhold missing	2,500	5,000
(d)(1)–(8) Handrail or handhold improper design	2,500	5,000
(e) Sill step missing	5,000	7,500

Section	Violation	Willful violation
(e)(1)–(11) Sill step improper design	2,500	5,000
(g) Optional safety appliances	2,500	5,000
238.431 Brake system	2,500	5,000
238.433 Draft System	2,500	5,000
238.435 Interior fittings and surfaces	2,500	5,000
238.437 [Reserved]		
238.439 Doors:		
(a) Exterior side doors	2,500	5,000
(b) Manual override feature	2,500	5,000
(c) Notification to crew of door status	2,500	5,000
(d) Emergency back-up power	2,500	5,000
(f) End door kick-out panel or pop-out window	2,500	5,000
(g) Marking and instructions	[Reserved]	
238.441 Emergency roof access	2,500	5,000
238.443 Headlights	2,500	5,000
238.445 Automated monitoring	2,500	5,000
238.447 Train operator's controls and power car cab layout	2,500	5,000
SUBPART F—INSPECTION, TESTING, AND MAINTENANCE REQUIREMENTS FOR TIER II PASSENGER EQUIPMENT		
238.503 Inspection, testing, and maintenance requirements:		
(a) Failure to develop inspection, testing, and maintenance program or obtain FRA approval	10,000	15,000
(b) Failure to comply with provisions of the program	5,000	7,500
(c) Failure to ensure equipment free of conditions which endanger safety of crew, passengers, or equipment	2,500	5,000
(d) Specific safety inspections:		
(1)(i) Failure to perform Class I brake test or equivalent	10,000	15,000
(1)(ii) Partial failure to perform Class I brake test or equivalent	5,000	7,500
(2)(i) Failure to perform exterior mechanical inspection	[1] 2,000	4,000
(2)(ii) Failure to perform interior mechanical inspection	[1] 1,000	2,000
(g) Failure to perform scheduled maintenance as required in program	2,500	5,000
(h) Failure to comply with training, qualification and designation program	5,000	7,500
(i) Failure to develop or comply with standard procedures for performing inspection, tests, and maintenance	2,500	5,000
(j) Failure to conduct annual review	5,000	7,500
(k) Failure to establish or utilize quality control program	5,000	7,500
SUBPART G—SPECIFIC SAFETY PLANNING REQUIREMENTS FOR TIER II PASSENGER EQUIPMENT		
238.603 Safety plan:		
(a) Failure to develop safety operating plan	7,500	11,000
(b) Failure to develop procurement plan	7,500	11,000
(1)–(7) Failure to develop portion of plan	2,500	5,000
(c) Failure to maintain documentation	2,500	5,000

[1] A penalty may be assessed against an individual only for a willful violation. Generally when two or more violations of these regulations are discovered with respect to a single unit of passenger equipment that is placed or continued in service by a railroad, the appropriate penalties set forth above are aggregated up to a maximum of $16,000 per day. However, failure to perform, with respect to a particular unit of passenger equipment, any of the inspections and tests required under subparts D and F of this part will be treated as a violation separate and distinct from, and in addition to, any substantive violative conditions found on that unit of passenger equipment. Moreover, the Administrator reserves the right to assess a penalty of up to $100,000 for any violation where circumstances warrant. *See* 49 CFR part 209, appendix A.

Failure to observe any condition for movement of defective equipment set forth in § 238.17 will deprive the railroad of the benefit of the movement-for-repair provision and make the railroad and any responsible individuals liable for penalty under the particular regulatory section(s) concerning the substantive defect(s) present on the unit of passenger equipment at the time of movement.

Failure to observe any condition for the movement of passenger equipment containing defective safety appliances, other than power brakes, set forth in § 238.17(e) will deprive the railroad of the movement-for-repair provision and make the railroad and any responsible individuals liable for penalty under the particular regulatory section(s) contained in part 231 of this chapter or § 238.429 concerning the substantive defective condition.

The penalties listed for failure to perform the exterior and interior mechanical inspections and tests required under § 238.303 and § 238.305 may be assessed for each unit of passenger equipment contained in a train that is not properly inspected. Whereas, the penalties listed for failure to perform the brake inspections and tests under § 238.313 through § 238.319 may be assessed for each train that is not properly inspected.

[2] The penalty schedule uses section numbers from 49 CFR part 238. If more than one item is listed as a type of violation of a given section, each item is also designated by a ''penalty code,'' which is used to facilitate assessment of civil penalties, and which may or may not correspond to any subsection designation(s). For convenience, penalty citations will cite the CFR section and the penalty code, if any. FRA reserves the right, should litigation become necessary, to substitute in its complaint the CFR citation in place of the combined CFR and penalty code citation, should they differ.

[64 FR 25660, May 12, 1999, as amended at 65 FR 41310, July 3, 2000; 67 FR 19994, Apr. 23, 2002; 72 FR 51198, Sept. 6, 2007; 73 FR 6413, Feb. 1, 2008; 73 FR 79704, Dec. 30, 2008]

APPENDIX B TO PART 238—TEST METHODS AND PERFORMANCE CRITERIA FOR THE FLAMMABILITY AND SMOKE EMISSION CHARACTERISTICS OF MATERIALS USED IN PASSENGER CARS AND LOCOMOTIVE CABS

This appendix contains the test methods and performance criteria for the flammability and smoke emission characteristics of materials used in passenger cars and locomotive cabs, in accordance with the requirements of § 238.103.

(a) *Incorporation by reference.* Certain documents are incorporated by reference into this appendix with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy of each document during normal business hours at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue, SE., Washington, DC 20950 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* The documents incorporated by reference into this appendix and the sources from which you may obtain these documents are listed below:

(1) American Society for Testing and Materials (ASTM), 100 Barr Harbor Dr., West Conshohocken, PA 19428–2959.

(i) ASTM C 1166–00, Standard Test Method for Flame Propagation of Dense and Cellular Elastomeric Gaskets and Accessories.

(ii) ASTM D 2724–87, Standard Test Methods for Bonded, Fused, and Laminated Apparel Fabrics.

(iii) ASTM D 3574–95, Standard Test Methods for Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams.

(iv) ASTM D 3675–98, Standard Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source.

(v) ASTM E 119–00a, Standard Test Methods for Fire Tests of Building Construction and Materials.

(vi) ASTM E 162–98, Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.

(vii) ASTM E 648–00, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

(viii) ASTM E 662–01, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

(ix) ASTM E 1354–99, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.

(x) ASTM E 1537–99, Standard Test Method for Fire Testing of Upholstered Furniture.

(xi) ASTM E 1590–01, Standard Test Method for Fire Testing of Mattresses.

(2) General Services Administration, Federal Supply Service, Specification Section, 470 E. L'Enfant Plaza, SW., Suite 8100, Washington, DC, 20407. FED-STD-191A-Textile Test Method 5830, Leaching Resistance of Cloth; Standard Method (July 20, 1978).

(3) State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, 3485 Orange Grove Avenue, North Highlands, CA 95660–5595.

(i) California Technical Bulletin (Cal TB) 129, Flammability Test Procedure for Mattresses for Use in Public Buildings (October, 1992).

(ii) Cal TB 133, Flammability Test Procedure for Seating Furniture for Use in Public Occupancies (January, 1991).

(b) *Definitions.* As used in this appendix—

Average heat release rate ($\dot{q}''_{180}$) means, as defined in ASTM E 1354–99, the average heat release rate per unit area in the time period beginning at the time of ignition and ending 180 seconds later.

Critical radiant flux (C.R.F.) means, as defined in ASTM E 648–00, a measure of the behavior of horizontally-mounted floor covering systems exposed to a flaming ignition source in a graded radiant heat energy environment in a test chamber.

Flame spread index (I_s) means, as defined in ASTM E 162–98, a factor derived from the rate of progress of the flame front (F_s) and the rate of heat liberation by the material under test (Q), such that $I_s = F_s \times Q$.

Flaming dripping means periodic dripping of flaming material from the site of material burning or material installation.

Flaming running means continuous flaming material leaving the site of material burning or material installation.

Heat release rate means, as defined in ASTM E 1354–99, the heat evolved from a specimen per unit of time.

Specific extinction area (σ_f) means, as defined in ASTM E 1354–99, specific extinction area for smoke.

Specific optical density (D_s) means, as defined in ASTM E 662–01, the optical density measured over unit path length within a chamber of unit volume, produced from a specimen of unit surface area, that is irradiated by a heat flux of 2.5 watts/cm^2 for a specified period of time.

Surface flammability means the rate at which flames will travel along surfaces.

(c) *Required test methods and performance criteria.* The materials used in locomotive cabs and passenger cars shall be tested according to the methods and meet the performance criteria set forth in the following table and notes:

Test Procedures and Performance Criteria for the Flammability and Smoke Emission Characteristics of Materials Used in Passenger Cars and Locomotive Cabs

CATEGORY	FUNCTION OF MATERIAL	TEST METHOD	PERFORMANCE CRITERIA
Cushions, Mattresses	All [1, 2, 3, 4, 5, 6, 7, 8]	ASTM D 3675-98	$I_s \leq 25$
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 175$
Fabrics	Seat upholstery, mattress ticking and covers, curtains, draperies, wall coverings, and window shades [1, 2, 3, 6, 7, 8]	14 CFR 25, Appendix F, Part I, (vertical test)	Flame time ≤ 10 seconds Burn length ≤ 6 inches
		ASTM E 662-01	$D_s(4.0) \leq 200$
Other Vehicle Components [9, 10, 11, 12]	Seat and mattress frames, wall and ceiling panels, seat and toilet shrouds, tray and other tables, partitions, shelves, opaque windscreens, end caps, roof housings, and component boxes and covers [1, 2]	ASTM E 162-98	$I_s \leq 35$
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 200$
	Flexible cellular foams used in armrests and seat padding [1, 2, 4, 6]	ASTM D 3675-98	$I_s \leq 25$
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 175$
	Thermal and acoustic insulation [1, 2]	ASTM E 162-98	$I_s \leq 25$
		ASTM E 662-01	$D_s(4.0) \leq 100$
	HVAC ducting [1, 2]	ASTM E 162-98	$I_s \leq 35$
		ASTM E 662-01	$D_s(4.0) \leq 100$
	Floor covering [12,13]	ASTM E 648-00	C.R.F. ≥ 5 kW/m^2
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 200$
	Light diffusers, windows and transparent plastic windscreens [2, 14]	ASTM E 162-98	$I_s \leq 100$
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 200$
Elastomers [1, 10, 11]	Window gaskets, door nosings, inter-car diaphragms, roof mats, and seat springs	ASTM C 1166-00	Average flame propagation ≤ 4 inches
		ASTM E 662-01	$D_s(1.5) \leq 100$ $D_s(4.0) \leq 200$
Structural Components [15]	Flooring [16], Other [17]	ASTM E 119-00a	Pass

[1] Materials tested for surface flammability shall not exhibit any flaming running or dripping.

[2] The ASTM E 662 01 maximum test limits for smoke emission (specific optical density) shall be measured in either the flaming or

[1] Materials tested for surface flammability shall not exhibit any flaming running or dripping.

[2] The ASTM E 662–01 maximum test limits for smoke emission (specific optical density) shall be measured in either the flaming or

non-flaming mode, utilizing the mode which generates the most smoke.

[3] Testing of a complete seat assembly (including cushions, fabric layers, upholstery) according to ASTM E 1537–99 using the pass/fail criteria of Cal TB 133, and testing of a complete mattress assembly (including foam and ticking) according to ASTM E 1590–01 using the pass/fail criteria of Cal TB 129 shall be permitted in lieu of the test methods prescribed herein, provided the assembly component units remain unchanged or new (replacement) assembly components possess equivalent fire performance properties to the original components tested. A fire hazard analysis must also be conducted that considers the operating environment within which the seat or mattress assembly will be used in relation to the risk of vandalism, puncture, cutting, or other acts which may expose the individual components of the assemblies to an ignition source. Notes 5, 6, 7, and 8 apply.

[4] Testing is performed without upholstery.

[5] The surface flammability and smoke emission characteristics shall be demonstrated to be permanent after dynamic testing according to ASTM D 3574–95, Test I_2 (Dynamic Fatigue Test by the Roller Shear at Constant Force) or Test I_3 (Dynamic Fatigue Test by Constant Force Pounding) both using Procedure B, except that the test samples shall be a minimum of 6 inches (154 mm) by 18 inches (457 mm) by the thickness of the material in its end use configuration, or multiples thereof. If Test I_3 is used, the size of the indentor described in paragraph 96.2 shall be modified to accommodate the specified test specimen.

[6] The surface flammability and smoke emission characteristics shall be demonstrated to be permanent by washing, if appropriate, according to FED-STD–191A Textile Test Method 5830.

[7] The surface flammability and smoke emission characteristics shall be demonstrated to be permanent by dry-cleaning, if appropriate, according to ASTM D 2724–87.

[8] Materials that cannot be washed or dry-cleaned shall be so labeled and shall meet the applicable performance criteria after being cleaned as recommended by the manufacturer.

[9] Signage is not required to meet any flammability or smoke emission performance criteria specified in this Appendix.

[10] Materials used to fabricate miscellaneous, discontinuous small parts (such as knobs, rollers, fasteners, clips, grommets, and small electrical parts) that will not contribute materially to fire growth in end use configuration are exempt from flammability and smoke emission performance requirements, provided that the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration and an appropriate fire hazard analysis is conducted which addresses the location and quantity of the materials used, and the vulnerability of the materials to ignition and contribution to flame spread.

[11] If the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration, materials used to fabricate such a part may be tested in accordance with ASTM E 1354–99 as an alternative to both (a) the ASTM E 162–98 flammability test procedure, or the appropriate flammability test procedure otherwise specified in the table, and (b) the ASTM E 662–01 smoke generation test procedure. Testing shall be at 50 kW/m^2 applied heat flux with a retainer frame. Materials tested in accordance with ASTM E 1354–99 shall meet the following performance criteria: average heat release rate ($\dot{q}''_{180}$) less than or equal to 100 kW/m^2, and average specific extinction area (σ_f) less than or equal to 500 m^2/kg over the same 180-second period.

[12] Carpeting used as a wall or ceiling covering shall be tested according to ASTM E 162–98 and ASTM E 662–01 and meet the respective criteria of I_s less than or equal to 35 and D_s (1.5) less than or equal to 100 and D_s (4.0) less than or equal to 200. Notes 1 and 2 apply.

[13] Floor covering shall be tested with padding in accordance with ASTM E 648–00, if the padding is used in the actual installation.

[14] For double window glazing, only the interior glazing is required to meet the requirements specified herein. (The exterior glazing is not required to meet these requirements.)

[15] Penetrations (ducts, etc.) shall be designed against acting as passageways for fire and smoke and representative penetrations shall be included as part of test assemblies.

[16] A structural flooring assembly separating the interior of a vehicle from its undercarriage shall meet the performance criteria during a nominal test period as determined by the railroad. The nominal test period must be twice the maximum expected time period under normal circumstances for a vehicle to stop completely and safely from its maximum operating speed, plus the time necessary to evacuate all the vehicle's occupants to a safe area. The nominal test period must not be less than 15 minutes. Only one specimen need be tested. A proportional reduction may be made in the dimensions of the specimen provided it serves to truly test the ability of the structural flooring assembly to perform as a barrier against under-vehicle fires. The fire resistance period required shall be consistent with the safe evacuation of a full load of passengers from the vehicle under worst-case conditions.

[17] Portions of the vehicle body which separate major ignition sources, energy sources, or sources of fuel-load from vehicle interiors, shall have sufficient fire endurance as determined by a fire hazard analysis acceptable to

the railroad which addresses the location and quantity of the materials used, as well as vulnerability of the materials to ignition, flame spread, and smoke generation. These portions include equipment carrying portions of a vehicle's roof and the interior structure separating the levels of a bi-level car, but do not include a flooring assembly subject to Note 16. A railroad is not required to use the ASTM E 119–00a test method.

[67 FR 42910, June 25, 2002, as amended at 74 FR 25175, May 27, 2009]

APPENDIX C TO PART 238—SUSPENSION SYSTEM SAFETY PERFORMANCE STANDARDS

This appendix contains the minimum suspension system safety performance standards for Tier II passenger equipment as required by § 238.427. These requirements shall be the basis for evaluating suspension system safety performance until an industry standard acceptable to FRA is developed and approved under the procedures provided in § 238.21.

(a) Passenger equipment suspension systems shall be designed to limit the lateral and vertical forces and lateral to vertical (L/V) ratios, for the time duration required to travel five feet at any operating speed or over any class of track, under all operating conditions as determined by the railroad, as follows:

(1) The maximum single wheel lateral to vertical force (L/V) ratio shall not exceed Nadal's limit as follows:

$$\text{Wheel L/V} \leq \frac{\tan(\delta) - \mu}{1 + \mu \tan(\delta)}$$

where:

δ=flange angle (deg).

μ=coefficient of friction of 0.5.

(2) The net axle lateral force shall not exceed 0.5 times the static vertical axle load.

(3) The vertical wheel/rail force shall not be less than or equal to 10 percent of the static vertical wheel load.

(4) The sum of the vertical wheel loads on one side of any truck shall not be less than or equal to 20 percent of the static vertical axle load. This shall include the effect of a crosswind allowance as specified by the railroad for the intended service.

(5) The maximum truck side L/V ratio shall not exceed 0.6.

(6) When stopped on track with a uniform 6-inch superelevation, vertical wheel loads, at all wheels, shall not be less than or equal to 60 percent of the nominal vertical wheel load on level track.

(b) For purposes of this appendix, wheel/rail force measurements shall be processed through a low pass filter having a cut-off frequency of 25 Hz.

APPENDIX D TO PART 238—REQUIREMENTS FOR EXTERNAL FUEL TANKS ON TIER I LOCOMOTIVES

The requirements contained in this appendix are intended to address the structural and puncture resistance properties of the locomotive fuel tank to reduce the risk of fuel spillage to acceptable levels under derailment and minor collision conditions.

(a) *Structural strength*—(1) *Load case 1—minor derailment*. The end plate of the fuel tank shall support a sudden loading of one-half the weight of the car body at a vertical acceleration of 2g, without exceeding the ultimate strength of the material. The load is assumed to be supported on one rail, within an eight inch band (plus or minus) at a point nominally above the head of the rail, on tangent track. Consideration should be given in the design of the fuel tank to maximize the vertical clearance between the top of the rail and the bottom of the fuel tank.

(2) *Load case 2—jackknifed locomotive*. The fuel tank shall support transversely at the center a sudden loading equivalent to one half the weight of the locomotive at a vertical acceleration of 2g, without exceeding the ultimate strength of the material. The load is assumed to be supported on one rail, distributed between the longitudinal center line and the edge of the tank bottom, with a rail head surface of two inches.

(3) *Load case 3—side impact*. In a side impact collision by an 80,000 pound Gross Vehicle Weight tractor/trailer at the longitudinal center of the fuel tank, the fuel tank shall withstand, without exceeding the ultimate strength, a 200,000 pound load (2.5g) distributed over an area of six inches by forty-eight inches (half the bumper area) at a height of thirty inches above the rail (standard DOT bumper height).

(4) *Load case 4—penetration resistance*. The minimum thickness of the sides, bottom sheet and end plates of the fuel tank shall be equivalent to a 5/16-inch steel plate with a 25,000 pounds-per-square-inch yield strength (where the thickness varies inversely with the square root of yield strength). The lower one third of the end plates shall have the equivalent penetration resistance by the above method of a 3/4-inch steel plate with a 25,000 pounds-per-square-inch yield strength. This may be accomplished by any combination of materials or other mechanical protection.

(b) *Sideswipe*. To minimize fuel tank damage during sideswipes (railroad vehicles and grade crossings), all drain plugs, clean-out ports, inspection covers, sight glasses, gauge openings, etc., must be flush with the tank surface or adequately protected to avoid catching foreign objects or breakage. All seams must be protected or flush to avoid catching foreign objects.

(c) *Spill controls.* Vents and fills shall be designed to avert spillage of fuel in the event of a roll over.

APPENDIX E TO PART 238—GENERAL PRINCIPLES OF RELIABILITY-BASED MAINTENANCE PROGRAMS

(a) Any maintenance program has the following four basic objectives:

(1) To ensure realization of the design level of safety and reliability of the equipment;

(2) To restore safety and reliability to their design levels when deterioration has occurred;

(3) To obtain the information necessary for design improvements of those items whose design reliability proves inadequate; and

(4) To accomplish these goals at a minimum total cost, including maintenance costs and the costs of residual failures.

(b) Reliability-based maintenance programs are based on the following general principles. A failure is an unsatisfactory condition. There are two types of failures: functional and potential. Functional failures are usually reported by operating crews. Conversely, maintenance crews usually discover potential failures. A potential failure is an identifiable physical condition, which indicates that a functional failure is imminent. The consequences of a functional failure determine the priority of a maintenance effort. These consequences fall into the following general categories:

(1) Safety consequences, involving possible loss of the equipment and its occupants;

(2) Operational consequences, which involve an indirect economic loss as well as the direct cost of repair;

(3) Non-operational consequences, which involve only the direct cost of repair; or

(4) Hidden failure consequences, which involve exposure to a possible multiple failure as a result of the undetected failure of a hidden function.

(c) In a reliability-based maintenance program, scheduled maintenance is required for any item whose loss of function or mode of failure could have safety consequences. If preventative tasks cannot reduce the risk of such failures to an acceptable level, the item requires redesign to alter its failure consequences. Scheduled maintenance is also required for any item whose functional failure will not be evident to the operating crew, and therefore reported for corrective action. In all other cases the consequences of failure are economic, and maintenance tasks directed at preventing such failures must be justified on economic grounds. All failure consequences, including economic consequences, are established by the design characteristics of the equipment and can be altered only by basic changes in the design. Safety consequences can, in nearly all cases, be reduced to economic consequences by the use of redundancy. Hidden functions can usually be made evident by instrumentation or other design features. The feasibility and cost effectiveness of scheduled maintenance depend on the inspectablility of the component, and the cost of corrective maintenance depends on its failure modes and design reliability.

(d) The design reliability of equipment or components will only be achieved with an effective maintenance program. This level of reliability is established by the design of each component and the manufacturing processes that produced it. Scheduled maintenance can ensure that design reliability of each component is achieved, but maintenance alone cannot yield a level of reliability beyond the design reliability.

(e) When a maintenance program is developed, it includes tasks that satisfy the criteria for both applicability and effectiveness. The applicability of a task is determined by the characteristics of the component or equipment to be maintained. The effectiveness is stated in terms of the consequences that the task is designed to prevent. The basics types of tasks that are performed by maintenance personnel are each applicable under a unique set of conditions. Tasks may be directed at preventing functional failures or preventing a failure event consisting of the sequential occurrence of two or more independent failures which may have consequences that would not be produced by any of the failures occurring separately. The task types include:

(1) Inspections of an item to find and correct any potential failures;

(2) Rework/remanufacture/overhaul of an item at or before some specified time or age limit;

(3) Discard of an item (or parts of it) at or before some specified life limit; and

(4) Failure finding inspections of a hidden-function item to find and correct functional failures that have already occurred but were not evident to the operating crew.

(b) Components or systems in a reliability-based maintenance program may be defined as simple or complex. A simple component or system is one that is subject to only one or a very few failure modes. This type of component or system frequently shows decreasing reliability with increasing operating age. An age/time limit may be used to reduce the overall failure rate of simple components or systems. Here, safe-life limits, fail-safe designs, or damage tolerance-based residual life calculations may be imposed on a single component or system to play a crucial role in controlling critical failures. Complex components or systems are ones whose functional failure may result from many different failure modes and show little or no decrease in overall reliability with increasing age unless there is a dominant failure mode. Therefore, age limits imposed on complex

components or systems have little or no effect on their overall failure rates.

(g) When planning the maintenance of a component or system to protect the safety and operating capability of the equipment, a number of items must be considered in the reliability assessment process:

(1) The consequences of each type of functional failure;

(2) The visibility of a functional failure to the operating crew (evidence that a failure has occurred);

(3) The visibility of reduced resistance to failure (evidence that a failure is imminent);

(4) The age-reliability characteristics of each item;

(5) The economic tradeoff between the cost of scheduled maintenance and the benefits to be derived from it;

(6) A multiple failure, resulting from a sequence of independent failures, may have consequences that would not be caused by any one of the individual failures alone. These consequences are taken into account in the definition of the failure consequences for the first failure; and

(7) A default strategy governs decision making in the absence of full information or agreement. This strategy provides for conservative initial decisions, to be revised on the basis of information derived from operating experience.

(h) A successful reliability-based maintenance program must be dynamic. Any prior-to-service program is based on limited information. As such, the operating organization must be prepared to collect and respond to real data throughout the operating life of the equipment. Management of the ongoing maintenance program requires an organized information system for surveillance and analysis of the performance of each item under actual operating conditions. This information is needed to determine the refinements and modifications to be made in the initial maintenance program (including the adjustment of task intervals) and to determine the need for product improvement. The information derived from operating experience may be considered to have the following hierarchy of importance in the reliability-based maintenance program:

(1) Failures that could affect operating safety;

(2) Failures that have operational consequences;

(3) The failure modes of units removed as a result of failures;

(4) The general condition of unfailed parts in units that have failed; and

(5) The general condition of serviceable units inspected as samples.

(i) At the time an initial maintenance program is developed, information is usually available to determine the tasks necessary to protect safety and operating capability. However, the information required to determine optimum task intervals and the applicability of age or life limits can be obtained only from age or life exploration after the equipment enters service. With any new equipment there is always the possibility of unanticipated failure modes. The first occurrence of any serious unanticipated failure should immediately set into motion the following improvement cycle:

(1) An inspection task is developed to prevent recurrences while the item is being redesigned;

(2) The operating fleet is modified to incorporate the redesigned part; and

(3) After the modification has proved successful, the special inspection task is eliminated from the maintenance program.

(j) Component improvements based on identification of the actual reliability characteristics of each item through age or life exploration, is part of the normal development cycle of all complex equipment.

PART 239—PASSENGER TRAIN EMERGENCY PREPAREDNESS

Subpart A—General

Sec.
239.1 Purpose and scope.
239.3 Application.
239.5 Preemptive effect.
239.7 Definitions.
239.9 Responsibility for compliance.
239.11 Penalties.
239.13 Waivers.
239.15 Information collection.

Subpart B—Specific Requirements

239.101 Emergency preparedness plan.
239.103 Passenger train emergency simulations.
239.105 Debriefing and critique.
239.107 Emergency exits.

Subpart C—Review, Approval, and Retention of Emergency Preparedness Plans

239.201 Emergency preparedness plan; filing and approval.
239.203 Retention of emergency preparedness plan.

Subpart D—Operational (Efficiency) Tests; Inspection of Records and Recordkeeping

239.301 Operational (efficiency) tests.
239.303 Electronic recordkeeping.

APPENDIX A TO PART 239—SCHEDULE OF CIVIL PENALTIES

AUTHORITY: 49 U.S.C. 20102–20103, 20105–20114, 20133, 21301, 21304, and 21311; 28 U.S.C. 2461, note; and 49 CFR 1.49(c), (g), (m).