DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

49 CFR Parts 216, 223, 229, 231, 232, and 238

[FRA Docket No. PCSS–1, Notice No. 5]

RIN 2130–AA95

Passenger Equipment Safety Standards

AGENCY: Federal Railroad Administration (FRA), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: FRA is issuing comprehensive Federal safety standards for railroad passenger equipment. The purpose of these safety standards 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 any such occurrences, to the extent they cannot be prevented. The final rule promotes passenger train safety through requirements for railroad passenger equipment design and performance; fire safety; emergency systems; the inspection, testing, and maintenance of passenger equipment; and other provisions for the safe operation of railroad passenger equipment. The final rule addresses passenger train safety in an environment where technology is advancing and equipment is being designed for operation at higher speeds. The final rule amends existing regulations concerning special notice for repairs, safety glazing, locomotive safety, safety appliances, and railroad power brakes as applied to passenger equipment.

The final rule does not apply to tourist and historic railroad operations. However, after consulting with the excursion railroad associations to determine appropriate applicability in light of financial, operational, or other factors unique to such operations, FRA may prescribe requirements for these operations that are similar to or different from those affecting other types of passenger operations.

DATES: This regulation is effective July 12, 1999. The incorporation by reference of certain publications listed in the rule is approved by the Director of the Federal Register as of July 12, 1999.

ADDRESSES: Any petition for reconsideration should reference FRA Docket No. PCSS–1, Notice No. 5, and be submitted in triplicate to the Docket Clerk, Office of Chief Counsel, FRA, 1120 Vermont Avenue, Mail Stop 10, Washington, D.C. 20590.

FOR FURTHER INFORMATION CONTACT: Ronald Newman, Staff Director, Motive Power and Equipment Division, Office of Safety Assurance and Compliance, FRA, 1120 Vermont Avenue, Mail Stop 25, Washington, D.C. 20590 (telephone: 202–493–6300); Daniel Alpert, Trial Attorney, Office of Chief Counsel, FRA, 1120 Vermont Avenue, Mail Stop 10, Washington, D.C. 20590 (telephone: 202–493–6026); or Thomas Herrmann, Trial Attorney, Office of Chief Counsel, FRA, 1120 Vermont Avenue, Mail Stop 10, Washington, D.C. 20590 (telephone: 202–493–6036).

SUPPLEMENTARY INFORMATION:

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I. Introduction

Passenger railroads offer the traveling public one of the safest forms of transportation available. In the eight-year period 1990–1997, there were 0.89 passenger fatalities for every billion miles of passenger transportation by rail. Nevertheless, collisions, derailments, and other such occurrences continue to occur, often as a result of factors beyond the control of the passenger railroad. Further, the rail passenger environment is rapidly changing. Worldwide, passenger equipment operating speeds are increasing. Passenger trainsets designed to European safety standards have been proposed for operation in the United States-and a few are in operation. Overall, these trainsets do not meet the structural standards that are common for passenger equipment operating in the United States. FRA believes that adherence to such common standards by the nation's passenger railroads has in large measure contributed to the high level of safety at which rail passenger service is currently provided in the United States. However, these standards generally do not have the force of law.

Effective Federal safety standards for freight equipment have long been in place, but equivalent Federal safety standards for passenger equipment have not existed. Further, the Association of American Railroads (AAR) currently sets industry standards for the design and maintenance of freight equipment that add materially to the safe operation of such equipment. However, over the years, the AAR has discontinued the development and maintenance of industry standards for railroad passenger equipment.

FRA must necessarily be vigilant in ensuring that passenger trains continue to be designed, built, and operated with a high level of safety. In general, the railroad operating environment in the United States requires passenger equipment to operate commingled with very heavy and long freight trains, often over track with frequent grade crossings used by heavy highway equipment. European passenger operations, on the other hand, are intermingled with freight equipment of lesser weight than in North America. In many cases, highway-rail grade crossings also pose lesser hazards to passenger trains in Europe due to lower highway vehicle weight. FRA is concerned with the level of safety provided by passenger equipment designed to European and other international standards when such equipment is operated in the United States.

A clear set of Federal safety standards for railroad passenger equipment is needed that is tailored to the nation's operating environment in order to provide for the safety of rail operations in the United States and to facilitate sound planning for these operations. In furtherance of this safety objective, FRA is pleased by the American Public Transit Association's (APTA) initiative to continue the development and maintenance of voluntary industry standards for the safety of railroad passenger equipment. These standards will complement FRA's safety standards and, thus, will work together to provide an even higher level of safety for rail passengers, rail employees, and the public as a whole.

II. Statutory Background

In September, 1994, the Secretary of Transportation convened a meeting of representatives from all sectors of the rail industry with the goal of enhancing rail safety. As one of the initiatives arising from this Rail Safety Summit, the Secretary announced that DOT would begin developing safety standards for rail passenger equipment over a five-year period. In November, 1994, Congress adopted the Secretary's schedule for implementing rail passenger equipment regulations and included it in the Federal Railroad Safety Authorization Act of 1994 (the Act), Pub. L. No. 103–440, 108 Stat. 4619, 4623–4624 (November 2, 1994). Section 215 of the Act, as now codified at 49 U.S.C. 20133, requires:

(a) MINIMUM STANDARDS.—The Secretary of Transportation shall prescribe regulations establishing minimum standards for the safety of cars used by railroad carriers to transport passengers. Before prescribing such regulations, the Secretary shall consider—

(1) the crashworthiness of the cars;

(2) interior features (including luggage restraints, seat belts, and exposed surfaces) that may affect passenger safety;

(3) maintenance and inspection of the cars;

(4) emergency response procedures and equipment; and

(5) any operating rules and conditions that directly affect safety not otherwise governed by regulations.

The Secretary may make applicable some or all of the standards established under this subsection to cars existing at the time the regulations are prescribed, as well as to new cars, and the Secretary shall explain in the rulemaking document the basis for making such standards applicable to existing cars.

(b) INITIAL AND FINAL REGULATIONS.—(1) The Secretary shall prescribe initial regulations under subsection (a) within 3 years after the date of enactment of the Federal Railroad Safety Authorization Act of 1994. The initial regulations may exempt equipment used by tourist, historic, scenic, and excursion railroad carriers to transport passengers.

(2) The Secretary shall prescribe final regulations under subsection

(a) within 5 years after such date of enactment.

(c) PERSONNEL.—The Secretary may establish within the Department of Transportation 2 additional full-time equivalent positions beyond the number permitted under existing law to assist with the drafting, prescribing, and implementation of regulations under this section.

(d) CONSULTATION.—In prescribing regulations, issuing orders, and making amendments under this section, the Secretary may consult with Amtrak, public authorities operating railroad passenger service, other railroad carriers transporting passengers, organizations of passengers, and organizations of employees. A consultation is not subject to the Federal Advisory Committee Act (5 U.S.C. App.), but minutes of the consultation shall be placed in the public docket of the regulatory proceeding.

The Secretary of Transportation has delegated these rulemaking responsibilities to the Federal Railroad Administrator. 49 CFR 1.49(m).

III. Passenger Equipment Safety Standards Working Group

Consistent with the intent of Congress that FRA consult with the railroad industry in prescribing these regulations, FRA invited various organizations to participate in a working group to focus on the issues related to railroad passenger equipment safety and assist FRA in developing Federal safety standards. The Passenger Equipment Safety Standards Working Group (or the ''Working Group'') first met on June 7, 1995, and has assisted FRA throughout the rulemaking process. Since its initial meeting, the Working Group has evolved so that its membership includes representatives from the following organizations:

American Association of Private Railroad Car Owners, Inc. (AAPRCO)
American Association of State Highway and Transportation Officials (AASHTO)
APTA
AAR
Brotherhood of Locomotive Engineers (BLE)
Brotherhood Railway Carmen (BRC)
FRA
Federal Transit Administration (FTA) of DOT
National Railroad Passenger Corporation (Amtrak)
National Association of Railroad Passengers (NARP)
Railway Progress Institute (RPI)
Safe Travel America (STA)
Transportation Workers Union of America (TWU)
United Transportation Union (UTU), and
Washington State Department of Transportation (WDOT)

The Working Group is chaired by FRA, and supported by FRA program, legal, and research staff, including technical personnel from the Volpe National Transportation Systems Center (Volpe Center) of the Research and Special Programs Administration of DOT. FRA has included vendor representatives designated by RPI as associate members of the Working Group. FRA has also included the AAPRCO as an associate Working Group member. The National Transportation Safety Board (NTSB) has designated staff members to advise the Working Group.

In developing proposed safety standards for passenger equipment operating at speeds greater than 125 mph but not exceeding 150 mph, FRA formed a subgroup (the ''Tier II Equipment Subgroup'') of Working Group members representing interests associated with the provision of rail passenger service at such high speeds. The full Working Group recommended the formation of a smaller subgroup to consider Tier II passenger equipment standards, as a number of Working Group members found the operation of high-speed passenger equipment to be outside their immediate interest and expertise. FRA invited representatives from organizations including Amtrak, the BLE, BRC, RPI, and UTU to participate in developing the Tier II standards.

In accordance with 49 U.S.C. 20133(d), the evolving positions of the Working Group members—as reflected in the minutes of the group's meetings and associated documentation, together with data provided by the members during their deliberations—have been placed in the public docket of this rulemaking.

IV. Proceedings to Date

On June 17, 1996, FRA published an Advance Notice of Proposed Rulemaking (ANPRM) concerning the establishment of comprehensive safety standards for railroad passenger equipment (61 FR 30672). The ANPRM provided background information on the need for such standards, offered preliminary ideas on approaching passenger safety issues, and presented questions on various topics including: system safety programs and plans; passenger equipment crashworthiness;

inspection, testing, and maintenance requirements; training and qualification requirements for mechanical personnel and train crews; excursion, tourist, and private equipment; commuter equipment and operations; train make-up and operating speed; tiered safety standards; fire safety; and operating practices and procedures.

FRA's commitment to developing proposed regulations through the Working Group necessarily influenced the role and purpose of the ANPRM. FRA specifically asked that members of the Working Group not respond formally to the ANPRM. The issues and ideas presented in the ANPRM had already been placed before the Working Group, and the Working Group had commented on drafts of the ANPRM. As a result, FRA solicited the submission of written comments that might be of assistance in developing a proposed rule from interested persons not involved in the Working Group's deliberations.

FRA received 12 comments in response to the ANPRM. These comments were shared with the Working Group and were taken into consideration by the members of the group as they advised FRA during the development of a Notice of Proposed Rulemaking (NPRM). The Working Group worked intensively, and concluded with a meeting in Philadelphia on September 30-October 2, 1996. Working Group members agreed to the preparation of a NPRM reflecting partial consensus on a number of the issues in the rulemaking. However, the industry parties were unable to agree on any option with respect to inspection requirements for power brakes or daily inspection of equipment. Further, one labor organization later advised FRA that it could not participate in a consensus on less than the full range of issues in the rulemaking.

FRA prepared in draft an NPRM and shared it with the Working Group members on March 19, 1997. The NPRM was then enriched with discussions of issues and options reflecting concerns of Working Group members in response to the draft, and some changes were incorporated into the proposed rule.

On September 23, 1997, FRA published the NPRM (1997 NPRM) in the **Federal Register** to add a new part, 49 CFR part 238 (Passenger Equipment Safety Standards), and to amend 49 CFR parts 216 (Special Notice and Emergency Order Procedures: Railroad Track, Locomotive and Equipment), 223 (Safety Glazing Standards—Locomotives, Passenger Cars and Cabooses), 229 (Railroad Locomotive Safety Standards), 231 (Railroad Safety Appliance Standards), and 232 (Railroad Power Brakes and Drawbars). 62 FR 49728. The proposed part 238 set forth comprehensive Federal safety standards for the safety of railroad passenger equipment, including equipment design and performance standards for passenger and crew survivability in the event of a passenger train accident, as well as inspection, testing, and maintenance standards for passenger equipment.

The 1997 NPRM generated written comments from 34 separate parties, and all of these comments may be found in the public docket of the rulemaking. The written comments included a request by the New York Department of Transportation (NYDOT) to extend the comment period for 90 days. The NYDOT sought this additional time to more thoroughly review the proposed rule, and secure expert testimony and empirical data on the proposed rule's possible impact on the high-speed intercity rail passenger program in the State of New York. FRA did not grant the request, however, particularly because FRA had planned to convene the Working Group in the interim and needed to assemble the comments on the rule for discussion within the Working Group. FRA asked the NYDOT to submit its comments by the close of the comment period on November 24, 1997, and it did so. FRA did explain to the NYDOT that it would consider comments submitted after the formal close of the comment period to the extent possible without incurring additional expense or delay in issuing the final rule, and FRA has done so.

FRA held a public hearing on the proposed rule in Washington, D.C. on November 21, 1997, at which nine parties submitted oral comments. These parties consisted of: APTA; the BRC; the BLE; Amtrak; Renfe Talgo of America, Inc. (Talgo); WDOT; NARP; the Omniglow Corporation; and The Institute of Electrical and Electronics Engineers, Inc. (IEEE). A copy of the transcript of this hearing is available in the public docket of this rulemaking.

As noted earlier, FRA convened the Passenger Equipment Safety Standards Working Group following the close of the comment period to consider the comments received in response to the 1997 NPRM and help develop the final rule. This continued the consultative process FRA has used throughout the rulemaking. Notice of the Working Group meetings was available through the FRA Docket Clerk, as stated in the NPRM, *see* 62 FR 49729, and the meetings were open to the public.

The Working Group met in full in Washington, D.C., on December 15–16, 1997. A smaller body of the Working Group met again on January 6, 1998, to discuss in particular high-speed passenger equipment safety issues, as well as brake inspection, testing and maintenance issues for long-distance intercity passenger trains. Minutes of these meetings, including copies of the discussion documents circulated at the meetings, are available in the public docket of the rulemaking. *See* 63 FR 28496; May 26, 1998. FRA received one set of written comments on the minutes of the meetings, which FRA had prepared, and these comments are also available in the same docket.

V. Discussion of Specific Comments and Conclusions

A. Application of the Final Rule to Rapid Transit Operations and ''Light Rail''

In the 1997 NPRM, FRA proposed applying the rule to rapid transit operations in an urban area, unless those operations are not connected with the general system of railroad transportation. In other words, FRA made clear that its rule would apply to rapid transit operations over the general system. The Utah Transit Authority (UTA), in commenting on the NPRM, expressed concern with the inclusion of rapid transit operations, including light rail transit, in the proposed rule. The UTA stated that the rule provided no definition of what is meant by the phrase ''not connected with the general railroad system of transportation.'' As a result, the UTA requested that the final rule provide such a definition. Further, the UTA requested that any such definition take into account rail operations that are time-separated or physically separated (using derails and electric locks), or both, so that under such circumstances rapid transit systems would not be considered connected with the general railroad system of transportation and, therefore, be excluded from the rule.

In response to the 1997 NPRM, New Jersey Transit (NJT) commented that by permitting FRA to rule on whether a transit agency may operate light rail service over a freight right-of-way, FRA's jurisdiction would be expanded in conflict with FTA's mandate in 49 C.F.R. part 659. NJT explained that the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102–240, and 49 C.F.R. part 659 promulgated in its pursuance, required states to designate an agency of the state, other than a transit agency, to oversee and implement requirements concerning all fixed-guideway systems not under FRA's jurisdiction.

The safety jurisdictions of FRA and FTA are mutually exclusive. FTA's regulatory authority to issue regulations creating a state safety oversight program applies only to ''rail fixed guideway mass transportation systems not subject to regulation by the Federal Railroad Administration.'' 49 U.S.C. 5330(a). Consistent with DOT Secretary of Transportation Rodney Slater's concept of One-DOT and the need to assure seamless application of intermodal transportation policies, FRA and FTA are jointly developing a proposed policy statement outlining the scope of FRA's jurisdiction over ''light rail'' operations that share the use of rights-of-way with conventional railroads. As discussed later in this document, the two agencies will be soliciting input from rail operators and other interested entities during the development of this policy statement.

FRA's safety jurisdiction is very broad and extends to all types of railroads except for urban rapid transit operations not connected to the general railroad system. The term ''railroad'' is defined by statute as follows:

In this part—

(1) ''railroad''—

(A) Means any form of nonhighway ground transportation that runs on rails or electromagnetic guideways, 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

(B) does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

49 U.S.C. 20102.

The statutory definition of the term ''railroad'' makes certain elements of FRA's safety jurisdiction quite clear:

- FRA, with one exception, has jurisdiction over all railroads regardless of the type of equipment they use, their connection to the general railroad system of transportation, or their status as a common carrier engaged in interstate commerce. FRA will, for example, assert jurisdiction over high-speed intercity rail service even if completely separated from the general railroad system that now exists and magnetic levitation systems that are not urban rapid transit.
- Commuter and other short-haul railroad passenger operations in a metropolitan or suburban area (except for one type of short-haul operation, *i.e.*, urban rapid transit) are railroads within FRA's jurisdiction whether or not they are connected to the general railroad system. For operations on or over the general system, the commuter/rapid transit distinction has no jurisdictional relevance—all general system operations are within FRA's exercise of jurisdiction. Because the only urban rapid transit operations that FRA intends to cover under this rule are those on the general system, there is no need to expand on the commuter/rapid transit distinction here.
- Rapid transit operations in an urban area that **are not connected** to the general railroad system are not within FRA's jurisdiction. This is the sole exception to FRA's jurisdiction over all railroads. There is no exception for ''light rail,'' a term not found in the statute. Although FRA could assert jurisdiction over a rapid transit operation based on any connection it has to the general railroad system, FRA believes there are certain connections that are too minimal to warrant the exercise of its jurisdiction. For example, a rapid transit system that has a switch for receiving shipments from the general system railroad is not one over which FRA would assert jurisdiction. This assumes that the switch is used only for that purpose. In that case, any entry onto the rapid transit line by the freight railroad would be for a very short distance and solely for the purpose of dropping off or picking up cars. In this situation, the rapid transit line is in the same situation as any shipper or consignee; without this sort of connection, it cannot receive goods by rail. Absent a change in policy, FRA will not attempt to apply this rule to rapid transit systems with these sorts of connections. However, if such a system is properly considered a rail fixed guideway system, FTA's rules (49 CFR 659) will apply to it.
- Rapid transit operations in an urban area that **are connected** to the general railroad system of transportation are within FRA's jurisdiction. FRA will assert jurisdiction over a rapid transit operation that is conducted on or over the general system. It does not matter that the rapid transit operation occupies the track only at times when the freight, commuter, or intercity passenger railroad that shares the track is not operating. While such time separation could, as explained in the 1997 NPRM, provide the basis for waiver of certain of FRA's rules, it does not mean that FRA will not assert jurisdiction. However, FRA will assert jurisdiction over only the portions of the rapid transit system that are conducted on the general system. For example, a rapid transit line that operates over the general system for a portion of its length but has significant portions of street railway that are not part of the general system would be subject to FRA's rules only with respect to the general system portion. The remaining portions would not be subject to FRA's rules. If the non-general system portions of the rapid transit line are considered a ''rail fixed guideway system'' under 49 CFR part 659, those rules, issued by FTA, would apply to them.

As discussed above, it is the nature and location of the railroad operation, not the nature of the equipment, that determines whether FRA has jurisdiction under the safety statutes. Light rail operations that operate on the general system are always within that statutory jurisdiction. They are not within the sole statutory exception (urban rapid transit not connected to the general system) so they are railroads under the safety statutes. The greatest risk inherent in the shared use of the trackage is a collision between the light rail equipment and conventional equipment. The light rail vehicles are not designed to withstand such a collision with far heavier equipment. Were such a crash to occur with either or both equipment operating at high speeds, the consequences for passengers in the light rail vehicle(s) would likely be catastrophic.

In the past, FRA has withheld exercise of its jurisdiction with respect to light rail operations over general system trackage where there was full time separation (freight operations limited to nighttime hours). The recent proliferation of proposals for light rail operations on the general system and the issuance of this final rule establishing the first comprehensive Federal standards for railroad passenger equipment call for changing this approach. Moreover, recent developments have indicated that FRA's current approach assumes a degree of separation that is unlikely to be maintained over time. Proposals for limited overlap, deadhead movement of transit equipment, etc., have demonstrated the complexity of using common trackage for disparate purposes. Accordingly, FRA has asked that new transit starts that propose using the general rail system trackage submit appropriate waiver applications to FRA; such applications should be submitted as early as possible. As previously noted, FTA and FRA are working toward the development of a joint policy statement on the appropriate scope of FRA's jurisdiction over ''light rail'' that shares rights-of-way with conventional railroads. The agencies foresee an approach intended to dovetail FRA's safety regulations with the FTA state safety oversight program where that is appropriate and FTA jurisdiction is applicable. The agencies would work together to ensure coordination of decision making. Before general implementation, the policy statement will be discussed with the affected communities of interest and may be published (together with any needed regulatory amendments) for formal comment in the **Federal Register**. At the same time this joint policy is issued, FRA plans to issue a separate proposed statement of policy that, among other things, will provide guidance on how light rail operators may seek waivers of FRA's rules. In the interim, the policy expressed in this preamble will guide FRA's actions with respect to this rule (subject to an appropriate period of consultation and adjustment with respect to the two time-separated shared use projects currently in operation).

FRA does, however, recognize that lower speed rail operations that do not operate over highway-rail grade crossings and that totally preclude the sharing of trackage between light rail equipment and conventional equipment provide an operating environment that does not require the structural standards needed for commingled passenger and freight operations. Accordingly, the final rule (in § 238.201) provides that passenger equipment, including locomotives, are not subject to the structural requirements of the rule if they are used exclusively on a rail line (A) with no public highway-rail grade crossings, (B) on which no freight operations occur at any time, (C) on which only passenger equipment of compatible design is utilized, and (D) on which trains operate at speeds no higher than 79 mph. FRA will discuss with the Working Group in Phase II of the rulemaking what structural standards are appropriate for such operations.

B. Static End Sstrength Requirement: Application to Existing Equipment

In § 238.203 of the 1997 NPRM, FRA generally proposed that on or after January 1, 1998, all passenger equipment shall be required to have a minimum static end strength (or ''buff'' or ''compressive'' strength) of 800,000 pounds. As some commenters recognized, FRA intended the date of January 1, 1998, to represent the effective date of the final rule. Yet, in light of the actual publication date of the 1997 NPRM, the date of January 1, 1998, appeared anachronistic, and FRA should have modified the NPRM to make its intent more explicit. A number of commenters nonetheless raised concerns with the application of this section-whether the date were January 1, 1998, or later-since FRA proposed to apply the static end strength requirement to existing passenger equipment.

APTA recommended, in its comments on the rule, that FRA modify the proposal so that the requirement apply on or after the effective date of the final rule to passenger equipment placed in service for the first time. APTA stated that the AEM–7 locomotive and the RTG model turbo train could not meet the requirement as proposed. APTA estimated that the purchase of replacement equipment could take up to four years and would cost more than $500 million.

Amtrak commented that the proposed requirement to have buff loading apply to the existing rail fleet is not justified based on the industry's experience. Amtrak did agree that, in order to move the industry forward on crash energy management, new equipment must be built to a uniform strength standard. Amtrak stated that it currently operates AEM–7 locomotives that do not meet the proposed requirement. In addition, Amtrak was not sure it had available the appropriate technical information on whether its fleet of Heritage equipment conformed to the proposal. At the public hearing, though, Amtrak did explain that it had no evidence that its fleet of passenger cars did not comply with the proposal. (See transcript of public hearing, pages 173–174).

The Northeast Illinois Regional Commuter Railroad Corporation (Metra), in its comments on the rule, recommended that the static end strength provision apply only to new passenger equipment orders placed on or after January 1, 1998. Metra explained that it was awaiting delivery of cars under construction, that some of the cars may be built after January 1, 1998, and that a change order would cause a series of problems.

In commenting on the 1997 NPRM, Talgo expressed concern that FRA proposed applying the static end strength requirement to existing passenger equipment in service on or after January 1, 1998. Talgo stated that this proposal would render unusable its two trainsets then in service on lease to the WDOT. Additionally, Talgo explained that it was well underway in manufacturing five new trainsets—two for the WDOT, one for Amtrak, and two others for future sale in the U.S. market—that would likewise be rendered unusable in their current form. Talgo stated that neither it nor any other manufacturer of rail equipment could have anticipated the proposed regulation's immediate application of broad structural design changes. Citing discussions within the Working Group and the comments of other parties, Talgo asserted that other passenger equipment manufacturers and operators likewise assumed that modifications in basic structural standards would be applicable only to equipment purchased after January 1, 1999, or placed in service after January 1, 2001, and that much existing passenger equipment operating in the United States would be unable to comply with the structural requirements scheduled for early implementation. Talgo also stated that FRA did not properly identify the economic impact of its proposal on Talgo equipment. Talgo requested that FRA modify the rule so that the static end strength requirement and other structural requirements apply only to passenger equipment ordered on or after January 1, 1999, or placed in service for the first time on or after January 1, 2001.

The WDOT commented that FRA's proposal appeared to be directly targeted at the State of Washington and Amtrak's purchase of Talgo trains under manufacture. WDOT stated that imposition of the proposal in the middle of the construction process, without ''grandfathering,'' appeared to reveal an effort to make its Talgo equipment non-compliant. WDOT recommended that the rule be modified so that the static end strength provision only apply to passenger equipment ordered after January 1, 1999. The NARP, in its comments on the proposed rule, shared WDOT's opposition to imposing the static end strength requirement on existing passenger equipment, and it recommended instead applying the requirement under a time-table similar to that proposed generally for structural requirements—*i.e.*, ordered on or after January 1, 1999, or placed in service for the first time on or after January 1, 2001. The NARP believed that the proposal could cancel WDOT's rail passenger program and thereby lead to countless, unnecessary highway deaths involving people that otherwise would have been on a WDOT passenger train.

In commenting on the 1997 NPRM, the State of Vermont Agency of Transportation (VAOT) explained that it was in the process of implementing new passenger rail service with used rail diesel cars manufactured by Budd. The cars were originally built to meet the AAR buff strength requirement, according to the VAOT, but it could not assure that the vehicles meet the standards today. The VAOT requested that the Budd cars be grandfathered because they were manufactured to AAR standards, built prior to April 1, 1956, and have a proven service record. The VAOT believed it fair for the rulemaking to grandfather these cars as being compliant at the time ordered by VAOT. Similarly, the NYDOT recommended in its comments on the proposed rule that the structural requirements apply only to new equipment, citing its intent to operate rebuilt turboliner equipment in the Empire Corridor through a cooperative effort with FRA and Amtrak. Further, the North Carolina Department of Transportation (NCDOT) expressed concern in its comments on the proposed rule that the rulemaking would require its fleet of rebuilt passenger, food service and specialty cars to undergo additional renovations and retrofitting to comply with the rule. NCDOT commented that its trainsets were designed to meet the passenger equipment safety standards in effect at the time of their order, and that the proposed regulation has the potential to thwart its rail passenger initiative.

In the final rule, FRA is retaining the 800,000-pound static end strength requirement for most new and existing passenger equipment. However, the final rule does provide that the static end strength standard and other structural standards do not apply to equipment used exclusively on a rail line (A) with no public highway-rail grade crossings, (B) on which no freight operations occur at any time, (C) on which only passenger equipment of compatible design is utilized, and (D) on which trains operate at speeds no higher than 79 mph. See § 238.201. Furthermore, the final rule creates a presumption that passenger equipment in service in the United States as of the effective date of the final rule meets the 800,000-pound static end strength requirement, unless the railroad operating the equipment knows, or FRA can show, that the equipment was not built to this 800,000-pound strength requirement. See § 238.203(b). Under this formulation, for example, Amtrak's fleet of Heritage passenger cars are presumed to comply with the static end strength requirement on the basis of Amtrak's testimony at the public hearing on the NPRM.

FRA has decided that it is in the best interest of safety to apply the buff strength requirement to existing passenger equipment and effectively regulate the use of passenger equipment not possessing at least 800,000 pounds of buff strength as specified in this rule. As noted, the operating environment in the United States requires railroad passenger equipment to operate commingled with heavy and long freight trains, often over track with frequent grade crossings used by heavy highway equipment. FRA has serious concerns about the operation in such an environment of passenger equipment not possessing a minimum buff strength of 800,000 pounds. As a result, and in response to Talgo's and WDOT's comments on this rule, FRA cannot avoid directly addressing the current operation in the United States of the passenger trainsets manufactured by Talgo unless FRA disregards its duty to provide for the safety of rail passenger transportation. Since FRA has raised the issue of compressive strength on passenger equipment with all affected parties since well before the inception of this rulemaking, it would strain credulity to assert that a requirement for 800,000 pounds of compressive strength could truly be a matter of surprise in a rulemaking on railroad passenger equipment safety.

Making the 800,000-pound compressive strength requirement applicable to existing passenger equipment creates a bright line that will help bring needed clarity to the growing number of situations where light rail equipment is likely to be used on the general railroad system of transportation. Operation on the general system of this equipment, which is built to standards far lower than the 800,000-pound standard specified in this rule, presents enormous safety risks to the occupants of the equipment, absent imposition of strict conditions designed to virtually eliminate the risk of a light rail/conventional equipment collision. The need to address these risks as a condition of operation will be made perfectly clear by imposition of the buff strength requirement across the board. Light rail operators will have to seek a waiver of the requirement and will have to plan their operations in such a way as to maximize the likelihood of obtaining such a waiver. (A petition for grandfathering approval of the equipment could also be filed in certain cases, as discussed below.)

In regulating the use of passenger equipment not possessing a minimum buff strength of 800,000 pounds as specified in this final rule, the rule permits non-compliant passenger equipment to be continued in service for a six-month period following publication of the rule in order to permit the filing of a grandfathering petition with FRA; if a petition is filed within this six-month period, operation may continue for up to an additional six months while the petition is being processed. Grandfathering approval of non-compliant equipment 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 first file and secure approval of a grandfathering petition for such usage. *See* discussion under § 238.203 for the contents of the petition and the approval process. FRA will approve a petition for ''grandfathering'' if it complies with the requirements of § 238.203 and the proposed usage of the equipment is in the public interest and consistent with railroad safety. Amtrak and WDOT may file petitions for grandfathering approval of their Talgo-manufactured passenger equipment, in accordance with the requirements of § 238.203.

C. United States International Treaty Obligations

The United States is a party to the General Agreement on Tarriffs and Trade (GATT). One of the GATT agreements is the Agreement on Technical Barriers to Trade (TBT), originally concluded in 1979 and approved by the United States Congress in the Trade Agreements Act of 1979, Pub. L. No. 96–39 (July 26, 1979). A new TBT Agreement was reached as a result of the 1994 Uruguay Round of GATT multinational trade negotiations, and subsequently approved by the United States Congress in the Uruguay Round Agreements Act, Pub. L. No. 103–465 (December 8, 1994). The TBT Agreement seeks to avoid creating unnecessary obstacles to trade, while recognizing the right of signatory countries to establish and maintain technical regulations for the protection of human, animal, and plant life or health. The TBT Agreement has been codified into law at 19 U.S.C. 2531 *et seq.*

In commenting on the NPRM, Talgo believed that a number of the proposed structural standards were inconsistent with the TBT Agreement in that domestic industry would be favored by adopting the *de facto* standards of North American passenger equipment. Talgo stated that many requirements in the proposed rule seem to have been developed exclusively with domestically-manufactured equipment in mind, ''arbitrarily making compliance with the rules by other, non-U.S. manufactured equipment—such as Talgo equipment—extremely difficult.'' Talgo also asserted that domestic industry would be favored under the implementation schedule of the rule by noting FRA's statements in the NPRM that several of the proposed structural requirements chosen for early implementation reflect the current construction practice for North American passenger equipment. Talgo contended that the implementation schedule disregards that, solely because imported equipment has been designed differently, it cannot satisfy the requirements at once.

FRA believes that this final rule is consistent with the United States' obligations under the TBT Agreement, and that Talgo's concerns arise, in part, from a misunderstanding of FRA's use of the term ''North American passenger equipment.'' Article 2.1 of the TBT Agreement, cited by Talgo in its comments, states:

> Members shall ensure that in respect of technical regulations, products imported from the territory of any Member shall be accorded treatment no less favorable than that accorded to like products of national origin and to like products originating in any other country.

A ''technical regulation'' refers to mandatory product standards, and FRA agrees with Talgo that the structural standards in this rule fall under this definition. See Annex 1 to the TBT Agreement, ''Terms and Their Definitions for the Purpose of this Agreement, 1.'' However, the impact of this rule on Talgo passenger equipment, specifically its passenger cars, has nothing to do with the fact that the equipment originates in a foreign country, Spain, as opposed to the United States.

Through this rule, FRA is not favoring rail passenger cars that are domestically manufactured over those of foreign origin since, as far as FRA is aware, there is currently no domestic manufacturer of rail passenger cars in the United States. (The General Electric Company and the General Motors Corporation manufacture locomotives in the United States—not rail passenger cars; and neither entity is being favored by FRA in this rule over foreign manufacturers of locomotives.) Of course, a significant portion of the nation's rail passenger car fleet—the oldest portion—has been manufactured in the United States. Yet, over the years, manufacturers from Japan, Canada, and other countries have exported passenger cars to the United States for service on the nation's railroads. Overall, these imported rail passenger cars have possessed the same minimum structural strength as their domestic forebearers; they have been constructed to standards that are common to North American passenger equipment, *i.e.*, passenger equipment operated in North America. The five Talgo trainsets noted earlier have not been so constructed. FRA's use of the term North American passenger equipment (or United States passenger equipment, for that matter) was not intended to refer to passenger equipment manufactured in North America in distinction to passenger equipment manufactured elsewhere.

Talgo also commented that, to a significant extent, the proposed requirements were design-based and phrased in a number of places in variables dependent on design rather than performance. In this regard, Talgo believed the proposed rule violates Article 2.8 of the TBT Agreement, which states: ''Wherever appropriate, Members shall specify technical regulations based on product requirements in terms of performance rather than design or descriptive characteristics.'' Talgo asserted that the rule can and should be stated in terms of variables relating to the performance of the equipment rather than its design, and that the rule should accommodate different engineering designs, such as its articulated, lightweight trainsets.

The principal structural requirement of the final rule, which existing Talgo-manufactured passenger cars do not meet, is in fact a performance-based requirement. As further specified in § 238.203, the rule requires that new and existing passenger cars must possess a minimum static end strength of 800,000 pounds. The rule does not dictate how a passenger car must be constructed to meet this requirement, as long as the car can resist the specified 800,000-pound load. This formulation is consistent with the requirements of 19 U.S.C. 2532(3), which states:

> Performance Criteria.—Each Federal agency shall, if appropriate, develop standards based on performance criteria such as those relating to the intended use of a product and the level of performance that the product must achieve under defined conditions, rather than on design criteria, such as those relating to physical form of the product or the types of material of which the product is made.

(Of course, the rule does require that the body structure of a passenger car be designed, *to the maximum extent possible*, to fail by buckling or crushing, or both, of structural members when overloaded in compression rather than by fracture of structural members or failure of structural connections. *See* § 238.203(c). Yet, in any regard, FRA believes it unsafe to design a passenger car to fail first by fracture of structural members or failure of structural connections, as the ability of the car structure to absorb collision energy is negated.)

FRA recognizes that the five Talgo trainsets were designed to international standards that require lesser compressive strength. Talgo has pointed out that these trainsets will be configured in the same manner as two leased trainsets formerly operated in the State of Washington. These trains are intended to be pulled by a conventional locomotive and have unoccupied units at the front and rear of the trainsets which are available to absorb initial crash energy. Talgo contends that this configuration provides equivalent protection from loss of occupied volume in a rear-end or head-on collision when compared with conventional cars which would be occupied by passengers or crew. FRA has provided a process for WDOT and others to secure grandfathering approval regarding the compressive strength requirement for passenger equipment placed in use prior to November 8, 1999, as previously noted. However, as explained below, FRA is unable to relax the minimum compressive strength requirement for passenger equipment simply on the basis of train configuration, since to do so would diminish the safety provided for the rail travelling public as a whole.

FRA believes the minimum static end strength requirement in the final rule is not inconsistent with the TBT Agreement, in that it fulfills FRA's objective of protecting human safety and only restricts the use of equipment not meeting that objective because of the performance of the equipment—not because of the origin of the equipment. In this regard, 19 U.S.C. 2531(b) provides in part:

> No standards-related activity of any * * * Federal agency * * * shall be deemed to constitute an unnecessary obstacle to the foreign commerce of the United States if the demonstrable purpose of the standards-related activity is to achieve a legitimate domestic purpose including * * * the protection of legitimate health or safety * * * and if such activity does not operate to exclude imported products which fully meet the objectives of such activity.

Having a passenger car possess a minimum compressive strength of 800,000 pounds, along with other features, has evolved as a result of a long history of efforts by railroads and suppliers to learn the hard lessons taught by a difficult operating environment in the United States. Passenger train collisions and derailments may occur in a variety of different scenarios and implicate structural features of passenger equipment in similarly numerous ways. The rule cannot be applied in a general way to both (1) except any consist of passenger cars from the same compressive strength requirements applicable to all other passenger cars solely because the passenger car consist is buffered at each end by an unoccupied car and linked by articulated connections, and (2) provide for the safety of the occupants of passenger cars.

Further, over the past few years, FRA has funded the most extensive and detailed research and analysis ever conducted by a public body in the United States concerning passenger car safety. That effort has included attention to international practice, particularly for high-speed equipment. However, given existing data and analysis, FRA is unable to specify an alternate performance standard for passenger car compressive strength that would meet FRA's safety objectives and be equally applicable to passenger cars of any design that might some day be proffered for use in the United States. Nor, so far as FRA is aware, has any government or international body achieved a similar feat. Certainly doing so within the time available to issue standards under the 1994 statutory mandate would not have been possible.

FRA notes that Talgo further commented that the early implementation dates proposed for certain structural requirements are inconsistent with Article 2.12 of the TBT Agreement in that a sufficient amount of time would not be provided foreign producers to modify their products' design or manufacturing processes to comply with new or significantly revised regulatory requirements. Article 2.12 provides:

> Except in those urgent circumstances referred to in [Article 2] paragraph 10 [of the TBT Agreement], Members shall allow a reasonable interval between the publication of technical regulations and their entry into force in order to allow time for producers in exporting Members * * * to adapt their products or methods of production to the requirements of the importing Member.

In the final rule, the compressive strength requirement takes effect sooner than any other principal structural requirement, and it applies to both new and existing passenger cars and locomotives. If any provision of the rule were found to be inconsistent with Article 2.12 of the TBT Agreement, then, it would most likely be the compressive strength requirement. However, the United States Congress has expressly authorized applying the requirements of the final rule to existing passenger cars, provided only that the basis for doing so is explained in the rulemaking document. *See* Section 215 of the Federal Railroad Safety Authorization Act of 1994, above, as codified at 49 U.S.C. 20133 (''The Secretary may make applicable some or all of the standards established under this subsection [, 49 U.S.C. 20133(a),] to cars existing at the time the regulations are prescribed.''). FRA has made the compressive strength requirement applicable to existing passenger cars as explained in the preamble. However, through the submission of appropriate data and analysis, and approval by FRA as further specified in § 238.203, discussed below, certain passenger cars not possessing the minimum compressive strength of 800,000 pounds may operate on the general railroad system of transportation, and the rule does afford a reasonable time for that information to be gathered.

In providing the possibility that some equipment now being used which does not meet the buff strength requirement of this rule might continue to be used (''grandfathered''), FRA intends to permit only very safe operations to occur. Petitioners will need to demonstrate—through a quantitative risk assessment that incorporates design information, engineering analysis of the equipment's static end strength and of the likely performance of the equipment in derailment and collision scenarios, and risk mitigation measures to avoid the possibility of collisions or to limit the speed at which a collision might occur, or both, that will be employed in connection with the usage of the equipment on a specified rail line or lines—that 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. In this regard, FRA notes that passenger equipment not possessing the minimum static end strength specified in this rule does not have the same capacity to absorb safely within its body structure the compressive forces that develop in a collision as equipment meeting the standard. The engineering analysis submitted by the petitioner should address how these forces will be dissipated in a manner that does not jeopardize occupant safety in collision scenarios.

D. Non-Conventional Passenger Equipment

As noted above, commenters have requested that FRA specify design-neutral or performance-based requirements so that the safety of all passenger equipment may be evaluated on the same basis. In comments in this docket, Talgo has suggested substituted (and reduced) force levels that it believes are appropriate for inclusion in the final rule in lieu of those proposed for truck-to-carbody attachment and anti-climbing arrangements, for instance. As explained, FRA has specified the compressive strength requirement as fairly as we are able in consideration of the safety of the rail travelling public. FRA has also done so with respect to the other structural requirements in the rule.

FRA recognizes that the existing Talgo trainsets presents unique challenges in terms of describing appropriate force levels in several regards. FRA understands that the Talgo trainsets are articulated, low-floor trainsets with independently rotating wheels. The car bodies are made from light-weight aluminum extrusions. In contrast, the vast majority of passenger carrying equipment used on the nations's railroads is individually suspended, has automatic couplers, has a higher floor height above the rail, has wheels fixed to an axle, and is constructed with a steel underframe made up from fabricated members. FRA has conducted, and continues to conduct, research which addresses the influence of carbody construction, suspension configuration, and coupling arrangement on the crashworthiness, derailment tendency, and other safety-related aspects of Talgo and other non-conventional equipment.

Developing safety regulations requires detailed technical knowledge of the system being regulated. At the time this rule is being written, FRA is unable to specify alternative performance-based standards with respect to the structural requirements in this rule that would meet FRA's safety objectives for passenger equipment of any design. Areas of particular technical concern with regard to the Talgo trainsets, which need to be resolved by FRA through an ongoing exchange of information, include the nature of its articulated connection and its potential to allow override in a collision, and the welding of the aluminum extrusions which make up the body shell. The Talgo tilt trainsets have characteristics that are unique, or nearly unique, that may either reduce or increase vulnerability in a derailment or collision. For instance, the articulated design of the trainset may tend to keep the train in line in the case of a derailment where the decelerations are reasonably uniform throughout the length of the train, preventing secondary impacts. On the other hand, the absence of major structural members in the floor of the passenger units could be a serious problem should the train be involved in a collision with freight train cars or lading that has fouled the track on which the passenger train is travelling, as a result of the freight train having derailed. In this regard, the absence of major structural members in the floor of the Talgo passenger units increases their vulnerability to penetration by the trainset's trucks, should the trucks separate from the train.

Historically, the United States industry requirement for a minimum compressive strength has reinforced a pattern of passenger car construction resulting in use of stiff, quite substantial underframes that have served other practical purposes in derailments and collisions, including prevention of car body buckling, prevention of harm to passengers from failure of the floor structure and entry of debris, and resistance to penetration of the car from the side where the primary impact was at the floor level. Both with respect to compressive strength and other structural requirements that the Talgo trainset may not be able to meet, it is important to ensure that alternative means of achieving crashworthiness are just as successful as the standards described in this final rule.

Creating alternative performance-based standards for a particular type of passenger equipment requires a very early dialogue and technical information exchange. In the summer of 1995, FRA convened the first meeting of equipment manufacturers (including representatives of Canadian, European and Japanese consortia) to discuss passenger safety standards. That meeting led to designation of equipment manufacturer representatives as associate members of the Passenger Equipment Safety Standards Working Group. Although notified along with a number of other manufacturers of passenger equipment, Talgo representatives did not participate in the process. (For its part, the WDOT did not formally indicate to FRA an interest in participating in the rulemaking until after the Working Group had tentatively agreed on the structural standard proposals—FRA received a letter from the WDOT commenting on the ANPRM on September 4, 1996. However, AASHTO had participated from the beginning of the rulemaking.) Talgo did not enter the discussions directly until publication of the NPRM in September of 1997, and was still in the process of providing engineering data through October of 1998. Given the timing of this latest submission of data to FRA, approximately ten-months after the close of the public comment period on the NPRM, FRA has not had the opportunity to fully evaluate the information provided by Talgo for purposes of this rule.

FRA appreciates Talgo's recent undertakings to conform any future trainsets (beyond the five trainsets noted earlier) built for North American service to the 800,000-pound static end strength requirement and any other applicable requirements in this rule. FRA will be pleased to work with Talgo and members of the Working Group in Phase II of the rulemaking to determine whether different performance-based regulations are appropriate. In the interim, FRA has provided a special approval process in § 238.201 for considering whether the new generation of Talgo equipment and any other passenger equipment of special construction provide an equivalent level of safety with the Tier I standards (other than the static end strength requirements) contained in the final rule. See the discussion in the section-by-section analysis of § 238.201 for an explanation of the special approval process.

E. System Safety

FRA believes that passenger railroads should carefully evaluate their operations with a view toward enhancing the safety of those operations. The importance of formal safety planning has been recognized in Emergency Order No. 20 (61 FR 6880; Feb. 22, 1996) and the rule on passenger train emergency preparedness (63 FR 24630; May 4, 1998). In furtherance of safety planning, the 1997 NPRM contained a set of system safety requirements to be applied to all intercity passenger and commuter rail equipment. See 62 FR 49760. FRA intended that each individual passenger railroad be required to develop a system safety plan and a system safety program tailored to its specific operation, including train speed. FRA explained, however, that the Working Group did not reach consensus on system safety requirements for Tier I equipment; whereas the Tier II Subgroup did reach full consensus on system safety program requirements for Tier II equipment. Strong support did exist among Working Group members to apply formal system safety planning to Tier I equipment, yet views differed as to whether system safety planning should be required by law.

In particular, the 1997 NPRM noted that APTA objected to FRA issuing any regulations governing system safety plans because commuter railroads have voluntarily agreed to adopt such safety plans. 62 FR 49734. FRA also explained its understanding that APTA's system safety approach will be more comprehensive than what FRA proposed and address each commuter railroad's system more as an integrated whole, not focused principally on rail equipment. See 62 FR 49734. FRA therefore invited comment on APTA's suggestion that commuter railroads be allowed to regulate themselves in this area; whether FRA should mandate the contents of system safety plans; whether the areas FRA proposed to require railroads to address were appropriate; whether additional areas should be added; and to what extent FRA should propose to enforce portions of the system safety plans. FRA further asked whether the rule should require that system safety plans be comprehensive and address the entire railroad system in which the equipment operates, as well as whether the emergency preparedness planning requirements contained in the passenger train emergency preparedness rulemaking be expressly integrated with the system safety planning requirements contained in this part. *Id.* at 49733–4.

In commenting on the rulemaking, APTA believed FRA's approach to system safety short-sighted in that it would apply only to the equipment component of the commuter railroad system and therefore ignore track, signal system, other infrastructure, and operating practices components. Further, APTA questioned FRA's general focus in the system safety plan (on fire safety; software safety; inspection, testing and maintenance; training; and new equipment) prior to having a railroad identify its major safety risks through its individual system level analysis. APTA stated that it supports a true system safety approach that allows each railroad to determine its own major safety risks and addresses all the components of the passenger rail system—not just the equipment component.

As an alternative to Federal regulation, APTA proposed a system safety program based on system safety plans—developed using MIL–STD–882C as a guide—that would be submitted by its individual member railroad properties and audited by APTA. APTA explained it would invite FRA to observe the audits and the follow-up actions taken by the commuter railroads in response to the audits. APTA requested that FRA hold Federal requirements for commuter railroad system safety plans in abeyance for a 3-year probationary period—corresponding to one complete audit cycle—while FRA observes and evaluates the program.

Amtrak commented that it supports APTA's position on system safety for both Tier I and Tier II equipment. Amtrak believed it appropriate for FRA to start with a voluntary system safety approach and then, based on actual experience, follow up with specific regulations in the future. Amtrak believed FRA needs to allow the industry the time to establish the culture and process that allows system safety to function without creating an unwarranted bureaucratic burden.

In its comments on the 1997 NPRM, Metra agreed with the value of a system safety plan, but believed that such plans should not be regulated. Metra recommended the rule contain only a top-level system safety plan requirement for railroads to identify the most serious safety risks within their specific operations, and then allow each railroad to create its own programs to reduce those risks. Metra explained that a railroad's system safety plan should project beyond current practice to continuously improve that practice and that Federal enforcement of such a plan would continually find violations because current practice would not reflect the ideals set forth in the plan. Metra believed that FRA regulation would make a system safety plan a useless tool for improving safety, as the plan would be limited to mimicking Federal regulation and describing current practice. In addition, Metra noted that a system safety plan is distinct from a document that describes current practice for routine and regulated activities. Metra proposed that this document, a safety policy, reference all current-practice safety-related procedures and require railroads to adhere to them.

Bombardier commented that the 1997 NPRM does not provide the latitude for each railroad to tailor or customize its system safety plan to its individual operations and needs. Further, Bombardier believed that the NPRM confuses the requirements for the railroad's system safety plan with those required for equipment acquisition. If FRA insists that the rule contain a requirement for a system safety plan, according to Bombardier, it should be limited to requiring each railroad to develop its own plan based on MIL-STD–882C or APTA's Manual for the Development of a System Safety Plan for Commuter Railroads. Separately, the rule should require a system safety plan specifically addressing equipment procurement.

The BRC commented that FRA must mandate the contents of system safety plans to ensure that vital topics are included in such plans. Further, the BRC believed FRA must have the power to enforce compliance with system safety plans. Otherwise, the BRC believed the plans themselves would amount to little more than suggested operating practices. The BRC also believed that FRA must review each railroad's system safety plan and approve it only if it complies with Federal regulations. Similarly, the UTU commented that the 1997 NPRM's provisions on system safety plans is the most important section of the rule. The UTU believed FRA should continue to treat it as such and not allow it to be weakened.

The NTSB commented that it supports FRA mandating the contents of system safety plans for minimal consistency and oversight, rather than allowing the railroads to regulate themselves in this area, so that important safety elements are consistently included in each safety plan. The NTSB believed that the system safety plans should be comprehensive and address the entire railroad system in which the passenger equipment operates. The NTSB observed that if the industry does not have a comprehensive system safety plan, it may not be able to identify, track, monitor, or rectify situations that can lead to unsafe conditions. Further, the NTSB remarked that system safety should be a continuous, iterative process that has a built-in feedback mechanism and should be used throughout the program's life cycle to arrive at the best plan possible.

The NTSB noted that it has made safety recommendations urging FRA to include specific safety requirements in a system safety plan. It urged FRA to incorporate the following recommendations into FRA's general requirements for system safety plans:

> Require carriers to train employees in emergency procedures to be used after an accident, to establish priorities for emergency action, and to conduct accident simulation to test the effectiveness of the program, inviting civic emergency personnel participation. (R–76–29)
>
> Develop and validate through simulated disaster exercises a model emergency response plan for the guidance of the railroad industry in formulating individual plans to be utilized by their train crewmembers in the event of an emergency. (R–80–6)

In this regard, FRA did issue final regulations governing the preparation, adoption, and implementation of emergency preparedness plans by railroads connected with the operation of passenger trains, in the passenger train emergency preparedness rulemaking. *See* 63 FR 24630, May 4, 1998. That rule specifically requires emergency preparedness plans to address such subjects as communication, employee training and qualification, joint operations, tunnel safety, liaison with emergency responders, on-board emergency equipment, and passenger safety information. The plan adopted by each affected railroad is also subject to formal review and approval by FRA.

FRA believes the approach taken in the emergency preparedness rulemaking in requiring railroads to adopt a safety plan addressing specific topics is more appropriate than imposing a general requirement for railroads to adopt a comprehensive system safety plan. FRA believes this is consistent with the view of the commenters to mandate the contents of safety program plans for minimal consistency and oversight, so that important safety elements are included in each safety plan. At the same time, focusing the safety planning requirements and streamlining the rule will facilitate the regulated community's understanding of the rule's requirements and thereby aid in its compliance. As further specified, the final rule will require that each railroad adopt safety program plans addressing:

- Fire safety;
- Employee training and qualifications;
- Equipment inspection, testing, and maintenance;
- Pre-revenue service acceptance testing of equipment; and
- Train hardware and software safety.

In addition, more particular safety planning requirements are imposed on Tier II passenger equipment, as discussed below, reflecting both the greater risks to safety from operating the equipment at such high speeds and the importance of advanced planning in order to meet new safety challenges.

As FRA recognized in the 1997 NPRM, FRA's proposed approach to system safety focused principally on rail passenger equipment. This was not a pure system safety approach, inasmuch as FRA did not focus on safety planning for others elements of the railroad infrastructure such as the track and signal system, or for a host of items including platform safety, security and trespasser prevention.

FRA will closely monitor Tier I railroad operations in their development and adherence to voluntary, comprehensive system safety plans. FRA has already established a liaison relationship with APTA and has already begun participating in system safety plan audits on commuter railroads. FRA is using this involvement to enrich FRA's Safety Assurance and Compliance Program (SACP) efforts on these railroads—which, unlike the triennial audit process for system safety plans, is a continuous activity with frequent on-property involvement by FRA safety professionals. FRA will reconsider its decision not to impose a general requirement for system safety plans on Tier I railroad operations if the need to do so arises. FRA expects that

Tier I railroad operations will be able to integrate the specific safety planning requirements contained in this final rule into their own system safety plans, in the same way the railroads will incorporate into their plans the emergency planning requirements contained in 49 CFR part 239.

FRA is retaining more extensive safety planning requirements for Tier II railroad operations. These requirements are directed at ensuring the safety of the equipment in its operating environment and that the introduction of novel technology is thoroughly analyzed prior to procurement of the equipment. Tier II railroad operations will be operations with new characteristics that require special attention and have heightened safety risks due to the speed of the equipment. In particular, each railroad must a have safety program plan for the operation of its Tier II passenger equipment prior to placing the equipment into revenue service. In addition, each railroad must have a safety program plan for each procurement of Tier II passenger equipment or major upgrade or introduction of new technology in Tier II passenger equipment. The railroad must also receive FRA approval of a pre-revenue service acceptance testing plan, as well as FRA approval prior to placing such new or modified equipment into revenue service.

In general, however, the final rule does not require that FRA approve a railroad's safety plans required under the rule. As noted, FRA believes it best to focus its resources on Tier II passenger equipment operations due to their special circumstances. Further, FRA approval may not be necessary when, by operation of the rule, each railroad must independently comply with specific safety planning requirements or face sanction from FRA. Under 49 CFR § 238.11 of the final rule, any person who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty.

F. Side Exit Doors on Passenger Cars

In the 1997 NPRM, FRA generally proposed that new passenger cars have a minimum of four exterior side doors—or the functional equivalent of four such doors—each door permitting at least one 95th-percentile male to pass through at a single time. *See* 62 FR 49807 (§ 238.237), and 62 FR 49820 (§ 238.441). Exterior side doors are the primary means of egress from a passenger train, yet there is no Federal requirement that a passenger car be equipped with such doors. FRA does recognize that in an emergency passengers would generally be able to move through a passenger car's end doors to seek refuge in adjacent cars. In fact, it is safer for passengers to remain on a train unless doing so in itself risks their safety, because of hazards along the railroad right-of-way such as electrified rails and other trains. However, the tragic September 22, 1993 Amtrak train derailment near Mobile, Alabama, and the February 16, 1996 collision involving MARC and Amtrak passenger trains near Silver Spring, Maryland, show that in a life-threatening situation passengers have no alternative but to exit the train. All of the 42 passenger fatalities in the Mobile, Alabama train derailment resulted from asphyxia due to drowning (NTSB Railroad-Marine Accident Report 94/01), and the deaths of at least eight of the eleven persons killed in the Silver Spring, Maryland train collision resulted from the fire that ensued (NTSB Railroad Accident Report (RAR) 97/02). FRA is not suggesting that the cars involved in those accidents lacked a sufficient number of emergency exits; nevertheless, these are examples of instances where passengers have died because they could not leave the train. (However, the NTSB did note in its investigation report of the Silver Spring, Maryland train collision that ''[e]xcept for those passengers who died of blunt trauma injuries, others may have survived the accident, albeit with thermal injuries, had proper and immediate egress from the car been available.'' *Id.* at page 63. The NTSB explained in its explicit findings on the collision that ''the emergency egress of passengers was impeded because the passenger cars lacked readily accessible and identifiable quick-release mechanisms for the exterior doors, removable windows or kick panels in the side doors, and adequate emergency instruction signage.'' *Id.* at 73.)

So that each passenger car has sufficient doorway openings to allow passengers and crewmembers to exit quickly in a life-threatening situation, FRA proposed requiring that passenger cars be equipped with side doors. Exiting a passenger train through a functioning emergency window exit is slower than exiting a train through a functioning door, and presents a risk of non-fatal injury. FRA made clear in the 1997 NPRM that the proposed side door requirement was not a recommendation of the Working Group, although FRA believed such a requirement necessary at least as an interim measure. *See* 62 FR 49770. FRA also recognized that existing designs of passenger cars do not always provide for four side doors, and, in fact, the proposed requirement did not specifically require that passenger cars have four side doors. For instance, the requirement would have been met if a passenger car had two double-wide doors that permit two 95th-percentile males to pass through each such door at the same time—the functional equivalent of four side doors having openings of the same size in the aggregate. FRA invited comments concerning the extent to which existing designs of passenger cars could not comply with the proposed requirement, noting that modifications to the proposal may be necessary based on the information supplied. Further, as a long-term approach, FRA explained that it is investigating an emergency evacuation performance requirement similar to that used in commercial aviation where a sufficient number of emergency exits must be provided to evacuate the maximum passenger load in a specified time for various types of emergency situations.

In its comments on the 1997 NPRM, APTA stated that the proposed requirement would eliminate certain types of cars as well as certain desirable car design safety features. Specifically, Amtrak would not be able to procure Viewliner cars and NJT would not be able to increase the number of Comet IV cab cars with extra structural protection for train operators, according to APTA. APTA recommended that the rule text be modified to include passenger car end doors in the calculation of the required number of door exits. APTA believed this would encourage structural changes that involve the elimination of a side door to provide additional protection to train operators and allow Amtrak to continue its Viewliner cars in service.

Amtrak, in commenting on the proposal, expressed particular concern that the proposed requirement would prevent the future construction of its Bi-Level Superliner equipment in a configuration that maximizes the equipment's economic performance. Amtrak noted that its current policy calls for equipping every window in such equipment with at least one emergency pane, and that the proposed requirement would not take that into consideration. Amtrak supported APTA's recommended modification to the rule text.

The NARP also questioned the proposed side exterior door requirement for passenger cars. The NARP noted that the most common way to exit a car in an emergency is through the car's end doors, and it suggested that emergency window exits are probably more reliable than additional doors, believing the doors are more likely to be rendered inoperable. The NARP stated that research should focus on the relationship between a car's seating capacity and layout and its emergency-exit capacity. The NARP opposed requiring four doors on a 44-foot Talgo car, and saw little benefit from adding additional doors to a Superliner dining car without a costly stairwell installation. The NARP asserted that a requirement for four side doors may be economically fatal for a single-level dining car, and advised instead that one side door may be provided in the hallway opposite the kitchen and a second side door placed in the kitchen.

In commenting on the proposal, WDOT believed it not appropriate to require four side doors on a 44-foot Talgo passenger car, which is approximately half the length of conventional passenger cars. WDOT stated that a Talgo passenger car has two exterior doors for a maximum of 36 people in each car, while an Amtrak Horizon coach has four exterior doors and seats 72 passengers. WDOT maintained that the rule should reflect these differences or provide clear, concise performance-based standards in the alternative. In this regard, WDOT found the term ''functional equivalent'' as used in the rule to be vague and in need of better definition. Further, WDOT commented that, traditionally, dining and bistro cars have not had exterior side doors; and requiring such doors in these cars would significantly decrease the amount of available dining space, decrease revenue-generating space, and add substantial costs. WDOT recommended FRA remove dining and bistro cars from any exterior side door requirement as it would decrease the amount of available dining space and thereby reduce passenger convenience, comfort and satisfaction. Talgo similarly commented that the proposed requirement should be modified to state that the functional equivalent of four side doors in a car of conventional length is two side doors in a car of half the length, and that dining and bistro cars be exempted from any requirement.

In response to the proposal in the NPRM, Bombardier recommended that the wording of the rule be changed to require that each passenger car have a minimum of two side doors. Bombardier noted that on Amtrak's high-speed trainsets (HST), the passenger cars that will be positioned next to the power cars are equipped with only two exterior side doors, both of which are located on the end nearest to the power car. In the event of an evacuation, Bombardier explained that passengers could exit through those side doors as well as through the door at the opposite end of the car. Bombardier believed the use of such end doors should be considered in determining the time needed to evacuate a passenger car, and it noted in this regard that intercity passenger cars generally carry fewer passengers than commuter cars.

Based on the comments received, FRA has decided to modify the requirement for exterior side doors on Tier I passenger cars ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002, and for any Tier II passenger car placed in service. The final rule requires that each such passenger car have a minimum of two exterior side doors, and each door must have a minimum clear opening of 30 inches horizontally by 74 inches vertically. Since the minimum number of required side doors has been reduced from that proposed in the NPRM, this provision should not hinder railroads from removing the locomotive engineer's exterior side door in cab car and MU locomotive control compartments for purposes of adding to the structural integrity of the equipment. As the BLE raised in its comments on the rule, removing this side door allows for a continuous side sill structure along the control compartment, thereby enhancing the compartment's structural integrity and reducing the risk the compartment will be crushed in a corner or side impact. A dining car or other food service car is subject to the side door requirement as a passenger car under this rule, since FRA believes that all passenger cars must have exterior side doorway openings to allow for passenger and crew escape in a life-threatening situation, and also permit emergency rescue access.

Unlike the proposed rule, FRA has specified the dimensions of the doorway opening in inches rather than retain the language referencing a 95th-percentile adult male. This modification clarifies the rule for the regulated community in that what constituted a 95th-percentile adult male was originally not defined. FRA believes that a doorway with a minimum clear opening of 30 inches horizontally by 74 inches vertically will provide passage for a large, fully-clothed person and accommodate emergency response personnel equipped with fire and rescue gear. For instance, see the discussion below of § 238.113 (Emergency window exits) for detail on the sizes of adult backboards used by emergency responders to evacuate injured persons. FRA has specified the vertical dimension of 74 inches based on the height of the 95th-percentile adult male (72.8 inches) stated in Table 2 of Public Health Service Publication No. 1000, Series 11, No. 8, ''Weight, Height, and Selected Body Dimensions of Adults,'' June 1965. (A copy of this document has been placed in the public docket for this rulemaking.) The stated height of 72.8 inches was recorded for adult males not wearing shoes, and FRA has adjusted for this. FRA did not find this Public Health Service Publication that useful for purposes of specifying a horizontal dimension of the doorway as the stated body dimensions were, in effect, recorded without clothing (see page 5)—and of course did not address the size of equipment carried by emergency response personnel. FRA notes that the Americans with Disabilities Act (ADA) Accessibility Specifications for Transportation Vehicles also contain requirements for doorway width clearance (See 49 CFR part 38). These ADA requirements apply by their own force independent of the requirements of this rule.

Further, unlike the proposed rule, the final rule no longer provides that a passenger car may have the functional equivalent of the specified number of side doors. Each passenger car must have at least two separate, exterior side doorway openings. This will increase the likelihood that at least one of a passenger car's side doorway openings will allow passage in the event a train collision or derailment results in either, or both, structural damage to—or blockage of—the door. In this regard, railroads should consider where the passenger car side doors are located so as to facilitate passenger and crew escape in a life-threatening situation.

FRA reemphasizes that this requirement is only an interim measure that will prevent passenger cars from being introduced into service without side exterior doors. In Phase II of the rulemaking, FRA will focus on formulating a systems approach to emergency egress that provides for a sufficient number of emergency exits to evacuate the maximum passenger car load in a specified time for various types of emergency situations. FRA will evaluate with the Working Group whether APTA's recommended approach to emergency egress under development in APTA's PRESS Task Force should be incorporated into the Phase II rulemaking.

G. Fuel Tank Standards

Locomotive diesel fuel tanks are vulnerable to damage from collisions, derailments, and debris on the roadbed due to their location on the underframe and between the trucks of locomotives. Damage to the tank frequently results in spilled fuel, creating the safety problem of an increased risk of fire and the environmental problem of cleanup and restoration of the spill site. Although 49 CFR 229.71 does require a minimum clearance of 2.5 inches between the top of the rail and the lowest point on a part or appliance of a locomotive, such as a fuel tank, FRA regulations do not address the safety of fuel tanks in particular.

In 1992, the NTSB issued a report identifying concerns regarding safety problems caused by diesel fuel spills from ruptured or punctured locomotive fuel tanks. Entitled ''Locomotive Fuel Tank Integrity Safety Study,'' the NTSB report cited in particular a collision involving an Amtrak train and an MBTA commuter train on December 12, 1990, as both trains were entering a station in Boston, Massachusetts. (NTSB Safety Study-92/04.) Fuel spilled from a tank which had separated from an Amtrak locomotive during the collision. The fuel ignited. Smoke and fumes from the burning diesel fuel filled the tunnel, increasing the hazard level in the post-crash phase of the accident, and hindering emergency response activity. As a result of the safety study, the NTSB made several safety recommendations to FRA, including in particular that FRA:

> Conduct, in conjunction with the Association of American Railroads, General Electric, and the Electro-Motive Division of General Motors, research to determine if the locomotive fuel tank can be improved to withstand forces encountered in the more severe locomotive derailment accidents or if fuel containment can be improved to reduce the rate of fuel leakage and fuel ignition. Consideration should be given to crash or simulated testing and evaluation of recent and proposed design modifications to the locomotive fuel tank, including increasing the structural strength of end and side wall plates, raising the tank higher above the rail, and using internal tank bladders and foam inserts. (Class II, Priority Action) (R–92–10)
>
> Establish, if warranted, minimum performance standards for locomotive fuel tanks based on the research called for in recommendation R–92–10. (Class III, Longer Term Action) (R–92–11)

The NTSB reiterated Safety Recommendation R–92–10 in a letter to FRA dated August 28, 1997, conveying the NTSB's final safety recommendations arising from the February 16, 1996, collision between a MARC commuter train and an Amtrak passenger train. During the collision, the fuel tank on the lead Amtrak locomotive ruptured catastrophically. The fuel sprayed into the exposed interior of the MARC cab control car and ignited, engulfing the car. (Letter at 12.)

As explained in FRA's report to Congress on locomotive crashworthiness and working conditions, FRA believes that fuel tank design has a direct impact on safety. Minimum performance standards for locomotive fuel tanks should be included in Federal safety regulations. Accordingly, FRA proposed in the 1997 NPRM that AAR Recommended Practice No. 506 (RP–506), *Performance Requirements for Diesel-Electric Locomotive Fuel Tanks,* be incorporated into the rule as the external fuel tank requirements for Tier I passenger locomotives. FRA believes that RP–506 represents a good, interim safety standard for Tier I passenger locomotives. In the final rule, FRA has restated the requirements of RP–506 as Appendix D to part 238, as explained below, and has thereby incorporated it into the final rule.

FRA does note that further study may yield additional safety improvements for locomotive fuel tank design, and in September of 1997 FRA convened a Locomotive Crashworthiness Working Group of the Railroad Safety Advisory Committee (RSAC) to develop standards regarding a broad range of crashworthiness issues for both passenger and freight locomotives, including fuel tanks. Freight locomotive fuel tanks can cause a risk to passengers in the event of a train-to-train collision involving a passenger and a freight train. Therefore, in addition to the economy that can be achieved from standard fuel tank design requirements for the entire industry, industry-wide design requirements benefit both public and employee safety. Based on currently available information through the Locomotive Crashworthiness Working Group, it appears that locomotives built with AAR RP–506-compliant fuel tanks are performing well in derailments and highway-rail crossing collisions.

In its comments on the proposed rule, the NTSB agreed that external fuel tanks on Tier I locomotives should incorporate at a minimum, and on an interim basis, RP–506. Yet, the NTSB believed that more demanding safety standards for passenger locomotives be included in the permanent Tier I fuel tank regulations, specifically: higher ground clearance, compartmentalization, and a bottom skid plate. The NTSB noted that the advantages of higher fuel tank ground clearance were shown in Amtrak derailments in Kingman, Arizona, and Garden City, Georgia. According to the NTSB, investigation of both accidents revealed that essentially no fuel loss occurred in the involved locomotive units (GE Models P40 and P42), despite a substantial accumulation of debris beneath the fuel tanks that may have otherwise damaged current, conventional frame-suspended fuel tanks. The NTSB attributed the maintenance of fuel tank integrity to higher than typical fuel tank ground clearance, not found in conventionally designed, frame-suspended fuel tanks. Accordingly, the NTSB specifically recommended that fuel tank regulations should require higher ground clearance for both Tier I and Tier II operations. In light of the strong potential safety benefits associated with higher locomotive fuel tank ground clearance, FRA will carefully consider with the Working Group how best to implement the NTSB's recommendation in Phase II of this rulemaking.

In addition, FRA invited comments whether the proposed rule should require that locomotive fuel tanks be compartmentalized. The Working Group specifically discussed requiring whether the interior of fuel tanks be divided into a minimum of four separate compartments so that a penetration in the exterior skin of any one compartment results in loss of fuel only from that compartment. The Working Group recommended that such a requirement be addressed in the second phase of the rulemaking, to allow for additional research to remedy fuel feeding disruptions that may result from the compartmentalization of fuel tanks. Commenters were therefore requested to provide the results of specific research and operating experience showing how compartmentalization can be practically accomplished. Commenters were also asked to explain why the issue of compartmentalization should or should not be addressed in the final rule of this first phase of the rulemaking.

The NTSB commented that it supported continued research for fuel tank compartmentalization to remedy fuel loss during derailments. It stated that compartmentalization is required in aviation applications, where fuel tanks within the airframe contour must be able to resist rupture and retain fuel under inertial forces prescribed for emergency landing conditions (citing 14 CFR 25.963). Therefore, research should be conducted to determine if similar successes can be attained in railroad application, according to the NTSB. The BLE also commented that it supports requirements for compartmentalized fuel tanks on all passenger locomotives. Noting that diesel fires create devastating results in passenger train accidents, the BLE believed every effort should be made to avoid them, including using the most advanced technology possible. Further, APTA commented that it believes fuel tank compartmentalization has the potential to reduce the amount of fuel spilled in a railroad accident; recommended that FRA consider requiring compartmentalized fuel tanks on new locomotives if the technical difficulties resulting in interruptions in fuel flow are resolved; and suggested that FRA make a priority to resolve these technical difficulties. In accordance with these comments, FRA will carefully consider with the Working Group in Phase II of the rulemaking a requirement to compartmentalize fuel tanks on new locomotives, drawing upon research conducted and experience gained in the interim through the Locomotive Crashworthiness Working Group and the APTA PRESS Task Force.

H. Train Interior Safety

Based on previous research results, the interior passenger protection requirements for Tier I and II passenger equipment rely on ''compartmentalization'' as a passenger protection strategy. Such a strategy has the advantages of being passive, *i.e.*, requiring no action to be taken on the part of the occupants, of being effective for a range of occupant sizes, and potentially being effective in a wide range of interior configurations. Research results indicate that during a collision the interior environment of a passenger coach car is substantially less hostile than the interiors of automobiles and aircraft. Owing to this lower hostility in a collision environment, the interior of a typical passenger coach car can provide a level of protection to passengers without active restraints at least as effective in preventing fatality as that protection afforded to automobile and transport aircraft passengers with active restraints. See the discussion on train interior safety in the NPRM for more detail. 62 FR 49745–49749.

Conclusions from the research previously conducted on passenger protection in train collisions show that lap belts and shoulder restraints, if used, provide the highest level of occupant protection of those protection strategies studied—greater than the level of protection afforded by compartmentalization. However, as noted in the NPRM, FRA believes that more research is necessary to determine the feasibility and effectiveness of these active restraints, as well as the impact on seat design and strength necessary to support the loads associated with use of the restraints. In this regard, FRA requested information and comment from interested parties whether there is any existing research or experience which would justify active seat restraints in this phase of the rulemaking. See 62 FR 49745.

In comments on the NPRM, Simula Technologies, Inc., (Simula) stated that there may be a potential for a higher level of occupant protection offered by passive or active restraints than by compartmentalization. Simula noted that cost effectiveness considerations differ when considering the application of occupant protection strategies to a train crew as compared to passengers. For instance, it believed that the relatively high expense of passive restraints may be justified for one or two crewmembers in a particularly severe environment—for instance, a locomotive cab. Simula agreed with FRA that more research is needed to determine the most cost effective means of providing occupant safety improvements.

APTA, in its comments on the NPRM, believed that FRA has taken the correct approach in not mandating active seat restraints in this stage of the rulemaking. APTA found accurate the description of the physics of passenger motion during a collision which was contained in the preamble of the NPRM. APTA noted that active seat restraints provide the most benefit in high passenger deceleration situations, such as in automobile collisions; whereas, in the case of the low decelerations of passenger train collisions, other types of protection measures such as compartmentalization to minimize the distance a passenger travels before striking an interior surface and padding of interior surfaces can be as effective as active seat restraints in protecting passengers from secondary collisions.

In its comments on the NPRM, the BRC stated that, ideally, passenger equipment should have seat belts or other restraints to keep occupants from striking seats from behind or striking other interior surfaces and occupants. The BRC believed this to be a true cause of serious injury and death during rapid decelerations in collisions and derailments. The BRC further commented that a seat must be strong enough to hold an occupant utilizing such restraints and yet resist the force(s) of other unrestrained occupants striking the seat. In addition, a member of the public commented that Amtrak should provide its passengers with lap belts and shoulder harnesses, noting that they can reduce injuries to all occupants when used.

FRA has continued to pursue research into implementing seat belts and shoulder restraints in intercity and commuter passenger equipment. The purpose of this research is to develop the information required by FRA to determine if occupant restraints should be required in future regulations. This research is being conducted in three steps: preliminary design studies; design development; and engineering modeling, construction, and testing. The first step of the research has been completed. Principal conclusions from the research to date are that an existing inter-city passenger coach seat can be modified to accept lap and shoulder belts. In particular, for Amtrak's traditional seat design, appropriate modification of the connections between the seat and floor, and between the seat pan and seat back, allow it to support the loads associated with two restrained 95th-percentile adult males occupying the seats as well as the loads associated with being struck from behind by two 95th-percentile adult males. Such seats can be designed to compartmentalize safely an unrestrained single 5th-percentile adult female striking the seat from behind.

Existing three-position commuter seat designs cannot be modified to accept lap and shoulder belts. The additional loads associated with the third restrained and the third unrestrained occupant cause multiple structural failures for existing three-position commuter seat designs—these designs simply fold up under the load. In order to meet weight requirements, advanced structural materials and fabrication techniques are likely to be required to develop a three-position commuter seat design which can support the loads associated with three restrained 95th-percentile adult males in the seats and the loads associated with being struck from behind the seats by three 95th-percentile adult males.

For the intercity passenger coach seat, FRA currently plans to complete work on the details of the necessary modifications to Amtrak's traditional seat design, modify accordingly four to six pairs of seats for testing, and then dynamically sled test these seats. For the commuter seat, a study is planned to develop an engineering model design of a three-position commuter car passenger seat which incorporates lap and shoulder belts. Composite structures and advanced manufacturing techniques will be considered in this study. Principal design considerations include the need to address secondary collision loads, as well as manufacturing and maintenance costs, weight, and durability.

In the second phase of the rulemaking, FRA and the Working Group will reevaluate the feasibility and effectiveness of requiring active restraints such as lap belts and shoulder harnesses in passenger equipment, based on the results of the ongoing research.

I. Fire Safety

In 1984, FRA published guidelines recommending test methods and performance criteria for the flammability, smoke emission, and fire endurance characteristics for categories and functions of materials to be used in the construction of new or rebuilt rail passenger equipment. *See* 49 FR 33076, Aug. 20, 1984; 49 FR 44582, Nov. 7, 1984. The guidelines were originally developed by the Volpe Center for the Urban Mass Transit Administration (UMTA now FTA) of DOT in the late 1970s, and were intended for application to rail transit vehicles. *See* 47 FR 53559, Nov. 26, 1982; 49 FR 32482, Aug. 14, 1984. FRA recommended applying the guidelines to intercity and commuter rail cars, due to the similarity of use for many of the materials in these cars.

The intent of the guidelines is to prevent fire ignition and to maximize the time available for passenger evacuation if fire does occur. FRA later reissued the guidelines in 1989 to update the recommended test methods. *See* 54 FR 1837, Jan. 17, 1989. Test methods cited in the FRA guidelines include those of the American Society for Testing and Materials (ASTM) and the Federal Aviation Administration (FAA). In particular, the ASTM and FAA testing methods provide a useful screening device to identify materials that are especially hazardous.

FRA sought comments in the ANPRM on the need for more thorough guidelines or Federal regulations concerning fire safety. *See* 61 FR 30696. FRA noted that fire resistance, detection, and suppression technologies have all advanced since the guidelines were first published. In addition, FRA explained that a trend toward a systems approach to fire safety is evident in most countries with modern rail systems. In response, the National Fire Protection Association (NFPA) commented that perhaps more thorough guidelines are needed, or at least should be evaluated. Fire Cause Analysis also responded that, at a minimum, more in depth guidelines based on current system safety procedures and available fire safety engineering techniques are needed. The commenter noted in particular that Federal maintenance standards related to fire safety are necessary to ensure that materials carefully qualified for use in rail passenger vehicles because of their fire safety characteristics are not replaced with either substandard materials or materials whose origin and fire performance cannot be determined.

The 1997 NPRM addressed fire safety by proposing to make FRA's fire safety guidelines mandatory for the construction of new passenger equipment as well as the refurbishing of existing equipment. *See* 62 FR 49803. As explained below in the discussion of this final rule, FRA has simplified and revised the table of tests and performance criteria for the flammability and smoke emission characteristics of materials used in passenger cars and locomotive cabs. In addition, FRA has clarified in the final rule the application of the required tests and performance criteria. As proposed in the NPRM, the final rule also furthers fire safety through a fire protection plan and program to be carried out by each operating railroad, which will include conducting a fire safety analysis of existing passenger equipment and taking appropriate action to reduce the risk of personal injuries.

As noted in the NPRM, the National Institute of Standards and Technology (NIST) of the United States Department of Commerce is conducting research under the direction of FRA and the Volpe Center involving the fire safety of rail passenger vehicles. The NIST project is investigating the use of alternative fire testing methods and computer hazard analysis models to identify and evaluate approaches to passenger train fire safety. The evaluation is examining the effects and tradeoffs of passenger car and system design (including materials), fire detection and suppression systems, and passenger egress time. A peer review committee has been established to provide project guidance and review interim results and reports. The committee includes representatives from FRA, the Volpe Center, the NFPA, builders of rail passenger vehicles, producers of materials, Amtrak and commuter railroads, and testing laboratories.

In the first phase of the NIST project, selected materials which satisfy the testing methods referenced in FRA's fire safety guidelines were evaluated using the ASTM E1354 Cone Calorimeter.[1] The Cone Calorimeter provides a measurement of heat release rate (the amount of energy that a material produces while burning), specimen mass loss, smoke production, and combustion gases. For a given confined space such as a rail car interior, the air temperature and risk of harm to passengers are increased as the heat release rate increases. As a result, even if passengers do not come in direct contact with a fire, they may likely be injured from the high temperatures, high heat fluxes, and large amounts of toxic gases emitted by materials involved in the fire. The results of the Phase I tests showed a strong correlation between the FRA-cited test data and the Cone Calorimeter test data.

Phase I test data were used in the second phase of the NIST project to perform a fire hazard analysis of selected passenger train fire scenarios. Also included in this analysis were data obtained from tests of larger interior components, including seat assemblies, using the ASTM E 1537 Furniture Calorimeter. The analysis employed computer modeling to assess the impact on passenger train fire safety for a range of construction materials and system design. The interim report documenting Phase II is in final preparation by NIST. In the final phase of the project, selected real-scale proof tests using an Amfleet coach rail car and interior assemblies will be performed to verify the small-scale (bench-scale) criteria and hazard analysis studies in actual end use configurations.

Overall, the NIST research effort follows upon FRA-sponsored studies by the National Bureau of Standards in 1984 and NIST in 1993 which noted, among their findings, that the performance of individual components of a rail passenger car in a real-world fire environment may be different from that experienced in bench-scale tests due to vehicle geometry and materials interaction.[2] The results of the NIST research project will help in developing a broad set of performance criteria for materials using the Cone Calorimeter and the Furniture Calorimeter in a context similar to that provided generally in the table of FRA fire safety requirements contained in Appendix B to part 238. In addition, unlike data derived from most test methods referenced in Appendix B, heat release rate and other measurements obtained from the Cone Calorimeter and the Furniture Calorimeter can be used in a fire modeling methodology to evaluate the contribution of materials to the overall fire safety of a passenger train. Although FRA has targeted for consideration in the second phase of the

[1] ''Fire Safety of Passenger Trains: Phase I Material Evaluation (Cone Calorimeter).'' (DOT/FRA/ORD/–98/01–DOT–VNTSC–FRA–98–2, January, 1999). A copy of the report has also been placed in the public docket of this rulemaking.

[2] ''Fire Tests of Amtrak Passenger Rail Vehicle Interiors.'' (NBS Technical Note 1193, May 1984); ''Fire Safety of Passenger Trains: A Review of U.S. and Foreign Approaches.'' (DOT/FRA/ORD–93/23—DOT–VNTSC–FRA–93–26, December, 1993). The 1993 report is available to the public through the National Technical Information Service, Springfield, VA 22161. A copy of both reports have been placed in the public docket for this rulemaking.

rulemaking a broad set of performance criteria employing the Cone Calorimeter and Furniture Calorimeter for materials used in passenger cars and locomotive cabs, FRA has introduced use of the Cone Calorimeter and Furniture Calorimeter in a limited manner in this final rule as explained below in the discussion of Appendix B to part 238.

FRA notes that the ASTM has developed a standard which describes how to evaluate fire hazard assessment techniques (ASTM E 1546, Guide for the Development of Fire Hazard Assessment Standards). An ASTM group, the E–5.17 Subcommittee on Transportation, is currently completing a document entitled ''Standard Guide for Fire Hazard Assessment of Rail Passenger Vehicles.'' The proposed guide is intended to provide an alternative approach to ensuring an equivalent level of fire safety using a performance-based approach which examines fire scenarios, as well as design considerations, to evaluate the potential fire hazard of a rail transportation vehicle. One of the principal issues related to the proposed guide is that calculation methods are suggested which use models that have not been validated for application to rail cars. In this regard, the results of the NIST fire safety research will be helpful for the ASTM subcommittee, as NIST is using the Hazard I computer model to develop correlations between small-scale tests of materials and full-scale tests of rail cars.

In the NPRM, FRA explained that the NFPA publishes a standard (NFPA 130) covering fire protection requirements for fixed guideway transit systems and for life safety from fire in transit stations, trainways, vehicles, and outdoor maintenance and storage areas. *See* 62 FR 49744–5. (A copy of the 1997 edition of this standard has been placed in the public docket for this rulemaking.) However, this standard has not historically been applied to passenger railroad systems, including those that provide commuter service (NFPA 130 1–1.2). FRA noted that an APTA representative on the Working Group who is a member of the NFPA initiated an NFPA-sponsored task force to revise the scope of NFPA 130 to cover all rail passenger transportation systems, including intercity and commuter rail, and revise other provisions as necessary. The NFPA task force met several times in 1997 and 1998, and submitted recommended revisions to the NFPA 130 Committee in August, 1998. Although the NFPA 130 Committee accepted the task force recommendations in principle, the standard revision approval process will not be complete until late 1999.

In its comments on the NPRM, the NFPA urged FRA to adopt NFPA 130 upon completion of its revision. The NFPA cited the National Technology Transfer and Advancement Act of 1995, Pub. L. 104–113, and one of its provisions which requires, in general, that Federal agencies ''use technical standards that are developed or adopted by voluntary consensus standards bodies'' (Section 12, paragraph (d)(1)). In the second phase of this rulemaking, FRA will consider with the Working Group the incorporation of NFPA 130, as revised, into this rule.

In response to the NPRM, FRA received a number of other comments on the provisions of the rule related to fire safety. Those comments on the proposed fire protection plan and program are noted in particular, below, in the discussion of 49 C.F.R. § 238.103 in the final rule. In regard to the proposed table of tests and performance criteria for the flammability and smoke emission characteristics of materials used in passenger cars and locomotive cabs contained in Appendix B to part 238, Fire Cause Analysis commented on the advisability of making such tests and performance criteria mandatory without considerable and detailed enabling language. Fire Cause Analysis noted in particular that the table of tests and performance criteria in Appendix B contained confusing and overlapping component and function categories for materials; that application of the tests and performance criteria to ''small parts'' requires special consideration to provide flexibility for car builders; and that the fire performance of electrical wiring and cable was not expressly addressed in the NPRM, although addressed by NFPA 130.

A member of the public commented that he considered FRA's fire safety guidelines good in some but not all respects. The commenter stated in particular that the current acceptance levels of smoke emission are inadequate to protect passengers from toxic levels of smoke; and that permitting glazing and lighting lenses to have a flame spread index of 100 with flaming running and flaming dripping is not justified based on the location of these objects, ease of ignition, and Btu content of polycarbonate. Nonetheless, the commenter recommended adoption of the guidelines into law, noting that some vendors, car builders, and agencies operating rail equipment have not taken the guidelines seriously. Otherwise, the commenter believed that the fire safety guidelines will be discounted.

APTA, in its comments on the NPRM, supported the proposed materials selection criteria for new equipment (as well as the proposed fire safety program for new equipment discussed below). APTA also recommended that FRA consider updating the fire safety standards based on the work of the NFPA 130 task force and the research being conducted by the NIST. The BRC, in its comments on the NPRM, stated that interior materials in passenger equipment must be required to meet strict standards for flammability and smoke emission. The BRC believed that compliance with the current guidelines alone is insufficient for safety, and that additional technology, preventative measures, and fire safety standards must be considered.

In the final rule, FRA has not significantly changed the table of test methods and performance criteria for the flammability and smoke emission characteristics of materials used in passenger cars and locomotive cabs, as contained in Appendix B to part 238. FRA has sought to maintain the current high levels of safety provided by the fire safety guidelines, while developing a more workable framework for their use as a regulation. In fact, as part of the NIST fire safety research, specific input on the 1989 FRA fire safety guidelines was solicited from rail system operators, car builders, and consultants at a workshop held at the NIST Building and Fire Research Lab (BFRL) in July, 1997. (The minutes of that workshop are contained in Follow-Up Workshop Notes.[3]) This input was used to help simplify and revise the table of tests and performance criteria contained in Appendix B. In summary, the specific changes FRA has made to the table in the final rule include:

- Reorganizing table component and function categories;
- Adding a dynamic testing requirement for cushions;
- Adding a new test method for evaluating seat assemblies;
- Providing a test exception and test alternative for small component parts;
- Adding express requirements for wire and cable testing;
- Updating test methods for elastomers;
- Providing an alternative test method for smoke generation;
- Adding express requirements for structural assemblies other than floors; and
- Renumbering and adding notes to the table to reflect the changes.

[3] ''Follow-Up Notes: NIST/CFR FRA Project, Meeting/Workshop of 7/23/97.'' September 15, 1997. Prepared by J. Zicherman. A copy of this document has been placed in the public docket for this rulemaking.

The discussion of Appendix B to part 238, below, provides a detailed explanation of the changes made to the table of test methods and performance criteria for the flammability and smoke emission characteristics of materials used in passenger cars and locomotive cabs.

VI. Inspection and Testing of Brake Systems and Mechanical Components

A. Background Prior to 1997 NPRM

In 1992, Congress amended the Federal rail safety laws by adding certain statutory mandates related to power brake safety. These amendments specifically address the revision of the power brake regulations and state in pertinent part:

(r) POWER BRAKE SAFETY.—(1) The Secretary shall conduct a review of the Department of Transportation's rules with respect to railroad power brakes, and not later than December 31, 1993, shall revise such rules based on such safety data as may be presented during that review.

* * * * *

Pub. L. No. 102–365, § 7; codified at 49 U.S.C. 20141, superseding 45 U.S.C. 431(r).

In response to the statutory mandate, various recommendations to improve power brake safety, and due to its own determination that the power brake regulations were in need of revision, FRA published an ANPRM on December 31, 1992, concerning railroad power brake safety. *See* 57 FR 62546. The ANPRM provided background information and presented questions on various subjects related to intercity passenger and commuter train operations, including: training of testing and inspection personnel; electronic braking systems; cleaning, oiling, testing, and stenciling (COT&S) requirements; performance of brake inspections; and high speed passenger train brakes. Following publication of the ANPRM, FRA conducted a series of public workshops. The ANPRM and the public workshops were intended as fact-finding tools to elicit views of those persons outside FRA charged with ensuring compliance with the power brake regulations on a day-to-day basis.

Furthermore, on July 26, 1993, the NTSB made the following recommendation to FRA: ''Amend the power brake regulations, 49 Code of Federal Regulations 232.12, to provide appropriate guidelines for inspecting brake equipment on modern passenger cars.'' (R–93–16). The recommendation arose out of the NTSB's investigation of the December 17, 1991, derailment of an Amtrak passenger train in Palatka, Florida. The derailed equipment struck two homes and blocked a street north of the Palatka station. The derailment resulted in eleven passengers sustaining serious injuries and 41 others receiving minor injuries. In addition, five members of the operating crew and four onboard service personnel received minor injuries. By letter dated September 16, 1993, FRA told the NTSB that it was in the process of reviewing and rewriting the power brake regulations and would consider the NTSB's recommendation during the process.

Based on comments and information received, FRA published a Notice of Proposed Rulemaking in 1994 (1994 NPRM) regarding revision of the power brake regulations. The 1994 NPRM contained specific requirements related to intercity passenger and commuter train operations, including: general design requirements; movement of defective equipment; employee qualifications; inspection and testing of brake systems and mechanical components; single car testing requirements and periodic maintenance; operating requirements; and requirements for the introduction of new train brake system technology. *See* 59 FR 47676, 47722–53, September, 16, 1994. Following publication of the 1994 NPRM, FRA held a series of public hearings in 1994 to allow interested parties the opportunity to comment on specific issues addressed in the 1994 NPRM. Due to the strong objections raised by a large number of commenters, FRA announced by notice published on January 17, 1995, that it would defer action on the 1994 NPRM and permit the submission of additional comments prior to making a determination as to how it would proceed in this matter. *See* 60 FR 3375.

After review of all the comments submitted, FRA determined that in order to limit the number of issues to be examined and developed in any one proceeding it would proceed with the revision of the power brake regulations via three separate processes. In light of the testimony and comments received on the 1994 NPRM, emphasizing the differences between passenger and freight operations and the brake and mechanical equipment utilized by the two, FRA decided to separate passenger equipment power brake and mechanical standards from freight equipment power brake standards.

As passenger equipment power brake and mechanical standards are a logical subset of passenger equipment safety standards (*see* 49 U.S.C. 20133(c)), FRA requested the Passenger Equipment Safety Standards Working Group to assist FRA in developing appropriate power brake and mechanical standards for passenger equipment. The 1997 NPRM, upon which this final rule is based, was developed by FRA in consultation with this Working Group.

In addition, FRA determined that a second NPRM covering freight equipment power brake standards would be developed with the assistance of FRA's RSAC. *See* 61 FR 29164, June 7, 1996. Furthermore, in the interest of public safety and due to statutory as well as internal commitments, FRA determined that it would separate the issues related to two-way end-of-train-telemetry devices from both the passenger and freight issues. FRA convened a public regulatory conference and published a final rule on two-way end-of-train devices on January 2, 1997. *See* 62 FR 278.

Beginning in December of 1995, the Passenger Equipment Safety Standards Working Group adopted the additional task of attempting to develop power brake and mechanical inspection and maintenance standards applicable to intercity passenger and commuter train operations and equipment. The Working Group met on four separate occasions, for a total of ten days of meetings, with a good portion of these meetings being devoted to discussion of power brake and mechanical inspection and maintenance issues. From the outset, a majority of the members, as well as FRA, believed that any requirements developed by the group regarding the inspection and testing of the brake and mechanical equipment should not vary significantly from the current requirements and should be consistent with current industry practice.

FRA's accident/incident data related to intercity passenger and commuter train operations support the assumption that the current practices of these operations in the area of power brake inspection, testing, and maintenance are for the most part sufficient to ensure the safety of the public. Between January 1, 1990 and October 31, 1996, there were only five brake related accidents involving commuter and intercity passenger railroad equipment. No casualties resulted from any of these accidents and the total damage to railroad equipment totaled approximately $650,000, or $96,000 annually. In addition, between January 1, 1995 and October 31, 1996, FRA inspected approximately 13,000 commuter and intercity passenger rail units for compliance with 49 CFR part 232. The defect ratio for these units during this period was approximately 0.8 percent. Furthermore, during this same period FRA inspected approximately 6,300 locomotives for compliance with 49 CFR part 229. The brake defect ratio for these units was approximately 4.65 percent. Consequently, the defect ratio for brake related defects on locomotives and other passenger equipment during this period was approximately 2.08 percent.

The existing regulations covering the inspection and testing of the braking systems on passenger trains are contained in 49 CFR part 232. The current regulations do provide some requirements relevant to passenger train operations, including: initial terminal inspection and testing, intermediate inspections, running tests, and general maintenance requirements. *See* 49 CFR 232.12, 232.13(a), 232.16, and 232.17. However, most of the existing regulations are written to address freight train operations and do not sufficiently address the unique operating environment of commuter and intercity passenger train operations or the equipment currently being used in those operations. Therefore, it has been necessary for FRA to provide interpretations of some of the current regulations in order to address these unique concerns.

Currently, all non-MU (multiple unit) commuter trains that do not remain connected to a source of compressed air overnight and all MU commuter trains equipped with RT–5 or similar brake systems must receive an initial terminal inspection of the brake system pursuant to § 232.12(c)–(j) prior to the train's first departure on any given calendar day. All non-MU commuter trains that remain connected to a source of compressed air over-night are permitted to receive an initial terminal inspection of the brake system sometime during each 24-hour period in which they are used. Furthermore, all intercity passenger trains must receive an initial terminal inspection of the brake system at the point where they are originally made up and must receive an intermediate inspection in accordance with § 232.12(b) every 1,000 miles.

There are currently no regulations which specifically require the inspection of the mechanical components on passenger equipment. Although the current regulations do not contain any mechanical inspection requirement of passenger equipment, virtually every passenger railroad currently performs some type of daily mechanical inspection on its passenger equipment with highly qualified personnel. For several years Amtrak has been conducting voluntary mechanical safety inspections of passenger train components.

As noted previously, most of the members of the Working Group believed that any requirements developed by the group regarding the inspection, testing, and maintenance of the brake and mechanical equipment should not vary significantly from the current requirements and should be consistent with current industry practice. However, the Working Group was unable to reach consensus on any power brake or mechanical equipment standards, despite the positing of multiple alternatives, use of a facilitator, and the foundation provided by the 1994 NPRM. The Working Group identified and discussed options with which the agency and labor can agree, and others with which FRA and the railroads can agree. However, bridging the gap between those various options proved elusive. Consequently, as the Working Group could not reach any type of consensus on the inspection and testing requirements, it was determined that FRA would address these issues unilaterally, based on the information and discussions provided by the Working Group and the information gathered from the 1994 NPRM.

B. 1997 NPRM on Passenger Safety Equipment Standards

During the Working Group discussions, labor representatives, particularly the BRC, insisted that a comprehensive power brake inspection must be performed prior to a train's first run on a given calendar day. The BRC also believed that it is necessary for the first inspection of the day to determine whether the brake shoes and the disc pads actually apply as intended. The BRC further contended that in order to perform a comprehensive inspection equivalent to an initial terminal inspection the train must be walked or otherwise inspected on a car-to-car basis and that these principal inspections should be performed only by carmen or other qualified mechanical personnel as they are the only employees sufficiently trained to perform the inspections. Rail labor representatives also advocated a daily inspection of all safety-related mechanical components with pass/fail criteria or limits written into the Federal safety standards much like the requirements contained in 49 CFR part 215 addressing freight equipment.

Representatives of intercity passenger and commuter railroads expressed the desire to have the flexibility to conduct comprehensive in-depth inspections of the brake and mechanical system sometime during the day in which the equipment is utilized. These parties argued that safety would be better served by allowing the railroads the flexibility to conduct these inspections on a daily basis as it would allow the railroads to conduct the inspections at locations that are more conducive to permitting a full inspection of the equipment than many of the outlying locations where trains are stationed overnight and where the ability to observe all the equipment may be hampered. It was further contended that, if the railroads are allowed some flexibility in conducting these type of inspections, then the equipment can be moved to a location where a fully qualified mechanical inspector can perform detailed inspections under optimum conditions.

Several parties also pointed out that, with proper maintenance, ''tread brake units'' and other friction brake components, commonly used in commuter train operations, are highly reliable and that the non-functioning of any individual unit would in no way compromise the overall safety of the train. Furthermore, permitting the inspection of brake components in the middle of the day, rather than at the beginning of the day, involves no greater safety risk to passengers because friction brake systems and their components degrade in performance based largely on use, and nothing short of a continuous brake inspection can guarantee 100-percent performance at all times. Railroad representatives suggested an inspection scheme that would permit an in-depth, comprehensive brake inspection to be performed sometime during the day in which the equipment is used with a brake inspection being performed prior to the first run of the day verifying the continuity of the trainline by performing a set and release on the rear car of the train.

APTA and other passenger railroad representatives strongly maintained that specific inspection criteria or limits related to the mechanical components of passenger equipment were not necessary. During the ongoing meetings of the Working Group, FRA repeatedly requested that railroad representatives provide a recommended list of mechanical components and criteria for their inspection. These representatives consistently responded with very broad requirements basically limited to inspections for obvious and visible defects. Although passenger railroad representatives did not object to the safety principle of a mechanical inspection, they did not want their operations to be bound by a rigid list of components and criteria for the inspection.

Based on consideration of all of the information outlined above, FRA published an NPRM on Passenger Equipment Safety Standards on September 23, 1997. *See* 62 FR 49728.

This NPRM contained specific proposals related to the inspection, testing, and maintenance of both the brake and mechanical components on passenger equipment. The proposal attempted to balance the concerns of rail labor representatives and representatives of intercity and commuter railroads.

1. Proposed Brake System Inspections

In the 1997 NPRM, FRA proposed to abandon the terminology related to the power brake inspection and testing requirements contained in the current regulations, and proposed to identify various classes of inspections based on the duties and type of inspection required. *See* 62 FR 49737, 49774–77, 49810–11. FRA believed that this type of classification system would avoid confusion with the power brake inspection and testing requirements applicable to freight operations and would avoid the connotations historically attached to the current terminology. FRA also believed that this approach was better suited for providing operational flexibility to commuter operations while maintaining the safety provided by the current inspection and testing requirements. Although FRA proposed a change in the terminology used to describe the various power brake inspections and tests, the requirements of the inspections and tests closely tracked the current requirements with some modifications made to address the unique operating environment of, and equipment operated in, commuter and intercity passenger train service. Members of the Working Group appeared receptive to this kind of classification system and discussed various options using some of this terminology. Consequently, FRA proposed four different types of brake inspections, ''Class I,'' ''Class IA,'' ''Class II,'' and ''running brake test,'' that were to be performed by commuter and intercity passenger railroads some time during the operation of their equipment.

In the proposal, FRA also divided passenger train operations into two distinct types for purposes of brake inspections and testing. FRA recognized that there were major differences in the operations of commuter or short-distance intercity passenger trains, and long-distance intercity passenger trains. Commuter and short-distance intercity passenger trains tend to operate for fairly short distances between passenger stations and generally operate in relatively short turn-around service between two terminals several times in any given day. In contrast, long-distance intercity passenger trains tend to operate for long distances, with trips between the beginning terminal and ending terminal taking a day or more and traversing multiple states with relatively long distances between passenger stations. Consequently, FRA proposed the terms ''commuter train,'' ''short-distance intercity passenger train,'' and ''long-distance intercity passenger train'' in order to identify the inspection and testing requirements associated with each. *See* 62 FR 49737–38, 49774–76, 49810–11. For the most part, commuter and short-distance intercity passenger trains were treated similarly, whereas long-distance intercity passenger trains had slightly different proposed inspection and testing requirements. In addition, FRA proposed slightly different requirements with regard to the movement of defective equipment in long-distance intercity passenger trains (see the discussion below on the ''Movement of Equipment with Defective Brakes'').

The proposed Class I brake test basically required an inspection similar to an initial terminal inspection as currently described at § 232.12(c)-(j), but was somewhat more extensive and specifically aimed at the types of equipment being used in commuter and intercity passenger train service. *See* 62 FR 49738–39, 49774–76, 49810. The proposed Class I brake test would require an inspection of the application and release of the friction brakes on each side of each car as well as an inspection of the brake shoes, pads, discs, rigging, angle cocks, piston travel, and brake indicators if the equipment is so equipped. The Class I brake test would also require testing of the communication signal system and the emergency braking control devices. In recognition of the advanced technology and various designs used in many of these operations, which make observation of the piston travel virtually impossible, FRA proposed to permit the inspection of the piston travel to be conducted either through direct observation of the clearance between the brake shoe and the wheel or by observation of a brake actuator. Furthermore, FRA proposed to require a brake pipe leakage test only when leakage will affect service performance.

As FRA proposed that Class I brake tests be comprehensive inspections of the braking system, FRA believed that commuter and short-distance intercity passenger train operations should be permitted some flexibility in conducting these inspections. Consequently, FRA proposed that commuter and short-distance intercity passenger train operations perform a Class I brake test sometime during the calendar day in which the equipment is used. FRA believed that the flexibility permitted by the proposed requirement would allow railroads to move equipment to locations that are most conducive to the inspection of the brake equipment and would allow railroads to combine the daily mechanical inspections with the brake inspection for added efficiency.

In the NPRM, FRA recognized the differences between commuter or short-distance intercity operations and long-distance intercity passenger train operations. FRA noted that long-distance intercity passenger trains do not operate in shorter turn around service over the same sections of track on a daily basis for the purpose of transporting passengers from major centers of employment. Instead, these trains tend to operate for extended periods of time, over long distances with greater distances between passenger stations and terminals. Further, these trains may operate well over 1,000 miles in any 24 hour period. Thus, FRA believed that the opportunity for conducting inspections on these trains was somewhat diminished. Therefore, FRA determined that a thorough inspection of the braking system on these types of operations must be conducted prior to the train's departure from an initial starting terminal. Consequently, FRA proposed that a Class I brake inspection be performed on long-distance intercity passenger trains prior to departure from an initial terminal. *See* 62 FR 49810. FRA did not believe there would be any significant burden placed on these operations as the current regulations require that an initial terminal inspection be performed at these locations.

FRA also recognized that these long-distance intercity passenger trains could conceivably travel significant distances if Class I inspections were required only once every 24 hours the equipment is in service as proposed for commuter and short-distance intercity passenger trains. Thus, FRA believed that some outside mileage limit had to be placed on these trains between brake inspections. Under the current regulations a passenger train is permitted to travel no farther than 1,000 miles from its initial terminal, at which point it must receive an intermediate inspection of brakes that includes an application of the brakes and the inspection of the brake rigging to ensure it is properly secured. *See* 49 CFR 232.12(b). However, in recognition of the improved technology used in passenger train brake systems combined with the comprehensive nature of the proposed Class I brake tests and mechanical safety inspections being performed by highly qualified inspectors, FRA proposed to permit long-distance passenger trains to travel up to 1,500 miles between Class I brake tests. Under FRA's proposal a comprehensive Class I brake test would be performed once every calendar day that the equipment is used or every 1,500 miles, which ever occurred first. *See* 62 FR 49739, 49775, 49810.

FRA also proposed that the brake inspection and testing intervals proposed for long-distance passenger trains apply to all Tier II equipment (i.e., equipment operating at speeds greater than 125 mph but not exceeding 150 mph), regardless of whether it is used in short-or long-distance intercity trains. As FRA's proposal permitted operators of Tier II equipment to develop inspection and testing criteria and procedures, these operations would be required to develop a brake test that is equivalent to a Class I brake test for Tier II equipment. Due to the speeds at which this equipment will be allowed to operate, FRA believed it was a necessity that an equivalent Class I brake test be performed on Tier II equipment before it departs from its initial terminal. Similarly, FRA proposed that the equivalent Class I brake test be performed every calendar day in which Tier II equipment is used or every 1,500 miles, whichever comes first. *See* 62 FR 49739, 49784, 49821.

The proposed Class IA brake test was somewhat less comprehensive than the proposed Class I brake test but included a detailed inspection of the brake system to verify the continuity of the brake system and the proper functioning of the brake valves on each car. A Class IA brake test would be similar to the intermediate brake inspection currently required for freight trains prescribed at § 232.13(d)(1). The proposed Class IA brake test would generally require a walking inspection of the set and release of the brakes on each car; however, the proposal allowed brake indicators to be used to verify the set and release if the railroad determined that operating conditions pose a safety hazard to an inspector walking along the train. The Class IA brake test also required a leakage test if leakage affects service performance, as well as an inspection of: angle cocks; piston travel, if determinable; brake indicators; emergency brake control devices; and communication of brake pipe pressure changes at the rear of train to the controlling locomotive. *See* 62 FR 49738–39, 49776–77, 49810.

FRA proposed that a Class IA brake test would be performed prior to a commuter or short-distance intercity passenger train's first departure on any given day. FRA believed that the proposed Class IA brake was sufficiently detailed to ensure the proper functioning of the brake system yet not so intensive that it would require individuals to perform an inspection for which they are not qualified. Although FRA tended to agree with the position advanced by many labor representatives that some sort of car-to-car inspection must be made of the brake equipment prior to the first run of the day, FRA did not agree that it is necessary to perform a full Class I brake test in order to ensure the proper functioning of the brake equipment in all situations. However, contrary to the position espoused by APTA, FRA believed that something more than just a determination that the brakes on the rear car set and release is necessary.

In addition to the proposed Class I and Class IA brake tests, FRA also proposed a Class II brake test. The proposed Class II brake test would be an inspection intended to verify the continuity of the train brake system and would be similar to the intermediate terminal inspection currently prescribed at § 232.13(a). A Class II brake test basically required a set and release of the brakes on the rear car. The proposed Class II test would be required in those circumstances where minor changes to a train consist occur, such as the change of a control stand, the removal of cars from the consist, the addition of previously tested cars, and the situations in which an operator first takes control of the train. *See* 62 FR 49739, 49777, 49811.

FRA also proposed that a running brake test be conducted as soon as conditions safely permit it to be conducted after a train receives a Class I, Class IA, or Class II brake test. FRA believed that this test should be conducted in accordance with each railroad's operating rules. The proposed "running brake test" requirement was similar to the "running test" requirements currently contained at § 232.16. *See* 62 FR 49740, 49777, 49811.

2. Proposed Mechanical Inspections

In the 1997 NPRM, FRA proposed three types of mechanical inspections, these included: a calendar day exterior and interior inspection, and a periodic inspection. *See* 62 FR 49771–73, 49807–09. The proposed exterior calendar day mechanical inspection for passenger cars and unpowered vehicles used in passenger trains was patterned after a combination of the current calendar day inspection required for locomotives under the Railroad Locomotive Safety Standards and the pre-departure inspection for freight cars under the Railroad Freight Car Safety Standards. *See* 49 CFR 229.21 and 215.13, respectively. FRA proposed that the calendar day mechanical inspection apply to all passenger cars and all unpowered vehicles used in passenger trains (which includes, e.g., not only coaches, MU locomotives, and cab cars but also any other rail rolling equipment used in a passenger train), and that all exterior mechanical inspections be performed by highly qualified personnel. A mechanical safety inspection of freight cars has been a longstanding Federal safety requirement, and FRA believed that the lack of a similar requirement for passenger equipment created a serious void in the current Federal railroad safety standards.

Rail labor representatives advocated a daily inspection of all safety-related mechanical components with pass/fail criteria or limits written into the Federal safety standards much like the requirements contained in 49 CFR part 215, whereas APTA and other passenger railroad representatives on the other hand strongly maintained that specific inspection criteria or limits are not necessary. During the meetings of the Working Group, FRA repeatedly requested that railroad representatives provide a recommended list of mechanical components and criteria for their inspection. These representatives consistently responded with very broad requirements basically limited to inspections for obvious and visible defects. Although passenger railroad representatives did not object to the safety principle of a mechanical inspection, they did not want their operations to be bound by a rigid list of components and criteria for the inspection.

FRA agreed with labor representatives that a specific list of components to be inspected with enforceable inspection or pass/fail criteria needed to be included as part of the proposed Passenger Equipment Safety Standards. In the 1997 NPRM, FRA identified the components that were to be inspected as part of the exterior calendar day mechanical safety inspection and provided measurable inspection criteria for the components. The proposal required the railroad to ascertain that each passenger car, and each unpowered vehicle used in a passenger train conforms with the conditions enumerated in the proposal. The Working Group members generally agreed that the components contained in the proposal represented valid safety-related components that should be frequently inspected by railroads.

However, members of the Working Group had widely different opinions regarding the criteria to be used to inspect the components. Therefore, as FRA was not provided any clear guidance from the Working Group, FRA selected inspection criteria based on the locomotive calendar day inspection and the freight car safety pre-departure inspection required by 49 CFR parts 229 and 215, respectively. FRA believed that passenger equipment should receive an inspection which is at least equivalent to that received by locomotives and freight cars. The components and conditions identified by FRA to be included in the exterior calendar day mechanical inspection included: couplers; suspension system; trucks; side bearings; wheels; jumpers; cable connections; buffer plates; products of combustion; batteries; diaphragms; and secondary brake systems. *See* 62 FR 49807–08.

FRA also proposed that each railroad perform an interior calendar day mechanical inspection by individuals qualified by the railroad to do so. FRA originally contemplated requiring the interior inspections to be performed by highly qualified personnel to track the exterior calendar day mechanical inspection requirements. However, after several discussions with members of the Working Group and several other representatives of passenger railroads, FRA determined that the training and experience typical of a mechanical inspector is not necessary and often does not apply to inspecting interior safety components of passenger equipment. In addition, the most economical way to accomplish the mechanical inspection is to combine the exterior inspection with the Class I brake test and then have a crew member or train coach cleaner combine the interior mechanical inspection with coach cleaning. FRA listed the following components that were to be inspected as part of the interior calendar day mechanical inspection: trap doors; end and side doors; manual door releases; safety covers, doors and plates; vestibule step lighting; and safety-related signs and instructions. *See* 62 FR 49808.

Because FRA intended the daily exterior and interior mechanical inspections to serve as the time when the railroad repairs defects that occurred en route, FRA further proposed that safety components not in compliance with this part would be required to be repaired before the equipment was permitted to remain in or return to passenger service after the performance of the mechanical inspections. In other words, FRA intended for the flexibility to operate defective equipment in passenger service to end at the calendar day mechanical inspection.

Initially, FRA considered requiring a more extensive list of components to be checked at each interior calendar day mechanical inspection. However, based on discussions conducted with the Working Group, FRA determined that the daily inspection and repair of some interior items could be burdensome to the railroads without producing an offsetting safety benefit. As a result, FRA proposed a periodic mechanical inspection for passenger cars in order to reduce the frequency with which certain components require inspection. FRA proposed that the following components be inspected for proper operation and repaired, if necessary, as part of the periodic maintenance of the equipment: emergency lights; emergency exit windows; seats and seat attachments; overhead luggage racks and attachments; floor and stair surfaces; and hand-operated electrical switches. *See* 62 FR 49808–09.

FRA determined that virtually all passenger railroads have defined periodic maintenance intervals for all of the equipment they operate with intervals varying from 60 to 180 days, depending on the type of equipment and the service in which it is used. Although FRA did not intend to limit the railroad's flexibility to set periodic maintenance intervals, FRA believed that an outside limit had to be placed on the performance of the periodic mechanical inspection. Thus, FRA proposed that the periodic mechanical inspection be performed at least every 180 days, as that appeared to be the outside limit of currently established maintenance cycles.

In addition to the daily and periodic mechanical inspections, FRA also proposed extensive requirements regarding the performance of single car tests on passenger equipment. FRA believed that the proposed single car test has proven itself effective in uncovering brake system problems that are the root cause of certain wheel defects or that have been caused by repairs made to the brake system. The current regulations require that a single car test be performed on passenger cars whenever they are on a shop or repair track. As the current requirement carries the potential of permitting a railroad to avoid the performance of the test by calling a repair track something other than a repair track, FRA believed it was prudent to base the requirement to perform a single car test on the type of defect or repair involved rather than the location where the defect is repaired. Therefore, FRA proposed a list of defective conditions and the repair or replacement of certain components which would trigger the requirement to perform a single car test. *See* 62 FR 49774, 49809. In an attempt to promote the prompt repair of defective equipment, FRA proposed some flexibility in the performance of the test by permitting cars to be moved to a location where the test could be performed if repairs were made at a location that could not perform the test.

3. Proposed Qualifications of Inspection and Testing Personnel

In the 1997 NPRM, FRA proposed the terms ''qualified person'' and ''qualified mechanical inspector'' to differentiate between the type of personnel that will be permitted to perform certain brake or mechanical inspections required in the proposal. A ''qualified person'' was defined as a person determined by the railroad to have the knowledge and skills necessary to perform one or more functions required under this part. Whereas, a ''qualified mechanical inspector'' was defined as a ''qualified person'' who as a part of the training, qualification, and designation program required by the proposal had received instruction and training that included ''hands-on'' experience (under appropriate supervision or apprenticeship) in one or more of the following functions: trouble-shooting, inspection, testing, and maintenance or repair of the specific train brake and other components and systems for which the inspector is assigned responsibility. Further, the mechanical inspector was to be a person whose primary responsibility includes work generally consistent with those functions. *See* 62 FR 49754.

As FRA intended for Class I brake inspections and exterior calendar day mechanical inspections to be in-depth inspections of the entire braking system and the safety-critical mechanical components, which most likely will be performed only one time in any given day in which the equipment is used, and because of the flexibility FRA proposed in the performance of such inspections, FRA proposed that these inspections had to be performed by individuals possessing not only the knowledge to identify and detect a defective condition in all of the brake equipment required to be inspected but also the knowledge to recognize the interrelational workings of the equipment and the ability to ''troubleshoot'' and repair the equipment. Consequently, FRA proposed that only qualified mechanical inspectors would be permitted to perform Class I brake tests and exterior calendar day mechanical inspections.

As the definition of qualified mechanical inspector required the person's primary responsibility to be the inspection, testing, or maintenance of passenger equipment, the definition largely ruled out the possibility of train crew members becoming qualified mechanical inspectors because the primary responsibility of a train crew member is generally the operation of the train. FRA intended the definition to allow the members of the trades associated with the testing and maintenance of equipment such as carmen, machinists, and electricians to become qualified mechanical inspectors. However, FRA made clear that membership in labor organizations or completion of apprenticeship programs associated with these crafts was not required to be designated a qualified mechanical inspector. The two primary qualifications were the possession of the knowledge required to do the job and a primary work assignment inspecting, testing, or maintaining the equipment.

FRA included a clear definition of ''qualified person'' to allow railroads the flexibility of having train crews perform Class IA, Class II, and running brake tests and interior calendar day mechanical inspections. A qualified person had to be trained and designated as able to perform the types of brake and mechanical inspections and tests that the railroad assigned to him or her. However, a qualified person did not need the extensive knowledge of brake systems or mechanical components or be able to trouble-shoot and repair them. The qualified person was considered to be the ''checker.'' He or she was to possess the knowledge and experience necessary to be able to identify brake system problems.

C. Overview of Comments Relating to Proposed Inspection and Testing Requirements

Those parties filing comments, presenting testimony and participating in the Working Group meetings with regard to the proposed inspection and testing requirements have provided the agency with a wealth of facts and informed opinions, and have been extremely helpful to FRA in resolving the issues. Most commenters provided testimony or written comments on more than one issue and generally were supported by the positions of other commenters. Rather than attempt to paraphrase each commenter's response to each of the proposed regulatory sections, FRA believes it would be better, and more understandable, to provide a brief overview of the thrust of the comments received in this portion of the preamble and provide general FRA conclusions while addressing the specific comments of various parties in the section-by-section analysis. For purposes of discussion, the comments are grouped in three categories: (1) railroad management representatives; (2) railroad labor representatives; and (3) other commenters.

Railroad management representatives, APTA and its member railroads and Amtrak, generally agreed with the concept of performing the proposed comprehensive daily brake and mechanical inspections. However, these representatives raised a number of concerns with the proposed inspections. Commenters for APTA believed that the proposed requirement to perform a Class IA brake test prior to the first run of the day for commuter and short-distance intercity trains is unnecessary and adds no value to the proposed inspection scheme. APTA recommends that a Class I brake test remain valid for up to 12 hours after it is performed, if the train remains intact with compressors running, and that the performance of a Class II brake test prior to the first departure would be sufficient to ensure the proper operation of the brake system. APTA contends that the performance of a Class II brake test prior to departure would detect any brake problems caused by vandalism and that commuter railroads have been operated safely in this fashion for years.

Railroad management representatives also raised issues concerning the performance of the proposed exterior calendar day mechanical inspection. The major concern of these commenters was that the proposal was unclear as to whether trainsets had to be uncoupled or placed over a pit to perform the inspections. These commenters recommended that the rule text explicitly state that the inspection is to be performed to the extent possible without uncoupling the cars or placing the cars over an elevated pit. APTA representatives also recommended that some of the items proposed in the exterior calendar day mechanical inspection be moved to the periodic mechanical inspection as they could not reasonably be seen without uncoupling the car or placing it over an elevated pit. These included certain requirements related to the inspection of the couplers, the truck and car body assembly, and the center castings on trucks. Some commenters also recommended elimination of the requirement that all secondary braking systems be working, since that could not be known until the train is in operation and the system is attempted to be used.

APTA representatives also commented on the proposed requirements for performing single car tests. APTA recommended that FRA adopt the new single car test procedures recently developed by the PRESS brake committee rather than the outdated AAR standard. These commenters also recommended that the replacement or repair of certain proposed components not trigger the requirement to perform a single car test since most of the brake system is not disturbed by the repairs and some sort of partial test could sufficiently demonstrate proper operation of the brake system. These commenters also sought the flexibility not to perform the test if a wheel defect is known to be caused by other than a brake-related problem. APTA further recommended that railroads be permitted to perform single car tests from the locomotive control stands.

The major issue raised by railroad management representatives addressed FRA's proposal that all Class I brake tests and all exterior calendar day mechanical inspections be performed by a qualified mechanical inspector (QMI). APTA representatives objected to the use of this designation for several reasons and recommended the alternative term ''qualified maintenance person.'' The main objection of these commenters relates to the requirement that a QMI's primary responsibility must be the inspection, testing, maintenance, troubleshooting, or maintenance of the brake system or mechanical components. These commenters also object to FRA's statement that the definition of QMI largely rules out the possibility of train crew members being designated as QMIs. These commenters contend that any person who is properly trained can perform the inspections proposed by FRA. These commenters also object to the use of the term qualified mechanical inspector based on the concern that such a title might lead employees designated as such to seek premium pay due to the title bestowed.

APTA representatives contend that the proposed definition of QMI violates the Administrative Procedure Act (APA), exceeds FRA's statutory authority, and is counter to the Railway Labor Act. These commenters contend that the Administrative record does not support a finding by FRA that only employees whose ''primary responsibility'' includes work in the area of troubleshooting, testing, inspecting, maintenance, or repair to train brake and other components are capable of performing Class I and exterior mechanical inspections. These commenters also contend that FRA's proposed definition is counter to FRA's statutory mandate not to prescribe employee qualifications except where clearly necessary for safety reasons. *See* 49 U.S.C. 20110. Furthermore, it is contended that the proposed definition is counter to the Railway Labor Act because it impinges upon the exclusive jurisdiction of the National Mediation Board to make final determinations over employee classes or crafts and to interpret collective bargaining agreements. In essence, this argument contends that by limiting the employees who can perform a Class I brake test or an exterior mechanical inspection, FRA is in effect making an employee class or craft designation.

A concern raised by Metra is interrelated to the proposed QMI requirement, in that Metra seeks flexibility or relief from the QMI requirement on weekends. Metra contends that train crews perform most of the brake tests conducted by the railroad on weekends and have been for several years. Metra claims that there is no data showing a decrease in safety on Metra during weekend operations to support FRA's proposal that these brake inspections must be performed by a QMI rather than a train crew member. Metra seeks relief from the QMI requirement on weekends for railroads which have established a successful operating history of performing the tests with qualified persons rather than QMIs.

Rail labor representatives, while generally supportive of the proposed inspection and testing requirements, also raised a number of concerns related to the proposed requirements. Labor representatives objected to the proposed Class IA brake test and continued to insist that railroads should be required to conduct a full Class I brake test prior to the first run of the day. These commenters also advocated against providing any leeway for weekend operations with regard to the proposed inspections and tests, claiming that in many instances equipment used on weekends is used more rigorously than when used during the week and, therefore, quality inspections are probably more important. Labor representatives also noted that FRA failed to address what tests or inspections are to be performed on equipment added to an en route passenger train. Furthermore, these commenters supported the concept of requiring that QMIs perform all Class I brake tests and exterior mechanical inspections but recommended that FRA develop a clear and unequivocal definition of QMI which specifically excludes train crew members from the definition.

Labor representatives agreed with APTA representatives that FRA should adopt the single car testing procedures developed through the PRESS brake committee. These representatives believed that the newly developed procedures were better than the existing AAR procedures but stressed that the test must be conducted whenever any of the items listed in the NPRM occurred. Labor commenters believed a single car test should be performed prior to permitting a car to be moved and that the test should not be permitted to be performed with a locomotive.

The primary concern raised by labor representatives, particularly the BRC, involves the proposed 1,500-mile inspection interval for performing Class I brake tests on long-distance intercity passenger trains. Although the BRC agrees that the current 1,000-mile inspection should be replaced with the proposed Class I brake test, the BRC objects to extending the distance between brake tests to 1,500 miles. The BRC claims that the proposed increase is not justified by the facts. The BRC contends that an inspection at 1,000 mile intervals is necessary to ensure the safety of passenger train operations due to the numerous defective conditions being found during 1,000 mile inspections. As support for this contention, the BRC submitted information compiled by a carman stationed at Union Station in Washington, D.C. from January 1996 through February of 1997 who allegedly performed 1,000-mile inspections at this location. The BRC also cited other specific examples of defective equipment being moved in passenger trains. Based on this information and extrapolating similar conditions across the country, the BRC contends that numerous defective conditions are uncovered at 1,000 mile brake inspections and that there is no safety justification for extending the distance between brake inspections.

Amtrak responded to the information provided in the BRC's submission regarding defects found during inspections at Washington, D.C. in January 1996 through February 1997. Amtrak contends that Washington, D.C. is not a 1,000-mile inspection point and thus, should not be used to determine the appropriate interval for brake inspections. Amtrak also contends that the data presented was not sufficiently detailed to determine if the listed defects violated the railroad's standards for equipment operating en route. Amtrak contends that based upon their records 66 percent of the 609 cars identified by the BRC were in trains that terminated at Washington, DC and should not be considered in determining brake inspection intervals. Of the 204 cars alleged to be defective and that were part of trains which run through Washington, DC, Amtrak records show that only 7 of the cars were shopped at Washington, DC and that 110 additional cars were shopped within 7 days after the date of the reported defect. In almost all cases the repairs were made at a location other than Washington, DC, which was frequently the end destination for the train. Amtrak concludes that the defects reported by the BRC at Washington, DC constitute items from an in-bound inspection but were not true defects that required shopping a car from an en route train.

Amtrak provided additional information containing a summary of the set-outs which took place on the railroad during the period from March 1997 to February 1998 for safety and non-safety related causes. This information showed that 301 cars were set-out by Amtrak during this period. Of those 301 cars that were set-out, only 29 were set-out at intermediate (1,000 mile) inspection points and only 15 of those 29 were for brake-related defects. Therefore, Amtrak contends that 90 percent of the cars that were set-out were set-out en route and were not found during intermediate inspections. During this same period Amtrak conducted 1,000-mile inspections on approximately 130,000 cars. Consequently, Amtrak contends that the annual defect rate at intermediate inspection points for this period was 0.02 percent and that it was costing Amtrak approximately $175,000 per defect found to conduct 1,000-mile inspections.

The BRC submitted a response to the information provided by Amtrak. In this submission the BRC contends that Amtrak's analysis regarding the reported defects is faulty and self-serving. This commenter contends that all the defects found at Union Station must be considered when evaluating an extension of the 1,000-mile inspection regardless of whether Union Station is a 1,000-mile inspection point and regardless of the distance traveled by the cars involved. The BRC contends that any defective conditions found are indicative of what will be traveling past 1,000-mile inspection locations should the distance between brake inspections be extended to 1,500 miles. The BRC further contends that Amtrak's analysis regarding the number of cars set-out at intermediate inspections is flawed for several reasons. The BRC claims that intermediate inspection points cited by Amtrak are not 1,000-mile inspection locations and that the same type of inspection is not performed. (FRA's review of Amtrak's submission indicates that when Amtrak referred to intermediate inspection points it was referring to 1,000 mile inspection locations.) Further, it is contended that looking solely at the number of cars set-out at these locations is improper because it does not take into account the defects that are repaired while a car remained entrained. The BRC reasserted its position that the data does not support an extension of the 1,000-mile inspection interval and, if anything, the data supports reducing the inspection requirement to 500 miles.

D. General FRA Conclusions

After consideration of all the comments submitted, both in writing and through oral testimony and discussion within the Working Group, FRA intends for the requirements regarding the inspection and testing of passenger equipment contained in the final rule to closely track the proposed requirements contained in the 1997 NPRM. In this final rule, FRA will make slight modifications to the proposed requirements in an attempt to clarify the requirements, to cover areas that were not adequately addressed, and to address the specific comments submitted. FRA generally believes that the approach taken in the NPRM to the inspection and testing of passenger equipment incorporates the current best practices of the industry, effectively balances the positions of the various parties involved, and increases the overall safety of passenger train operations.

1. Brake and Mechanical Inspections

FRA intends to modify the Class I brake test and the exterior calendar day mechanical inspection requirements to ensure the proper operation of all cars added to a train while en route. FRA is adding certain provisions to require the performance of a Class I brake test and an exterior mechanical inspection on each car added to a passenger train at the time it is added to the train unless documentation is provided to the train crew that a Class I brake test and an exterior mechanical inspection 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. FRA is adding this requirement in order to address the concerns raised by various labor representatives that no provisions were provided in the proposal to address circumstances when cars are added to an en route train. If a car has received such inspection, the railroad will be required to perform a Class II brake test at the time the car is added to the train. FRA believes that these provisions will ensure the integrity of the brakes and mechanical components on every car added to an existing train and should not be a burden for railroads since cars are generally added to passenger trains at major terminals with the facilities and personnel available for conducting such inspections. Furthermore, these inspection requirements are very similar to what is currently required when a freight car is added to a train while en route. *See* 49 CFR §§ 215.13 and 232.13.

FRA is also modifying the requirements for when a Class IA brake test must be performed. FRA continues to believe that some type of car-by-car inspection must be performed prior to a passenger train's first run of the day if the train was used in passenger service the previous day without any brake inspection being performed after it completed service and before it laid-up for the evening. However, FRA agrees with the comments submitted by APTA representatives that the need for such an inspection is minimized if a Class I brake test is performed within a relatively short period of time prior to the first run of the day and the train has not been used in passenger service since the performance of that inspection. From a safety standpoint, it appears to be unnecessary to require the performance of a second comprehensive brake test when the equipment has not been used and has remained on a source of compressed air since the last comprehensive brake test was performed. In such circumstances, FRA believes that the performance of a Class II brake test would be sufficient to determine if there are any problems with the braking system due to vandalism or other causes since the last comprehensive Class I brake test. Furthermore, as APTA's comments point out, commuter railroads have been safely operated in a fashion similar to this for a number of years. Consequently, the final rule will require the performance of a Class II brake test prior to the first run of the day if a Class I brake test was performed within the previous twelve hours and the train has not been used in passenger service and has not been disconnected from a source of compressed air for more than four hours since the performance of the Class I brake test.

FRA will also include certain minimal recordkeeping requirements related to the performance of the interior and exterior calendar day and periodic mechanical inspection provisions. FRA believes that proper and accurate recordkeeping is a cornerstone of any inspection process and is essential to ensuring the performance and quality of the required inspections. Without such records the inspection requirements would be difficult to enforce. Although recordkeeping was discussed in the Working Group and FRA believes them to be an integral part of any inspection requirement, FRA inadvertently omitted any such requirements in the NPRM specifically related to mechanical inspections. This omission was brought to FRA's attention through verbal and written comments provided by various interested parties.

FRA is also making minor changes and clarifications to the proposed exterior calendar day mechanical inspection. In the final rule, FRA is explicitly stating that the exterior mechanical inspection is to be performed to the extent possible without uncoupling the trainset and without placing the equipment over a pit or on an elevated track. This explicit statement is being added in response to APTA's concerns regarding what would constitute proper performance of these inspections. FRA intended the inspection to be very similar to the freight car safety inspection currently required pursuant to Part 215. FRA also recognizes that certain items contained in the proposed exterior mechanical inspection could not have been easily inspected without proper shop facilities. Therefore, FRA is moving some of the exterior mechanical inspection requirements related to couplers and trucks to the periodic mechanical inspection requirements as these periodic inspections will likely be performed at locations with facilities available that are more conducive to inspecting the specific components. The changes made in the final rule were discussed with the Working Group at the December 15–16, 1997 meeting.

FRA is also adding various provisions related to the performance of periodic mechanical inspections. As noted above, FRA is moving certain items from the exterior calendar day mechanical inspection to the periodic mechanical inspections as they cannot be easily inspected without proper shop facilities. In the NPRM, FRA proposed that a periodic mechanical inspection be performed every 180 days. After a review of the industry's practices regarding the performance of periodic mechanical-type inspections, FRA believes that the items removed from the calendar day mechanical inspection as well as some of the items previously proposed in the 180 day periodic mechanical inspection should be and are currently inspected on a more frequent basis by the railroads. As it is FRA's intent in this proceeding to attempt to codify the current best practices of the industry, FRA believes that the current intervals for inspecting certain components should be maintained. Therefore, FRA will require the periodic inspection of certain mechanical components, floors, passageways, and switches on a 92-day basis. Furthermore, FRA will also require a 92-day inspection of emergency lighting systems as they are critical to the safety of passengers in the event of an accident or derailment. FRA is adding an inspection of the roller bearings to the 92-day inspection. Although this component was inadvertently left out of the 1997 NPRM, they were covered in the 1994 NPRM; and FRA believes that roller bearings are an integral part of the mechanical components and must be part of any mechanical inspection scheme. Furthermore, several labor commenters recommended inspections criteria similar to that contained in 49 CFR part 215, which specifically addresses the condition of roller bearings. *See* 49 CFR § 215.115. As roller bearings are best viewed in a shop facility context, FRA is adding the inspection of this component to the 92-day periodic mechanical inspection, which is consistent with the current practices of the industry.

FRA will also retain a semi-annual periodic inspection for certain components as proposed in the 1997 NPRM. FRA proposed a 180-day periodic inspection, but in order to remain consistent with the 92-day inspection scheme, FRA will require a 184-day periodic inspection of certain components, including: seats; luggage racks; beds; and emergency windows. FRA removed the inspection of the couplers from the calendar day inspection and added them to the 184-day inspection requirement. FRA is placing the coupler inspection at this interval rather than the 92-day interval in order to reduce the amount of coupling and uncoupling that will be required. FRA is also extending the inspection interval related to manual door releases. Due to the general reliability of these devices and because they are partially inspected on a daily basis, FRA believes that an annual inspection of the releases will ensure their proper operation. Thus, FRA will require an inspection of the manual door releases every 368 days.

Although FRA has established certain periodic inspection intervals in order to establish a default interval, FRA intends to make clear that FRA will allow railroads to develop alternative intervals for performing such inspections for specific components or equipment based on a more quantitative reliability assessment completed as part of their system safety programs. FRA expects that railroads will utilize reliability-based maintenance programs as appropriate, given this opportunity to do so. As successful reliability based maintenance programs are dynamic, it is expected that, in the process of defining and documenting the reliable use of equipment or specific components, over time, continued assessments may indicate a need to increase or decrease inspection intervals. FRA will only permit lengthened inspection intervals beyond the default intervals when such changes are justified by a quantitative reliability assessment. The previously described inspection intervals are based on sound but limited information provided to FRA that FRA believes represents a combination of operating experience, analytical analyses, knowledge and intuition. FRA does expect that railroads will collect and respond to additional data throughout the operating life of the equipment. (A detailed discussion of reliability-based maintenance programs is contained in the section-by-section discussion of § 238.307.)

FRA is also modifying the proposed requirements related to the performance of single car tests. Based on the recommendations of representatives from both rail labor and rail management, FRA will reference the single car testing procedures which were developed by APTA PRESS rather than the AAR single car testing procedures referenced in the 1997 NPRM. The single car test procedures were issued by APTA on July 1, 1998 and are contained in APTA Mechanical Safety Standard SS–M–005–98. The single car test procedures issued by APTA are more comprehensive and better address passenger equipment than the older AAR recommended practices. In the 1997 NPRM, FRA proposed to require the performance of single car tests on all passenger cars and other unpowered vehicles used in passenger trains. However, the definition of passenger cars includes self-propelled vehicles such as MU locomotives, to which FRA did not intend to apply the proposed single car test requirements. Thus, FRA is modifying the language of the single car test requirements to clarify that the testing requirements apply to nonself-propelled passenger cars and unpowered vehicles used in passenger trains.

FRA is also modifying some of the circumstances under which a single car test is required to be performed. FRA agrees with several of the commenters that the 1997 NPRM may have been over-inclusive in listing the components whose repair, replacement, or removal would trigger the performance of a single car test. Thus, in accordance with the discussions conducted with the Working Group in mid-December of 1997, FRA is amending the list of brake components to include only those circumstances where a relay valve, service portion, emergency portion, or pipe bracket is removed, repaired, or replaced. Whenever any other component previously contained in the 1997 NPRM is removed, repaired, or replaced FRA will require that only that portion that is renewed or replaced be tested. FRA believes that the items removed from the previously proposed list can generally be removed, replaced, or repaired without affecting other portions of the brake system and, thus, the need to perform a single car test is reduced. FRA also will not mandate the performance of a single car test for wheel defects, other than a built-up tread, if the railroad can establish that the wheel defect is due to a cause other than a defective brake system. Thus, the burden will fall on the railroad to establish and maintain sufficient documentation that a wheel defect is due to something other than a brake-related cause. FRA intends to make it clear that if the railroad cannot establish the specific non-brake related cause for a wheel defect, it is required to perform a single car test.

2. Qualified Maintenance Person

An issue related to the inspection and testing requirements on which FRA has received extensive comment, particularly from APTA representatives, is the proposed definition of ''qualified mechanical inspector (QMI).'' FRA recognizes the concern raised by some commenters that the term QMI might result in employees designated as such to seek some sort of premium pay status. Although FRA is not overly swayed by this concern, FRA is changing the term in the manner suggested by these commenters to ''qualified maintenance person (QMP).'' FRA believes that the term used to describe the individual responsible for conducting certain brake and mechanical inspections has little bearing on the qualifications or knowledge of the individual and, thus, is not adverse to accommodating a change in the term. However, but for clarifying language, FRA is not changing the underlying definition of what is required to be designated as a QMP.

The major concern raised by APTA representatives centered on the requirement contained in the definition of a QMI that the person's ''primary responsibility'' include work in the area of troubleshooting, testing, inspecting, maintenance, or repair to train brake systems and other components. These commenters believed that anyone who is properly trained can perform the required inspections regardless of the amount of time actually spent engaged in the activity.

The entire concept of QMI (or QMP) is premised on the idea that flexibility in the inspection of passenger equipment, flexibility in the movement of defective equipment and slight reductions in periodic maintenance could be provided if the mechanical components and brake system were inspected on a daily basis by highly qualified individuals. Thus, the requirement that a highly qualified person perform certain brake and mechanical inspections is part of a package which includes flexibility in the performance of brake and mechanical inspections, permits wider latitude in the movement of defective equipment, and provides reductions in the periodic maintenance that is required to be performed on certain equipment. Therefore, FRA expects the highly qualified person to be an individual who can not only identify a particular defective condition but who will have the knowledge and experience to know how the defective condition affects other mechanical components or other parts of the brake system and will have an understanding of what might have caused a particular defective condition. FRA believes that in order for a person to become highly proficient in the performance of a particular task that person must perform the task on a repeated and consistent basis. As it is almost impossible to develop and impose specific experience requirements, FRA believes that a requirement that the person's primary responsibility be in one or more of the specifically identified work areas and that the person have a basic understanding of what is required to properly repair and maintain safety-critical brake or mechanical components is necessary to ensure the high quality inspections envisioned by the rule.

FRA disagrees with the contentions raised by APTA representatives that the definition of QMI (or QMP) violates the APA and exceeds FRA's statutory authority. Contrary to the assertions made by APTA representatives, the administrative record together with FRA's independent knowledge of the passenger rail industry do support a requirement that only a QMI (or QMP) conduct Class I brake tests and exterior mechanical inspections. Except for limited weekend service operated by Metra, virtually every passenger train operation affected by this rule currently conducts daily brake and mechanical inspections utilizing employees who, except for training on the requirements of this rule, would meet the definition of a QMI (or QMP). That is, the employees who are currently responsible for conducting the major daily brake and mechanical inspections on virtually all passenger trains meet the ''primary responsibility'' requirement contained in the definition of QMI (or QMP). Therefore, the industry's current practice acknowledges and supports the need to conduct daily inspections with employees whose primary responsibility is the troubleshooting, inspection, testing, maintenance, or repair of train brake systems or other mechanical components. Furthermore, due to the flexibility provided in this rule for conducting brake and mechanical inspections and moving defective equipment as well as the extension of certain periodic maintenance, FRA believes that the current best practices of the railroads with regard to brake and mechanical inspections must be maintained, especially as they relate to the quality of the personnel performing the inspections and the continuity of observation provided by a dedicated work force (which is important to detection of developing hazards in the fleet).

FRA further believes that APTA's contention that the definition of QMI (or QMP) violates the Railway Labor Act is due to a misunderstanding of the definition. FRA is not attempting to make any determinations over employee classes or crafts or to interpret collective bargaining agreements. In the 1997 NPRM, FRA stated that the definition would allow the members of trades associated with testing and maintenance of equipment such as carmen, machinists, and electricians to become QMIs (or QMPs). However, FRA further stated that membership in a labor organization or completion of an apprenticeship program associated with a particular craft is not required. FRA made clear that the two overriding qualifications are possession of the knowledge required to do the job and a primary work assignment inspecting, testing, or maintaining the equipment.

FRA also intends to clarify the meaning of ''primary responsibility'' as used in the definition of QMP. As a rule of thumb FRA will consider a person's ''primary responsibility'' to be the task that the person performs at least 50 percent of the time. Therefore, a person who spends at least 50 percent of the time engaged in the duties of inspecting, testing, maintenance, troubleshooting, or repair of train brakes systems and other mechanical components could be designated as a QMP, if the person is properly trained to perform the tasks assigned and possesses a current understanding of what is required to properly repair and maintain the safety-critical brake or mechanical components for which they are assigned responsibility. However, FRA will consider the totality of the circumstances surrounding an employee's duties in determining a person's ''primary responsibility.'' For example, a person may not spend 50 percent of his or her day engaged in any one readily identifiable type of activity; in those situations FRA will have to look at the circumstances involved on a case-by-case basis.

The definition of QMP largely rules out the possibility of train crew members being designated as these highly qualified inspectors since the primary responsibility, as defined above, of virtually all current train crew personnel is the operation of trains and for the most part train crew personnel do not possess a current understanding of what is required to properly repair and maintain the safety-critical brake or mechanical components that are inspected during Class I brake tests or exterior calendar day mechanical inspections. However, contrary to the contentions raised by APTA, there is nothing in the rule which prevents a railroad from utilizing employees who are not designated as QMPs from conducting brake and mechanical inspections provided those inspections are not intended to constitute the required Class I brake test or the exterior calendar day mechanical inspection. Furthermore, the rule provides that certain required brake and mechanical inspections (Class IA brake tests, Class II brake tests, running brake tests, and interior calendar day mechanical inspections) may be performed by a properly ''qualified person'' and do mandate the use of a QMP. FRA believes that these are the types of inspections which train crew members are currently assigned to perform and have been performing effectively for years. Consequently, FRA believes that the inspection requirements and the qualification requirements contained in this rule are merely a codification of the current best practices of the passenger train industry and are necessary to ensure the continued safety of those operations while providing the industry some flexibility in the performance of certain inspections and in the movement of defective equipment as well as providing slight increases in periodic maintenance cycles for some equipment.

FRA does not intend to provide any special provisions for weekend operations with regard to the conducting of Class I brake tests and calendar day mechanical inspection by QMPs as suggested in the comments by some APTA representatives. The rationale for requiring daily brake and mechanical attention by highly qualified inspectors, a proposition generally accepted by Working Group members, appears to apply equally to weekend periods. In fact based on FRA's experience, equipment used on weekends is generally used more rigorously than equipment used during weekday operations. At present only one commuter operation (Metra) has raised significant concerns regarding weekend operations. Although there is no specific data suggesting that existing weekend operations on Metra, which involves having many of the brake inspections conducted by train crew members, have created a safety hazard, FRA has found it virtually impossible to draft and justify provisions providing limited flexibility for Metra that do not create potential loopholes that could be abused by other passenger train operations that have not had the apparent safety success of Metra. Moreover, based on FRA's independent investigation of Metra's operation, it is believed that the impact of this final rule on Metra's weekend operations will be significantly less than that indicated in APTA's written comments and originally perceived by Metra. FRA believes that most of the personnel needed by Metra to conduct its weekend operations in accordance with this final rule are available to Metra or its contractors and that minor adjustments could be made to its weekend operations that might avoid significant new expense.

As the concerns regarding weekend operations appear to involve just one commuter operation and because the precise impact on that operation is not known or available at this time, FRA believes that the waiver process would be the best method for evaluating any lingering concerns that may be raised by that operator. This would afford FRA an opportunity to provide any appropriate relief based on the specific needs and the safety history of the individual railroad without opening the door to potential abuses by other railroads that are not similarly situated.

3. Long-Distance Intercity Passenger Trains

FRA is also retaining the requirements proposed in the 1997 NPRM related to the performance of Class I brake tests on long-distance intercity passenger trains. FRA will require that a Class I brake test be performed on long-distance intercity passenger trains prior to the trains' departure from an originating terminal and once every 1,500 miles or every calendar day, whichever occurs first. After reviewing the information and comments submitted by labor representatives, the information and comments provided by Amtrak, and based upon the independent information developed by FRA, FRA believes that the enhanced inspection scheme contained in this final rule will ensure the continued safety of long-distance intercity passenger trains.

Contrary to the statements made in the comments submitted by some labor representatives, FRA is not merely increasing the distance between brake inspections. Rather, FRA is increasing both the quality and the content of the inspections that must be performed on long-distance intercity passenger trains and, thus, increasing the safety of such trains. Under the current regulations these passenger trains are required to receive an initial terminal brake inspection at the point where they are originally assembled; from that point the train must receive an intermediate brake inspection every 1,000 miles. The current 1,000-mile inspection merely requires the performance of a leakage test, an application of the brakes and the inspection of the brake rigging on each car to ensure it is properly secured. *See* 49 CFR 232.12(b). The current 1,000-mile brake inspection does not require 100 percent operative brakes prior to departure and does not require piston travel to be inspected. The current regulations also do not require the performance of any type of mechanical inspection on passenger equipment at 1,000-mile inspection points or at any other time in the train's journey. Thus, under the current regulations a long-distance intercity passenger train can travel from New York to Los Angeles on one initial terminal inspection, a series of 1,000-mile inspections, and no mechanical inspections.

Whereas, this rule will require the performance of a Class I brake test, which is more comprehensive than the current initial terminal inspection, at the point where the train is originally assembled and will require the performance of another Class I brake test every 1,500 miles or every calendar day thereafter, whichever comes first, by highly qualified inspectors. Thus, at least every 1,500 miles or every calendar day a long-distance passenger train will be required to receive a brake inspection which is more comprehensive than the current initial terminal inspection and which requires that the train have 100 percent operative brakes and have piston travel set within established limits. Furthermore, this rule will require the performance of an exterior and interior mechanical inspection every calendar day that the train is in service. Consequently, the inspection scheme proposed in the 1997 NPRM and retained in this final rule will, in FRA's view, increase the safety and better ensure the integrity of the brake and mechanical components of long-distance passenger trains.

FRA also believes that some recognition must be given to the various types of advanced braking system technologies used on many long-distance intercity passenger trains. Many of these advanced technologies are not found with any regularity in freight operations. Dynamic brakes are typically employed on these types of trains to limit thermal stresses on friction surfaces and to limit the wear and tear on the brake equipment. Furthermore, the brake valves and brake components used on today's long-distance passenger trains are far more reliable than was the case several decades ago. Other technological advances utilized with regularity by these passenger trains include:

- The use of brake cylinder pressure indicators which provide a reliable indication of the application and release of the brakes.
- The use of disc brakes which provide shorter stopping distances and decrease the risk of thermal damage to wheels.
- The ability to cut out brakes on a per-axle or per-truck basis rather than a per car basis, thus permitting greater use of those brakes that are operable.
- Brake ratios that are 2½ times greater than the brake ratios of loaded freight cars.

The reliability and performance of brake systems on these passenger trains enhance the safety of these trains and, when combined with other aspects of this discussion, support FRA's determination that these brake systems can be safely operated with the inspection intervals that were proposed in the 1997 NPRM. Although some of the technologies noted above have existed for several decades, most of the technologies were not in wide spread use until after 1980. Furthermore, most of the noted technological advances just started to be integrated into one efficient and reliable braking system within the last decade. Consequently, the technology incorporated into the brake equipment used in today's long-distance intercity passenger trains has increased the reliability of the braking system and permits the safe operation of the equipment for extended distances even though a portion of the braking system may be inoperative or defective.

FRA also disagrees with the contentions raised by certain labor representatives that the facts and data do not support the 500 mile extension in the brake inspection interval even with the more comprehensive inspection scheme. These commenters recommend that the current 1,000-mile brake inspection interval be retained together with the increased inspection regiment. These commenters contend that due to the large number of defects being found at 1,000-mile inspections that the need to retain the inspection is justified. As an example and support for this position, the BRC submitted information containing numerous defective conditions compiled by carmen stationed at Union Station in Washington D.C. from January 1996 through February of 1997 that the carmen allegedly found on trains traveling through Union Station. After reviewing the documentation submitted, FRA does not believe the information supports the conclusion that 1,000-mile brake inspections must be maintained and that it would be unsafe to extend the distance between brake inspections under the inspection scheme contained in this final rule.

Due to the lack of detail contained in the information submitted by the BRC, it is impossible to determine whether the vast majority of the alleged defective conditions were defective under the Federal regulations or whether the conditions were merely in excess of Amtrak's voluntary maintenance standards or operating practices. In addition, based on the description of some of the conditions, they would not be considered defective conditions under current Federal regulations. Furthermore, the vast majority of the conditions alleged in the document were not power brake defects, and thus, under the current regulations, would not have been required to have been inspected at a 1,000-mile inspection, nor do the current regulations mandate any type of mechanical inspection on passenger equipment. Moreover, as the vast majority of the alleged conditions were mechanical and wheel defects, FRA believes that these types of defective conditions will be addressed by the exterior calendar day mechanical inspection contained in this final rule which will be required to be performed every calendar day that a piece of equipment is in service.

FRA agrees with the comments submitted by the BRC that the data and information submitted by Amtrak regarding the allegedly defective equipment found at Washington, D.C., does not fully address whether the cars identified by carmen at that location were defective and does indicate that at least many of the cars were repaired for the defective condition noted within several days after moving through Washington, D.C. However, contrary to the conclusions reached by labor representatives, the fact that a car remained in service with an alleged defective mechanical or brake condition does not necessarily mean the train involved was in an unsafe condition or that the equipment was being moved illegally. The current regulations regarding freight mechanical equipment and the existing statutory mandates regarding the movement of equipment with defective safety appliances and brakes permit the movement of a certain amount of defective equipment to certain locations provided it is determined by a qualified person that such a movement can be made safely or that a sufficient percentage of the brakes remain operative. *See* 49 U.S.C. 20303, 49 CFR 215.9. As this final rule will specifically address the inspection of the mechanical components on passenger equipment and the movement of defective mechanical components, which is not covered by existing regulations, FRA believes that the amount of defective equipment being operated will be reduced significantly and will be handled safely in revenue trains. Although FRA agrees that the information submitted by Amtrak regarding the number of cars set out at 1,000-mile inspection points does not reflect the true number of defects being found during the inspections, FRA does find it significant that a very small percentage of cars set-out by Amtrak are set-out at 1,000-mile inspection locations and that most set-outs occur en route. (In its April 17, 1998 letter, Amtrak used the term intermediate inspections which upon FRA's review of the information provided was intended to describe 1,000-mile inspection locations.)

FRA also feels it is necessary to make clear that the number of cars alleged to have been found in defective condition at Union Station in Washington D.C. is not indicative of a safety problem on long-distance intercity passenger trains. Assuming that all of the cars contained in BRC's submission were in fact defective as alleged, it appears that approximately 750 cars were defective. However, the information also reveals that approximately 1,300 trains were inspected, thus, using a conservative estimate of 10 cars per train, approximately 13,000 cars were inspected. Therefore, approximately only 6 percent of the cars inspected were found to contain either a mechanical or brake defect. Furthermore, of the approximate 750 cars alleged to have been found defective, only approximately 20 percent of those cars contained a power brake-related defect. Consequently, only about 1–2 percent of the total cars inspected contained a power brake-related defect. Moreover, from the information provided it appears that none of the trains contained in the BRC submission were involved in any type of accident or incident related to the defective conditions alleged.

FRA believes that the key to any inspection scheme developed for long-distance intercity passenger trains is the quality of the inspection which is performed at a train's point of origin. FRA is convinced that if a train is properly inspected with highly qualified inspectors and has 100 percent operative brakes at its point of origin, then the train can easily travel up to 1,500 miles between brake inspections without significant deterioration of the braking system. FRA independently monitored a few long-distance intercity passenger trains running from New York to Miami, New York to New Orleans, and New York to Chicago and found that when the trains departed from their point of origin with a brake system that was defect free they arrived at destination without any defective conditions existing on the trains' brake system. These findings are consistent with FRA's experience in inspecting long-distance intercity passenger trains over the last several years. It should be noted that during this independent monitoring, FRA did find some trains that after receiving initial terminal inspections still contained some defective conditions on the brake system. Although FRA believes that none of the defective conditions found would have prevented the safe operation of the trains, FRA recognizes that FRA as well as the railroads must be vigilant in ensuring that quality brake system inspections are performed on a train at its point of origin and at each location where a Class I brake test is required to be performed. Consequently, due to the comprehensive nature of Class I brake tests and the exterior calendar day mechanical inspection combined with the technological advances incorporated into the braking systems utilized in these types of trains and after a review of the data and information provided and based on FRA's experience with these types of operations, FRA intends to retain the proposed 1,500 mileage interval for the performance of Class I brake tests in this final rule.

VII. Movement of Defective Equipment

A. Background

The current regulations do not contain requirements pertaining to the movement of equipment with defective power brakes. The movement of equipment with these types of defects is currently controlled by a specific statutory provision originally enacted in 1910, which states:

> (a) GENERAL.— A vehicle that is equipped in compliance with this chapter whose equipment becomes defective or insecure nevertheless may be moved when necessary to make repairs, without a penalty being imposed under section 21302 of this title, from the place at which the defect or insecurity was first discovered to the ***nearest available place at which the repairs can be made***—
>
> (1) on the railroad line on which the defect or insecurity was discovered; or
>
> (2) at the option of a connecting railroad carrier, on the railroad line of the connecting carrier, if not further than the place of repair described in clause (1) of this subsection.

49 U.S.C. 20303(a) (emphasis added).

Although there is no limit contained in 49 U.S.C. 20303 as to the number of cars with defective equipment that may be hauled in a train, FRA has a longstanding interpretation which requires that, at a minimum, 85 percent of the cars in a train have operative brakes. FRA bases this interpretation on another statutory requirement which permits a railroad to use a train only if Aat least 50 percent of the vehicles in the train are equipped with power or train brakes and the engineer is using the power or train brakes on those vehicles and on all other vehicles equipped with them that are associated with those vehicles in a train.'' 49 U.S.C. 20302(a)(5)(B). As originally enacted in 1903, section 20302 also granted the Interstate Commerce Commission (ICC) the authority to increase this percentage, and in 1910 the ICC issued an order increasing the minimum percentage to 85 percent. *See* 49 CFR 232.1, which codified the ICC order.

As virtually all freight cars are presently equipped with power brakes and are operated on an associated trainline, the statutory requirement is in essence a requirement that 100 percent of the cars in a train have operative power brakes, unless being hauled for repairs pursuant to 49 U.S.C. 20303. Consequently, FRA currently requires that equipment with defective or inoperative air brakes make-up no more than 15 percent of the train and that, if it is necessary to move the equipment from where the railroad first discovered it to be defective, the defective equipment be moved no farther than the nearest place on the railroad's line where the necessary repairs can be made or, at the option of the receiving carrier, to a repair point that is no farther than the repair point on the delivering line.

The requirements regarding the movement of equipment with defective or insecure brakes noted above can and do create safety hazards as well as operational difficulties in the area of commuter and intercity passenger railroad operations. As the provisions regarding the movement of defective brake equipment were written almost a century ago, they do not address the realities of these types of operations in today's world. Strict application of the requirements has the potential of causing major disruptions of service and serious safety and security problems. For example, requiring repairs to be made at the nearest location where the necessary repairs can be made could result in passengers being discharged between stations where adequate facilities for their safety are not available or in the overcrowding of station platforms and trailing trains due to discharging passengers from a defective train at a location other than the passenger's destination. In addition, strict application of the statutory requirements could result in the moving of trains with defective brake equipment against the current of traffic during busy commuting hours. Irregular movements of this type increase the risk of collisions on the railroad. Furthermore, many of today's commuter train operations often utilize six cars or less in trains and in many instances operate just two-car trains. Consequently, the necessity to cut out the brakes on one car can easily result in noncompliance with the 85-percent requirement for hauling the car for repairs, thus prohibiting the train's movement and resulting in the same type of safety problems noted above.

B. Overview of 1997 NPRM

In the NPRM, FRA attempted to recognize the nature of commuter and intercity passenger operations and the importance of addressing the safety of passengers, as well as avoiding disruption of this service, when applying the requirements regarding the movement of equipment with defective brakes on a day-to-day basis. In addition, the representatives of commuter and intercity passenger train operations participating in the proceeding requested that the regulations be brought up to date, recognizing that brakes will have to be cut out en route from time to time (e.g., because of damage from debris on the track structure or because of sticking brakes), and that contemporary braking systems and established stopping distances provide a very considerable margin of safety. Representatives from APTA proposed a method of updating the existing requirements regarding the movement of commuter passenger equipment with defective brakes to bring them more in line with the realities of today's operations. FRA believed that the restrictions proposed by APTA were very conservative and effectively ensure a high level of safety in light of the reliability of braking systems currently used in commuter and intercity passenger train operations. FRA believed that affirmatively recognizing appropriate movement restrictions would actually enhance safety, since compliance with the existing restrictions is potentially unsafe.

FRA recognized that some of the restrictions proposed in the NPRM were not in accord with the requirements contained in 49 U.S.C. 20303(a). Therefore, FRA proposed the utilization of the authority granted in 49 U.S.C. 20306 to exempt passenger train operations covered by this part from the statutory requirements contained in 49 U.S.C. 20303(a) permitting the movement of equipment with defective or insecure brakes only if various requirements are met, including the requirement that the movement for repair be only to the nearest location where the necessary repairs can be made. FRA believed that the granting of this exemption was justified based on the technological advances made in the brake systems and equipment used in passenger operations, and was necessary for these operations to make efficient use of the technological advances and protect the safety of the riding public. *See* 62 FR 49740–42, 49756–58. Although FRA recognized that it could be argued that the purpose of section 20306 is too narrow to comprehend the instant application, FRA believed that the use of the provision as contemplated in this proposal was consistent with the authority granted the Secretary of Transportation. As noted previously, the statutory requirements regarding the movement of equipment with defective brake equipment were written nearly a century ago and, in FRA's opinion, were focused generally on the operation of freight equipment and did not contemplate the types of commuter and intercity passenger train operations currently prevalent throughout the nation. Since the original enactment in 1910 of the provisions now codified at 49 U.S.C. 20303(a), there have been substantial changes both in the nature of the operations of passenger trains as well as in the technology used in those operations.

In the NPRM, FRA noted that contemporary passenger equipment incorporates various types of advanced braking systems; in some cases these include electrical activation of brakes on each car (with pneumatic application through the train line available as a backup). Dynamic brakes are also typically employed to limit thermal stresses on friction surfaces and to limit the wear and tear on the brake equipment. Furthermore, the brake valves and brake components used today are far more reliable than was the case several decades ago. In addition to these technological advances, the brake equipment used in commuter and intercity passenger train operations incorporate advanced technologies not found with any regularity in freight operations. These include:

- The use of brake cylinder pressure indicators which provide a reliable indication of the application and release of the brakes.
- The use of disc brakes which provide shorter stopping distances and decrease the risk of thermal damage to wheels.
- The ability to effectuate a graduated release of the brakes due to a design feature of the brake equipment which permits more flexibility and more forgiving train control.
- The ability to cut out brakes on a per-axle or per-truck basis rather than a per car basis, thus permitting greater use of those brakes that are operable.
- The use of a pressure-maintaining feature on each car which continuously maintains the air pressure in the brake system, thereby compensating for any leakage in the trainline and preventing a total loss of air in the brake system.
- The use of a separate trainline from the locomotive main reservoir to continuously charge supply reservoirs independent of the brake pipe train line.
- Brake ratios that are 2½ times greater than the brake ratios of loaded freight cars.

Although some of the technologies noted above have existed for several decades, most of the technologies were not in wide spread use until after 1980. Furthermore, most of the noted technological advances just started to be integrated into one efficient and reliable braking system within the last decade. In addition to the technological advances, commuter and intercity passenger train operations have experienced considerable growth in the last 15 years necessitating the need to provide more reliable and efficient service to the riding public. Since 1980, the number of commuter operations providing rail service has almost doubled and the number of daily passengers serviced by passenger operations has more than doubled over the same time period. Furthermore, commuter and intercity passenger train operations conduct more frequent single car tests, COT&S, and maintenance of the braking systems than is generally the practice in the freight industry. Consequently, FRA concluded that the technology incorporated into the brake equipment used in today's commuter and intercity passenger train operations has increased the reliability of the braking system and permits the safe operation of the equipment for extended distances even though a portion of the braking system may be inoperative or defective.

FRA also proposed an exemption for passenger train operations from a long-standing agency interpretation, based on a 1910 ICC order codified at 49 CFR 232.1, that prohibits the movement of a train for repairs under 49 U.S.C. 20303 if less than 85 percent of the train's brakes are operative. FRA found that many passenger operations utilize a small number of cars in their trains and the necessity to cut out the brakes on just one car can easily result in noncompliance. FRA believed that the proposed speed restrictions would compensate for the loss of brakes on a minority of cars. *See* 62 FR 49740–42, 49756–58.

Based on the preceding discussions, FRA proposed various restrictions on the movement of vehicles with defective brake equipment which allow commuter and intercity passenger train operations to take advantage of the efficiencies created due to the advanced braking systems these operations employ as well as the improvements made in brake equipment over the years, while ensuring if not enhancing the safety of the traveling public. *See* 62 FR 49756–58, 49796–98. FRA proposed to permit trains to be operated with up to 50 percent inoperative brakes to the next forward passenger station or terminal based on the percentage of operative brakes, which may have resulted in movements past locations where the necessary repairs could be made. However, to ensure the safety of these trains with lower percentages of operative brakes, FRA also proposed various speed restrictions and other operating restrictions, based on the percentage of operative brakes. FRA believed that the proposed speed restrictions were very conservative and ensured a high level of safety. In fact, test data established that with the proposed speed restrictions the stopping distances of those trains with lower percentages of operative brakes were shorter than if the trains were operating at normal speed and had 100 percent operative brakes. Consequently, FRA believed that the proposed approach to the movement of equipment with defective brakes not only enhanced the overall safety of train operations but benefitted both the railroads, by providing operational flexibility, and the traveling public, by permitting them to get to their destinations in a more expedient and safe fashion.

FRA also proposed various requirements to ensure that equipment being hauled for repairs is adequately identified. Currently, there is no requirement that equipment with defective power brakes be tagged or otherwise identified, although most railroads voluntarily engage in such activity. Furthermore, the current regulations regarding freight cars and locomotives contain tagging requirements for the movement of equipment not in compliance with those parts. *See* 49 CFR 215.9 and 229.9. Therefore, FRA proposed specific requirements related to the identification of equipment with defective power brakes through either the traditional tags which are placed in established locations on the equipment or by an automated tracking system developed by the railroad. *See* 62 FR 49796–98. FRA also proposed that certain information be contained whichever method was used by a railroad. FRA believed that the proposed tagging or tracking requirements add reliability, accountability, and enforceability to ensure the timely and proper repair of equipment with defective power brakes.

FRA also proposed a new method for calculating the percentage of operative power brakes (operative primary brakes) in a train. Although the statute discusses the percentage of operative brakes in terms of a percentage of vehicles, the statute was written nearly a century ago and at that time the only way to cut out the brakes on a car or locomotive was to cut out the entire unit. See 49 U.S.C. 20302(a)(5)(B).

Today, virtually every piece of equipment used in passenger service can have the brakes cut out on a per-truck or per-axle basis. Consequently, FRA merely proposed a method of calculating the percentage of operative brakes based on the design of passenger equipment used today, and thus, a means to more accurately reflect the true braking ability of the train as a whole. FRA believed that the proposed method of calculation was consistent with the intent of Congress when it drafted the statutory requirement and simply recognized the technological advancements made in braking systems over the last century. Consequently, FRA proposed that the percentage of operative brakes would be determined by dividing the number of axles in the train with operative brakes by the total number of axles in the train. Furthermore, for equipment utilizing tread brake units (TBU), FRA proposed that the percentage of operative brakes be determined by dividing the number of operative TBUs by the total number of TBUs. *See* 62 FR 49757, 49797.

The NPRM also contained proposed provisions regarding the movement of equipment with other than power brake defects. *See* 62 FR 49758–59, 49798–99. There are currently no statutory or regulatory restrictions on the movement of passenger cars with defective conditions that are not power brake or safety appliance related. The proposed provisions contained in the NPRM were similar to the provisions for moving defective locomotives and freight cars currently contained in 49 CFR 229.9 and 215.9, respectively. As these provisions have generally worked well with regard to the movement of defective locomotives and freight cars and in order to maintain consistency, FRA modeled the proposed movement requirements on those existing requirements. FRA proposed to allow passenger railroads the flexibility to continue to use equipment with non-safety-critical defects until the next scheduled calendar day exterior mechanical inspection. However, FRA intended for the calendar day mechanical inspections to be the tool used by railroads to repair all reported defects and to prevent continued use of defective equipment to carry passengers.

In the NPRM, FRA intended for 49 CFR 229.9 to continue to govern the movement of locomotives used in passenger service which develop defective conditions, not covered by part 238, that are not in compliance with part 229. FRA also did not intend to alter the current statutory requirements contained in 49 U.S.C. 20303 regarding the movement of passenger equipment with defective or insecure safety appliances. Consequently, in the NPRM, FRA required that passenger equipment that develops a defective or insecure safety appliance continue to be subject to all the statutory restrictions on its movement. It should be noted that the proposed requirements applicable to Tier I equipment merely referenced the Railroad Safety Appliance Standards (49 CFR part 231); however, FRA proposed separate safety appliance requirements for Tier II passenger equipment.

FRA proposed that passenger equipment that is found with conditions not in compliance with this part, other than power brake defects, be moved only after a QMI has determined that the equipment is safe to move and determined any restrictions necessary for the equipment's safe movement. FRA also allowed railroads to move equipment based on an assessment made by a QMI in communication with on-site personnel. FRA proposes this based on the reality that mechanical personnel are not readily available at every location on a railroad's line of road. However, FRA further proposed that if a QMI does not actually inspect the equipment to determine that it is safe to move, then, at the first forward location where a QMI is on duty, an inspector will perform a physical inspection of the equipment to confirm the initial assessment made while in communication with on-site personnel previously.

The NPRM also required the tracking of defective equipment in either of two ways. One option was to tag the equipment in a manner similar to what is currently required under § 215.9 for freight cars. The second option was to record the specified information in an automated tracking system. The latter alternative was offered to provide railroads some flexibility and was made in recognition of advances in electronic recordkeeping.

C. Discussion of Comments on the 1997 NPRM and General FRA Conclusions

1. Movement of Equipment With Defective Brakes

Labor representatives raised several concerns, both in their written comments and at the Working Group meetings, regarding the proposed provisions related to the movement of passenger equipment with defective power brakes. These commenters objected to FRA's use of the authority granted in 49 U.S.C. 20306 to exempt passenger train operations covered by this part from the statutory requirements contained in 49 U.S.C. 20303(a) permitting the movement of equipment with defective or insecure brakes only if various requirements are met, including the requirement that the movement for repair be only to the nearest location where the necessary repairs can be made. These commenters contend that the statutory provisions contained in 49 U.S.C. 20306 were not intended to permit FRA to waive the movement for repair provisions contained in the Safety Appliance Acts for an entire segment of the industry. Furthermore, these commenters contend that FRA is improperly relying on technological advances that exist on passenger trains to invoke the authority under 49 U.S.C. 20306 because many of the technological advances cited by FRA do not currently exist or are not currently used on a large portion of the passenger fleet. Labor representatives contend that passenger equipment which develops defective brake equipment should only be permitted to move to a location where the passengers can be off-loaded with appropriate speed restrictions.

Labor representatives also objected to FRA's statement that the term ''power brake defect'' does not include a failure to inspect such a component. These commenters claim that FRA's exclusion of the failure to properly inspect a brake component eliminates an important means of enforcement necessary to ensure that proper power brake inspections are performed. It is claimed that by excluding the failure to inspect from being a power brake defect, FRA has eliminated any incentive for railroads to ensure that trains have operative brakes because there will be little financial repercussion to continuing to use improperly inspected equipment. These commenters also objected to the proposed provision that requires the railroad operating long-distance intercity passenger trains to designate those location where power brake repairs will be conducted. It is claimed that by allowing the carriers to designate such locations the carrier is in absolute control of how far defective equipment will travel and abuse of the provision may occur. Labor representatives also objected to allowing railroads to use automated tracking systems to record information regarding defective equipment. These commenters believe that tagging the equipment must be required in order for inspectors to readily identify defective equipment. It is further contended that an automated tracking system is susceptible to manipulation, abuse and reduces accountability. One commenter recommended that FRA add further restrictions on the use and movement of cars with defective brakes at the front or rear of the train.

Railroad representatives and APTA representatives did not provide many comments on the proposed provisions related to the movement of passenger equipment with defective brakes. These commenters did note that there was not a major benefit to the railroads with being able to haul certain defective equipment to the next forward terminal as proposed. These commenters did recommend that FRA provide the railroads at least two years to develop and implement the defect reporting and tracking system proposed in the NPRM.

After considering the written comments submitted and the information provided at the Working Group meetings, FRA has determined that some minor changes need to be made to the requirements proposed in the NPRM regarding the movement of equipment with defective power brakes. In order to avoid the legal implications involved with employing the statutory authority contained at 49 U.S.C. 20306 for exempting equipment from the statutory requirements related to safety appliances and power brakes, and because railroad representatives acknowledged that the flexibility provided through reliance on the exemption is minimal, FRA will not rely on the statutory exemption provision contained at 49 U.S.C. 20306 in this final rule and will modify the movement for repair provisions accordingly. FRA will retain the exemption for passenger train operations from a long-standing agency interpretation that prohibits the movement of a train for repairs under 49 U.S.C. 20303 if less than 85 percent of the train's brakes are operative. The interpretation is based on a 1910 ICC order codified at 49 CFR 232.1, FRA believes that this requirement is overly restrictive when applied to passenger train operations as many passenger operations utilize a small number of cars in their trains and the necessity to cut out the brakes on just one car can easily result in noncompliance. FRA believes that the retention of the speed restrictions contained in the proposal will fully compensate for the loss of brakes on a minority of cars. FRA rejects the BRC's recommendation that passenger trains with defective brakes be permitted to move no farther than the next passenger station because such a stringent requirement is unnecessary, more restrictive that the current statutory mandate regarding the movement of defective brake equipment, and is radically counter to the way passenger trains currently handle defective equipment.

FRA intends to retain those portions of the movement for repair requirements that are consistent with the existing statutory provisions regarding the movement of equipment with power brake defects and revise those that are contrary. Therefore, passenger trains operating with 75–99 percent operative brakes will not be permitted to travel to the next forward terminal as proposed, but will be permitted to travel only to the next forward location were the necessary repairs to the brake equipment can be effectuated as mandated in the existing statute. In FRA's view, all of the other proposed methods for moving defective power brake equipment are consistent with and are in accordance with the current statutory requirements and can be retained. For example, FRA will retain the provisions which permit a passenger train with 50–75 percent operative brakes to be moved at reduced speeds to the next forward passenger station. Although the percentage of operative brakes is lower than currently permitted by FRA's longstanding agency interpretation (which FRA believes is fully compensated for by the speed restrictions), FRA believes that the movement of the defective equipment to the next passenger station is in accordance with the statutory requirement as the safety of the passengers must be considered in determining the nearest location where necessary repairs can be made. In addition, permitting passenger trains to continue to the next forward location where the necessary repairs can be performed is also consistent with the statutory requirement as such movement is necessary to ensure the safety of the traveling public by protecting them from the hazards incident to performing movements against the current of traffic. Furthermore, retention of the movement provisions related to long-distance intercity passenger trains and long-distance Tier II equipment are consistent with the current statutory requirements as these provisions permit the movement of defective brake equipment on these trains only to the next passenger station or the next repair location, with various speed restrictions depending on the percentage of operative brakes.

FRA will also retain the requirement that operators of long-distance passenger trains designate the locations where repairs can be conducted on the equipment. Although FRA agrees that this provision puts the control of what locations constitute repair locations in the hands of the railroad, FRA believes that the operators of these long-distance intercity trains are in the best position to determine which locations have the necessary expertise to handle the repairs of the somewhat advanced braking systems utilized in passenger trains. Due to the unique technologies used on the brake systems of these operations and the unique operating environments, the facilities and personnel necessary to conduct proper repairs on this equipment are somewhat specialized and limited. Moreover, FRA is retaining the broad performance-based requirement that railroads operating this equipment designate a sufficient number of repair locations to ensure the safe and timely repair of the equipment. Contrary to the beliefs of some labor commenters, FRA believes that this performance standard provides FRA sufficient grounds to institute civil penalty enforcement actions or take other enforcement actions if, based on its expertise and experience, FRA believes the railroad is failing to designate an adequate number of repair locations.

Rather than attempt to develop a standard applicable to all situations in the context of short-distance intercity and commuter trains, which FRA does not believe can be accomplished, FRA intends to approach the issue of what constitutes the next forward location where repairs can be effectuated based on a case-by-case analysis of each situation. FRA believes that its field inspectors are in the best position to determine whether a railroad exercised good faith in determining when and where to move a piece of defective equipment. In making these determinations both the railroad as well as FRA's inspectors must conduct a multi-factor analysis based on the facts of each case. In determining whether a particular location is a location where necessary repairs can be made or whether a location is the next forward repair location in a passenger train context, the accessibility of the location, the ability to safely make the repairs at that location, and the safety of the passengers are the overriding factors that must be considered in any analysis. These factors have a multitude of sub-factors which must be considered, such as: the type of repair required; the safety of employees responsible for conducting the repairs; the safety of employees responsible for getting the equipment to or from a particular location; the switching operations necessary to effectuate the move; the railroad's recent history and current practice of making repairs (brake and non-brake) at a particular location; relevant weather conditions; potential overcrowding of passenger platforms; and the overcrowding of trailing trains.

FRA will also retain the requirement that equipment found with conditions not in compliance with this part must be appropriately tagged or recorded in an automated tracking system. Although FRA is sensitive to the concerns raised by labor representatives regarding the use of automated tracking systems, FRA believes that provisions must be provided to allow railroads to take advantage of existing and developing technologies regarding the electronic maintenance and retention of records. Although railroad and FRA inspectors may require additional training on the use of electronic records, FRA believes that the use of such a medium to track defective equipment can expedite the identification and repair of defective equipment and, thus, reduce the time that defective equipment is operated in passenger service. In response to labor's concerns, the final rule contains a provision which will give FRA the ability to monitor and review a railroad's automated tracking system and will provide FRA the ability to prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of directly tagging defective equipment if FRA finds that the automated tracking system is not properly secure, inaccessible to FRA or a railroad's employees, or fails to adequately track and monitor the movement of defective equipment. Furthermore, if the automated tracking system developed and implemented by a railroad does not accurately and adequately record the information required by this part, the railroad will be in violation of the movement for repair provisions and subject to civil penalty liability.

In response to one labor commenter's concerns, FRA is slightly modifying the provisions related to the operation of trains with defective brakes on the front or rear car. In the NPRM, FRA proposed that if the power brakes on the front or rear unit become inoperative then a qualified person must be stationed at the handbrake on the unit. *See* 62 FR 49797. FRA recognizes that in some instances the handbrake on a car located at the front or rear of a train may not be accessible to a member of the train crew or may be located outside the interior of the car and, thus, unsafe for a crew member to operate while the train is in motion. FRA also recognizes that in many circumstances when a car at the front or rear of the train has inoperative brakes certain speed restrictions should be placed on the train; however, FRA believes that railroads are in the best position to determine what the appropriate speed restriction should be given the circumstances involved. Consequently, FRA is modifying the requirements for the use of such cars and will add provisions requiring that appropriate speed restrictions be imposed and that equipment with inaccessible handbrakes or with handbrakes located outside the interior of a car be removed or repositioned in the train at the first possible location.

FRA believes that the concern raised by certain labor representatives regarding FRA's definition of ''power brake defect'' is due to a lack of understanding of the proposed rule as well as a misunderstanding of the current regulations. Under the current power brake regulations the unit of violation for failure to inspect is the train not individual cars, although FRA can take a separate violation for each car containing a defective condition upon departure after the train received or should have received an initial terminal inspection or for each car not identified as defective after the performance of an intermediate inspection. Moreover, the failure to inspect a piece of equipment cannot be cured through any of the proposed provisions regarding the movement of defective equipment. That is, if a railroad fails to inspect a piece of equipment as required, the railroad cannot avoid civil penalty liability by moving the equipment in accordance with the proposed provisions. Furthermore, the final rule contains specific civil penalties for a railroad's failure to perform inspections as required. Railroads will also continue to be subject to potential civil penalty for any car found in defective condition after it has performed or should have performed a Class I or Class IA brake test and any car not properly moved or identified as defective at other times. The final rule will also retain the proposed provision providing that passenger equipment will be considered ''in use'' prior to departure but after it has received or should have received an inspection required by this part. Thus, FRA inspectors will no longer have to wait until a piece of equipment departs a location before issuing a civil penalty, a practice continually criticized by both labor and railroad representatives.

In addition, the NPRM as well as this final rule provides FRA inspectors the ability to issue Special Notices for Repair, which enable an FRA inspector to remove an unsafe piece of equipment from service until appropriate action is taken by the railroad. *See* 62 FR 49790. This enforcement tool is not currently available to FRA inspectors in the area of power brakes and mechanical components on passenger equipment and could be used in circumstances where passenger equipment is not inspected prior to being placed in service. Consequently, the final rule will not only retain all of the enforcement tools available to FRA under the current regulations but will include other methods for ensuring compliance by the railroads and provide both a financial and operational incentive for railroads to properly inspect passenger equipment.

Some of the members of the Working Group, particularly those representing labor organizations, expressed concern that any alteration of the movement for repair provisions made in the context of commuter and intercity passenger train operations may have a spillover effect into the freight industry. FRA wishes to make clear that it has no intention, at this time, of providing freight operations the flexibility to handle defective brake equipment that it is providing passenger operations. As noted above, many of the advanced brake system technologies currently used in passenger service are not used in the freight context. Furthermore, even if freight operations were to make similar advances in the braking equipment they employ, this development on the freight side may not create the efficiencies created in the passenger train context since the operating environments of freight trains and passenger trains differ significantly. More importantly, the special safety considerations relative to passengers are not present in freight operations.

2. Movement of Equipment With Other Than Power Brake Defects

Railroad representatives expressed some concerns regarding the provisions related to the movement of equipment with other than a power brake defect. The primary recommendation of these commenters was that FRA should revise the proposed provisions to require the use of a ''qualified maintenance person'' (qualified mechanical inspector (QMI) in the NPRM) only when a potentially safety-critical running gear defect is involved. These commenters believed that the requirement to have the car inspected by a QMP whenever a nonsafety-critical running gear component becomes defective would impose unnecessary, significant delays to their operations and is counter to current operating practices. These commenters contended that a ''qualified person'' as defined in the proposal would be sufficient to determine the safety implications in moving many of the mechanical components covered by the rule if they were to become defective en route. For example, it was noted that a highly qualified inspector was not necessary to determine whether a car that experiences a defective door, cracked window, or burnt out light bulbs could or should remain in service. Railroad representatives also sought additional flexibility in the movement of equipment with a nonsafety-critical running gear defect from a calendar day mechanical inspection.

Labor representatives also raised a number of concerns with the provisions related to the movement of equipment with other than power brake defects. One concern raised by these commenters indicated that FRA should not allow railroads to determine which mechanical components are ''safety-critical'' as such an approach would create a massive loophole and render some of the movement restrictions unenforceable. These commenters also voiced concerns over FRA's proposal that an off-site mechanical inspector could make an assessment regarding the safety of moving a certain piece of equipment based on the communication with on-site personnel. Although these commenters appeared to recognize the flexibility provided by such an approach, they raised concerns that such an approach is ripe for abuse and would require a mechanical inspector to rely on the observation of personnel lacking the necessary training and expertise. The commenters believed that further restrictions need to be placed on these communications but they failed to specify any specific restrictions that could be utilized. Labor representatives again raised concerns over FRA's allowance of an automated tracking system in lieu of direct tagging of defective equipment. These commenters reiterated their concerns that such a system can be easily manipulated and removes accountability from the system of repairing defective equipment.

After review of the comments submitted and provided orally at the Working Group meetings, FRA has made some modest changes in the final rule regarding the movement of equipment with non-power brake defects. FRA agrees with the comments of railroad representatives that the NPRM may have been over-reaching in requiring a QMP to make a determination regarding the safety of moving a piece of defective equipment for any of the mechanical components addressed in this regulation. However, FRA also agrees with the comments submitted by labor representatives that railroads should not determine what components are considered safety-critical. Therefore, FRA will require a determination regarding the safety of moving a piece of equipment by a QMP whenever a potential running gear defect is involved. FRA rejects the language proposed by APTA that the defect be a potentially ''safety-critical'' running gear defect as FRA believes that any defect to a running gear component is potentially safety-critical. In order to avoid confusion, FRA is providing an explicit definition of ''running gear defect.'' FRA is defining the term to mean any defective condition which involves a truck component, the propulsion system, the draft system, a wheel or a wheel component. In the final rule, FRA will permit the use of a qualified person to determine the safety and establish appropriate movement restrictions on continued use of equipment which involves non-running gear defects.

FRA will also provide very limited flexibility to the railroads to operate defective equipment from a location where a calendar day mechanical inspection was performed in order to effectuate repairs. FRA intends for the calendar mechanical inspection to be as comprehensive as possible and to be the time when all defective components are identified and repaired. In order to ensure that these daily inspections are performed by highly qualified personnel, FRA has provided the railroads with considerable flexibility to perform these inspections at locations that are best suited to a quality and comprehensive inspection. Therefore, FRA will permit the movement of defective equipment from these inspection locations with very stringent restrictions. Equipment containing running gear defects may only be moved from such locations if it is not in passenger service and is in a non-revenue train. Equipment containing non-running gear defects may be moved in a revenue train provide the equipment is locked-out and empty. Any equipment moved must also be properly identified and moved in accordance with any movement restriction imposed. FRA believes these stringent movement restrictions will provide railroads limited flexibility to move defective equipment to a location where it can best be repaired but will limit a railroad's desire or ability to move defective equipment from these inspection locations and will encourage the performance of the calendar day mechanical inspections at locations where repairs to equipment can be conducted.

FRA has also retained the requirement that the QMP may make his or her determination regarding the continued use of equipment containing a potential running gear defect based on the description provided by on-site personnel. Although FRA recognizes the concerns raised by labor representatives, FRA believes that the rule must recognize the reality of current operations and acknowledge the fact that mechanical personnel are not readily available at every location on a railroad's line of road. Furthermore, when such off-site determinations are made the rule requires that the equipment only be moved to the next forward location where the equipment can be inspected by a QMP to verify the description of the defect provided by the on-site personnel.

FRA is also adding a provision to the requirements dealing with the movement of equipment with other than power brake defects to address the inspection of roller bearings on a car whose truck is involved in a derailment. The added requirement prohibits a railroad from continuing in service a piece of passenger equipment that has a roller bearing whose truck was involved in a derailment unless the bearing is inspected and tested in accordance with the stated provisions. The added provision is identical to the requirement currently contained in 49 CFR § 215.115(b). Although the existing provision is applicable to freight cars, virtually every passenger train operation follows the provisions contained in that section prior to returning a piece of equipment to service after it was involved in a derailment and, thus, should not result in any added burden to the industry. FRA believes that the practice is critical to ensuring the proper operation of the roller bearing after a derailment occurs and should be incorporated into this final rule.

FRA also intends to make clear that the movement of equipment with a defective safety appliance will continue to be governed by the statutory provisions contained at 49 U.S.C. 20303. As noted previously this provision permits the movement of defective equipment to the nearest location where the necessary repairs can be made. The determination of what constitutes the nearest location where the necessary repairs can be effectuated in a safety appliance context is identical to the analysis required when dealing with a power brake defect. In making these determinations both the railroad as well as FRA's inspectors must conduct a multi-factor analysis based on the facts of each case. In determining whether a particular location is a location where necessary repairs can be made or whether a location is the nearest repair location in a passenger train context, the accessibility of the location, the ability to safely make the repairs at that location, and the safety of the passengers are the overriding factors that must be considered in any analysis. These factors have a multitude of sub-factors which must be considered, such as: the type of repair required; the safety of the passengers if a move against the current of traffic is conducted; the safety of employees responsible for conducting the repairs; the safety of employees responsible for getting the equipment to or from a particular location; the switching operations necessary to effectuate the move; the railroad's recent history and current practice of making repairs (brake and non-brake) at a particular location; relevant weather conditions; potential overcrowding of passenger platforms; and the overcrowding of trailing trains. Therefore, in many circumstances trains will be permitted to continue to the next forward location where the necessary repairs can be performed as such movement is necessary to ensure the safety of the traveling public by protecting them from the hazards incident to performing movements against the current of traffic.

VIII. FRA's Passenger Train Safety Initiatives

This final rule is part of several related and complementary efforts by FRA to improve the safety of rail passenger service. FRA has issued regulations governing emergency preparedness and emergency response procedures for rail passenger service in a separate rulemaking proceeding, designated as FRA No. PTEP–1. *See* 63 FR 24630, May 4, 1998. FRA formed a separate working group (the Passenger Train Emergency Preparedness Working Group) to assist FRA in the development of such regulations. This related proceeding has addressed some of the issues FRA originally identified in the ANPRM on passenger equipment safety. Persons wishing to receive more information regarding this other rulemaking should contact Mr. Edward R. English, Director, Office of Safety Assurance and Compliance, FRA, 1120 Vermont Avenue, Mail Stop 25, Washington, D.C. 20590 (telephone number: 202–493–6300), or David H. Kasminoff, Esq., Trial Attorney, Office of Chief Counsel, FRA, 1120 Vermont Avenue, Mail Stop 10, Washington, D.C. 20590 (telephone: 202–493–6043).

Further, in response to the separate collisions involving New Jersey Transit and MARC trains in early 1996, FRA issued Emergency Order No. 20 (Notice No. 1) on February 20, 1996, requiring prompt action to immediately enhance passenger train operating rules and emergency egress and to develop an interim system safety plan addressing the safety of operations that permit passengers to occupy the leading car in a train. 61 FR 6876, Feb. 22, 1996. Both the New Jersey Transit and MARC train collisions involved operations where a cab car occupied the lead position in a passenger train. The Emergency Order explained that in collisions involving the front of a passenger train, operating with a cab car in the forward position or a multiple unit (MU) locomotive, *i.e.*, a self-propelled locomotive with passenger seating, presents an increased risk of severe personal injury or death as compared with locomotive-hauled service when the locomotive occupies the lead position in the train and thereby acts as a buffer for the trailing passenger cars. This risk is of particular concern where operations are conducted at relatively higher speeds, where there is a mix of various types of trains, and where there are numerous highway-rail crossings over which large motor vehicles are operated. Accordingly, the Emergency Order required in particular that ''railroads operating scheduled intercity or commuter rail service * * * conduct an analysis of their operations and file with FRA an interim safety plan indicating the manner in which risk of a collision involving a cab car is addressed.'' 61 FR 6879.

The Emergency Order also noted that there is a need to ensure that emergency exits are clearly marked and in operable condition on all passenger lines, regardless of the equipment or train control system used. Although FRA Safety Glazing Standards, 49 CFR part 223, require that passenger cars have a minimum of four emergency window exits ''designed to permit rapid and easy removal during a crisis situation,'' the Silver Spring collision raised concerns that at least some of the occupants of the MARC train attempted unsuccessfully to exit through the windows. The Emergency Order requires ''that any emergency windows that are not already legibly marked as such on the inside and outside be so marked, and that a representative sample of all such windows be examined to ensure operability.'' 61 FR 6880. On February 29, 1996, FRA issued Notice No. 2 to Emergency Order No. 20 to refine three aspects of the original order, including providing more detailed guidance on the emergency egress sampling provision. 61 FR 8703, Mar. 5, 1996.

In addition, FRA submitted a report to Congress on locomotive crashworthiness and working conditions on September 18, 1996, and subsequently referred the issues raised in the report to the RSAC. FRA established RSAC in March of 1996, to provide FRA with advice and recommendations on railroad safety matters. *See* 61 FR 9740, Mar. 11, 1996. RSAC consists of 48 individual representatives, drawn from 27 organizations representing various rail industry perspectives, and two associate nonvoting representatives from the agencies with railroad safety regulatory responsibility in Canada and Mexico. In September of 1997, FRA convened the Locomotive Crashworthiness Working Group through RSAC to make recommendations as to the best way to address the findings of FRA's report to Congress, including developing standards regarding a broad range of crashworthiness issues for both passenger and freight locomotives. In the context of improving railroad communications, RSAC established a working group to specifically address communication facilities and procedures, with a strong emphasis on passenger train emergency requirements. The final rule that resulted from this effort was published on September 4, 1998, reflecting the consensus recommendations of the RSAC. 63 FR 47182.

FRA notes that, in its comments on the NPRM, Siemens Transportation Systems, Inc., (Siemens) stated that much of the safety standard changes for passenger rail cars could be scaled back if more consideration were given to the technology that is available for crash avoidance safety systems. Siemens believed the principal safety focus should be on efforts to avoid collisions in the first place, such as those at highway-rail grade crossings and with other trains.

FRA recognizes that rail passenger safety involves the safety of the railroad system as a whole. FRA does have active rulemaking and research projects in a variety of contexts, including signal and train control systems, and grade crossing safety. FRA also has existing regulations governing both railroad and grade crossing signal system safety, for example. (See 49 C.F.R. parts 233–236.) Nevertheless, this final rule is designed to address the specific statutory mandate that minimum standards be prescribed for the safety of cars used to transport railroad passengers, as noted above.

IX. Section-by-Section Analysis

This section-by-section analysis will explain the provisions of the final rule and the changes made from the 1997 NPRM. Of course, a number of the issues and provisions involving this rule have been discussed and addressed in detail in the preceding discussions. Accordingly, the preceding discussions should be considered in conjunction with those below and will be referred to as appropriate.

Amendments to 49 CFR Part 216

Part 216 authorizes certain FRA and participating State inspectors to issue Special Notices for Repair, under specified conditions, for freight cars with defects under part 215, locomotives with defects under parts 229 or 230 or 49 U.S.C. chapter 207, and track with defects under part 213. The revisions to part 216 contained in this final rule will create a fourth category of Special Notices for Repair: for passenger equipment with defects under part 238. Consequently, if an inspector determines that noncomplying passenger equipment is ''unsafe for further service'' and issues a Special Notice for Repair, the railroad will be required to take the passenger equipment out of service, to make repairs to bring the equipment into compliance with part 238, and to report the repairs to FRA. The final rule also makes conforming changes to part 216 reflecting this new enforcement tool.

This final rule also includes various technical amendments to update part 216 to reflect the following: (1) Internal organizational changes within FRA; (2) the division of former part 230, Locomotive Inspection Regulations, into parts 229 and 230 and the redesignation of those portions of former part 230 related to non-steam locomotives as part 229, Railroad Locomotive Safety Standards; and (3) the repeal, reenactment without substantive change, and recodification of the Federal railroad safety laws in 1994. *See* 45 FR 21092, Mar. 31, 1980; Pub. L. 103–272, July 5, 1994.

Amendments to 49 CFR Parts 223, 229, 231, and 232

FRA is making conforming changes to the applicability sections of FRA's Railroad Locomotive Safety Standards, Railroad Safety Appliance Standards, and railroad power brakes and drawbars regulations that were necessitated by provisions contained in this new part 238. In this final rule, FRA has adjusted the application of provisions in parts 229, 231, or 232 or has deleted certain provisions in those parts to avoid duplication of provisions in part 238. FRA has not deleted the passenger train brake test and maintenance requirements from part 232, at this time, because part 238 will not cover certain operations subject to part 232, e.g., tourist, historic, scenic, and excursion railroad operations on the general system. Moreover, the requirements contained in part 232 will continue to apply to passenger operations until the requirements contained in part 238 become effective to such operations. FRA is also making a technical amendment to part 223 so as to reference the additional emergency window exit and window safety glazing requirements found in part 238.

49 CFR Part 238

Subpart A—General

Section 238.1 Purpose and Scope

Paragraph (a) states the purpose of the rule to prevent collisions, derailments, and other occurrences involving railroad passenger equipment that cause injury or death to railroad employees, railroad passengers, and the general public; and to mitigate the consequences of such occurrences to the extent they cannot be prevented. Paragraph (b) states that the regulations in this part provide minimum standards for the subjects addressed. FRA has nonetheless specified in places throughout the regulatory text that the prescribed requirements are only minimum standards so as to reinforce this principle. Railroads and other persons subject to this part may adopt and enforce more stringent requirements, so long as they are not inconsistent with this part.

Paragraph (c) contains the dates upon which railroads covered by this part will be required to comply with the requirements contained in this final rule related to the inspection, testing, maintenance, training, and movement of defective equipment. FRA recognizes the interrelationship between the proper training of railroad personnel and the implementation of the inspection, testing, maintenance and movement of defective equipment provisions contained in the final rule. FRA realizes that in order for railroads to comply with the requirements related to the inspection, testing, and maintenance requirements and the requirements regarding the movement of defective equipment, the railroads must first be provided a sufficient amount of time to develop and implement a proper training program. Based on information received by FRA, it appears that many railroads are in the initial stages of developing training programs or modifying existing programs to meet the requirements of this final rule and that this process should be completed within a year. After the development of the training programs the railroads will need several months to a year to rotate their employees through the programs in order not to disrupt the operation of their railroads. Thus, FRA believes that 26 months is a sufficient amount of time for railroads to develop and train their employees as required by this final rule. Consequently, FRA will require compliance with the inspection, testing, and maintenance provisions as well the movement of defective equipment provisions after that same 26 month period.

FRA also recognizes that there are certain aspects of the inspection, testing, and maintenance requirements as well as the movement of defective equipment provisions that provide operational flexibility to the railroads. Due to this flexibility, FRA believes that some railroads will desire the ability to begin operations under the inspection, testing, and maintenance requirements and the movement of defective equipment provisions as soon as their employees have been properly trained. Therefore, FRA has included provisions which allow a railroad to notify FRA in writing that it is willing to begin compliance with the inspection, testing, and maintenance requirements and the movement of defective equipment provisions some time earlier than the 26 months provided. FRA wishes to make clear that it does not intend for railroads to take advantage of the flexibility provided under some of the provisions unless the railroad is willing to comply with all the requirements contained in those provisions. Thus, in order to begin operating under any of the provisions contained in subpart D, except the maintenance requirements contained in §§ 238.309 and 238.311, or to operate defective equipment under §§ 238.15 or 238.17, the railroad must be performing all of the requirements contained in those sections and that subpart.

As the maintenance requirements regarding the periodic performance of COT&S and the performance of single car tests, contained in §§ 238.309 and 238.311, are separable from the inspection requirements, FRA will permit railroads to request earlier application of those two sections. However, in order to begin operation under either of these two sections, the railroad must be willing to operate in accordance with all of the provisions in both sections. That is, the provisions contained in §§ 238.309 and 238.311 must be implemented as a package and cannot be implemented separately, except for the requirements related to the performance of COT&S on locomotives. This paragraph makes clear that the requirements related to the performance of COT&S on MU locomotives and conventional locomotives will become effective September 9, 1999. As discussed in more detail in the section-by-section analysis of § 238.309, FRA believes that the extensions of COT&S contained in paragraphs (b) and (c) of § 238.309 are supported either by the tests conducted by Metro-North or are a practice that has been approved by waiver for several years. Furthermore, there is no corresponding single car testing requirement applicable to MU and conventional locomotives.

As a point of clarification, FRA makes clear that a railroad will be subject to compliance under the existing inspection, testing, and maintenance provisions contained in part 232 of this chapter until the railroad is required to operate under the inspection and testing provisions of this part (i.e., 26 months) or until the railroad voluntarily commits to operate under the provisions of this part.

Section 238.3 Application

As a general matter, in paragraphs (a)(1) and (a)(2), the rule applies to all railroads that operate intercity passenger train service on the general railroad system of transportation or provide commuter or other short-haul passenger train service in a metropolitan or suburban area; that is, the rule applies to commuter or other short-haul service described in paragraph (a)(2) regardless of whether that service is connected to the general railroad system. A public authority that indirectly provides passenger train service by contracting out the actual operation to another railroad or independent contractor would be regulated by FRA as a railroad under the provisions of this rule. In order to avoid confusion, FRA has omitted proposed paragraph (a)(3) regarding the rule's applicability to rapid transit operations as these types of operations, which are merely a subset of ''commuter or other short-haul rail passenger train service,'' are sufficiently covered under paragraphs (a)(1) and (a)(2) in the final rule. Paragraph (b) makes explicit the liability imposed by statute, 49 U.S.C. 20303, on a railroad that owns track over which another railroad hauls or uses equipment with a power brake or safety appliance defect. Under paragraph (b), a railroad that permits operations over its trackage by passenger equipment subject to this part that does not comply with a power brake provision of this part or a safety appliance provision of this part is subject to the power brake and safety appliance provisions of this part with respect to such operations that it permits.

This section contains no explicit reference to private cars. Rather than addressing the scope of applicability of part 238 to private cars in this section, FRA has indicated in the particular substantive sections of the rule whether private cars are covered, according to the terms of those sections. FRA has applied certain requirements of the rule to private cars that operate on railroads subject to this part. FRA has taken into account the burden imposed by requiring private car owners and operators to conform to the requirements of this part. Further, FRA recognizes that private cars are often hauled by railroads such as Amtrak and commuter railroads which often impose their own safety requirements on the operation of the private cars. Accordingly, FRA has limited the application of the rule only to those requirements necessary to ensure the safe operation of the passenger train that is hauling the private car. For instance, private cars are subject to brake inspection, testing, and maintenance requirements.

The rule is structured to apply to intercity, commuter and other short-haul service, but not to tourist, scenic, historic, and excursion operations. The term ''tourist, scenic, historic, or excursion operations'' is defined in § 238.5 to mean ''railroad operations that carry passengers, often using antiquated equipment, with the conveyance of the passengers to a particular destination not being the principal purpose.'' The term refers to the particular physical operation, not to the nature of the railroad company as a whole that conducts the operation. As a result, part 238 exempts not only a recreational train ride by a tourist railroad company that employs five people but also a recreational train ride by the Union Pacific Railroad Company, a Class I freight railroad. FRA has not yet had the opportunity to fully consult with tourist and historic railroad operators and their associations to determine the appropriate applicability of the provisions contained in this final rule to such railroad operations. The Federal Railroad Safety Authorization Act of 1994 directs FRA to examine the unique circumstances of tourist railroads when establishing safety regulations. The Act, which amended 49 U.S.C. 20103, states that:

> In prescribing regulations that pertain to railroad safety that affect tourist, historic, scenic, or excursion railroad carriers, the Secretary of Transportation shall take into consideration any financial, operational, or other factors that may be unique to such railroad carriers. The Secretary shall submit a report to Congress not later than September 30, 1995, on actions taken under this subsection.

Pub. L. 103–440, § 217, 108 Stat. 4619, 4624, November 2, 1994. In its 1996 report to Congress entitled ''Regulatory Actions Affecting Tourist Railroads,'' FRA responded to the direction in the statutory provision and also provided additional information related to tourist railroad safety for consideration of the Congress.

Section 215 of the 1994 Act specifically permits FRA to exempt equipment used by tourist, historic, scenic, and excursion railroads to transport passengers from the initial regulations required to be prescribed by November 2, 1997. 49 U.S.C. 20133(b)(1). FRA is addressing the passenger equipment safety concerns for these unique types of operations through the Tourist and Historic Railroads Working Group formed under RSAC. Any requirements applicable to these operations will be part of a separate rulemaking proceeding.

FRA notes that the Syracuse, Binghamton and New York Railroad Corporation (SBNY) commented on the application of the rule to its passenger shuttle and excursion service on approximately ten miles of trackage shared with rail freight traffic in the city of Syracuse and county of Onondaga, New York. SBNY commented that, although it understands its excursion service would be exempt from the rule, its shuttle operations appear to fall directly within the proposed regulation. SBNY believed that applying the proposed regulations to its shuttle service would impose a significant and unbearable burden with little if any improvement in safety. SBNY asked that the rule expressly except from its application passenger train operations on track that is limited to operating speeds of 30 mph or less.

FRA believes the SBNY is properly characterized as a commuter or other short-haul railroad subject to this part. FRA has not adopted SNBY's recommendation to change the application of the final rule so as to except passenger train operations on track that is limited to operating speeds of 30 mph or less. First of all, any such operation must already comply with existing regulations affecting railroad passenger equipment safety, such as the locomotive safety standards (49 C.F.R. part 229), and standards on railroad power brakes and drawbars (49 C.F.R. part 231). Second, many provisions of the final rule itself cannot logically be distinguished in any manner on the basis of operating speed. For instance, materials in locomotives and passenger cars should be required to comply with the testing standards for flammability and smoke emissions characteristics to protect against sources of ignition—no matter the operating speed of the equipment. Finally, FRA notes that

SBNY operates conventional diesel multiple-unit passenger equipment built to AAR standards. Accordingly, the railroad should not experience burdens related to structural standards. If there are unique factors present with regard to SBNY's equipment, the waiver process may provide a way of accommodating those differences.

The requirements of this rule do not apply to circus trains. In its comments on the NPRM, Feld Entertainment, Inc., (Feld), parent company of Ringling Bros. and Barnum & Bailey circus (Ringling Bros.), supported the rule's consideration of the special circumstances of certain classes of rail carriers, such as private passenger cars and circus trains. Feld stated on behalf of Ringling Bros. that it suspended the use of rim-stamped straight-plate wheels on its tread-braked passenger cars following the 1994 derailment of a circus train in Lakeland, Florida. See 62 FR 49743. Feld also stated that Ringling Bros. takes seriously its commitment to the safety of its employees and animals. FRA anticipates deferring further consideration of applying any of the requirements in this final rule to circus trains to the Tourist and Historic Railroads Working Group.

Section 238.5 Definitions

This section contains a set of definitions to introduce the regulations. FRA intends these definitions to clarify the meaning of important terms as they are used in the text of the rule. Several of the definitions involve new or fundamental concepts which require further discussion.

''Brake indicator'' means a device, actuated by brake cylinder pressure, which indicates whether brakes are applied or released on a car. The use of brake indicators in the performance of brake tests is a controversial subject. Rail labor organizations correctly maintain that brake indicators are not fully reliable indicators of brake application and release on each car in the train. Further, railroads correctly maintain that reliance on brake indicators is necessary because inspectors cannot always safely observe brake application and release. FRA believes that brake indicators serve an important role in the performance of brake tests. FRA has specified three different types of brake tests—Class I, Class IA, and Class II (described below)—that must be performed on passenger equipment. Railroads should perform Class I brake tests so that the inspector is able to actually observe brake application and release. However, FRA believes that during the performance of a Class IA brake test, railroads may rely on brake indicators if they determine that the inspector cannot safely make a direct observation of the brake application or release.

''Primary brake'' and ''secondary brake'' are complementary definitions. ''Primary brake'' refers to ''those components of the train brake system necessary to stop the train within the signal spacing distance without thermal damage to friction braking surfaces,'' while ''secondary brake'' refers to ''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 wheels.'' FRA provides these definitions to help draw the line between safety and economics of brake systems. Railroads have long held that the dynamic portion of a blended brake is not a safety system. Under the provisions in this final rule, railroads must demonstrate through testing and analysis that the dynamic brake fits the definition of a secondary brake. Defective primary braking systems are a serious safety problem that railroads must address immediately. Defective secondary braking systems, as defined in § 238.5, are not a serious safety concern, because, by definition, their failure does not result in unacceptable thermal inputs into friction brake components. Accordingly, FRA intends to allow railroads more flexibility in dealing with defective secondary braking systems.

Three brake tests are fundamental to this final rule. A ''Class I brake test'' means a complete passenger train brake system test as further specified in § 238.313. The Class I test is the most complete test. It must be performed once each calendar day that a passenger train is in service by a qualified maintenance person. The Class I test is intended to replace the current initial terminal brake test. *See* 49 CFR 232.12(c)-(j). The Class I test is much more tailored to the specific designs of passenger equipment than the initial terminal brake test that is required now.

A ''Class IA brake test'' means a test and inspection (as further specified in § 238.315) of the air brake system on each car in a passenger train to ensure the air brake system functions as intended in response to the command sent through the train line. The Class IA test is a somewhat less complete test than the Class I test and is intended to be very similar to the current 1,000-mile brake test. An important difference between the Class I and Class IA tests is that the Class IA test may be performed by qualified persons as long as they have been properly trained and designated by the railroad to perform the inspection. The Class IA test allows commuter railroads the flexibility to have trains depart their first run of the day from an outlying point without having to station qualified maintenance persons at all outlying points. If railroads take advantage of the flexibility offered by the Class IA test, they must follow-up with a Class I test sometime during the day.

A ''Class II train brake test'' means a test (as further specified in § 238.317) of brake pipe integrity and continuity from controlling locomotive to rear car. The Class II brake test is a simple set-and-release test intended to replace the passenger train intermediate terminal air brake test. *See* 49 CFR 232.13(b). The Class II test is also tailored to the special design of the passenger equipment.

The concept of ''ordered'' is vital to the correct application of this final rule. As applied to the acquisition of equipment, the term 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. Many of the provisions of this final rule, particularly structural requirements, will apply only to newly constructed equipment. When FRA applies certain requirements only to passenger equipment ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, FRA intends to ''grandfather'' in this regard any equipment that is both ordered before September 8, 2000, and placed in service for the first time before September 9, 2002. FRA believes this approach will allow railroads to minimize, or avoid altogether, any costs associated with changes to existing orders and yet limit the delay in realizing the safety benefits of the requirements in this rule.

FRA's definition of ''passenger car'' goes beyond its traditional meaning. ''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 cab car, an MU locomotive, and a passenger coach. A cab car and an MU locomotive are also a ''locomotive'' under this rule. 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; therefore, passenger coaches are a subset of passenger cars. ''Control stand'' is defined in *The Railroad Dictionary of Car and Locomotive Terms* (Simmons-Boardman Publishing Corp. 1980), as '''[t]he upright column upon which the throttle control, reverser handle, transition lever, and dynamic braking control are mounted within convenient reach of the engineer on a locomotive. The air gauges and some switches are also included on the control stand.''

''Passenger equipment'' is the most inclusive definition. It means 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 a (1) passenger coach, (2) cab car, (3) MU locomotive, (4) locomotive not intended to provide transportation for members of the general public that is used to power a passenger train, and (5) any non-self-propelled vehicle used in a train with one or more passenger cars. The term therefore covers a baggage car, express car, freight car, mail car or a private car when used in a train with one or more passenger cars. In the context of articulated equipment, ''passenger equipment'' means that segment of rail rolling equipment located between two trucks that is used in a train with one or more passenger cars. However, this term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive.

It should be noted that the definition of passenger equipment has been somewhat modified from that which was proposed in the NPRM. *See* 62 FR 49794. The change in the definition is based on comments from the AAPRCO and the American Short Line Railroad Association (ASLRA), and clarifies FRA's intent with regard to private cars. Under the final rule, FRA makes clear that a private car is considered ''passenger equipment'' for purposes of this rule only when it is used in a train with one or more passenger cars. Consequently, a private car will not be considered ''passenger equipment'' under the rule when the private car is being used alone; or used in a train consisting only of private cars or freight cars, or both. This approach is consistent with FRA's intent in drafting the NPRM, and fully incorporates the AAPRCO's and ASLRA's comments.

FRA has also modified the definition of ''passenger equipment'' so that the term does not include a freight locomotive when used to haul a passenger train due to failure of a passenger locomotive. At the Working Group meeting in December, 1997, the AAR had raised the concern that the proposed rule did not provide an exclusion for a freight locomotive used to haul a passenger train for relief purposes. FRA believes that a limited exception is warranted for a freight locomotive used to haul a passenger train due to the failure of the passenger train's own motive power; FRA does not wish for the passenger train to be stranded. FRA has modified the definition of the term ''locomotive'' accordingly in this final rule.

In the context of articulated equipment, FRA has clarified that ''passenger equipment'' means that segment of rail rolling equipment located between two trucks that is used in a train with one or more passenger cars. In the NPRM, FRA had used similar language in the definition of ''unit'' (see 62 FR 49796). Since the definition of ''unit'' itself draws upon the definition of ''passenger equipment,'' FRA has decided to insert this clarifying language here.

The terms ''passenger station'' and ''terminal'' are crucial to understanding the requirements related to the inspection of equipment and the movement of defective equipment contained in this final rule. ''Passenger station'' means a location designated in the railroad's timetable where passengers are regularly scheduled to get on or off any train. Under certain carefully controlled conditions, the rule permits a passenger train with defective equipment to move to the next forward passenger station. This flexibility is allowed to prevent railroads from discharging passengers in potentially unsafe locations and to minimize schedule impacts where this can safely be done. By contrast, ''terminal'' means a train's starting point or ending point of a single scheduled trip, where passengers may embark or disembark a train; normally, a ''terminal'' is a point where the train would reverse direction or change destinations.

The concepts of ''qualified person'' and ''qualified maintenance person'' are vital to understanding the required inspection, testing, and maintenance provisions of the rule. A ''qualified person'' is a person determined by the railroad to have the knowledge and skills necessary to perform one or more functions required under this part. With the proper training, a train crewmember could be a qualified person.

A ''qualified maintenance person'' is a ''qualified person'' who as a part of the training, qualification, and designation program required under § 238.111 has received instruction and training that includes ''hands-on'' experience (under appropriate supervision or apprenticeship) in one or more of the following functions: trouble-shooting, inspection, testing, maintenance or repair of the specific train brake and other components and systems for which the inspector 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 and periodic 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.

As noted in detail in the preceding general preamble discussion, FRA is slightly modifying the terminology and definition of these highly qualified inspectors from that proposed in the 1997 NPRM in order to address the concerns by some commenters and to clarify the definition as much as possible. In the 1997 NPRM, FRA proposed the term ''qualified mechanical inspector'' (QMI) to describe these highly qualified inspectors. FRA recognizes the concern raised by some commenters, that the term QMI might result in employees designated as such to seek some sort of premium pay status. Although FRA is not overly swayed by this concern, FRA is changing the term in the manner suggested by these commenters to ''qualified maintenance person (QMP).'' FRA believes that the term used to describe the individual responsible for conducting certain brake and mechanical inspections has little bearing on the qualifications or knowledge of the individual and, thus, is not adverse to accommodating a change in the term. However, but for clarifying language, FRA is not changing the underlying definition of what is required to be designated as a QMP.

The definition contained in this final rule clarifies the intent of the NPRM by specifically stating that a QMP must be properly trained and have a primary responsibility in the function of trouble-shooting, inspection, testing, maintenance, or repair of the specific train brake and other components and systems for which the inspector is assigned responsibility. The slightly modified definition also clarifies that a QMP 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.

The major concern raised by APTA representatives centered on the requirement contained in the definition of a QMI that the person's ''primary responsibility'' include work in the area of troubleshooting, testing, inspecting, maintenance, or repair to train brake systems and other components. These commenters believed that anyone who is properly trained can perform the required inspections regardless of the amount of time actually spent engaged in the activity. The entire concept of QMP (or QMI) is premised on the idea that flexibility in the inspection of passenger equipment, flexibility in the movement of defective equipment and slight reductions in periodic maintenance could be provided if the mechanical components and brake system were inspected on a daily basis by highly qualified individuals. Thus, the requirement that a highly qualified person perform certain brake and mechanical inspections is part of a package which includes flexibility in the performance of brake and mechanical inspections, permits wider latitude in the movement of defective equipment, and provides reductions in the periodic maintenance that is required to be performed on certain equipment. Therefore, FRA expects the highly qualified person to be an individual who can not only identify a particular defective condition but who will have the knowledge and experience to know how the defective condition affects other mechanical components or other parts of the brake system and will have an understanding of what might have caused a particular defective condition. FRA believes that in order for a person to become highly proficient in the performance of a particular task that person must perform the task on a repeated and consistent basis. As it is almost impossible to develop and impose specific experience requirements, FRA believes that a requirement that the person's primary responsibility be in one or more of the specifically identified work areas and that the person have a basic understanding of what is required to properly repair and maintain safety-critical brake or mechanical components is necessary to ensure the high quality inspections envisioned by the rule. FRA notes the frequent contention of railroad representatives that mechanical forces are intimately familiar with the vehicles in the fleet for which they are responsible. FRA wishes to continue this record of careful attention to those fleets, which will tend to help ensure that developing problems are identified early and are dealt with across those fleets.

FRA disagrees with the contentions raised by APTA representatives that the definition of QMP violates the Administrative Procedure Act and exceeds FRA's statutory authority. Contrary to the assertions made by APTA representatives, the administrative record together with FRA's independent knowledge of the passenger rail industry do support a requirement that only a QMP conduct Class I brake tests and exterior mechanical inspections. Except for limited weekend service operated by Metra, virtually every passenger train operation affected by this rule currently conducts daily brake and mechanical inspections utilizing employees who, except for training on the requirements of this rule, would meet the definition of a QMP. That is, the employees who are currently responsible for conducting the major daily brake and mechanical inspections on virtually all passenger trains meet the ''primary responsibility'' requirement contained in the definition of QMP. Therefore, the industry's current practice acknowledges and supports the need to conduct daily inspections with employees whose primary responsibility is the troubleshooting, inspection, testing, maintenance, or repair of train brake systems or other mechanical components. Furthermore, due to the flexibility provided in this rule for conducting brake and mechanical inspections and moving defective equipment as well as the extension of certain periodic maintenance, FRA believes that the current best practices of the railroads with regard to brake and mechanical inspections must be maintained, especially as it relates to the quality of the personnel performing the inspections.

FRA further believes that APTA's contention that the definition of QMP violates the Railway Labor Act is due to a misunderstanding of the definition. FRA is not attempting to make any determinations over employee classes or crafts or to interpret collective bargaining agreements. As was made clear in the 1997 NPRM, the definition would allow the members of trades associated with testing and maintenance of equipment such as carmen, machinists, and electricians to become QMPs. However, membership in a labor organization or completion of an apprenticeship program associated with a particular craft is not required. FRA makes clear that the two overriding qualifications are possession of the knowledge required to do the job and a primary work assignment involving the troubleshooting, inspecting, testing, maintaining, or repairing the equipment.

FRA is also clarifying the meaning of ''primary responsibility'' as used in the definition of QMP. As a rule of thumb FRA will consider a person's ''primary responsibility'' to be the task that the person performs at least 50 percent of the time. Therefore, a person who spends at least 50 percent of the time engaged in the duties of inspecting, testing, maintenance, troubleshooting, or repair of train brakes systems and other mechanical components could be designated as a QMP, provided the person is properly trained to perform the tasks assigned and possesses 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. However, FRA will consider the totality of the circumstances surrounding an employee's duties in determining a person's ''primary responsibility.'' For example, a person may not spend 50 percent of his or her day engaged in any one readily identifiable type of activity; in those situations FRA will have to look at the circumstances involved on a case-by-case basis.

The definition of QMP largely rules out the possibility of train crew members from being designated as these highly qualified inspectors since the primary responsibility, as defined above, of virtually all current train crew personnel is the operation of trains, and for the most part, train crew personnel do not possess a current understanding of what is required to properly repair and maintain the safety-critical brake or mechanical components that are inspected during Class I brake tests or exterior calendar day mechanical inspections. However, contrary to the contentions raised by APTA there is nothing in the rule which prevents a railroad from utilizing employees who are not designated as QMPs from conducting brake and mechanical inspections provided those inspections are not intended to constitute the required Class I brake test or the exterior calendar day mechanical inspection. Furthermore, the rule provides that certain required brake and mechanical inspections (Class IA brake tests, Class II brake tests, running brake tests, and interior calendar day mechanical inspections) may be performed by a properly ''qualified person'' and do not mandate the use of a QMP. FRA believes that these are the types of inspections which train crew members are currently assigned to perform and have been performing effectively for years. Consequently, FRA believes that the inspection requirements and the qualification requirements contained in this rule are merely a codification of the current best practices of the passenger train industry and are necessary to ensure the continued safety of those operations while providing the industry some flexibility in the performance of certain inspections and in the movement of defective equipment as well as providing slight increases in periodic maintenance for some equipment.

The term ''running gear defect'' has been added to the final rule's list of definitions. A running gear defect is defined as any defective condition which involves a truck component, a propulsion system component, a draft system component, a wheel or a wheel component. This term is important for understanding the restrictions regarding the movement of equipment with other than power brake defects. FRA agrees with the comments of railroad representatives that the 1997 NPRM may have been over-reaching in requiring a qualified mechanical inspector to make a determination regarding the safety of moving a piece of defective equipment for any of the mechanical components addressed in this regulation. However, FRA also agrees with the comments submitted by labor representatives that railroads should not determine what components are considered safety-critical. Therefore, FRA has modified the movement of defective equipment provisions in this final rule to require a determination regarding the safety of moving a piece of equipment by a qualified maintenance person (as discussed above) whenever a potential running gear defect is involved. FRA rejects the language proposed by APTA that the defect be a potentially ''safety-critical'' running gear defect as FRA believes that any defect to a running gear component is potentially safety-critical. In order to avoid confusion, FRA is providing an explicit definition of running gear defect. In the final rule, FRA is permitting the use of a qualified person to determine the safety and establish appropriate movement restrictions on continued use of equipment which involves non-running gear defects.

Definitions of the various types of trains covered by this final rule are extremely important to understand how FRA intends for the rule to be applied. The most general definition is that of a ''passenger train.'' The definition makes two points very clear. First, the final rule does not apply to tourist and excursion railroads; and, second, the provisions of the rule do apply to non-passenger carrying units included in a passenger train.

An important distinction highlighted in these definitions is the difference between a ''long-distance intercity passenger train'' and a ''short-distance intercity passenger train.'' ''Long-distance intercity passenger train'' 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 (Amtrak) Northeast Corridor between Washington D.C. and Boston, Massachusetts. ''Short-distance intercity passenger train'' means a passenger train that provides service exclusively on the Northeast Corridor or between cities that are not more than 125 miles apart. This distinction attempts to recognize the special set of operating conditions on the Northeast Corridor in light of the need to treat long-distance trains differently than short-distance trains. Additionally, APTA advised FRA that there are commuter rail systems that operate trains over 100 miles in distance on a single run, and thus recommended the use of the 125-mile distance in these definitions.

The definition of the term ''in service'' is modeled after the definition of that term in the Railroad Freight Car Safety Standards. *See* 49 CFR 215.5(e). Passenger equipment that is in service includes passenger equipment ''in passenger service,'' meaning ''carrying, or available to carry, fare-paying passengers,'' as well as all other passenger equipment unless it falls into one of the following four categories:

(a) Is being handled in accordance with §§ 238.15, 238.17, 238.305(c)(5), or 238.503(f), as applicable;

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

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

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

The term ''in service'' is important because if the train or passenger equipment is not in service, it is not subject to a part 238 civil penalty.

FRA has revised the definition of ''skin'' to reflect more appropriately its meaning in the broad sense as the outer covering of a fuel tank and a rail vehicle as a whole, not just the forward-facing end of a locomotive. Moreover, as noted below in the discussion of § 238.209 (Forward-facing end structure of locomotives), the exclusion from the definition of ''skin'' originally included as part of the definition itself proposed in the NPRM has instead been incorporated into the appropriate rule text for clarity at § 238.209 and § 238.409 (Forward end structures of power car cabs).

The last definition that warrants discussion is ''vestibule.'' FRA intends ''vestibule'' to mean an area of a passenger car that normally does not contain seating and that is used for passage between the seating area and the side exit doors. The definition of ''vestibule'' is important to determine the requirements for side door emergency-release mechanisms. For instance, a powered side door in a vestibule that is partitioned from the passenger compartment of a Tier I passenger car must have a manual override feature as specified in § 238.235 by December 31, 1999.

Section 238.7 Waivers

This section sets forth the procedures for seeking waivers of compliance with the requirements of this rule. Requests for such waivers may be filed by any interested party. In reviewing such requests, FRA conducts investigations to determine if a deviation from the general criteria can be made without compromising or diminishing rail safety. This section has been modified from that proposed in the 1997 NPRM to keep it consistent with the general waiver provisions contained in other Federal regulations issued by FRA. FRA recognizes that circumstances may arise when the operation of passenger equipment that does not meet the standards contained in this rule is appropriate and in the public interest.

Section 238.9 Responsibility for Compliance

General compliance requirements are contained in this section. Paragraph (a). Paragraphs (a)(1) and (a)(2) prohibit a railroad subject to part 238 from committing a series of specified acts with respect to a train or a piece of passenger equipment while the train or passenger equipment is in service if it has a condition that does not comply with part 238 or if it has not been inspected and tested as required by part 238. In particular, consistent with 49 U.S.C. chapter 203, paragraph (a)(1) imposes a strict liability standard with respect to violations of the safety appliance and power brake provisions of part 238. In addition to the acts prohibited by paragraph (a)(2) (that is, the use, haul, offering in interchange, or accepting in interchange of defective or not properly inspected equipment), paragraph (a)(1) prohibits a railroad from merely permitting the use or haul on its line of such equipment if it does not conform with the safety appliance and power brake provisions. *See* § 238.3(b). By contrast, paragraph (a)(2) imposes a lower standard of liability for using, hauling, delivering in interchange, or accepting in interchange a train or passenger equipment that is defective or not properly inspected, in violation of another provision of this part; a railroad subject to this part is liable only if it knew, had notice, or should have known of the existence of either the defective condition of the equipment or the failure to inspect and test. Finally, paragraph (a)(3) establishes a strict liability standard for noncompliance with any other provision of this part.

Paragraph (b). In accordance with the ''use'' or ''haul'' language previously contained in the Safety Appliance Acts (49 U.S.C. chapter 203) and with FRA's general rulemaking authority under the Federal railroad safety laws, FRA in paragraph (b) makes clear that passenger equipment will be considered ''in use'' prior to departure but after it receives or should have received the necessary tests and inspections required for movement. FRA will no longer wait for a piece of equipment with a power brake defect to be hauled before issuing a violation, a practice frequently criticized by the railroads. FRA believes that this approach will increase FRA's ability to prevent the movement of defective equipment that creates a potential safety hazard to both the public and railroad employees. FRA does not feel that this approach increases the railroads' burden since equipment should not be operated if it is found in defective condition in the pre-departure tests and inspections, unless permitted by the regulations.

Paragraph (c). This paragraph clarifies FRA's position that the requirements contained in this final rule are applicable not only to any ''railroad'' subject to this part but also to any ''person,'' as defined in § 238.5, that performs any function required by this final rule. Although various sections of the final rule address the duties of a railroad, FRA intends that any person who performs any action on behalf of a railroad or any person who performs any action covered by the final rule is required to perform that action in the same manner as required of a railroad or be subject to FRA enforcement action. For example, private car owners and contract shops that perform duties covered by these regulations would be required to perform those duties in the same manner as required of a railroad.

Section 238.11 Civil Penalties

This section identifies the civil penalties that FRA may impose upon any person, including a railroad or an independent contractor providing goods or services to a railroad, that violates any requirement of this part. These penalties are authorized by 49 U.S.C. 21301, 21302, and 21304. The penalty provision parallels penalty provisions included in numerous other safety regulations issued by FRA. Essentially, any person who violates any requirement of this part or causes the violation of any such requirement will be subject to a civil penalty of at least $500 and not more than $11,000 per violation. Civil penalties may be assessed against individuals only for willful violations, and where a grossly negligent violation or a pattern of repeated violations creates an imminent hazard of death or injury to persons, or causes death or injury, a penalty not to exceed $22,000 per violation may be assessed. In addition, each day a violation continues will constitute a separate offense. Furthermore, a person may be subject to criminal penalties under 49 U.S.C. 21311 for knowingly and willfully falsifying reports required by these regulations. FRA believes that the inclusion of penalty provisions for failure to comply with the regulations is important in ensuring that compliance is achieved. The final rule includes a schedule of civil penalties as appendix A to this part. Because the penalty schedule is a statement of policy, notice and comment was not required prior to its issuance. *See* 5 U.S.C. 553(b)(3)(A).

It should be noted that this section has been modified slightly from that proposed in the 1997 NPRM. The modifications were made to address the statutory requirements contained in the Federal Civil Penalties Inflation Adjustment Act of 1990, Pub. L. 101–410 Stat. 890, 28 U.S.C. 2461 note, as amended by the Debt Collection Improvement Act of 1996, Pub. L. 104–134, April 26, 1996, which required agencies to adjust for inflation the maximum civil monetary penalties within the agencies' jurisdiction. Consequently, the resulting $11,000 and $22,000 maximum penalties were determined by applying the criteria set forth in sections 4 and 5 of the statute to the maximum penalties otherwise provided for in the Federal railroad safety laws.

Section 238.13 Preemptive Effect

Section 238.13 informs the public as to FRA's views regarding what will be the preemptive effect of the final rule. While the presence or absence of such a section does not in itself affect the preemptive effect of a final rule, it informs the public about the statutory provision which governs the preemptive effect of the rule. Section 20106 of title 49 of the United States Code provides that all regulations prescribed by the Secretary relating to railroad safety preempt any State law, regulation, or order covering the same subject matter, except a provision necessary to eliminate or reduce an essentially local safety hazard that is not incompatible with a Federal law, regulation, or order and that does not unreasonably burden interstate commerce. With the exception of a provision directed at an essentially local safety hazard, 49 U.S.C. 20106 will preempt any State regulatory agency rule covering the same subject matter as the regulations in this final rule.

Section 238.15 Movement of Passenger Equipment With Defective Power Brakes

This section contains the requirements for movement of passenger equipment with a power brake defect without civil penalty liability under this part. (Railroads remain liable, however, ''in a proceeding to recover damages for death or injury of a railroad employee arising from the movement of'' the defective equipment. *See* 49 U.S.C. 20303(c).) A ''power brake defect,'' as defined in paragraph (a), ''is a condition of a power brake component, or other primary brake component, that does not conform with this'' rule. The term does not include a failure to properly inspect such a component.

Labor representatives objected to FRA's determination that the term ''power brake defect'' does not include a failure to inspect such a component. These commenters claim that FRA's exclusion of the failure to properly inspect a brake component eliminates an important means of enforcement necessary to ensure that proper power brake inspections are performed. It is claimed that by excluding the failure to inspect from being a power brake defect, FRA has eliminated any incentive for railroads to ensure that trains have operative brakes because there will be little financial repercussion to continuing to use improperly inspected equipment.

FRA believes that the concern raised by certain labor representatives regarding FRA's definition of ''power brake defect'' under this section is due to a lack of understanding of the rule as well as a misunderstanding of the existing regulations. Under the current power brake regulations the unit of violation for failure to inspect is the train not individual cars, although FRA can take a separate violation for each car containing a defective condition upon departure after the train received or should have received an initial terminal inspection or for each car not identified as defective after the performance of an intermediate inspection. Moreover, the failure to inspect a piece of equipment cannot be cured through any of the provisions contained in this final rule regarding the movement of defective equipment. Thus, if a railroad fails to inspect a piece of equipment as required, the railroad cannot avoid civil penalty liability by moving the equipment in accordance with the movement for repair provisions. Furthermore, the final rule contains specific civil penalties for a railroad's failure to perform inspections as required. Therefore, railroads will also continue to be subject to potential civil penalty for any car found in defective condition after it has performed or should have performed a Class I or Class IA brake test, and for any car not properly moved or identified as defective at other times.

The final rule also retains the provision stating that passenger equipment will be considered ''in use'' prior to departure but after it has received or should have received an inspection required by this part. *See* § 232.9. Thus, FRA inspectors will no longer have to wait until a piece of equipment departs a location before issuing a civil penalty, a practice continually criticized by both labor and railroad representatives. In addition, this final rule provides FRA inspectors the ability to issue Special Notices for Repair, which enable an FRA inspector to remove an unsafe piece of equipment from service until appropriate action is taken by the railroad. *See* Amendments to 49 CFR part 216. This enforcement tool is not currently available to FRA inspectors in the area of power brakes and mechanical components on passenger equipment and could be used in circumstances where passenger equipment is not inspected prior to being placed in service. Consequently, the final rule not only retains all of the enforcement tools available to FRA under the current regulations but includes other methods for ensuring compliance by the railroads and provides both a financial and operational incentive for railroads to properly inspect passenger equipment.

Paragraph (b)(1). This paragraph addresses the movement for repair of equipment with a power brake defect found during a Class I or IA brake test or, for Tier II equipment, the equivalent of a Class I or IA brake test. This paragraph allows railroads the flexibility to move passenger equipment with a power brake defect found during such a test if the following three conditions are satisfied: (1) If the train is moved for purposes of effecting repair of the defect, without passengers; (2) the applicable operating restrictions set forth in paragraph (d) are complied with; and (3) the information concerning the defect is recorded on a tag affixed to the equipment or in an automated defect tracking system as specified in paragraph (c)(2).

Paragraph (b)(2). This paragraph permits railroads to move, for purposes of scrapping or sale, passenger equipment with a power brake defect found during a Class I or IA brake test (or the Tier II equivalent) if each of the following conditions is satisfied: if the movement is without passengers, if the speed of the movement is 15 mph or less, and if the railroad's air brake or power brake instructions are followed when making the movement. This provision allows railroads to move surplus equipment without having to request permission for one-time moves from FRA, as is currently required. FRA has not had any serious safety concerns with the methods currently used by railroads to move this equipment and does not believe its limited resources should be tied up in approving these types of moves.

Paragraph (c), generally. This paragraph addresses the use of passenger equipment with a power brake defect that develops en route from a location where a Class I or IA brake test (or the Tier II equivalent) was performed on the equipment. The two basic requirements are that, at the location where the railroad first finds the defect, specified information (such as the nature of the defect and the destination where the defect will be repaired) must be placed on tags attached to the equipment or in a computer tracking system and that the railroad must observe the applicable operating restrictions in paragraph (d). A third requirement, found in paragraph (c)(4), is a special conditional requirement, applying only if the defect causes any brakes to be cut out or renders the brakes inoperative. This provision was slightly modified from what was proposed in order to prevent a railroad from avoiding the requirements contained in this subsection by simply not cutting-out an inoperative brake. Consequently, the language was modified so that the provision includes situations where a defect renders the brakes inoperative, not just situations where brakes are cut-out.

Paragraph (c)(2) requires that equipment being hauled for repairs be adequately identified. Currently, there is no requirement that equipment with defective power brakes be tagged or otherwise identified, although most railroads voluntarily engage in such activity. Furthermore, the current regulations regarding freight cars and locomotives contain tagging requirements for the movement of equipment not in compliance with those parts. *See* 49 CFR 215.9 and 229.9. Consequently, FRA is requiring the identification of equipment with defective power brakes through either the traditional tags which are placed in established locations on the equipment or by an automated tracking system developed by the railroad. Certain information must be contained whichever method is used by a railroad. FRA believes that the tagging or automated tracking requirements add reliability, accountability, and enforceability for the timely and proper repair of equipment with defective power brakes.

FRA is retaining the requirement that equipment found with conditions not in compliance with this part must be appropriately tagged or recorded in an automated tracking system. Although FRA is sensitive to the concerns raised by labor representatives regarding the use of automated tracking systems, FRA believes that provisions must be provided to allow railroads to take advantage of existing and developing technologies regarding the electronic maintenance and retention of records. Although railroad and FRA inspectors may require additional training on the use of electronic records, FRA believes that the use of such a medium to track defective equipment can expedite the identification and repair of defective equipment and, thus, reduce the time that defective equipment is operated in passenger service. In response to labor's concerns, a new paragraph (c)(3) has been added which contains a provision giving FRA the ability to monitor and review a railroad's automated tracking system and provides FRA the ability to prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of directly tagging defective equipment 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 and monitor the movement of defective equipment. urthermore, if the automated tracking system developed and implemented by a railroad does not accurately and adequately record the information required by this part, the railroad will be in violation of the movement for repair provisions and subject to civil penalty liability.

In addition, under paragraph (c)(4), if the defect causes the brakes on the equipment to be cut out, then the railroad must first find out what percentage of the power brakes in the train are cut out or inoperative in some other way, using the formula in paragraph (d)(1). Next, the railroad must notify the person responsible for the movement of trains of the percentage of operative brakes and the movement restrictions imposed by paragraph (d), inform the railroad's mechanical department about the brake defect, and walk the train to confirm the percentage of operative brakes at the next point where it is safe to do so. Slight modification was made to paragraph (c)(4)(ii) and (iii) replacing the term ''dispatcher'' with the phrase ''person responsible for the movement of trains'' as some railroads do not use the term dispatcher and the term mechanical ''desk'' was removed as it is unnecessary and covered by the term ''mechanical department.''

Paragraph (d)(1). This paragraph explains the term ''inoperative power brakes'' and contains a new method for calculating the percentage of operative power brakes (operative primary brakes) in a train. Regarding the term itself, a cut-out power brake is an inoperative power brake, but the failure or cutting out of a secondary brake system (as defined in § 238.5) does not result in inoperative power brakes. For example, failure of dynamic brakes does not render a power brake inoperative unless the dynamic brakes are in fact primary brakes. Although the statute discusses the percentage of operative brakes in terms of a percentage of vehicles, the statute was written nearly a century ago and at that time the only way to cut out the brakes on a car or locomotive was to cut out the entire unit. *See* 49 U.S.C. 20302(a)(5)(B). Today, virtually every piece of equipment used in passenger service can have the brakes cut out on a per-truck or per-axle basis. Consequently, FRA is merely providing a method of calculating the percentage of operative brakes based on the design of passenger equipment used today, and, thus, a means to more accurately reflect the true braking ability of the train as a whole. FRA believes that the method of calculation contained in this final rule is consistent with the intent of Congress when it drafted the statutory requirement and simply recognizes the technological advancements made in braking systems over the last century. Consequently, FRA intends to require the percentage of operative brakes to be determined by dividing the number of axles in the train with operative brakes by the total number of axles in the train. Furthermore, for equipment utilizing tread brake units (TBU), FRA requires that the percentage of operative brakes be determined by dividing the number of operative TBUs by the total number of TBUs.

Paragraphs (d)(2)–(d)(4), generally. These paragraphs contain various speed and other operating restrictions based on the percentage of operative brakes in order to permit passenger railroads the flexibility to efficiently move passengers without compromising safety. FRA believes that the movement restrictions contained in these paragraphs actually enhance the safety of the riding public. The requirements retain the basic principle that a train carrying passengers shall not depart a location where major brake inspections or tests are performed on a train unless the train has 100 percent operational brakes.

As previously noted in the general discussion, FRA has determined that some minor changes need to be made to the requirements proposed in the 1997 NPRM regarding the movement of equipment with defective power brakes. In order to avoid the legal implications involved with employing the statutory authority contained at 49 U.S.C. 20306 for exempting equipment from the statutory requirements related to safety appliances and power brakes, and because railroad representatives acknowledged that the flexibility provided through reliance on the exemption is minimal, FRA will not rely on the statutory exemption provision contained at 49 U.S.C. 20306 in this final rule and has modified the movement for repair provisions accordingly.

FRA will retain the exemption proposed in the 1997 NPRM for passenger train operations from a long-standing agency interpretation that prohibits the movement of a train for repairs under 49 U.S.C. 20303 if less than 85 percent of the train's brakes are operative. This interpretation is based on a 1910 ICC order codified at 49 CFR 232.1. FRA believes that this requirement is overly restrictive when applied to passenger train operations as many passenger operations utilize a small number of cars in their trains and the necessity to cut out the brakes on just one car can easily result in noncompliance. FRA believes that the retention in this final rule of the proposed speed restrictions will fully compensate for the loss of brakes on a minority of cars. FRA rejects the BRC's recommendation that passenger trains with defective brakes be permitted to move no further than the next passenger station because such a stringent requirement is unnecessary, more restrictive than the current statutory mandate regarding the movement of defective brake equipment, and is radically counter to the way passenger trains currently handle defective equipment.

FRA is retaining those portions of the proposed movement for repair requirements that it believes are fully consistent with the existing statutory provisions regarding the movement of equipment with power brake defects and has revised those that are contrary to the statutory provisions. Therefore, passenger trains operating with 75–99 percent operative brakes will not be permitted to travel to the next forward terminal as proposed, but will be permitted to travel only to the next forward location where the necessary repairs to the brake equipment can be effectuated as mandated in the existing statute. In FRA's view, all of the other proposed methods for moving defective power brake equipment are consistent with and are in accordance with the current statutory requirements and will be retained. For example, FRA is retaining the provision which permits a passenger train with 50–75 percent operative brakes to be moved at reduced speeds to the next forward passenger station. Although the percentage of operative brakes is lower than currently permitted by FRA's longstanding agency interpretation (which FRA believes is fully compensated for by the proposed speed restrictions), FRA believes that the movement of the defective equipment to the next passenger station is in accordance with the statutory requirement as the safety of the passengers must be considered in determining the nearest location where necessary repairs can be made. In addition, permitting passenger trains to continue to the next forward location where the necessary repairs can be performed is also consistent with the statutory requirement as such movement is necessary to ensure the safety of the traveling public by protecting them from the hazards incident to performing movements against the current of traffic and recognizes the hazards incident to overcrowding platforms and trailing trains. Furthermore, retention of the movement provisions related to long-distance intercity passenger trains and long-distance Tier II equipment is consistent with the current statutory requirements as these provisions permit the movement of defective brake equipment on these trains only to the next passenger station or the next repair location, with various speed restrictions depending on the percentage of operative brakes.

FRA recognizes that there are major differences in the operations of commuter or short-distance intercity passenger trains, and long-distance intercity passenger trains. Commuter and short-distance intercity passenger trains tend to operate for fairly short distances between passenger stations and generally operate in relatively short turn-around service between two terminals several times in any given day. On the other hand, long-distance intercity passenger trains tend to operate for long distances, with trips between the beginning terminal and ending terminal taking a day or more and traversing multiple States with relatively long distances between passenger stations. Consequently, the final rule contains slightly different requirements with regard to the movement of defective brake equipment in long-distance intercity passenger trains.

FRA believes that passenger railroads can safely and efficiently operate trains with en route brake failures under the strict set of conditions in this final rule. FRA has long held that the industry can safely operate trains at normal track speeds with as low as 85 percent effective brakes as long as the inoperative brakes were due to failures which occurred en route or due to defective cars being picked up en route and being moved for repairs. The only change in this final rule to current practice is the additional flexibility for certain passenger operations to move their equipment with a lower percentage of operative brakes, under strict speed restrictions, and recognition of the safety need to allow passenger trains to move to the nearest forward location capable of performing the repairs.

Paragraph (d)(2). This paragraph contains operating requirements for the movement of any passenger train that develops en route brake failures resulting in 74 to 50 percent operative brakes. In these circumstances, FRA will allow the train to proceed only to the next passenger station at a reduced speed, not to exceed 20 mph, to discharge passengers before proceeding without passengers to the nearest location where the necessary repairs can be made. This provision recognizes the dangers of unloading passenger at locations other than passenger stations by allowing railroads to move the equipment to a location with the facilities to handle the discharge of passengers. Furthermore, engineering evidence and test data demonstrate that the reduced speed more than compensates for the reduced braking force. At the reduced speed, even with only 50 percent effective brakes, a train is able to stop in a much shorter distance than the same train traveling at the maximum operating speed with 100 percent operative brakes.

Paragraphs (d)(3)(i) and (ii). FRA will also permit commuter, short-distance intercity, and short-distance Tier II passenger trains experiencing en route brake failures resulting in 99 to 75 percent operative brakes to continue in service only to the next forward location where the necessary repairs can be effectuated. FRA will permit these passenger trains to continue in service past a repair location to the next forward passenger station only if the repair location does not have the facilities to safely unload passengers. However, FRA will require the speed of the train with 84 to 75 percent operative brakes to be reduced to 50 percent of the train's maximum operating speed or 40 mph, whichever is less. Engineering evidence and test data demonstrate that the reduced speed more than compensates for the reduced braking force. At the reduced speed, even with only 75 percent effective brakes, a train is able to stop in a much shorter distance than the same train traveling at the maximum operating speed with 100 percent operative brakes. APTA also presented engineering evidence and test data that demonstrated that stopping distances remained well within signal spacing distances with a large margin of safety even for trains with as low as 85 percent effective brakes. Consequently, FRA will not impose speed restrictions on trains operating with 85 to 99 percent operative brakes.

Paragraph (d)(4). This paragraph contains the operating restrictions on moving equipment with defective brakes in long-distance intercity passenger trains. This paragraph permits the movement of defective brake equipment in these trains only to the nearest forward location designated as a repair location for this equipment by the operating railroad in the list required by § 238.19(d). FRA will also permit long-distance intercity passenger trains to continue in service past a designated repair location to the next forward passenger station only if the designated repair location does not have the facilities to safely unload passengers. Although FRA is permitting the continued operation of long-distance intercity passenger trains that develop en route brake failures resulting in 99 to 85 percent operative brakes at normal speeds, the final rule contains a speed restriction of no greater than 40 mph when the en route brake failures result in 84 to 75 percent operative brakes. Therefore, these trains gain flexibility in being permitted to move a greater percentage of defective equipment than currently allowed and are able to move that equipment to the next forward repair location rather than the ''nearest'' repair location as currently required. See 49 U.S.C. 20303(a). As noted previously, FRA believes that the safety of the traveling public mandates the flexibility of permitting passenger trains to continue to the next forward repair location or passenger station because requiring trains to reverse directions and perform back hauls to the nearest repair location increases the risk of collision on the railroad.

In this final rule, FRA is retaining the proposed requirement that operators of long-distance passenger trains designate the locations where repairs can be conducted on the equipment. Although FRA agrees that this provision puts the control of what locations constitute repair locations in the hands of the railroad, FRA believes that the operators of these long-distance intercity trains are in the best position to determine which locations have the necessary expertise to handle the repairs of the somewhat advanced braking systems utilized in passenger trains. Due to the unique technologies used on the brake systems of these operations and the unique operating environments, the facilities and personnel necessary to conduct proper repairs on this equipment are somewhat specialized and limited. Moreover, FRA is retaining the broad performance-based requirement that railroads operating this equipment designate a sufficient number of repair locations to ensure the safe and timely repair of the equipment. Contrary to the beliefs of some labor commenters, FRA believes that this performance standard provides FRA sufficient grounds to institute civil penalty enforcement actions or take other enforcement actions if, based on its expertise and experience, FRA believes the railroad is failing to designate an adequate number of repair locations.

Furthermore, rather than attempt to develop a standard applicable to all situations in the context of short-distance intercity and commuter trains, which FRA does not believe can be accomplished, FRA will approach the issue of what constitutes the next forward location where repairs can be effectuated based on a case-by-case analysis of each situation. FRA believes that its field inspectors are in the best position to determine whether a railroad exercised good faith in determining when and where to move a piece of defective brake equipment. In making these determinations both the railroad as well as FRA's inspectors must conduct a multi-factor analysis based on the facts of each case. In determining whether a particular location is a location where necessary repairs can be made or whether a location is the next forward repair location in a passenger train context, the accessibility of the location, the ability to safely make the repairs at that location, and the safety of the passengers are the overriding factors that must be considered in any analysis. These factors have a multitude of sub-factors which must be considered, such as: the type of repair required; the safety of employees responsible for conducting the repairs; the safety of employees responsible for getting the equipment to or from a particular location; the switching operations necessary to effectuate the move; the railroad's recent history and current practice of making repairs (brake and non-brake) at a particular location; relevant weather conditions; potential overcrowding of passenger platforms; and the overcrowding of trailing trains.

Paragraph (e). This paragraph contains the operating restrictions on passenger trains with inoperative power brakes on the front or rear unit of the train. Similar provisions were contained in the 1997 NPRM and included in each of the various operating restriction contained in paragraph (d). In order to make the rule easier to understand, FRA has added this paragraph to the final rule and removed the repetitious language from each of the provisions contained in paragraph (d). As noted in the general preamble discussion above, FRA is slightly modifying the provisions related to the operation of trains with defective brakes on the front or rear car. In the 1997 NPRM, FRA proposed that if the power brakes on the front or rear unit become inoperative then a qualified person must be stationed at the handbrake on the unit. *See* 62 FR 49797. FRA recognizes that in some instances the handbrake on a car located at the front or rear of a train may not be accessible to a member of the train crew or may be located outside the interior of the car and, thus, unsafe for a crew member to operate while the train is in motion. FRA also recognizes that in many circumstances when a car at the front or rear of a train has inoperative brakes certain speed restrictions should be placed on the train; however, FRA believes that railroads are in the best position to determine what the appropriate speed restriction should be given the circumstances involved. Therefore, FRA is modifying the requirements for the use of such cars and paragraph (e) requires that appropriate speed restrictions be imposed with inoperative brakes on the front or rear unit and that trains containing equipment with inaccessible handbrakes or with handbrakes located outside the interior of a car be operated at restricted speed (i.e. 20 mph) and that the defective equipment be removed or repositioned in the train at the first possible location. The operating restrictions contained in this paragraph are consistent with current industry practice and should not impose any additional burden to the industry.

It should be noted that the provisions contained in 49 U.S.C. 20303(c) continue to remain applicable to a railroad when hauling equipment with defective or insecure power brakes or other safety appliances pursuant to the requirements contained in this final rule. This section of the statute contains the liability provisions attendant with the movement of equipment with defective or insecure safety appliances, including power brakes.

Section 238.17 Movement of Passenger Equipment With Other Than Power Brake Defects

This section contains the requirements for the movement of passenger equipment with a condition not in compliance with part 238, excluding a power brake defect and including a safety appliance defect, without civil penalty liability under this part. (Railroads remain liable, however, under 49 U.S.C. 20303(c), as described in the discussion of the previous section.)

As previously noted, there are currently no statutory or regulatory restrictions on the movement of passenger cars with defective conditions that are not power brake or safety appliance defects. The provisions contained in this section are similar to the provisions for moving defective locomotives and freight cars currently contained in 49 CFR 229.9 and 215.9, respectively. As these provisions have generally worked well with regard to the movement of defective locomotives and freight cars and in order to maintain consistency, FRA has modeled these movement requirements on those existing requirements. FRA is allowing passenger railroads the flexibility to continue to use equipment with non-safety-critical defects until the next scheduled calendar day exterior mechanical inspection. However, FRA intends the calendar day mechanical inspection to be the tool used by railroads to repair all reported defects and to prevent continued use of defective equipment to carry passengers. (Compare § 238.17(b) with § 238.17(c).) FRA intends for 49 CFR 229.9 to continue to govern the movement of locomotives used in passenger service which develop defective conditions, not covered by part 238, that are not in compliance with part 229. Part 229 will continue to cover (non-steam) locomotives that are used by the tourist railroads until such railroads are covered by part 238.

After review of the comments submitted and provided orally at the Working Group meetings, FRA is making some modest changes in this final rule regarding the movement of equipment with non-power brake defects. FRA agrees with the comments of railroad representatives that the 1997 NPRM may have been over-reaching in requiring a QMP to make a determination regarding the safety of moving a piece of defective equipment for any of the mechanical components addressed in this regulation. However, FRA also agrees with the comments submitted by labor representatives that railroads should not determine what components are considered safety-critical. Therefore, FRA will require a determination regarding the safety of moving a piece of equipment by a QMP (as discussed above) whenever a potential running gear defect is involved. FRA rejects the language proposed by APTA that the defect be a potentially ''safety-critical'' running gear defect as FRA believes that any defect to a running gear component is potentially safety-critical. In order to avoid confusion, FRA is providing an explicit definition of ''running gear defect.'' FRA is defining the term to mean any condition not in compliance with this part which involves a truck component, a propulsion system component, a draft system component, a wheel or a wheel component. In this final rule, FRA will permit the use of a qualified person to determine the safety and establish appropriate movement restrictions on continued use of equipment which involves non-running gear defects.

In paragraph (b), FRA is providing very limited flexibility to railroads to operate defective equipment from a location where a calendar day mechanical inspection was performed in order to effectuate repairs. FRA intends for the calendar day mechanical inspection to be as comprehensive as possible and to be the time when all defective components are identified and repaired. In order to ensure that these daily inspections are performed by highly qualified inspectors, FRA has provided the railroads with considerable flexibility to perform these inspections at locations that are best suited to a quality and comprehensive inspection. Therefore, FRA will permit the movement of defective equipment from these inspection locations only with very stringent restrictions. Equipment containing running gear defects may only be moved from such locations if it is not in passenger service and is in a non-revenue train. Equipment containing non-running gear defects may be moved in a revenue train provided the equipment is locked-out and empty, except that the equipment may be used and occupied by a member of the train crew to the extent necessary to safely operate the train. Any defective equipment moved from such locations must also be properly identified as required in paragraph (c)(4) and moved in accordance with any movement restriction imposed. FRA believes these stringent movement restrictions will provide railroads limited flexibility to move defective equipment to a location where it can best be repaired but will limit a railroad's desire or ability to move defective equipment from these inspection locations and will encourage the performance of the calendar day mechanical inspections at locations where repairs to equipment can be conducted.

Paragraph (c) contains the requirements regarding the movement of passenger equipment that develops a condition not in compliance with this part, other than a safety appliance defect, while en route to its destination after its calendar day mechanical inspection was performed. This paragraph has been slightly modified from that proposed in the 1997 NPRM in order to recognize the differing requirements for running rear defects and non-running gear defects as noted in the discussion above. Paragraph (c)(1) retains the requirement that the QMP may make the determination regarding the continued use of equipment containing a potential running gear defect based on the description provided by on-site personnel. Although FRA recognizes the concerns raised by labor representatives, FRA believes that the rule must recognize the reality of current operations and acknowledge the fact that mechanical-type personnel are not readily available at every location on a railroad's line of road. Furthermore, when such off-site determinations are made the rule requires that the equipment only be moved to the next forward location where the equipment can be inspected by a QMP to verify the description of the defect provided by the on-site personnel. Paragraph (c)(2) also permits determinations regarding the continued use of equipment containing non-running gear defects to be made by a qualified person based on a description provided by on-site personnel. In cases where non-running gear defects are involved, FRA will not require that the equipment be inspected at the next forward location by a qualified person as the safety impact of such defects should be readily identifiable based upon a description by on-site personnel and can be adequately addressed via radio communication.

Paragraph (c)(4) contains the requirements for identifying defective equipment. This paragraph permits the identification and tracking of defective equipment in either of two ways. One option is to tag the equipment in a manner similar to what is currently required under § 215.9 for freight cars. The second option is to record the specified information in an automated tracking system. Although FRA is sensitive to the concerns raised by labor representatives regarding the use of automated tracking systems, FRA believes that provision must be made to allow railroads to take advantage of existing and developing technologies regarding the electronic maintenance and retention of records. Although railroad and FRA inspectors may require additional training on the use of electronic records, FRA believes that the use of such a medium to track defective equipment can expedite the identification and repair of defective equipment and, thus, reduce the time that defective equipment is operated in passenger service. In response to labor's concerns, paragraph (c)(5) has been added to this final rule and contains a provision which gives FRA the ability to monitor and review a railroad's automated tracking system and provides FRA the ability to prohibit or revoke a railroad's ability to utilize an automated tracking system in lieu of directly tagging defective equipment 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 and monitor the movement of defective equipment. Furthermore, if the automated tracking system developed and implemented by a railroad does not accurately and adequately record the information required by this part, the railroad will be in violation of the movement for repair provisions contained in this section and subject to civil penalty liability.

Paragraph (d) contains a requirement that was inadvertently omitted from the 1997 NPRM but which is integral to the movement of equipment which has been involved in a derailment. This paragraph addresses the inspection of roller bearings on a car whose truck is involved in a derailment. As the proper operation and condition of a vehicle's roller bearing is a key element in ensuring the safe movement of the vehicle, FRA believes it is vital that this provision be included in these final regulations. The added requirement prohibits a railroad from continuing in service a piece of passenger equipment that has a roller bearing whose truck was involved in a derailment unless the bearing is inspected and tested in accordance with the provisions stated. The added provision is identical to the requirement currently contained in 49 CFR § 215.115(b). Although the existing provision is applicable to freight cars, virtually every passenger train operation follows the provisions contained in that section prior to returning a piece of equipment to service after it was involved in a derailment and, thus, should not result in any added burden to the industry. FRA believes that the practice is critical to ensuring the proper operation of the roller bearing after a derailment occurs and should be incorporated into this final rule.

Paragraph (e) contains the special statutory restrictions on the movement of passenger equipment with a safety appliance defect, other than a power brake defect. FRA does not intend to alter the current statutory requirements contained in 49 U.S.C. 20303 regarding the movement of passenger equipment with defective or insecure safety appliances. *See* §§ 238.229, 238.429, 238.431. Consequently, in paragraph (e), FRA is requiring that passenger equipment that develops a defective or insecure safety appliance continue to be subject to all the statutory restrictions on its movement. Under the current statutory language—

> A vehicle that is equipped in compliance with this chapter whose equipment becomes defective or insecure nevertheless may be moved when necessary to make repairs * * * from the place at which the defect or insecurity was first discovered to the nearest available place at which the repairs can be made—
>
> (1) on the railroad line on which the defect or insecurity was discovered; or
>
> (2) at the option of a connecting railroad carrier, on the railroad line of the connecting carrier, if not farther than the place of repair described in clause (1) of this subsection.

49 U.S.C. 20303(a). It should be noted that the safety appliance requirements applicable to Tier I equipment merely references the Railroad Safety Appliance Standards (49 CFR part 231); however, FRA has mandated separate safety appliance requirements for Tier II passenger equipment. *See* §§ 238.429 and 238.431.

As noted previously, the statutory provisions related to the movement of equipment with defective or insecure safety appliances permit the movement of such equipment to the nearest location where the necessary repairs can be made. The determination of what constitutes the nearest location where the necessary repairs can be effectuated in a safety appliance context is identical to the analysis required when dealing with a power brake defect. In making these determinations both the railroad as well as FRA's inspectors must conduct a multi-factor analysis based on the facts of each case. In determining whether a particular location is a location where necessary repairs can be made or whether a location is the nearest repair location in a passenger train context, the accessibility of the location, the ability to safely make the repairs at that location, and the safety of the passengers are the overriding factors that must be considered in any analysis. These factors have a multitude of sub-factors which must be considered, such as: the type of repair required; the safety of the passengers if a move against the current of traffic is conducted; the safety of employees responsible for conducting the repairs; the safety of employees responsible for getting the equipment to or from a particular location; the switching operations necessary to effectuate the move; the railroad's recent history and current practice of making repairs (brake and non-brake) at a particular location; relevant weather conditions; potential overcrowding of passenger platforms; and the overcrowding of trailing trains. Therefore, in many circumstances trains will be permitted to continue to the next forward location where the necessary repairs can be performed as such movement is necessary to ensure the safety of the traveling public by protecting them from the hazards incident to performing movements against the current of traffic.

Section 238.19 Reporting and Tracking Defective Equipment

This section contains the reporting and tracking requirements that passenger railroads must maintain regarding defective passenger equipment. FRA is requiring that each railroad develop and maintain a system for reporting and tracking equipment defects. Paragraph (a) of this section requires that, for each equipment defect discovered by the railroad on equipment used by the railroad, the system record the following information: the number by which the equipment is identified, type of defect, when the defect occurred, the determination made by a qualified person or a qualified maintenance person on handling the equipment, the name of such person, any operating restrictions placed on the equipment, and finally how and when the defect was corrected. FRA has not identified any specific method or means by which a railroad should gather and maintain the required information. FRA believes that each railroad is in the best position to determine the method of obtaining the required information which is most efficient and effective based on its specific operation. Thus, railroads could maintain this information either in some type of written medium or electronically in conjunction with some type of automated tracking system.

FRA believes that the reporting and tracking of defective equipment is an essential feature of any effective system safety program. Railroad managers are able to utilize such systems to ensure that the railroad complies with safety regulations, does not use unsafe equipment, makes needed repairs, and has failure data to make reliability-based decisions on maintenance intervals. Furthermore, most passenger railroads currently have some sort of reporting and tracking system in place. FRA recognizes that some railroads may have to incur additional initial costs to develop or improve defect reporting and tracking systems; however, FRA believes these costs can be recouped through the increased operating efficiency that an effective recording and tracking system provides.

Paragraph (a) makes clear that railroads have this tracking system in place within 26 months after publication of the final rule in the **Federal Register**. APTA recommended that railroads be provided a two-year phase-in period for this requirement to become effective. As the requirements for tracking defective equipment are contingent on completion of a railroad's training of its employees, FRA will provide the same time period for implementation of the reporting and tracking system. However, FRA believes that APTA's recommendation was based on a misunderstanding that the defect tracking system had to be an automated electronic system. As the previous discussion makes clear, the defect tracking system need not be an electronic automated system but could consist of a written records retention system. Thus, even if a railroad needs two or more years to develop an automated tracking system, the railroad could utilize a written tracking system while the automated system is being developed. Virtually all railroads currently track their defective equipment by some means; FRA believes that these current methods of compiling data could be slightly modified to include—or already include—all of the information required by this section.

Paragraph (b) requires that railroads maintain the required information for a period equal to one periodic maintenance interval for each specific type of equipment. FRA believes that this minimum retention period will ensure that the records remain available when they are most needed, but will not place a burdensome record storage requirement on railroads. However, FRA strongly encourages railroads to keep these records for longer periods of time because they form the basis for future reliability-driven decisions concerning test and maintenance intervals.

In paragraph (d), FRA retains the previously proposed requirement that railroads operating long-distance passenger trains and Tier II passenger equipment maintain a list of the locations where repairs can be made to the equipment's power brake components. Although FRA agrees that this provision puts the control of what locations constitute repair locations in the hands of the railroad, FRA believes that the operators of these long-distance intercity trains and Tier II passenger equipment are in the best position to determine which locations have the necessary expertise to handle the repairs of the somewhat advanced braking systems utilized in these passenger trains. Due to the unique technologies used in the brake systems of these operations and the unique operating environments, the facilities and personnel necessary to conduct proper repairs on this equipment are somewhat specialized and limited. Moreover, this final rule retains the broad performance-based requirement that railroads operating this equipment designate a sufficient number of repair locations to ensure the safe and timely repair of the equipment. Contrary to the beliefs of some labor commenters, FRA believes that this performance standard provides FRA sufficient grounds to institute civil penalty enforcement actions or take other enforcement actions if, based on its expertise and experience, FRA believes the railroad is failing to designate an adequate number of repair locations.

Section 238.21 Special Approval Procedure

This section contains the procedures to be followed when seeking to obtain FRA approval of an alternative standard under §§ 238.103 (fire safety), 238.223 (fuel tanks), 238.309 (periodic brake equipment maintenance), 238.311 (single car test), 238.405 (longitudinal static compressive strength), or 238.427 (suspension system); for approval of alternative compliance under § 238.201 (covers structural standards other than the static end strength requirement); and for special approval of pre-revenue service acceptance testing plans as required by § 238.111. Procedures for obtaining FRA approval of inspection, testing, and maintenance programs for Tier II equipment under § 238.503 are found at § 238.505. FRA has revised this section in the final rule from that which was proposed in the NPRM, consistent with other changes made in the final rule.

FRA intends to entertain petitions for alternative compliance under § 238.201 to allow operation of equipment that complies with the static end strength requirement (§ 238.203) but does not fully comply with the other final standards in subpart C of part 238, provided the petitioner can demonstrate ''equivalent safety'' in that the equipment will operate at a level of safety that is at least equivalent to that afforded by the provision(s) of subpart C for which alternate compliance is sought. Equivalent safety may be afforded by features or measures that compensate for equipment that does not meet such standard(s) on its own. Equivalent safety is met when railroad employees, passengers, and the general public are no more at risk from passenger equipment that does not specifically meet the requirement(s) for which alternative compliance is sought, but is protected by compensating features or measures, than when the equipment specifically complies with the requirement(s) itself.

FRA recommends that the risk assessment portion of a railroad's system safety program be used to demonstrate equivalent safety. The burden would be on the petitioning railroad to perform a comparative risk assessment and to prove equivalent safety. FRA has experience with two instances involving different passenger equipment operations where a comparative risk assessment has been used successfully. Amtrak commissioned a comparative risk assessment between current Northeast Corridor operations and proposed operations involving the HST at speeds up to 150 mph. The risk assessment demonstrated that proposed countermeasures such as enhancements to the train control system and the increased structural strength and the crash energy management design of the HST should compensate for the increased operating speed. The comparative risk assessment quantitatively showed that, with the safety improvements included in the Amtrak plan, passengers were no more at risk travelling on the HST at 150 mph on the Northeast Corridor than if they were travelling on an existing Amtrak passenger train at a lesser speed on the same corridor.

The second instance is the proposed Florida Overland Express (FOX) operation of a French TGV high speed rail system in Florida that was being considered until January 1999. The State of Florida has withdrawn its support for the project, and work on the project has ceased. Nonetheless, FOX had performed a comparative risk assessment of three operations: the HST on the Northeast Corridor, the TGV on high speed lines in France, and the proposed FOX operation in Florida. *See* FRA Docket: RM Pet. 97–1. The analysis showed the TGV operation in France to pose less risk to passengers than the HST on the Northeast Corridor, and the proposed FOX operation to be even safer than the TGV in France. The FOX risk assessment suggested that collision avoidance provided by a dedicated right-of-way with no grade crossings more than compensated for the increased speed and decreased structural strength of the proposed equipment.

FRA cites these two instances as examples of what is expected to demonstrate equivalent safety for proposed operations when a petition for alternative compliance is submitted in accordance with § 238.201. Any such analysis would need to be predicated on a detailed engineering analysis of the crashworthiness of the vehicles proposed to be employed, permitting FRA to assess the gap in safety between those vehicles and equipment built to the specific requirements of subpart C. FRA would also expect an analysis showing the effectiveness of clearly compensating features or measures, such as closing grade crossings, providing absolute separation of lighter rail equipment from heavy rail equipment, or using highly capable signal and train control systems that significantly reduce the probability of accidents caused by human error. FRA would provide advice and guidance to organizations wishing to demonstrate equivalent safety, but the burden of performing a comparative risk assessment and establishing that the operation provides equivalent safety is on the entity proposing to operate equipment that does not fully comply with the standards in subpart C.

Section 238.23 Information Collection

This provision shows which sections of this part have been approved by the Office of Management and Budget (OMB) for compliance with the Paperwork Reduction Act of 1995. *See* 44 U.S.C. 3501 *et seq.* A more detailed discussion of the information collection requirements in this part is provided below.

Subpart B—Safety Planning and General Requirements

Section 238.101 Scope

This subpart contains safety planning requirements and other generally applicable requirements for all passenger equipment subject to this part.

Section 238.103 Fire Safety.

This section contains the fire safety planning and analysis requirements for passenger equipment, as well as the requirements for the materials used in passenger equipment. This section is comprised of parts of proposed sections 238.105 and 238.115 in the NPRM, which FRA has combined together in this final rule as APTA had suggested in its comments.

Paragraph (a)(1) contains the fire safety requirements for materials used in constructing passenger cars and cabs of locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. Such materials shall comply with 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's Associate Administrator for Safety under the procedures specified in section 238.21. Paragraph (a)(1) is based on proposed § 238.115(a)(1) in the NPRM. *See* 62 FR 49803.

In the final rule, paragraph (a)(1) expressly applies to materials used in constructing a passenger car or a locomotive cab, unlike the wording of proposed § 238.115(a)(1) in the NPRM, *see* 62 FR 49803, which expressly applied to all materials used in constructing the *interior* of a passenger car or a locomotive cab. As proposed in the NPRM, of course, such materials were required to meet the test performance criteria for flammability and smoke emission characteristics contained in Appendix B to part 238, *see* 62 FR 49823–4, or alternative standards after FRA approval. FRA has removed the word ''interior'' from this paragraph in the final rule because its use is inconsistent with the requirements of part 238 as a whole. In the NPRM, proposed Appendix B itself provided test performance criteria for a category of materials entitled, ''Exterior Plastic Components''; specifically, ''End Cap'' and ''Roof Housings'' under the function of material column in the table. Further, proposed Appendix B separately provided test methods and performance criteria for a function of material termed ''Exterior Boxes'' under the category entitled, ''Component Box Covers.'' As expressed in the NPRM, FRA intended that ''exterior'' materials used in constructing passenger cars and locomotive cabs comply with test performance criteria for flammability and smoke emission characteristics.

In the final rule, materials used in constructing passenger cars and locomotive cabs are required to meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B, or alternative standards after FRA approval. As a result, with the exception of any alternative standards approved by FRA, the terms of Appendix B govern which testing of materials is, or is not, required as a threshold inquiry. Whether materials are physically located on the exterior or in the interior of a passenger car, for example, such materials are subject to testing for flammability and smoke emission characteristics if so required by the terms of Appendix B. Overall, FRA believes that the final rule more appropriately specifies the flammability and smoke emission testing requirements for materials used in constructing passenger cars and locomotive cabs, without unnecessarily burdening railroads. In particular FRA notes that, unlike the NPRM, Appendix B in the final rule provides express exceptions from the need to test materials used in constructing passenger cars and locomotive cabs under certain conditions. (See the section-by-section analysis discussion of Appendix B to part 238, explaining the changes to Appendix B.)

In its comments on the NPRM, APTA recommended that the requirements of paragraph (a)(1) apply to passenger cars and cabs of locomotives ordered on or after one year following the effective date of the final rule. APTA's suggested rule text did not contain an outside limit on the placement in service of new passenger equipment not meeting the requirements of paragraph (a)(1), although ordered within the permitted time. However, FRA believes that an outside limit on the placement in service of new passenger equipment not meeting the requirements of this section needs to be retained so as not to delay unnecessarily the implementation of the rule.

Under paragraph (a)(2), on or after November 8, 1999 materials introduced into a passenger car or a locomotive cab, during any kind of rebuild, refurbishment, or overhaul of such passenger equipment, shall meet the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B, or alternative standards after FRA approval as specified in this rule. Originally, FRA proposed that the test performance criteria for flammability and smoke emission characteristics apply as of the effective date of the final rule to materials used in refurbishing passenger car and locomotive cab interiors. FRA has removed the express reference to passenger car and locomotive cab interiors for the reasons stated in the above discussion of paragraph (a)(1).

In response to the NPRM, APTA commented that it may support a rule requiring the materials selection criteria to be used when the interiors of existing passenger equipment are refurbished, if the term refurbish were carefully defined in the Working Group meetings. In either case, APTA recommended that this provision should apply as of one year following the effective date of the final rule. FRA has refined paragraph (a)(2) to address APTA's concern: Simply put, if material is introduced into passenger cars and locomotive cabs during any kind of rebuild, refurbishment, or overhaul of the equipment, the material must comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B, or alternative standards after FRA approval. For example, if a seat or a section of a wall is replaced, then the materials used to replace those components (including an individual seat cushion) must comply with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B, or alternative standards after FRA approval. However, paragraph (a)(2) does not in itself require a railroad to remove existing materials from a vehicle that do not comply with test performance criteria for flammability and smoke emission characteristics, when such materials are found but not intended to be replaced during the railroad's rebuilding, refurbishment, or overhaul of that vehicle. Of course, such non-compliant materials may be required to be removed from the vehicle pursuant to the fire safety analyses required under paragraph (d) of this section; yet, again, the requirements of paragraph (a)(2) do not specifically require such removal. FRA believes that deferring the implementation of this provision for one year, as recommended by APTA, is therefore not necessary for railroads in light of this section's clearly defined application.

As noted above in the discussions of paragraphs (a)(1) and (a)(2), railroads can request FRA approval to utilize alternative standards issued or recognized by an expert consensus organization in lieu of complying with the test performance criteria for flammability and smoke emission characteristics as specified in Appendix B. A railroad must make such a request pursuant to the procedures in § 238.21.

Paragraph (b) requires railroads to obtain certification that a representative sample of combustible materials to be used in constructing passenger cars and locomotive cabs (pursuant to paragraph (a)(1)) or introduced into such equipment as part of any kind of rebuild, refurbishment, or overhaul of the equipment (pursuant to paragraph (a)(2)) have been tested and comply with the fire safety requirements specified in this part. Paragraph (b) is based on § 238.115(b) in the NPRM. FRA has modified the certification requirement following a comment by APTA on the NPRM that the certification be based on a representative sample of the combustible materials used. In response to another APTA comment, FRA has also clarified that the certification be based on the results at the time the materials were tested.

Paragraph (c) requires each railroad to address the fire safety of new equipment during the design stage so as to reduce the risk of harm due to fire to an acceptable level using MIL–STD–882C as a guide or another such formal methodology. (A copy of MIL–STD–882C has been placed in the public docket for this rulemaking.) To this end, the rule requires that each railroad complete a written analysis of the fire safety problem and ensure that good fire protection practice is used during the design of the equipment. This paragraph is based on proposed § 238.105(a) and (b) in the NPRM. *See* 62 FR 49800.

Booz-Allen & Hamilton, Inc. (Booz-Allen) commented that the risk acceptance level be clarified. It stated that MIL–STD–882C does not define a risk acceptance level itself, and it believed each individual railroad should determine that level based on its own operating experience, fleet life, operating conditions, and other factors. FRA recognizes that MIL–STD–882C does not define a specific acceptance level itself. Yet, the Standard leads a railroad through the steps necessary to determine an acceptance level, and the railroad is in the best position to make that determination. FRA notes that Booz-Allen also submitted a number of other comments on the elements on the fire safety analyses required by the rule, and FRA has incorporated several of these comments in whole and in part.

Paragraph (d) requires that existing passenger equipment and operations be subjected to a fire safety analysis similar to that proposed for new equipment in paragraph (c). This paragraph is based on proposed § 238.105(d) in the NPRM. See 62 FR 49801. A preliminary fire safety analysis would be required within the first year. This effort would constitute an overview of the fleet and service environments, together with known elements of risk (e.g., tunnels). For any category of equipment and service identified as possibly presenting unacceptable risk, a full analysis and any necessary remedial action would be required within the following year. A full fire safety analysis, including review of the extent to which materials in all existing cars comply with the test performance criteria for flammability and smoke emission characteristics contained in Appendix B to this part or alternative standards approved by FRA under this part, would be required within 4 years. This overall review would closely parallel and reinforce the passenger train emergency preparedness planning effort mandated under a separate docket (*see* 63 FR 24630; May 4, 1998).

Paragraph (d) responds to NTSB concerns following its investigation of the collision involving a MARC commuter train with Amtrak's Capitol Limited at Silver Spring, Maryland, on February 16, 1996. Among 13 recommendations addressed to FRA was the following:

> Require that a comprehensive inspection of all commuter passenger cars be performed to independently verify that the interior materials in these cars meet the expected performance requirements for flammability and smoke emissions characteristics.

(R–97–20) (NTSB/RAR–97/02, ''Collision and Derailment of Maryland Rail Commuter MARC Train 286 and National Railroad Passenger Corporation AMTRAK Train 29 Near Silver Spring, Maryland on February 16, 1996.'') The NTSB noted that some materials taken from a MARC car not involved in the fire that resulted from the collision ''failed current flammability and smoke emissions testing criteria,'' and that the materials in the actual cab control car involved in the collision ''also most likely would have failed'' to meet the testing criteria. (NTSB/RAR 97/02 at 63.) The NTSB did note, however, that had the materials met current performance criteria, the outcome would not have been any different because of the presence of diesel fuel sprayed into the cab control car. *Id.* Overall, the NTSB found that because other commuter passenger cars may also have interior materials that may not meet specified performance criteria for flammability and smoke emission characteristics, the safety of passengers in those cars could be at risk.

FRA agrees with the NTSB that steps must be taken to minimize fire safety vulnerabilities in the existing rail passenger equipment fleet. Present fire safety guidelines are advisory and were not introduced by FRA until 1984. Even in recent years, passenger railroads have been free to utilize non-compliant materials (particularly during interior refurbishment funded locally without FTA support). It is appropriate for each commuter authority and Amtrak to evaluate the mix of materials, possible sources of ignition, and potential fire environments—including tunnels, cuts and elevated structures where evacuation to the outside of the vehicle may be difficult or ineffectual in reducing the risk of injury—relevant to the risk of injury due to fire or smoke exposure.

FRA is concerned in particular with the risk arising from the operation of cab cars forward and MU locomotives. Due to their position in the lead of a passenger train, these vehicles are more greatly exposed to the risk of fire from collisions with other rail vehicles as well as highway vehicles at grade crossings. In a collision, fire may erupt from the fuel tanks of both the rail and highway vehicles, and also from tanks used by highway vehicles that transport loads of flammable material. The level of risk on each railroad corresponds to the number of highway-rail grade crossings, density of rail traffic, and opportunities for collisions.

FRA requested comments on the costs and benefits associated with the approach contained in paragraph (d). APTA commented that there would be little safety benefit to commuter railroads, and potentially great cost, in requiring the fire safety program for new passenger equipment to be applied to all categories of existing passenger equipment. APTA commented that the need for a program of this type has not been demonstrated, and that neither statistics nor other evidence has been presented to show that non fuel-fed equipment fires are a serious cause of injury or death in the passenger railroad industry. APTA added that, unlike a fire safety analysis of new equipment, where design flexibility exists to correct in an economical manner any deficiencies uncovered by the analysis, costs to modify existing equipment can be an order of magnitude higher. Overall, APTA believed the impact of the proposal to be great due to the expense of retrofitting equipment, although it was unable to quantify the exact impact without performing the fire safety analyses necessary to determine what modifications needed to be done to equipment. Booz-Allen also commented that the rule will not be cost-effective for existing passenger equipment that has less than 5 years of service life.

FRA recognizes the concern that retrofitting existing passenger equipment may impose considerable cost, and FRA neither proposed nor is requiring that materials not complying with the test performance criteria for flammability and smoke emission characteristics be removed in every instance from existing passenger equipment, if such materials are found during a fire safety analysis. Accordingly, each railroad is afforded the flexibility of reducing an unacceptable safety risk uncovered during an analysis of its equipment by the best means it sees fit. However, FRA is reluctant to withhold application of this provision to equipment with less than a specified service life. First, the practical question exists whether the service life of a vehicle can be specified in fact, considering the ability to extend a vehicle's life by rebuilding and the possibility of its sale to other railroads. Second, FRA believes that a preliminary fire safety analysis of all passenger equipment is necessary to determine whether any passenger equipment may present an unacceptable safety risk for passengers and crewmembers, regardless of the age of the vehicle. If an unacceptable risk is in fact found and the railroad had intended on retiring the equipment in the near future, the railroad can evaluate for itself whether it is more economical to retire the equipment or correct the safety deficiency. Further, considering the historical record of fires on passenger equipment, FRA does not expect railroads to find widespread fire safety problems on the equipment it operates, and thus FRA would expect that most of the time a preliminary fire safety analysis would be all that is necessary.

In its comments on the NPRM, Booz-Allen questioned whether the fire safety analysis of existing equipment would include consideration of nonmetallic and noncombustible materials. FRA believes that such consideration is necessary because, for example, floor tiles or other non-metallic materials may have coatings that may emit gas in a fire. Booz-Allen also commented that the fire risk of equipment depends on the ignitability of the materials, and, accordingly, ignitability tests should be included as part of the performance criteria. FRA believes the ignitability of materials is sufficiently addressed by the test performance criteria for flammability and smoke emission characteristics found in Appendix B to this part.

In the end, FRA believes the concern of the commenters as to the expense of paragraph (d) is overestimated. A railroad is not required to replace non-compliant materials in every instance, if such materials are found, and that has been made clear in the rule text. Neither has FRA specified that the railroad perform a fire safety analysis equivalent to that required for new equipment under paragraph (c).

As a final point FRA notes that, following its investigation of the Silver Spring, Maryland, passenger train collision, the NTSB also found that Federal guidelines on the flammability and smoke emission characteristics and the testing of interior materials do not provide for the integrated use of passenger car interior materials and, as a result, are not useful in predicting the safety of the interior environment of a passenger car in a fire. (NTSB/RAR–97/02, at 74) FRA believes that existing fire safety guidelines have continuing value for their specific purpose. Those guidelines are being codified, as revised, in this final rule as the best currently available criteria for analysis of individual materials. As noted above, FRA is conducting research through NIST to address the interaction of materials and other aspects of fire safety from a broader, systems approach. This philosophy is embodied in part in paragraph (c) with respect to new equipment. Based on this ongoing research and industry fire safety efforts, FRA expects to propose new fire safety standards in the second phase of this rulemaking.

Section 238.105 Train Hardware and Software Safety

This section applies to train 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. Inclusion of these requirements in passenger equipment reflects the growing role of automated systems to control or monitor passenger train safety functions.

This section represents the merger of proposed sections 238.107 (''Software safety program'') and 238.121 ('' Train system software and hardware'') in the NPRM. Although FRA received no particular comments on these sections in response to the NPRM, FRA determined that these sections should be combined to make the requirements of the final rule more concise and clear.

Paragraph (a) requires the railroad to develop and maintain a written hardware and software safety program to guide the design, development, testing, integration, and verification of computer software and hardware that controls or monitors passenger equipment safety functions. In preparing this paragraph of the final rule, FRA essentially combined the requirements proposed in § 238.107(a), and § 238.121(a) of the NPRM. *See* 62 FR 49801, 49803. Paragraph (b) states that the hardware and software safety program shall be based on a formal safety methodology that includes a Failure Modes, Effects, Criticality Analysis (FMECA); full verification and validation testing for all hardware and software that controls or monitors equipment safety functions, including testing for the interfaces of such hardware and software; and comprehensive hardware and software integration testing to ensure that the software functions as intended. A formal safety analysis that includes full verification testing is standard practice for safety systems that contain software components. Hardware and software integration testing ensures that the hardware and the software installed in the hardware function together as intended. This testing is common practice for safety control systems that include both software and hardware components. The requirements found in paragraph (b) arise in particular from § 238.121(a) and (b) of the NPRM. *See* 62 FR 49803.

Paragraph (c) focuses on ensuring the safety and reliability of software that controls or monitors passenger equipment safety functions. Paragraph (c) specifies that, for purposes of complying with this section, such software shall be considered safety-critical unless a completely redundant, failsafe, non-software means to provide the same function is provided. The requirements of this paragraph were principally drawn from § 238.107(a) and (b) of the NPRM. *See* 62 FR 49801. FRA notes that the final rule omits proposed § 238.107(c) in the NPRM as a separate provision in this rule. *See id.* However, in complying with paragraph (c) of the final rule, a railroad must necessarily ensure that software safety requirements are specified in its contracts for the purchase of the software. The railroad must further retain documentation to show that the software was manufactured to the design criteria specified pursuant to this section and that all required testing was performed. However, verification and validation of control systems by an independent entity is not required by this rule, nor is a fully quantitative proof of safety mandated by this rule, as neither was proposed.

Paragraph (d) specifies that hardware and software that controls or monitors safety functions shall include design features that result in a safe condition in the event of a computer hardware or software failure. Such design features are used in aircraft, as well as in weapon control systems, to ensure their safety. In the case of primary braking systems, electronic controls must either fail safely (resulting in a full service brake application) or access to full pneumatic control must be provided. As clarified, this provision was proposed in § 238.121(c) of the NPRM. *See* 62 FR 49803.

Paragraph (e) makes clear that the railroad shall comply with the elements of its hardware and software safety program that affect the safety of the passenger equipment. Failure to carry out a provision unrelated to the safety of the equipment is not implicated by this section, so as not to unnecessarily restrict the flexibility of the railroad. FRA adapted this requirement from that proposed in § 238.107(d) of the NPRM. *See* 62 FR 498901.

Overall, the requirements of this section reflect good practices that have led to reliable, safe computer hardware and software control systems in other industries. Computer hardware and software systems designed to these requirements may require a larger initial investment to develop, but experience in other industries has shown that this investment is quickly recovered by significantly reducing hardware and software integration problems and minimizing trouble-shooting and debugging of equipment.

§ 238.107 Inspection, Testing, and Maintenance Plan

This section contains the general provisions requiring railroads to develop detailed plans for inspecting, testing, and maintaining Tier I equipment. (The inspection, testing, and maintenance plan for Tier II equipment is covered under § 238.503.) FRA's goal is for railroads to develop a set of standards to ensure that equipment remains safe and operates properly as it wears and ages, and to provide enough flexibility to allow individual railroads to adapt the maintenance standards to their own unique operating environment.

Paragraph (b) requires a railroad that operates Tier I passenger equipment subject to this part to develop and provide to FRA, if requested, particulars about its inspection, testing, and maintenance plan for that equipment, including the following:

- Inspection procedures, intervals and criteria;
- Testing procedures and intervals;
- Scheduled preventive maintenance intervals;
- Maintenance procedures; and
- Training of workers who perform the tasks.

Since FRA does not dictate the exact contents of the plan, individual railroads retain much flexibility to tailor the plan to their individual needs and experience. At the same time, FRA believes this requirement is important and will cause railroads to re-examine their inspection, testing, and maintenance procedures to determine that they are adequate to ensure that the safety-related components of their equipment are not deteriorating over time. This approach represents good business practice and in most cases merely formalizes what passenger railroads are already doing. However, FRA believes this section will provide valuable guidance to regional governments or coalitions attempting to establish new commuter rail service.

Paragraph (c) makes clear that the inspection, testing, and maintenance plan required by this section 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. FRA intends for the plan required by this section to detail only those tasks required to be performed in order to conduct the inspections, tests, and maintenance necessary to ensure that the equipment is in safe and proper condition for use. In proposing the creation of these plans, FRA did not intend to enter into the area of addressing employee safety while conducting the inspections, tests, and maintenance covered by the plans. FRA is always concerned with the safety of employees while conducting their duties, but employee safety in maintenance and servicing areas generally falls within the jurisdiction of the United States Department of Labor's Occupational Safety and Health Administration (OSHA). It is not FRA's intent to oust OSHA's jurisdiction with regard to the safety of employees while performing the inspections, tests and maintenance required by this part, except where FRA has already addressed workplace safety issues, such as for blue signal protection. Therefore, in order to prevent any uncertainty as to FRA's intent, FRA has modified this section by eliminating any language or provision which could have been potentially perceived as displacing the jurisdiction of OSHA and has added a specific clarification that FRA does not intend for the plan required by this section to address employee safety issues that arise in the course of conducting the inspections and tests described. Consequently, the specific elements that FRA proposed to be included in the inspection, testing, and maintenance plan have been eliminated for the reasons noted above and because they were merely duplicative of the general requirements contained in paragraph (b) and are unnecessary.

It should also be noted that the general inspection, testing, and maintenance requirements previously proposed in the 1997 NPRM at paragraph (b) of this section (62 FR 49801–802) and the maintenance interval requirements proposed at paragraph (c) have been removed from this section in this final rule. The conditions and components previously proposed in paragraph (b) of this section have been moved to the periodic mechanical inspection contained in § 238.307(c). As the conditions previously proposed in this paragraph were intended to ensure that the railroads had an inspection scheme in place to ensure that all systems and components of the equipment are free of conditions that endanger the safety of the crew, passengers or equipment, FRA believes that a specific inspection interval would be better suited to address the general condition of the equipment and ensure the safety of railroad employees, passengers and equipment. In addition, the maintenance interval requirements have been modified and moved to the periodic mechanical inspection requirements contained in § 238.307(b). Consequently, FRA has moved the general conditions maintenance interval provisions previously addressed in this section to the specific inspection requirements contained in subpart D of this final rule.

Section 238.109 Training, Qualification, and Designation Program

This section contains the training, qualification, and designation requirements for workers (that is, both railroad employees and contractors as defined in the section) who perform inspection, testing, and maintenance tasks. FRA believes that worker training, qualification, and designation are central to a safe operation.

Paragraph (a) requires railroads to adopt and comply with a training, qualification, and designation program for employees and contractors who perform safety-related inspection, testing, or maintenance tasks under this part. ''Contractor,'' in this context, means ''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.'' FRA intends for the training, qualification, and designation requirements to apply not only to railroad personnel but also to contract personnel that are responsible for performing brake system inspections, maintenance, or tests required by this part. FRA believes that railroads are in the best position to determine the precise method of training that is required for the personnel they elect to use to conduct the required brake system inspections, tests, and maintenance. Although FRA provides railroads with broad discretion to develop training programs specifically tailored to the type of equipment they operate and the personnel they employ, FRA will expect railroads to fully comply with the training and qualification plans they develop. This section has been amended slightly from that proposed in the 1997 NPRM in order to stress that a critical component of this training is ensuring that a railroad's employees are aware of the specific Federal requirements that govern their work. Currently, many railroad training programs fail to distinguish Federal requirements from company policy.

Paragraph (b) contains a series of general requirements or elements which must be part of any training and qualification plan developed and implemented by a railroad. FRA believes that the elements contained in this section are specific enough to ensure high quality training while being sufficiently broad to permit a railroad to develop a training plan that is best suited to its particular operation. This paragraph requires each railroad to identify the specific tasks related to the inspection, testing and maintenance of the brake systems operated by that railroad, develop written procedures for performing those tasks, identify the skills and knowledge necessary to perform those tasks, and specifically identify and educate its employees on the Federal requirements contained in this part related to the performance of those tasks. FRA believes that these requirements will ensure that, at a minimum, the railroad surveys its entire operation and has identified the various activities its employees perform. FRA intends for these written procedures and the identified skills and knowledge to be used as the foundation for any training program developed by the railroad.

This paragraph also makes clear that railroads are permitted to train employees only on those tasks that they will be responsible for performing. FRA tends to agree with several railroad commenters that there is no reason for individuals who solely perform simple air brake or mechanical tests and inspections to be as highly trained as those individuals responsible for conducting comprehensive brake or mechanical inspections or those individuals responsible for trouble-shooting, maintaining, and repairing the equipment. This paragraph also makes clear that a railroad may incorporate an already existing training program, such as an apprenticeship program. Thus, railroads would likely not need to provide much additional training, except training specifically addressing the requirements contained in this part and possibly refresher training, to its mechanical forces that have completed an apprentice program for their craft.

This paragraph also contains requirements that any program developed must include ''hands-on'' training as well as classroom instruction. FRA believes that classroom training by itself is not sufficient to ensure that an individual has retained or grasped the concepts and duties explained in a classroom setting. In order to adequately ensure that an individual actually understands the training provided in the classroom, some sort of ''hands-on'' capability must be demonstrated. FRA believes that the ''hands-on'' portion of the training program would be an ideal place for railroads to fully involve its labor forces in the training process. Appropriately trained and skilled employees would be perfectly suited to provide much of the ''hands-on'' training envisioned by FRA. Consequently, FRA strongly suggests that railroads work in partnership with their employees to develop a training program which utilizes the knowledge, skills, and experience of the employees to the greatest extent possible.

This paragraph specifically requires that employees pass either a written or oral examination covering the equipment, tasks, and Federal regulatory requirements for which they are responsible as well as require that each individual deemed qualified to perform a task required by this final rule demonstrate ''hands-on'' capability to perform that task. This paragraph also contains requirements for conducting periodic refresher training and supervisor oversight of an employee's performance once training is provided. FRA believes both these requirements are essential to ensure that an individual continues to possess the knowledge and skills necessary to continue to perform the tasks for which the individual is assigned responsibility. Furthermore, employees must be periodically retrained in order to keep up with technological advances relating to braking systems that are constantly being made by the industry.

This paragraph also contains the requirements related to maintaining adequate records for establishing that individuals are capable of performing the tasks for which they are assigned responsibility. FRA believes that the record keeping requirements contained in this paragraph are the cornerstone of the training and qualification provisions. As FRA is not proposing specific training curriculums or specific experience thresholds, FRA believes that these record keeping provisions are vital to ensuring that proper training is being provided to railroad personnel. FRA believes these requirements provide the means by which FRA will judge the effectiveness and appropriateness of a railroad's training and qualification program. These provisions also provide FRA with the ability to independently assess whether the training provided to a specific individual adequately addresses the tasks for which the individual is deemed capable of performing, and will most likely prevent potential abuses by railroads to use insufficiently trained individuals to perform the necessary inspections, tests, and maintenance required by this rule. This paragraph makes clear that FRA intends to require that railroads maintain specific personnel qualification records for all personnel (including contract personnel) responsible for the inspection, testing, and maintenance of train brake systems. This paragraph also makes clear that the records maintained by a railroad contain sufficient detail regarding the training provided in order for FRA to ascertain the basis for the railroad's determination.

FRA believes that many benefits can be gained from this increased investment in training. Better inspections will be performed, resulting in the running of less defective equipment, which translates to a better safety record. Equipment conditions requiring maintenance attention are more likely to be found while the equipment is at a maintenance or yard site where repairs can be more easily done. Trouble-shooting of brake and mechanical problems will take less time and more maintenance will be done right the first time, resulting in cost savings due to less rework.

Section 238.111 Pre-Revenue Service Acceptance Testing Plan

This section provides requirements for pre-revenue service testing of passenger equipment and relates to subpart G, which describes requirements for the procurement of Tier II passenger equipment and for a major upgrade or introduction of new technology that could affect safety systems of Tier II passenger equipment. Pre-revenue service acceptance tests are extremely important in that they are the culmination of all the safety analysis and component tests of a railroad's system safety program or other safety planning efforts. The pre-revenue service tests are intended to prove that the equipment can be operated safely in its intended environment and demonstrate the effectiveness of the system safety program or other safety planning undertaken by the railroad.

FRA has revised and clarified this section based on comments received in response to the NPRM. APTA believed that the proposed test program was excessive for equipment that has previous successful operating experience. It believed that an extensive pre-revenue service test program is needed only when a new type of equipment is placed in revenue service for the first time. Otherwise, APTA suggested a simple compatibility check with the infrastructure of a specific railroad is all that is needed when the railroad procures new equipment that has successful operating experience on other railroads. APTA claimed that FRA does not have the in-house expertise to approve plans, and that the need for FRA approval will delay the introduction of new equipment, causing a needless expense. APTA recommended that the rule require a full test program only for the first time equipment is introduced into revenue service, that FRA not approve the test plans, and that FRA instead be invited by railroads to witness the pre-revenue service tests.

Amtrak, in its comments on the NPRM, expressly agreed with APTA. Amtrak believed FRA does not have the resources to support the burden that would be required by the proposal. Further, Amtrak believed there is no technical justification to require the formal testing proposed by FRA when a particular equipment order is nothing more than acquiring additional equipment identical to that purchased on a previous order. Amtrak suggested that formal testing be limited to new and untried types of equipment according to a long-standing AAR practice.

Metra commented that the rule should require railroads to submit their own pre-revenue service testing plans to FRA and invite FRA to witness the testing, instead of having FRA determine when and how railroads should conduct acceptance testing on their systems. Metra explained that railroads know their own systems and are more capable of designing testing plans compatible with their systems. Metra believed waiting for FRA testing and approval would cause needless delay and expense.

In its comments on the NPRM, the BRC believed this section to be wholly necessary because of the types of equipment being brought into service that generally do not comply with the safety appliance laws or the safety glazing regulations, or both. The BRC believed that this equipment must comply with applicable laws and regulations affecting the safety of passengers and railroad workers in order to be brought into service in the United Service. The BRC also recommended that the pre-revenue service testing plan be filed with FRA so that the plan will be available under the Freedom of Information Act (FOIA).

In proposing requirements for pre-revenue service acceptance testing, FRA did distinguish between passenger equipment that has previously been used in revenue service in the United States and that which has not. In lieu of the requirements proposed in § 238.213 (a) through (e) of the NPRM, paragraph (f) provided for an abbreviated testing procedure for passenger equipment that has previously been used in revenue service. *See* 62 FR 49763, 49802–3. Accordingly, FRA agrees that when a particular equipment order is nothing more than acquiring additional equipment identical to that purchased on a previous order, there is no need for detailed testing requirements. This is reflected in § 238.111(a) of the final rule, which governs testing requirements for passenger equipment that has previously been used in revenue service in the United States. Each railroad is required to test such equipment only to ensure the compatibility of the equipment with the railroad's operating system. Although the railroad must keep a record of such testing and make it available to FRA for inspection and copying, no formal submission to FRA is required. (In this regard, FRA does not believe that the plan must be submitted to FRA for the purpose that it may be available to the public under FOIA, as that justification, in itself, would require virtually any railroad safety record to be submitted to FRA, whether or not FRA deems it necessary.) Further, no FRA approval is required prior to testing the equipment or placing it in revenue service. FRA expects the requirements of paragraph (a) to apply in the majority of situations a railroad places passenger equipment in service for the first time, and FRA has consequently placed this provision at the beginning of § 238.111 for ease of use by the regulated community.

As specified in the final rule, § 238.111(a) applies not only to the actual equipment which has previously been used in revenue service in the United States or to equipment which is manufactured identically thereto. Paragraph (a) also applies to equipment which is similarly manufactured to that equipment and has no material differences in safety-critical components or systems.

Paragraph (b) contains the requirements for a railroad placing passenger equipment in service for the first time on its system when the equipment has not previously been used in revenue service in the United States—in other words, when the equipment is not covered by paragraph (a). Each railroad must develop a pre-revenue service acceptance testing plan and submit the plan to FRA at least 30 days prior to beginning testing. Previous testing of the equipment at the Transportation Test Center, on another railroad, or elsewhere should be included in the submission.

The requirements of paragraph (b) distinguish between whether the passenger equipment intended for service is Tier I or Tier II passenger equipment, and FRA has decided to require approval of testing plans only for Tier II equipment. Although FRA disagrees with APTA's claim that FRA does not have the in-house expertise to approve the testing plans, FRA is mindful of APTA's concern that the need for FRA approval of the plans may unnecessarily delay the introduction of new equipment. Further, not having endless resources, FRA has decided to focus its resources here on Tier II passenger equipment in light of the equipment's higher operating speed and greater potential risk. As a result, a railroad intending to place in service Tier I equipment under this paragraph does not need FRA approval of its test plan for the equipment or FRA approval to place the equipment in service. Of course, paragraph (b) does provide that for Tier I equipment the railroad must notify FRA to permit the agency to witness the testing (paragraph (b)(2)); comply with the testing plan (paragraph (b)(3)); document the results of the testing and make it available for FRA inspection (paragraphs (b)(4), (6)); and correct or otherwise compensate for safety deficiencies uncovered during the testing prior to introducing the equipment in revenue service (paragraph (b)(5)). Each railroad is also under an independent duty to comply with the other requirements of Part 238 and the railroad safety laws in general. In this regard, a railroad would have to obtain a waiver of FRA safety regulations through the formal procedures of 49 C.F.R. part 211 before introducing any equipment into service that does not comply with the safety appliance regulations or the safety glazing standards, for example. However, by operation of § 238.111, a railroad is not restricted from seeking a waiver of an FRA safety regulation under 49 C.F.R. part 211, nor is FRA restricted from granting such a waiver. Part 211 contains procedures to ensure that FRA grants a waiver of a safety regulation in the interest of employee and public safety.

For Tier II passenger equipment, paragraph (b) requires the railroad to follow the additional steps of obtaining FRA approval of the testing plan under the procedures specified in § 238.21 (paragraph (b)(1)); reporting the results of the testing to FRA (paragraph (b)(4)); agreeing to comply with any operational limitations imposed by FRA on the use of the equipment (paragraph (b)(5)); and obtaining FRA approval prior to placing the equipment in revenue service (paragraph (b)(7)). Under paragraph (b)(7), a railroad is not required to follow the formal requirements set forth in § 238.21.

Paragraph (c) applies only to Tier II passenger equipment. If a railroad plans a major upgrade or introduction of new technology in 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) prior to placing the equipment in revenue service with such a major upgrade or new technology. This requirement is based on proposed §§ 238.603 (b) and (c) in the NPRM. *See* 62 FR 49823. FRA has integrated those proposed requirements into the section for clarity, as alluded to in the NPRM. *See* 62 FR 49785.

Overall, FRA believes the set of steps and the documentation required by § 238.111 are necessary to ensure that all safety risks have been reduced to a level that permits the equipment to be used in revenue service.

Section 238.113 Emergency Window Exits

This section represents the partial merger of NPRM § 238.235, emergency window exit requirements for Tier I passenger equipment, and NPRM § 238.439, as it concerned emergency window exit requirements for Tier II passenger equipment. FRA has combined these sections principally in response to the NTSB's comment on the proposed rule that these requirements should not be differentiated on the basis of train speed.

Paragraph (a)(1) requires that a single-level passenger car, other than a sleeping car or similarly designed car, have a minimum of four emergency window exits, either in a staggered configuration where practical or with one located in each end of each side of the car. A bi-level car shall have a minimum of four emergency window exits on each main level, configured as above, so that the car has a minimum total of eight emergency window exits.

FRA received several comments relating to the quantity of emergency window exits that the rule should require. First, the NTSB commented that specifying a minimum quantity requirement for emergency window exits in passenger cars is not sufficient. The NTSB believed that the requirement should be based on the capacity of the passenger car, the number of door exits, and the scientifically-determined time needed to completely evacuate the fully-loaded passenger car. Next, Talgo commented that passenger cars half the length of conventional cars should be required to have only two emergency window exits on each main level. Further, Bombardier commented that instead of limiting the application of this section to emergency window exits, FRA should apply the requirements of this section broadly to emergency exits—whether or not those exits are windows—to permit flexibility and innovation in future passenger car designs. Bombardier added that any such requirement would be in addition to the requirement for side doors.

The final rule largely carries forward the NPRM's proposal, and the current Federal requirement in § 223.9(c) of this chapter for four emergency window exits in each passenger car. The requirement for a minimum number of window exits is important to ensure an unobstructed avenue of egress in a variety of accident scenarios, regardless of car capacity. Of course, as FRA has explained, the Volpe Center is working on an emergency evacuation performance requirement for passenger cars to determine the number of total exits necessary to evacuate the maximum passenger load in a specified time for various situations. Further, through the APTA PRESS effort, FRA understands that APTA is developing a systems approach to emergency egress similar to that which Bombardier has suggested in its comments. FRA recognizes the merit such approaches have and will consider these alternative approaches in Phase II of the rulemaking.

Paragraph (b) requires, as specified, each emergency window exit in a new passenger car, including a sleeping car, to have a minimum unobstructed opening with dimensions of 26 inches horizontally by 24 inches vertically. In the NPRM, FRA invited comments as to what size requirements for emergency window exits FRA should impose in the final rule. FRA had proposed that Tier I equipment have a minimum, unobstructed emergency window exit opening of 24 inches horizontally by 18 inches vertically, and that Tier II equipment have a minimum, unobstructed emergency window exit opening of 30 inches horizontally by 30 inches vertically. The Tier II Equipment Subgroup, including Amtrak, had recommended the latter requirement for application to Tier II equipment. However, the full Working Group advised against imposing such a requirement on Tier I equipment. FRA had explained in the NPRM that, although it would prefer that all emergency window exits afford the larger opening, the Tier I equipment proposal provided the minimum opening needed for a fully-equipped emergency response worker to gain access to the interior of a train.

The NTSB commented that the horizontal and vertical openings of emergency window exits should be the same for both tiers of equipment, as the speed at which the equipment travels should not matter. The NTSB stated that the emergency window exit dimensions should be determined by the size dimensions needed: (1) To extricate an injured person from the passenger car; and (2) to allow an emergency responder fitted with a self-contained breathing apparatus to enter the passenger car. The NTSB noted that one of the typical adult backboards used by emergency responders to evacuate injured persons is 24 inches wide by 72 inches long, and therefore may not clear a window 24 inches wide. (The NTSB did note that the other typical adult backboards measure 16 inches wide by 72 inches long, and 12 inches wide by 84 inches long. The NTSB also stated that a typical steel basket stretcher used by emergency responders measures about 23 inches horizontally by 8 inches deep by about 81 inches vertically.) The NTSB further noted the concern that if a car derails to the extent that the normal vertical dimension becomes the horizontal dimension, the backboard must be tilted to fit through the opening. (During Working Group discussions, it was noted that for this to happen, the car must come to rest on its end.) Moreover, the NTSB stated that an emergency responder with a self-contained breathing apparatus may have difficulty entering an 18-inch vertical opening.

FRA agrees that the emergency window exit size requirements should be the same for both tiers of equipment. The final rule requires that emergency window exits have a minimum unobstructed opening with dimensions 26 inches horizontally by 24 inches vertically. This requirement only applies to new cars, however, as specified in paragraph (b). FRA recognizes that these dimensions are greater than those proposed for Tier I passenger equipment (and smaller than those proposed for Tier II passenger equipment).

A review of emergency window exit sizes on the nation's rail passenger car shows a wide variation in window size. Differences in size are not necessarily attributable to the age of the passenger cars: On certain railroads, some older passenger cars have smaller emergency window exits than do newer passenger cars; whereas, on other railroads, some newer passenger cars have smaller emergency window exits than do older passenger cars. Staff from the Boston, Massachusetts, and Los Angeles, California, fire departments recommended, upon DOT's inquiry, that emergency window exits provide at least a 26-inch horizontal opening to maneuver a 24-inch wide stretcher into and out of the window. They also expressed concern whether an 18-inch vertical opening would be large enough to allow an emergency responder wearing a self-contained breathing apparatus to fit through the window. United States Department of Defense MIL–STD–1472E (October 31, 1996), which contains design criteria for human engineering, provides dimensions for rectangular access openings for male body passage as differentiated by the amount of clothing worn. For side access, MIL–STD–1472E, section 5.7.8.3 provides that openings shall be not less than 26 inches in depth (vertical) and 30 inches in width (horizontal) for a male wearing light clothing. Further, the standard provides that openings shall be not less than 29 inches in depth and 34 inches in width for a male wearing bulky clothing. (This section of the military standard has been placed in the public docket for this rulemaking.)

On the basis of the comments and information received following publication of the NPRM, FRA believes that an emergency window exit vertical opening of 18 inches is not sufficient for new rail cars. The emergency window exit size requirements contained in this final rule provide a more reasonable dimension for passage of large, fully-clothed persons, including emergency response personnel with fire gear. The dimensions are practicable in light of the design of many passenger cars in the United States.

FRA explained in the NPRM that safety may be advanced by staggering the configuration of emergency window exits so that the exits are located diagonally across from each other on opposite sides of a car, instead of placing them directly across from each other. FRA invited comment on this issue, as well as on the concern that the seat arrangement of passenger cars may block access to and the removal of emergency window exits. The NTSB commented that emergency window exits should be staggered rather than opposite each other, and they must also be distributed as uniformly as practical to allow for passenger distribution. The rule will require staggering where practical, but other considerations must be taken into account, including the need to provide an unobstructed exit without diminishing normal seating capacity. Railroads should be mindful that if the ends of a car are crushed in a collision, then the window exits located at the car's ends may be rendered inoperable. In this regard, FRA's use of the term ''in each end'' in paragraph (a)(1) refers to the forward and rear ends of a car as divided in its center—and does not literally refer to the extreme forward and rear ends of a car nor require that emergency window exits be placed at the extreme ends of a car.

FRA is requiring that each sleeping car, and any similarly designed car having a number of separate compartments intended to be occupied by passengers or train crewmembers, have at least one emergency window exit in each compartment. An example of a similarly designed car subject to this requirement is a crew dormitory car. If an emergency window exit is not provided in individual sleeping compartments, occupants of those compartments may have difficulty reaching the car's doors quickly in an emergency, especially if the car's interior passageways become blocked or obscured by smoke. An emergency window exit is necessary in each compartment to enable occupants to quickly exit the car in a life-threatening situation, as when the car is submerged. FRA notes that, for purposes of this section, a restroom is not a compartment specifically required to have an emergency window exit.

Paragraph (a)(3) requires that each emergency window exit be designed to permit rapid and easy removal during an emergency situation without requiring the use of a tool or other implement. In the NPRM, FRA had specified that the emergency window exit must be easily operable by a 5th-percentile female without requiring the use of a tool or other implement. In response to the proposal, Bombardier commented that the feasibility and practicability of making the emergency exit operable by a 5th-percentile female is not known at this time. Bombardier recommended FRA more fully examine the feasibility of designing and maintaining passenger cars to meet this requirement before it is made a rule. In the final rule, FRA believes it appropriate not to specify a requirement at this time for the ease of operability of an emergency window exit by a 5th-percentile female. In Phase II of the rulemaking, FRA will evaluate with the Working Group whether such a concept should be reintroduced. Instead, FRA has decided to incorporate into the final rule language from the definitions of ''emergency window'' found in 49 CFR parts 223 and 239—that is, each emergency window must be designed to permit its rapid and easy removal during an emergency situation—and specifically require that such rapid and easy removal of the window be able to be accomplished without requiring the use of a tool or other implement.

Paragraph (c) is reserved for emergency window exit marking and operating instruction requirements. These requirements are currently provided in the rule on passenger train emergency preparedness. *See* 63 FR 24630. In Phase II of the rulemaking, FRA will consider integrating into this part (part 238) the emergency window exit marking and operating instruction found in parts 223 and 239 of this chapter. Additionally, FRA will consider revising those requirements as necessary.

Section 238.115 Emergency Lighting

Experience gained during emergency response to several passenger train accidents indicates that emergency lighting systems either did not work or failed after a short time, greatly hindering rescue operations. This section requires that passengers cars ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, be equipped with emergency lighting providing at least an average illumination level of 1 foot-candle 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). In addition, the emergency lighting on such cars must provide an illumination level of at least an average of 1 foot-candle at floor level along the center of each aisle and passageway, and a minimum of 0.1 foot-candle at floor level at any point along the center of each aisle and passageway. The cars must also be equipped with a back-up power feature capable of operating the lighting for a minimum of 90 minutes after loss of normal power with no more than a 40% loss of the prescribed illumination levels.

In the NPRM, FRA proposed requiring for both passenger cars and locomotives a minimum emergency lighting illumination level of 5 foot-candles at floor level for all potential passenger and crew evacuation routes from the equipment. *See* 62 FR 49803. FRA explained that its proposal was not a recommendation of the Working Group, as FRA believed an illumination level higher than that suggested by members of the Working Group was necessary for passengers to locate emergency exits, read instructions for operation of the exits, and operate the exits. *See* 62 FR 49764. FRA did request comments whether the lighting intensity requirement need be 5 foot-candles at floor level for all potential evacuation routes if the rail vehicle has a combination of lower intensity floor proximity lighting, similar to that used on aircraft to mark the exit path, and higher intensity lighting at the vehicle's exits. FRA also proposed applying the emergency lighting requirements to rebuilt passenger equipment, and noted that it was considering applying these requirements to existing passenger equipment sooner than when the equipment is rebuilt.

In response to FRA's proposal, APTA commented that requiring a minimum emergency lighting illumination level of 5 foot-candles is excessive. APTA believed that roughly a five-fold increase in battery capacity would be necessary to comply with the proposed illumination standard when combined with the two-hour minimum duration requirement proposed in the rule. APTA stated that a minimum emergency lighting illumination level of 1 foot-candle is adequate for new equipment, based on recent light level measurements taken on passenger coaches by Volpe Center personnel. APTA noted that a survey in support of its APTA PRESS efforts shows emergency lighting illumination levels to be between approximately 0.2 foot-candles and 1 foot-candle on existing passenger equipment. APTA observed that even an illumination level of less than 1 foot-candle measured at the floor can allow for an orderly evacuation of a passenger coach with well-marked exits.

In regard to applying the requirements of this section to existing passenger equipment, APTA suggested imposing an emergency lighting illumination level of less than 1 foot-candle on such equipment to avoid an expensive retrofit. APTA further recommended that the rule allow the emergency lighting illumination level to decay over the proposed two-hour duration it would be required to operate, and APTA suggested allowing the illumination level to degrade to no less than 50% of the original illumination level after two hours. In addition, APTA noted that emergency lighting systems in conventional locomotive cabs are radically different from those in passenger cars, and APTA asked FRA to reconsider how it would apply emergency lighting requirements inside locomotive cabs.

In commenting on this proposal, the BRC stated that the requirements for emergency lighting must be phased into existing passenger equipment sooner than when it is rebuilt. The BRC explained that for passengers it would be far better to have cars equipped with emergency and exit lighting to eliminate many of the hazards in getting out of the cars, and that there is no justification or analysis in the record for delaying the implementation of the requirements in existing passenger cars.

Metra, in its comments on this proposal, stated that a requirement for an emergency lighting illumination level of 5 foot-candles would be unnecessarily bright and costly. Metra recommended that the illumination level be set at 0.5 foot-candle. Further, Metra suggested that for new passenger equipment the requirement be modified to apply only to new orders placed after January 1, 1998, so as to avoid costs associated with change orders and dual standards on ongoing orders that will be delivered both before and after January 1, 1998. Finally, the Omniglow Corporation (Omniglow) commented in response to the NPRM that to effectively address an emergency situation where lives are at stake, each train exit should be equipped with emergency lighting.

In light of these comments and after further analysis, FRA has revised the requirements of this section in several ways from those originally proposed in the NPRM. First, under the final rule, the requirements of this section apply only to passenger cars—and not to passenger locomotives as proposed in the NPRM. As MU locomotives and cab cars that transport passengers are considered passenger cars under this rule, however, the practical effect of this revision is not to apply the specific emergency lighting requirements in this rule to conventional passenger locomotives. Moreover, the issue of specifying emergency lighting requirements for conventional locomotives as a whole, taking into account their unique characteristics, has been placed before the RSAC Locomotive Crashworthiness Working Group for its consideration.

Second, the requirements of the final rule do not apply to rebuilt passenger equipment. FRA is seeking a broader approach to implementing emergency lighting requirements in existing passenger cars, whether or not the cars are rebuilt. To accomplish this, FRA does not necessarily expect that existing passenger cars will be required to meet the area lighting standard specified for new equipment. However, FRA desires that achievable emergency lighting enhancements to existing passenger cars will be implemented over a reasonable period of time. In the second phase of the rulemaking, FRA will evaluate the anticipated APTA PRESS standard for implementing emergency lighting requirements in existing passenger cars with a view to incorporating the APTA standard into this Federal standard.

Third, as provided in paragraphs (b)(1)–(3) of the final rule and modified from the NPRM, this section prescribes the minimum emergency illumination level for new passenger cars as a 1 foot-candle average 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), a 1 foot-candle average measured 25 inches above the floor level along the center of each aisle and passageway, and a minimum of 0.1 foot-candle measured 25 inches above the floor level at any point along the center of each aisle and passageway. These illumination levels are based on the emergency lighting illumination levels specified in Section 5–9.2.1 of the National Fire Protection Association's (NFPA) ''Life Safety Code Handbook,'' Seventh Ed. (a copy of this section has been placed in the public docket for this rulemaking) and the Illuminating Engineering Society Lighting Handbook. Specifying the measurement of the emergency lighting illumination level at the floor for doors is intended to permit passengers and crewmembers to see and negotiate thresholds and steps typically located near doors. Specifying the measurement of the emergency lighting illumination level at 25 inches above the floor for aisles and passageways is intended to permit passenger and crewmembers to see and make their way past obstacles as they exit a train in an emergency, as demonstrated by tests conducted by the Volpe Center. At the same time, specifying that the illumination level be measured above the floor for aisles and passageways recognizes that light emitted from lighting fixtures placed on the sides of passenger cars may be obstructed, as by car seats, before the light reaches the floor, and, in this regard, the rule provides greater flexibility to railroads in the placement of lighting fixtures. FRA notes that the permanency of this area lighting standard will be dependent on successful resolution of issues related to emergency signage, exit path marking, and egress capacity that are being progressed toward resolution through the APTA PRESS Task Force and the Volpe Center, as noted below, as a predicate for completion of the standards in the second phase of this rulemaking.

FRA believes that the emergency lighting illumination levels specified in this section will enable the occupants of rail cars to discern their immediate surroundings and thereby minimize or avoid panic in an emergency. In this regard, a lighting demonstration was conducted in a SEPTA rail car in March 1998, and in the judgement of the FRA participants it showed that these illumination levels appear sufficient. These emergency lighting illumination levels are achievable for rail cars. In fact, the NFPA 101 specifications for emergency lighting illumination levels, noted above, are recommended for use in rail transit cars through NFPA 130, Section 5–5.3.

In the second phase of the rulemaking, FRA will focus on augmenting the emergency illumination level specified in this section by including requirements for lighted signage and exit path marking, as touched on above. Through a research study conducted by the Volpe Center, FRA has been investigating emergency lighting requirements as part of a systems approach to effective passenger train evacuation. This approach takes into consideration the interrelationship between features such as the number of door and window exits in a passenger car, lighted signs that indicate and facilitate the use of the door and window exits, and floor exit path marking, in addition to the general emergency lighting level in a car. FRA will also examine the APTA PRESS standard on emergency lighting, when final, to determine whether the standard satisfactorily addresses matters related to emergency signage, exit path marking, and egress capacity so that FRA does not have to revisit the issue of area lighting with a view toward increased illumination levels. In the interim, FRA will entertain proposals to utilize alternative methods of providing at least an equivalent level of emergency illumination to that prescribed in this rule.

FRA has further revised the requirements of this section from those proposed in the NPRM by shortening the required operation time period of the emergency lighting, and by permitting the emergency lighting illumination level to degrade over time, as well. Specifically, the final rule requires a passenger car to be equipped with a back-up power feature capable of operating the lighting for a minimum of 90 minutes after loss of normal power with no more than a 40% loss of the prescribed illumination levels. As a result, illumination levels shall be permitted to decline, as appropriate, from 1 ft-candle to 0.6 foot-candle, and from 0.1 foot-candle to 0.06 foot-candle. The lighting decay permitted here is also based on that specified in Section 5–9.2.1 of the NFPA's ''Life Safety Code Handbook,'' cited above. Operation of emergency lighting for an extended time is particularly necessary in the event of passenger train rescue operations in remote locations. Fully-equipped emergency response forces can take an hour or more to arrive at a remote accident site, and additional time would be required to deploy and reach people trapped or injured in a train. Even passenger train accidents in urban areas can pose significant rescue problems, especially in the case of tunnels, nighttime operations, and operations in inclement weather.

This section also requires the emergency lighting back-up power system to be able to operate in all orientations within 45 degrees of vertical and after experiencing a shock due to a longitudinal acceleration of 8g and vertical and lateral accelerations of 4g. The shock requirement will ensure that the back-up power system has a reasonable chance of operating after the initial shock caused by a collision or derailment. FRA originally considered that the back-up power system be capable of operation within a vehicle in any orientation. However, members of the Working Group advised that some battery technologies utilize a liquid electrolyte which can leak when the battery is tilted.

FRA invited commenters to address whether the back-up power system should be made capable of operation within a vehicle in any orientation, *see* 62 FR 49764; and, in response, the BRC commented that the back-up power system must be capable of operating in any orientation since railcars do not always remain upright when they derail. The BRC believed that the fact batteries may have a liquid electrolyte which can leak when the battery is tilted does not excuse railroads from obtaining proper batteries that will function in any orientation.

In the final rule, FRA is not requiring that the back-up power system be capable of operating in any orientation, and instead FRA is retaining the proposal in the NPRM that the system be capable of operating in all equipment orientations within 45 degrees of vertical. FRA will further examine this issue in the second phase of the rulemaking, and FRA is aware of a more costly battery technology utilizing a gel that should not leak when turned in any orientation. However, even if the back-up power system could operate when turned in any direction, FRA recognizes that a derailment of the magnitude that would cause such a situation would potentially destroy the battery box as a whole or sever the cables connecting the battery to the emergency lighting fixtures, or both. In this regard, FRA believes it more important to focus in the second phase of the rulemaking on addressing the NTSB's recommendation to require reliable emergency lighting fixtures in passenger cars, each fitted with a self-contained independent power source (R–97–17). (See NTSB/RAR–97/02) Section 238.115 does permit continued use of battery power common to all emergency lighting circuits in a particular car.

FRA notes, however, that the concept of a power source at each fixture, as a regulatory requirement, is novel. FRA findings in recent accidents support the NTSB's implied concern that placement of electrical conduits and battery packs below the floor of passenger coaches can result in damage that leads to the unavailability of emergency lights precisely at the time they are most needed. However, from initial investigation it is not certain whether current ''ballast'' technology provides illumination of sufficient light level quality with reliable maintainability. FRA presented the issue of placing an independent power source at each emergency lighting fixture to the Passenger Equipment Safety Standards Working Group at a meeting in December, 1997. FRA will aggressively pursue this option for more reliable emergency illumination in the second phase of the rulemaking, and FRA will also work with APTA PRESS on this issue.

Section 238.117 Protection Against Personal Injury

This section contains a general requirement to protect passengers and crewmembers from moving parts, electrical shock and hot pipes. This section extends to passenger equipment not classified as locomotives the protection against personal injury which applies to locomotives under 49 CFR 229.41. The requirements represent common-sense safety practice; reflect current industry practice; and should result in no additional cost burden to the industry. Although FRA received no specific comments on this section, FRA has modified this section to make clear that its requirements do not apply to the interior of a private car, consistent with FRA's overall approach to private cars in this rule. The protections of this section would apply, of course, to rail employees and others who may inspect or perform work on the exterior of a private car.

Section 238.119 Rim-Stamped Straight-Plate Wheels

This section addresses the NTSB's safety recommendation concerning the use of rim-stamped straight-plate wheels on tread-braked rail passenger equipment. Following its investigation of a January 13, 1994 Ringling Bros. and Barnum & Bailey Circus train derailment which killed two circus employees, the NTSB determined that the probable cause of the derailment was the fatigue failure of a thermally damaged straight-plate wheel due to fatigue cracking that initiated at a stress raiser associated with a stamped character on the wheel rim. *See* 62 FR 49743; NTSB/RAR–95/01. Noting that tread braking is a significant source of wheel overheating and thermal damage; straight-plate wheels are vulnerable to thermal damage; and rim-stamping provides a stress concentration for crack initiation, the NTSB recommended that FRA ''[p]rohibit the replacement of wheels on any tread-braked passenger railroad car with rim-stamped straight plate wheels.'' (Class II, Priority Action) (R–95–1).

In the NPRM, FRA stated that because a wheel having a rim-stamped straight-plate character is a sufficient safety concern in itself, FRA proposed extending the NTSB's safety recommendation to apply to all such wheels used on passenger equipment regardless whether the equipment were tread-braked or not. *See* 62 FR 49743, 49803. Further, FRA proposed addressing separately the use of such wheels on passenger equipment other than private passenger cars—for which there would be an immediate prohibition on the use of the wheels—in distinction to the use of such wheels on private cars—for which there would be a prohibition on the wheels' use as replacement wheels. *See* 62 FR 49743–4, 49803.

Based on comments received in response to the proposed rule, and after further analysis, FRA has modified the requirements of this section from those proposed in the NPRM. In the final rule, the restrictions on the use of rim-stamped straight-plate wheels apply only to such wheels use on tread-braked passenger equipment. AAPRCO, in its comments on the NPRM, stated that the proposed section was overly broad in prohibiting rim-stamped straight-plate wheels from being used as replacement wheels on private cars operated in a passenger train. Citing the above-noted NTSB report, AAPRCO explained that the only detected problem involving the use of rim-stamped straight-plate wheels occurred when such wheels were subjected to tread braking. AAPRCO believed that there is no known problem involving the use of such wheels on passenger equipment that is disc-braked and, therefore, not subject to heating. Accordingly, AAPRCO recommended limiting the prohibition against using rim-stamped straight-plate wheels as replacement wheels on private cars to those wheels that are tread-braked.

FRA notes that the stamping of manufacturers' marks on railroad wheel rims introduces stress concentrations in the wheel rims. Such stress risers can help originate cracks as the wheel is subjected to the low-cycle thermal fatigue of repeated tread-brake applications. As freight equipment operates with tread brakes, the AAR has discontinued rim stamping in order to preclude wheel failures due to cracking initiated at the stamp marks.

Disc brakes use a caliper and pad arrangement (like a bicycle brake) which operates on (squeeze) a disc which is affixed to the axle of a rail car, or to the back face of the wheel in a ''cheek'' mounted scheme, to provide retarding force. Disc brakes introduce no heat into the rim, since the heat is generated by the friction between the caliper pads and the disc. This condition is true only if the strategy to stop a vehicle relies solely on discs without tread-brake assistance.

Disc-braked rail cars sometimes have tread brakes which are used as parking brakes. These tread brakes may be applied periodically while the train is running, using low cylinder forces, in order to clean the wheel tread surface of oxides and debris which can interfere with the ability of the wheel to make an electrical connection with the rail for the purposes of shunting the track circuits to activate signals. This action is typically of short duration and is controlled by automatic circuitry (snow brakes) and should not pose a threat to the integrity of the wheels.

Braking strategies sometimes involve a combination of disc and tread braking to achieve desired deceleration rates. For example, Amtrak's AMFLEET I and II cars use such a combination—approximately 40% tread and 60% disc. In such a case, the wheels are tread-braked every time the vehicle comes to a stop, as opposed to the lower energy snow braking described above.

Straight plate wheels are well-known to be much more susceptible to thermal damage than curved or S-plate wheels. Plate curvature permits radial breathing of the rim as it is heated, resulting in lower rim stresses. The straight-plate wheel is much stiffer radially and stresses in these wheels are therefore greater for the same thermal input. If straight-plate wheels experience tread braking, or if tread brakes are used in the event of disc brake failure, the possibility exists for wheel thermal damage. However, the use of straight-plate, rim-stamped wheels should not pose a safety threat if the wheels are never tread-braked.

Because the use of straight-plate, rim-stamped wheels should pose no safety threat if the wheels are never tread-braked, the requirements of this section do not apply to such wheels used in such circumstances. Moreover, as provided in paragraph (c), if the wheels are in fact tread-braked but only in a limited manner to clean the wheel surface, the requirements of this section likewise do not apply. However, FRA hereby makes clear that the requirements of this section apply to the use of straight-plate, rim-stamped wheels when the wheels are subjected to tread braking in any combination with disc brakes for the purpose of slowing the passenger equipment.

The second principal change in the final rule from the NPRM provides particular consideration for the use of Class A rim-stamped, straight-plate wheels mounted on inboard-bearing axles on commuter passenger equipment. In commenting on the NPRM, APTA noted that a number of commuter railroads are currently operating—or are in the process of implementing service with—Bombardier-manufactured bi-level coaches that are equipped with Class A rim-stamped, reverse-plate wheels. APTA specified that the affected commuter railroads operate 182 passenger coaches equipped with these wheels and consist of the Southern California Regional Rail Authority (Metrolink), San Diego Northern Railway, Tri-County Commuter Rail Authority, Dallas Area Rapid Transit, and the San Joaquin Railroad Commission. APTA explained that reverse-plate wheels are considered a hybrid of the straight-plate design and therefore subject to the prohibition of this section. APTA added that these wheels have an average service life of five years. According to APTA, imposing this prohibition on the affected commuter rail operations will dramatically reduce or terminate commuter rail operations while replacement wheels are procured and installed. APTA stated that Class A reverse-plate wheels have a safe history of usage with no indication of wheel cracks caused by rim stamping, and that failures of Class B and C wheels of a true straight-plate design led to the NTSB's recommendation here. Based on these differences, APTA recommended that FRA allow Class A, rim-stamped reverse-plate wheels to continue in service.

FRA has considered APTA's comments and notes that the rim-stamped ''reverse''-plate wheels in issue are indeed straight-plate wheels. The ''reverse'' connotation refers to the orientation (angle) of the wheel plate with respect to the axle. Passenger wheelsets have inboard bearings—that is, the bearings are located between the wheels on the axle. Freight wheelsets are outboard-bearing in that the wheels are mounted between the bearings. The wheel plate is pitched one way or the other in either circumstance so that the wheel flanges end up being the same distance apart. In this way, either wheelset can transverse the same standard gage track.

From discussions with APTA, FRA understands that these Class A, rim-stamped straight-plate wheels are installed on rail cars weighing approximately 115,000 pounds, utilizing blended dynamic and friction braking. The friction-based portion of the braking system in turn is composed of approximately 67% tread braking, and 33% disc braking. FRA further understands that, when properly used, the extended-range dynamic brake can slow the vehicle from 90 mph—its top operating speed—to less than 10 mph with no friction (pneumatic) braking applied, and that this is the recommended method of operating these rail cars. The service brake rate is 2.0 mph/sec and the emergency rate is 2.5 mph/sec. In combination with the wheel slip/slide protection system provided for these cars, FRA believes that the wheels on these rail cars should be subjected to limited thermal input.

Further, FRA notes that wheels are generally classified as L, A, B, or C depending on the carbon content of the wheel material. The amount of carbon determines the hardness and strength of the steel. A Class A wheel has a lower carbon content, and correspondingly lower hardness and strength than a Class B or C wheel. Lower hardness means that the wheel has increased ductility or improved ability to resist cracking (fracture toughness). This is why Class L and A wheels are recommended for severe braking conditions. However, since these wheels are ''softer,'' heavy wheel loads will result in poor wear performance, which is why they are recommended only for light to moderate wheel loads. Class B and C wheels (with more carbon and increased hardness) exhibit good wear behavior, but are more prone to cracking. Railroads choose the wheel type for a particular class of service based on its operating characteristics.

As reflected in paragraph (a)(2), FRA believes that the commuter railroads operating vehicles with Class A, rim-stamped straight-plate wheels mounted on inboard-bearing axles—i.e., reverse-plate wheels—may continue to do so provided the railroads do not modify the operation of the vehicles in any way that would result in increased thermal input to the wheels during braking. As a result, vehicles equipped with these wheels may not operate at speeds exceeding their current maximum operating speeds. Further, these wheels may not be placed on different (especially heavier) rail vehicles. Provided the conditions for continued use of the wheels are met, however, a railroad may continue to use the wheels until it exhausts its stock of replacement wheels held as of May 12, 1999, which is the date of this final rule's publication. FRA understands that the manufacturer of these wheels has already started to stamp the wheels on their hubs, instead of on their rims, and FRA believes that the railroads' inventory of such rim-stamped wheels will be exhausted within the next 18 months. Once a commuter railroad's inventory of Class A, rim-stamped straight-plate wheels is exhausted, each such wheel must be replaced at the end of the wheel's service life with a wheel that is not rim-stamped.

In commenting on the NPRM, Talgo suggested clarifying the requirements of this section to state that the stamping of characters on the rim of a wheel is prohibited due to dangers associated with stress concentration. According to Talgo, if indeed the purpose of this section is to address rim-stamping itself, then the rule should be revised to address all types of wheels and not just straight-plate wheels. FRA does recognize that the stamping of manufacturers' marks on railroad wheel rims introduces stress concentrations in the rims, and, all things being equal, manufacturers should stamp wheels on their hubs instead of on their rims. Yet, FRA is concerned in particular with rim-stamped straight-plate wheels because, as noted above, a straight-plate wheel design is more susceptible to thermal damage than a curved wheel design. The plate curvature permits radial breathing of the rim as it is heated, resulting in lower rim stresses.

Similar to the proposal in the NPRM, the final rule allows rim-stamped, straight-plate wheels on tread-braked private cars to continue in service throughout the life of each wheel. However, as provided in paragraph (b), such wheels may not be used as replacement wheels on these cars. As explained in the NPRM, FRA recognizes that private cars are generally not highly utilized in comparison to intercity or commuter passenger equipment, and Amtrak imposes its own safety requirements on the use of such cars in its trains. *See* 62 FR 49743–4.

In commenting on the NPRM, a member of the public stated that many private car owners have a substantial investment in rim-stamped straight-plate wheels, and precluding their installation would consequently place a financial burden on many private car owners. This commenter requested that a provision be added to the rule to allow private car owners to install such wheels on their cars after January 1, 1998,—which FRA proposed as the effective date for this section—provided the wheels were owned by that date. In this regard, FRA notes that Amtrak has issued a letter to private car owners dated September 19, 1995, stating that after June 30, 2000, Amtrak will decline to move any tread-braked passenger cars with rim-stamped straight-plate wheels. In addition, Amtrak stated in the same letter that it would not accept any new applications for wheel change out with rim-stamped straight-plate wheels, regardless of the brake type. Amtrak's letter referenced the NTSB's safety recommendation noted in this section.

Since Amtrak is the chief carrier of private rail cars, the ability of a private rail car owner to use rim-stamped, straight-plate wheels will be significantly affected independent of the requirements of this rule. Further, allowing such wheels to continue in use until a car owner's inventory of the wheels is depleted would prolong the use of such wheels for potentially decades. FRA believes that the rule allows due consideration for private rail car owners in allowing them to continue using tread-braked private rail cars equipped with rim-stamped, straight-plate wheels throughout the life of each wheel, while recognizing that, as a whole, the wheels are subject to greater thermal input when in use and are more susceptible to cracking than the commuter railroad wheels discussed above. Moreover, FRA notes that under the definition of ''passenger equipment'' in this rule, a private rail car not operated in a train with a passenger car, such as in a freight train, or in a consist of private rail cars, is not subject to the requirements of this rule. (See above discussion of passenger equipment in § 238.5.). In addition, the final rule does not apply to tourist railroads, and a private rail car may therefore operate on such railroad without complying with the requirements of this rule. See § 238.3.

Subpart C—Specific Requirements for Tier I Passenger Equipment

Section 238.201 Scope.

This subpart contains specific requirements for railroad passenger equipment operating at speeds not exceeding 125 mph. This subpart contains various structural standards (§ 238.203Bstatic 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—fuel tanks). These structural standards do not apply to passenger equipment if used exclusively on a rail line (A) with no public highway-rail grade crossings, (B) on which no freight operations occur at any time, (C) on which only passenger equipment of compatible design is utilized, and (D) on which trains operate at speeds no higher than 79 mph.

In general, except for the static end strength standards (' 238.203) and as otherwise provided in this subpart, the requirements of this subpart apply only to passenger equipment ordered on or after September 8, 2000 or placed in service for the first time on or after September 9, 2002. That is, where no specific date or dates are provided in the regulatory text for a particular section, such as § 238.225 (Electrical system), these dates apply to that section's requirements. Of course, certain existing Federal requirements, such as the window safety glazing standards in part 223 of this chapter that are referenced in § 238.221 (Glazing), continue to apply by their own force.

The rule does provide that passenger equipment placed in service for the first time on or after September 8, 2000, unless otherwise provided in the cited sections, must meet the minimum structural requirements specified in: § 238.205(a) (anti-climbing mechanism); § 238.207 (link between coupling mechanism and car body); and § 238.211(a) (collision posts). Further, as specified in detail below, any such equipment in use on or after November 8, 1999 must also meet the static end strength standards specified in § 238.203. These four particular requirements are virtually identical to existing Federal requirements, found in 49 CFR § 229.141(a)(1)–(4), that apply to MU locomotives built new after April 1, 1956, and operated in trains having a total empty weight of 600,000 pounds or more. These requirements reflect the common construction practices for passenger equipment currently in service in the United States, and FRA believes they are minimum safety requirements. FRA notes that the 600,000-pound consist weight threshold for purposes of 49 CFR § 229.141 is not an appropriate distinction to apply to passenger equipment operated on the general system, intermingled with equipment of more substantial strength; and, as a result, part 238 contains no such consist weight distinction. In this regard, FRA notes that through this final rule it is amending the application of 49 CFR § 229.141 so that its requirements will not apply to passenger equipment subject to part 238.

In addition to these four structural requirements, the rule also requires that passenger equipment comply with other structural requirements specified in: §§ 238.205(b) (anti-climbing mechanism for locomotives); 238.209 (forward-facing end structure of locomotives); 238.211(b) (collision posts for locomotives); 238.213 (corner posts); 238.215 (rollover strength); 238.217 (side structure); 238.219 (truck-to-car-body attachment); and 238.223 (fuel tanks). These requirements 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, unless otherwise provided in the cited sections. FRA notes that, under special circumstances, it will allow the placement in service of passenger equipment not meeting these structural requirements if the equipment was in fact ordered within September 8, 2000 but not placed in service until after September 9, 2002. In such case, the railroad must provide documentation to the satisfaction of the Associate Administrator for Safety that demonstrates the special circumstances accounting for the delay in placing the equipment in service.

Structural Standards for Existing Equipment

The final rule requires that all passenger equipment (other than locomotives that comply with an alternative standard as specified, private cars, unoccupied vehicles operating at the rear of a passenger train, or equipment used in non-commingled service, as discussed below) in use on or after November 8, 1999 have a minimum static end strength of 800,000 pounds as specified in § 238.203. Static end strength is critical in protecting passenger equipment from crushing in a head-on or rear-end collision, especially in the North American railroad operating environment that includes frequent highway-rail grade crossings and the mixed operation of freight and passenger trains. FRA is confident that all but a limited number of existing passenger cars in the United States have been built to this basic compressive strength requirement. Beginning in 1939, the AAR recommended that new passenger cars operated in trains of over 600,000 pounds empty weight have a minimum static end strength of 800,000 pounds, and since 1956, Federal Regulations (49 CFR. 229.141) have required that new MU locomotives operated in such trains must meet this standard. Railroads with existing passenger cars that do not meet the minimum static end strength requirement may petition FRA for grandfathering approval to continue to use the equipment; see discussion under § 238.203.

FRA does, however, recognize that low-speed rail operations that are structured to totally preclude both operations over highway rail grade crossings and the sharing of trackage between light rail equipment and conventional equipment do not require the structural standards required for commingled operations. Accordingly, the final rule (in § 238.201) provides that passenger equipment is not subject to the structural requirements of the rule if it used exclusively on a rail line (A) with no public highway-rail grade crossings, (B) on which no freight operations occur at any time, (C) on which only passenger equipment of compatible design is utilized, and (D) on which trains operate at speeds no higher than 79 mph. FRA will discuss with the Working Group in Phase II of the rulemaking what structural standards are appropriate for such operations.

In the NPRM, FRA considered requiring that one or more of the other structural requirements for new passenger equipment, discussed above, be made applicable to existing equipment as soon as one of the following events occurs: the equipment is sold to another railroad; the equipment is rebuilt; the equipment reaches 40 years of age; or 10 years elapses after the effective date of the rule. FRA invited comments on: (1) What equipment would be affected by each of these structural requirements; (2) the feasibility and costs of retrofitting such equipment, with costs broken out for each of the different structural requirements, in the event such triggering events were adopted in the final rule; (3) whether these triggering events are reasonable, or whether some other fixed deadline should be established for making one or more of these structural requirements applicable to existing passenger equipment; and (4) the safety benefits that could accrue by making these requirements applicable to existing equipment. FRA did specifically note in the NPRM that older passenger equipment may not meet the collision post requirements in § 238.211(a) because of a change in collision post design following a collision between two Illinois Central Gulf Railroad commuter trains in Chicago, Illinois, on October 30, 1972.

In response, APTA commented that it opposed application of the rule's structural standards to existing passenger equipment in light of the potential adverse economic impact on passenger railroads. AAPRCO, in its comments on the NPRM, believed the costs associated with rebuilding private cars to meet the new passenger equipment requirements would be extremely high with no significant benefit to the public. AAPRCO stated that Amtrak requires all cars, including private cars, that operate on their system be maintained to strict standards of inspection, including full 40-year truck teardowns with specified periodic scheduled truck roll-outs, annual inspections, and full COT&S. AAPRCO noted that nearly all private cars currently in operation are over 40 years old.

In the final rule, FRA has made the compressive strength requirement the only structural requirement applicable to existing passenger equipment. However, in general, if the need arises to apply one of the other structural requirements specified in the rule to existing passenger equipment, FRA will reconsider whether such requirements should be made applicable to existing equipment. In particular, FRA will ask its Working Group in Phase II of the rulemaking to consider applying the other structural requirements specified in the rule to existing passenger equipment when the equipment is ''rebuilt'' or otherwise improved such that the useful life of the equipment is materially extended. Further, FRA will not specifically limit the consideration of the Working Group in this regard to the rule's structural requirements, but will include in its consideration any of the other requirements for Tier I passenger equipment in this final rule.

Equipment of Special Construction

Comments from Talgo, discussed in general above and in more specific terms below, question the relevance or appropriateness of some of the proposed structural standards to a trainset built with articulated connections using a monocoque or space frame design. In consultations associated with the Working Group review, FRA sought information from the commenter regarding its trainset and has sought to identify requirements that might be appropriate for this configuration. However, in general, the analytical basis for alternative engineering values suggested by the commenter either was not evident or was determined not to be appropriate. Talgo did submit additional engineering information in October of 1998 but FRA could not appropriately analyze this data for purposes of the final rule without substantially delaying the rule's issuance. FRA does recognize that special attention is needed to the specifics of this design, which is unique in current service in the United States, both to avoid inappropriate requirements and to ensure sound functioning of features that may warrant exceptions from other requirements.

In the final rule, § 238.201 has been amended to permit approval of equipment of special construction. (This alternative compliance approval process does not apply to the minimum static end strength requirements set forth in § 238.203.) The basis for decision would be similar to that discussed in the NPRM with respect to waivers (62 FR 49728, 49755), but the special approval mechanism would be employed as a more appropriate means of recognizing whether the equipment provides an equivalent level of safety with the standard of safety benchmarked in the particular provisions of the subpart.

No New Safety Appliance Requirements

FRA is not imposing new safety appliance requirements for passenger equipment subject to this subpart. The safety appliance requirements referenced in § 238.229 continue to apply to such passenger equipment and are noted in this rule for clarity. Similarly, the window glazing requirements in 49 CFR part 223 continue to apply by their own force.

Section 238.203 Static End Strength

This section contains the requirements for the overall compressive strength of all Tier I rail passenger equipment, except for equipment meeting the requirements of § 238.201. This section is based on the long-standing practice of constructing passenger cars to possess a minimum static end strength of 800,000 pounds on the line of draft without permanent deformation of the body structure. This practice has proven effective in the North American railroad operating environment that includes frequent highway-rail grade crossings, mixed operation of freight and passenger trains, and less than fully-capable signal and train control systems. This section should be read with the discussion relating to static end strength earlier in the preamble.

In general, paragraph (a) requires that on or after November 8, 1999 all passenger equipment (except as otherwise provided in § 238.201) shall resist a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure. As specified in paragraph (a)(2), unoccupied volumes of a passenger car or a locomotive may have a lesser static end strength to allow a crash energy management design approach to be employed, if the 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. FRA makes clear that, for purposes of paragraph (a)(2), the ability of a car or locomotive to resist 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 shall be determined on the basis of the individual car or locomotive's own strength and crash energy management design. Two or more units of passenger equipment may not be included in demonstrating the ability of the occupied volume of an individual passenger car or locomotive to resist a minimum static end load of 800,000 pounds as specified in paragraph (a)(2).

Paragraph (a)(2) is based on proposed § 238.203(b) in the NPRM, *see* 62 FR 49804. In the final rule, FRA has revised and incorporated that paragraph into paragraph (a). FRA has done so in part to make clear that a passenger car or a locomotive must first resist a minimum static end load of 800,000 pounds applied at the ends of the car or locomotive, unless the car or locomotive employs a crash energy management design in which case the load may then be resisted at the ends of the volume of the car or locomotive occupied by passengers or crewmembers.

FRA has included paragraph (a)(3) in the final rule in response to the comments on the NPRM that existing AEM–7 locomotives would not comply with the static end strength requirement proposed by FRA. As FRA understands, applying the 800,000-pound load at the buff stops of an AEM–7 locomotive apparently creates too large a moment on either the draft gear housing or on the buffer beam to side sill connection. Having analyzed the AEM–7 locomotive, FRA believes that the structure can support a 1,000,000-pound load applied at the center of the buffer beam, and provide an equivalent or greater level of safety than that proposed in the NPRM.

The requirements of paragraph (a)(3) are based on former AAR Standard 034–69, Section 6—Buffing, paragraph (f). In the final rule, FRA has doubled the load provided in the AAR Standard from 500,000 pounds to 1,000,000 pounds, to ensure safety. Further, FRA has tailored paragraph (a)(3) so that the alternative specified therein does not apply to any locomotive placed in service on or after July 12, 1999, as FRA wishes to limit application of this alternative to existing locomotives. In addition, the alternative specified in paragraph (a)(3) may not be applied to a cab car or an MU locomotive. Use of the alternative for such a locomotive will not provide as high a level of safety as for a conventional locomotive.

As specified in paragraph (a)(4), the requirements of paragraph (a) do not apply to unoccupied passenger equipment operating at the rear of a passenger train. In the NPRM, FRA had proposed excepting from the requirements of paragraph (a) vehicles such as auto-carriers and RoadRailers operated at the rear of a passenger train and used solely to transport freight. To the extent such equipment could be excepted from the requirements of this paragraph, FRA determined that other unoccupied passenger equipment operating at the rear of a passenger train could also be excepted. In general, however, FRA would prefer that every vehicle in a passenger train have a minimum static end strength as specified in this section so that in the event of a train collision the cars in the train will crush or resist crushing with a certain degree of predictability and, thereby, further the ability of the train to remain upright and in line. As most collisions involving a passenger train occur at the train's forward end, the requirement for unoccupied passenger equipment to possess a minimum compressive strength is more significant for such equipment operated at the train's forward end and in front of the passenger car consist, than for such equipment operated at the rear. As proposed in the NPRM, private cars are also excepted from the requirements of paragraph (a). Nevertheless, FRA believes that, at a minimum, most private cars do comply with the compressive strength requirements that are specified in this paragraph for other passenger equipment.

In the final rule, FRA has included paragraph (b) to address the concern of railroads commenting on the NPRM that their existing passenger equipment may need to undergo potentially costly testing to determine whether the equipment complies with the static end strength requirements specified in this rule. Although FRA believes that only a limited number of existing passenger equipment on the nation's railroads does not comply with the static end strength requirement specified in paragraph (a)(1), FRA has included a presumption in the final rule to alleviate the burden on railroads to show that their existing equipment complies with the requirements of this paragraph. Paragraph (b) provides that any passenger equipment placed in service before November 8, 1999 is presumed to comply with paragraph (a)(1) (and thus presumed to resist a minimum static end load of 800,000 pounds applied on the line of draft without permanent deformation of the body structure), 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). FRA makes clear that passenger equipment built in accordance with AAR specifications for the construction of passenger equipment operating in trains of more than 600,000 pounds total empty weight is deemed to be built to the requirements specified in paragraph (a)(1) and, thereby, compliant in this regard. Originally adopted in 1939, Section 6, paragraph (a), of AAR Standard S–034–69, "Specification for the Construction of New Passenger Equipment Cars," provides in part, "The car structure shall resist a minimum static end load of 800,000 lbs. at the rear draft stops ahead of the bolster on the center line of draft, without developing any permanent deformation in any member of the car structure." FRA also makes clear that, in a case where the railroad does not know whether its passenger equipment was built to the requirements specified in paragraph (a)(1) (or, in essence, this AAR specification), the presumption that the equipment was built to the requirements specified in paragraph (a)(1) still applies. The presumption is not applicable only in those cases where the railroad knows, or FRA can make a showing, that the equipment was not built to the requirements specified in paragraph (a)(1).

In response to the NYDOT's comment as to the effect of applying the static end strength requirement to existing passenger equipment, and thereby to the turboliner equipment planned for use in New York State, FRA believes that the RTL trainsets undergoing rebuild comply with the end strength requirement specified in paragraph (a)(1). However, these RTL trainsets need to be contrasted with the RTG trainsets which the NYDOT has also expressed an interest in rebuilding for like use. FRA believes that these RTG trainsets do not meet the end strength requirement specified in paragraph (a)(1), as FRA understands they were built in accordance with UIC (International Union of Railways) structural standards (which provide for lesser structural strength). FRA does note that no RTG trainsets are currently in service in the United States and that to rebuild the equipment would involve substantial cost while failing to meet the crashworthiness objectives of this rule. Information available to FRA indicates that the only useable remaining components of these trainsets are their shells. Further, FRA is not aware that any funding has been allocated to initiate the remanufacture of these trainsets, and any planned use of these trainsets should be considered speculative.

To prevent sudden, brittle-type failure of the passenger equipment body structure, paragraph (c) requires that the body structure 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.

In the final rule, FRA has added a paragraph (d) to provide a process for grandfathering approval of passenger equipment in use on a rail line or lines on November 8, 1999 that does not meet the minimum static end strength requirements. If the operator of the equipment files a petition with FRA seeking grandfathering approval to continue to use the equipment within this 180-day period after the rule is published, the equipment could continue in such usage while the petition is being processed, but such usage must stop May 8, 2000 unless the petition is approved. The section sets forth the requirements for petitions and service of the petition, and the process FRA will follow in soliciting comments on the petition and disposing of petitions.

FRA plans to "grandfather" equipment only for use in particular operating environments providing a sufficient showing is made that any incremental safety risk incurred in those environments is not of significant concern or that specific measures mitigating the risk to the traveling public and to railroad employees are utilized. Petitioners will need to demonstrate—through a quantitative risk assessment that incorporates design information, engineering analysis of the equipment's static end strength and of the likely performance of the equipment in derailment and collision scenarios, and risk mitigation measures to avoid the possibility of collisions or to limit the speed at which a collision might occur, or both, that will be employed in connection with the usage of the equipment on a specified rail line or lines—that 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. In this regard, FRA notes that passenger equipment not possessing the minimum static end strength specified in this rule does not have the same capacity to absorb safely within its body structure the compressive forces that develop in a collision as equipment meeting the standard. The engineering analysis submitted by the petitioner should address how these forces will be dissipated in a manner that does not jeopardize occupant safety in collision scenarios.

Grandfathering approval of non-compliant equipment 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 for such usage.

Section 238.205 Anti-Climbing Mechanism

This section contains the vertical strength requirements for anti-climbing mechanisms on rail passenger equipment. The purpose of the anti-climbing mechanism is to prevent the override or telescoping of one passenger train unit into another in a derailment or collision. FRA is requiring that all passenger equipment placed in service for the first time on or after November 8, 1999 shall have an anti-climbing mechanism at each end capable of resisting an upward or downward vertical force of 100,000 pounds without permanent deformation. When coupled together in any combination to join two vehicles, AAR Type H and Type F tight-lock couplers satisfy this requirement. This requirement incorporates a long-standing industry practice into the final rule.

The rule further requires that the forward end of a locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, be equipped with an anti-climbing mechanism capable of resisting an upward or downward vertical force of 200,000 pounds without failure. This requirement applies to locomotives or power cars of permanently coupled trains, and includes cab cars and MU locomotives. Specifying a vertical load requirement for lead vehicles (locomotives) that is greater than that for coupled vehicles is needed to address the greater tendency for override in a collision between uncoupled vehicles. AAR Standard S–580, which addresses the crashworthiness of locomotives, has included this requirement for all freight locomotives built since August 1990. FRA believes this industry practice is sound, and this requirement received endorsement by passenger railroad representatives. FRA recognizes that incorporating a separate anti-climbing arrangement in the leading structure of cab cars and MU locomotives presents a significant challenge. FRA will continue to work with the APTA PRESS Task Force to derive a suitable solution.

In its comments on the proposed rule, Talgo remarked that § 238.205(a), as drafted, seemed to consider that only couplers may properly function as anti-climbing mechanisms. Talgo recommended modifying this section to avoid this implication and ensure that anti-climbing mechanisms of varying design can be evaluated fairly. Talgo asserted that such a modification would ensure that articulated trainsets are not unfairly subject to a requirement that focuses only on conventionally coupled units. WDOT, in its comments on the NPRM, raised similar points, noting that articulated joints of semi-permanently coupled trainsets provide anti-climbing ability. As a result, FRA makes clear that the term anti-climbing mechanism is intended to be read broadly to encompass more than a conventional coupler, and that an articulated connection may serve as an anti-climbing mechanism for the purposes of this section provided it can withstand the vertical forces specified in this section.

In its comments on the NPRM, Talgo also believed that the rule should be restated to accommodate trains of different masses. Specifically, in determining the strength of the anti-climbing feature, Talgo recommended stating the operative variable as vertical acceleration, expressed in gs (units of acceleration of gravity), rather than load, expressed in pounds. Accordingly, Talgo recommended modifying this section so that the anti-climbing mechanism be capable of resisting a certain value of acceleration, instead of a vertical force of 100,000 pounds. Talgo supplemented its comments on this section following FRA's announcement that the minutes of the rulemaking's Working Group meetings had been added to the rulemaking's docket, *See* 63 FR 28496; May 26, 1998. As FRA had permitted comments for inclusion in the record as to whether the minutes accurately reflected statements made at the Working Group meetings, Talgo stated that the minutes do not mention that a representative of the Volpe Center acknowledged that this section should be modified to address lighter rail equipment. Talgo stated that, aside from the ends of its articulated trainsets which it noted are compliant with the 100,000 pound vertical force requirement, intermediate joints in the trainsets need only be equipped with anti-climbing mechanisms of 47,000 pounds strength to provide the same level of safety as required by the rule. Talgo explained that, for purposes of calculating a vertical force requirement, one should focus on the static force needed to lift a car of specified weight from one end while supported by the truck on the other end. Talgo further explained that this value should be multiplied by a safety factor—equal to 2.2., as it derived from values in the proposed rule—in order to take into account the possibilities of misalignment and similar dynamics in the event of a collision. As a result, Talgo believed specifying a 47,000-pound strength requirement for anti-climbing mechanisms on its equipment would provide the same level of safety as specifying a 100,000-pound strength requirement for anti-climbing mechanisms on conventional cars.

FRA notes that during a train collision the relatively strong underframe of a rail vehicle may ride up above the underframe of an adjacent rail vehicle, and extensively crush the weaker superstructure of the overridden vehicle. The potential for override to occur is influenced by the dynamic motions of the cars, the relative heights of the vehicles' underframes, and the changing geometry of the vehicles' structures as they crush during the collision. These factors allow the development of a vertical component of the very high longitudinal forces occurring in a train during a collision. This vertical force component, in effect, squeezes one underframe up and over the underframe of another vehicle in the train. While all three factors play a role in the occurrence of override, results of actual collisions indicate that the changing geometry of the car structures as they crush—which, in effect, creates a ramp during the collision—can overwhelm the influence of the difference in sill heights. There are numerous examples of cars with relatively low underframe heights that have overridden cars with relatively high underframe heights.

FRA has not modified the final rule in response to Talgo's comment that the rule should require the anti-climbing mechanism to be capable of resisting a certain value of acceleration instead of a specified vertical force. First, Talgo has not indicated in its comments what that value of acceleration should be, and FRA believes that formulating a performance standard in pounds of force, instead, is appropriate. Second, Talgo's subsequent comments have focused on specifying a 47,000-pound vertical force as an alternative to the

100,000-pound vertical force that an anti-climbing mechanism must resist under this section. In response to this latter suggestion by Talgo, FRA notes that the longitudinal force acting on a vehicle in a train during a collision is, in large part, a function of the vehicle's own deceleration plus the force required to decelerate all the vehicles behind it. (The longitudinal force is also dependent on the force required to crush the vehicles in the train.) When a sufficient vertical component of this total force develops, override occurs. Because the longitudinal force required to decelerate the trailing vehicles can exceed the force required to decelerate the subject vehicle, it is not possible to relate the deceleration of a single vehicle to the tendency to override in the way that Talgo has explained in arriving at its proposed 47,000-pound strength value. The Volpe Center representative cited by Talgo sought to make this point clear at the December 15, 1997 Working Group meeting. This representative also tried to make clear that he did not agree that consideration should be given to lighter rail equipment in the way that Talgo proposed at the Working Group meeting and in its comments on the rule.

Even though it may be theoretically possible to develop a formula which relates the decelerations of all the cars in a train to the tendency to override, such a formula would have to take into account the specific cars in the train and the time-phasing of the decelerations of the cars during a collision, as well as the forces required to crush each of the cars. Development of such a formula is beyond FRA's resources in issuing initial passenger equipment safety standards as mandated by Congress. However, FRA will further examine this issue in evaluating equipment of special construction.

Section 238.207 Link Between Coupling Mechanism and Car Body

This section contains the vertical strength requirements for the structure that links the coupling mechanism to the car body on passenger equipment. The purpose of this requirement is to avoid a premature failure of the draft system so that the anti-climbing mechanism will have an opportunity to engage.

FRA is requiring that all passenger equipment placed in service for the first time on or after November 8, 1999 be provided with a coupler carrier or other coupler-to-car-body linking structure that is designed to resist a vertical downward thrust from the coupler shank of 100,000 pounds, without permanent deformation for any normal horizontal position of the coupler or coupling mechanism.

In its comments on the NPRM, Talgo stated that this section should be modified to apply only in the case where the coupler between cars itself acts as the anti-climbing mechanism—not in cases where other anti-climbing designs such as articulated unions are utilized. As a result, Talgo recommended that the requirements of this section should apply only to the couplers at the far ends of an articulated trainset, and not to the interior articulated unions which do not employ couplers. Talgo believed that this approach has been proposed in the rule with respect to Tier II passenger equipment. Talgo further commented that the load requirement should be the same as provided in § 238.205.

FRA recognizes that in an articulated trainset, the articulated joint connecting the cars in the train serves as both the coupler carrier and as the anti-climbing mechanism. Such cars do not have a coupler shank, *per se*. For practical reasons, including administration of the rule, FRA proposed separate requirements for the strength of the anti-climbing mechanism in § 238.205 and for the strength of the link between the coupling mechanism and car body in § 238.207 because the vast majority of Tier I passenger equipment possesses a conventional draft system. However, FRA intended that for passenger equipment utilizing articulated connections that comply with the requirements of § 238.205(a), such articulated connections would also comply with the requirements of this section. In the final rule, FRA has made this explicit by adding a sentence to the rule text, and FRA has therefore adopted Talgo's comment in this regard. Talgo's comment with respect to specifying an appropriate load requirement for this section is consequently addressed in the discussion of § 238.205, above.

Section 238.209 Forward-Facing End Structure of Locomotives

This section contains the requirements for the covering or skin of the forward-facing end structure of each passenger locomotive ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. The purpose of these requirements is to protect the occupied volume of the locomotive cab. This area is especially vulnerable in a highway-rail grade crossing collision if a fuel tank that is part of or being transported by the highway vehicle ruptures, or bulk hazardous materials are released.

FRA is requiring that the skin covering the forward-facing end of each passenger locomotive, including a cab car and an MU locomotive, be at a minimum equivalent to a ½-inch steel plate with a 25,000 pounds-per-square-inch yield strength. Material of a higher yield strength material may be used to decrease the required thickness of the material provided at least an equivalent level of strength is maintained. The skin shall also be designed to inhibit the entry of fluids into the occupied area of the equipment, and be affixed to the collision posts or other main vertical structural members of the forward-facing end structure to add to the strength of the end structure.

AAR Standard S–580 has included these requirements for all locomotives built since August 1990. From observations of the improved performance of locomotives during collisions, FRA believes that this industry standard should be part of these safety standards. Passenger railroad representatives in the Working Group endorsed this improved safety requirement.

In its comments on the NPRM, APTA recommended that paragraph (c) be clarified so that the skin be designed to permit a train line door with a window in the forward-facing end structure of cab cars and MU locomotives. In fact, as proposed in the NPRM, the rule defined ''skin'' to mean the ''outer covering on a fuel tank or the front of a locomotive, including a cab car and an MU locomotive, excluding the windows and forward-facing doors.'' *See* § 238.5; 62 FR 49795 (The skin may also be covered with another coating of a material such as fiberglass). APTA's recommendation is therefore consistent with FRA's proposal. For clarity, however, FRA has revised the final rule by removing the exclusion concerning windows and forward-facing doors from the definition of ''skin'' in § 238.5, and placing the exclusion instead directly in paragraph (d) of this section.

Section 238.211 Collision Posts

This section contains the structural strength requirements for collision posts. Collision posts provide protection against the crushing of occupied volumes of passenger equipment, including the telescoping of one vehicle into another, in the event of a collision or derailment.

Paragraph (a) requires that all passenger equipment placed in service for the first time on or after November 8, 1999 shall have either two full-height collision posts, each collision post having an ultimate longitudinal strength of not less than 300,000 pounds, or an equivalent end structure. The 300,000-pound strength requirement makes mandatory the long-standing construction practice for collision posts in passenger equipment operating in the United States and has proven effective in the Nation's railroad operating environment. This requirement is similar to that contained in 49 CFR 229.141(a)(4), which applies to MU locomotives operated in trains having a total empty weight of 600,000 pounds or more, but also requires the collision posts to be full-height. As noted, FRA does not believe the 600,000-pound consist weight threshold is an appropriate distinction to retain for passenger equipment operating on the general system intermingled with equipment of more substantial strength, and, as a result, no such consist weight distinction is made in the final rule.

Full-height collision posts provide additional protection because they extend higher than posts attached only at the underframe. Little, if any, additional cost is imposed on builders by requiring full-height posts. Spacing the collision posts at approximately the one-third points laterally across the ends of the equipment will allow both posts to be engaged in many collision scenarios. An equivalent single end structure may be used in place of the two collision posts provided the structure can withstand the sum of the forces that each collision post is required to withstand. This allows for the design of monocoque, unitized or like structures. FRA notes, of course, that such a single end structure must also resist the loading requirements for corner posts as specified in § 238.213, as well as any other applicable end structure requirements as specified in this rule for Tier I passenger equipment.

Amtrak, in its comments on the NPRM, noted that its rail passenger operation is unique in the United States because it includes the use of unoccupied express and mail cars. Amtrak stated that collision posts applied to unoccupied head end cars (express cars) are unwarranted because the posts unnecessarily increase the tare weight of this equipment without any associated improvement in safety. FRA had originally proposed requiring that all passenger equipment comply with the requirements of paragraph (a), except for a vehicle of special design that operates at the rear of a passenger train and is used solely to transport freight, such as an auto-carrier or a RoadRailer. *See* 62 FR 49804. FRA sought this broader application of the collision post requirements in part because collision posts serve to repel adjacent passenger equipment in a train collision or derailment and, thereby, help prevent the uncontrolled crushing of equipment which could tend to misalign the train consist. For occupant safety, it is optimal that a train remain in line and upright in the event of a collision or derailment, and gradually come to a stop after ''plowing the ballast'' along the railroad track.

Nonetheless, FRA has revised the final rule to except unoccupied passenger equipment from the requirements of this section—whether operated at the rear or forward end of a passenger train. However, as noted above in the discussion of § 238.203, unoccupied passenger equipment operated at the forward end of a passenger train must comply with the static end strength requirement to maintain the integrity of the train.

Paragraph (b) requires that each locomotive, including a cab car or MU locomotive, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, have two forward collision posts, located at approximately the one-third points laterally across the end of the locomotive, each post capable of withstanding a 500,000-pound longitudinal force without exceeding the ultimate strength of the joint. In addition, each post must be capable of withstanding a 200,000-pound longitudinal force exerted 30 inches above the joint of the post to the underframe, without exceeding its ultimate strength. AAR Standard S–580 has included this requirement for all locomotives built since August 1990. From observation of the improved performance of these locomotives during collisions, including collisions with motor vehicles at highway-rail grade crossings, FRA believes this industry practice should become part of this rule's safety standards.

As an alternative, an equivalent end structure may be used in place of the two forward collision posts described in paragraph (b), to allow for the design of monocoque, unitized or like structures. The single end structure shall withstand the sum of the forces that each collision post is required to withstand, in addition to the loading requirements for corner posts as specified in § 238.213 and any other applicable end structure requirements as specified in this rule for Tier I passenger equipment.

Paragraph (c) provides that for a consist of semi-permanently coupled, articulated units, the end structure requirements in paragraphs (a) and (b) of this section apply only to the ends of the semi-permanently coupled consist of articulated units, provided that the railroad submits to the FRA Associate Administrator for Safety under the procedures specified in § 238.21—and FRA accepts as persuasive—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. In such case, the interior ends of the individual units in the consist need not be equipped with an end structure meeting the requirements of paragraphs (a) and (b). FRA notes that, in commenting on proposed § 238.211(c), both Talgo and WDOT had requested that FRA substitute the phrase ''semi-permanently coupled'' for ''permanently joined'' in describing the consist of units subject to the exception provided in paragraph (c). This recommendation has been adopted.

FRA has modified paragraph (c) from that proposed in the NPRM, *see* 62 FR 49804, by not providing an automatic exception from the collision post requirements for the interior ends of individual units in a consist of semi-permanently coupled, articulated units. Instead, a railroad must submit a documented engineering analysis supporting the capabilities of the articulated connection, as described above, and FRA must find that analysis persuasive. Articulated assemblies have a history of remaining in line during derailments and collisions and, if not designed to be uncoupled, only the outside ends of the entire assembly should be exposed to the risks of override. However, none of the relevant recent experience is on the North American continent, and the ability of articulated connections to remain intact during a collision with North American passenger equipment, freight rolling stock, or a fixed obstruction has not been demonstrated analytically. FRA noted the weakness in the proposed exception (§ 238.211(c) of the NPRM) while preparing the final rule. An approved, documented engineering analysis supporting the capabilities of the articulated connection is necessary to ensure the safety of passengers and crewmembers.

Section 238.213 Corner Posts

This section contains the requirements for corner posts on passenger cars, such as passenger coaches, cab cars and MU locomotives, ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. FRA has clarified the requirements of this section, as explained below.

A corner post is the vertical structural member normally located at the intersection of the end of a rail vehicle with a side of that vehicle. Paragraphs (a) and (b) specify the loads and orientation of the loads that a corner post in a passenger car must resist. The values specified in paragraphs (a) and (b) are the same as those proposed in the NPRM, *see* 62 FR 49804, though they have been stated in a different manner for clarity in the final rule.

This section allows flexibility so that corner posts may be located at positions other than at the extreme outside corners of a passenger car, as long as the corner posts are placed ahead of the occupied volume of the car. In this manner, corner posts may be positioned adjacent to the occupied volume of a passenger car to provide structural protection to the occupied volume. For instance, for passenger coaches equipped with end vestibules, the corner posts may be located in the side structure inboard of the vestibules' side door openings, provided that such posts are not placed inside the occupied volume, which includes any space for crew or passenger seating. FRA has fully defined ''occupied volume'' in § 238.5 to mean 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. Further, a vestibule is typically not considered occupied, except when it contains a control stand for use as a control cab.

FRA did not intend that the flexibility to place corner posts at locations other than at the extreme outside corners of passenger cars would permit such corner posts to be placed inside the occupied volume of the cars, and FRA recognizes that it should have made this point more explicit in the NPRM. *See* 62 FR 49766. (Of course, as a railroad is free to take safety measures beyond those required in this rule, a railroad may, therefore, operate a passenger car with corner posts inside the occupied volume of the car if another set of corner posts that do comply with the requirements of this section are placed ahead of the occupied volume.) In light of the vulnerabilities of cab cars and MU locomotives operating as the leading units in a passenger train, such passenger cars must be equipped with corner posts meeting the requirements of this section that are placed ahead of the occupied volume. Cab cars and MU locomotives will normally be occupied by a train crewmember in an end compartment, and thus must have corner posts placed near the extreme ends of the vehicles. As stated in its comments on the NPRM, the BLE does not wish the cab control compartment to be the designated section of a passenger car to crush in a collision, and FRA agrees with the BLE that the cab must be protected.

Bombardier, in its comments on the 1997 NPRM, suggested that proposed section 238.213(a) be modified so that the corner posts must resist the loads specified in this section at the point of attachment to the underframe and at the point of attachment to the roof structure, as those loads are applied individually. FRA had proposed that the corner post be able to resist these loads as applied simultaneously, not as applied individually. FRA has carried forward its proposal into the final rule, and has not adopted Bombardier's comment. Requiring the corner post to resist the specified loads as applied simultaneously at the points of attachment to the underframe and at the roof structure is a stricter requirement. In addition, the requirement is likely more representative of the conditions present in an actual collision where the corner post may be impacted at both points simultaneously, as in the case of a sideswipe with a passing rail car.

In their comments on the NPRM, Talgo and WDOT stated that the rule should provide an exception for articulated trainsets similar to that proposed for collision posts in § 238.211(c) of the NPRM. Accordingly, these commenters believed that corner posts should be required only at the far ends of an assembly of semi-permanently coupled, articulated passenger equipment—not at each end of each intermediate, semi-permanently coupled vehicle. FRA has not adopted these comments in the final rule. First, as discussed above, FRA has modified § 238.211 on collision posts so that there is no automatic exception from the collision post requirements for intermediate vehicles in an assembly of semi-permanently coupled, articulated passenger equipment. Further, corner posts, by their very definition and location, protect against hazards in a way that collision posts (positioned closer to the center of the end of a vehicle) cannot. There are many different scenarios in which a passenger car may be struck at its corner, such as in a corner-to-corner collision with another rail vehicle, or a raking collision with an object fouling the right-of-way. As noted in the NPRM, eight passengers were killed following incursion of a freight car into the side of two Amtrak coaches beginning at the corner of each car, near Lugoff, South Carolina, on July 31, 1991. Although there may be less chance of striking the corner of a semi-permanently coupled, articulated passenger car under certain circumstances, the possibility of doing so does exist. FRA, therefore, cannot grant an exclusion from the corner post requirements to such equipment operated as an intermediate unit in an assembly of semi-permanently coupled, articulated passenger cars.

In additional comments on this section, the BLE stated that the proposed corner post strength requirements for Tier I passenger equipment do not adequately address its safety concerns. The BLE noted that past cornering collisions may have resulted in fewer deaths and injuries had improved corner post structures been in place, and that Tier I passenger equipment may operate up to 125 mph in corridors with a significant number of highway-rail intersections. The BLE recommended that FRA apply the corner post requirements proposed for Tier II power cars in § 238.409 to all new and upgraded Tier I passenger equipment.

As FRA explained in the NPRM, the structural parameters for corner post strength represent the common practice for passenger cars built for North American service. They are being adopted as an interim measure to prevent the introduction of equipment not meeting such minimum requirements. FRA recognizes that current design practice has proven inadequate to protect the occupied volume in several recent side-swipe collisions involving passenger trains with cab cars leading. Crash modeling suggests that it is not feasible to modify current equipment designs to protect against collisions of the magnitude that occurred at Secaucus, New Jersey, and Silver Spring, Maryland, in February of 1996. Nevertheless, stronger corner posts are necessary to address collisions involving lower closing speeds. FRA is assisting the APTA PRESS Task Force in preparing a standard for corner post arrangements on cab cars and MU locomotives. Adoption of a suitable standard will be an immediate priority upon publication of the final rule.

Section 238.215 Rollover Strength

This section contains the structural requirements intended to prevent significant deformation of the normally occupied spaces of a passenger car in the event it rolls onto its side or roof. This section essentially requires the vehicle structure to be able to support twice the dead weight of the vehicle while the vehicle is resting on its side or roof. Analysis has shown that current passenger car design practice meets this requirement. This requirement has proven effective in preventing massive structural deformation of cars that have rolled during collisions or derailments. For this reason, FRA believes this requirement should be incorporated into these safety standards.

In the NPRM, FRA invited comment whether this requirement should also apply to locomotives. Representatives from RPI had advised that locomotives do not roll over frequently enough to justify such requirements for conventional locomotives.

The BRC commented that this requirement should apply to locomotives to protect the locomotive's crew from the crush and deformation of the locomotive's occupied volume. While recognizing that locomotives may not roll over frequently, the BRC observed that the additional strength will protect the locomotive's crew if other equipment does land on top of the locomotive. The BRC believed that the occupied volume of the locomotive must be protected to increase the chances of survivability for crewmembers. FRA notes that a rollover strength requirement for all locomotives—freight and passenger—is being examined in the RSAC Locomotive Crashworthiness Working Group. FRA believes that the Locomotive Crashworthiness Working Group is the most appropriate forum in which to address a rollover strength requirement for locomotives overall.

In its comments on the NPRM, Talgo stated that paragraph (a) should include the clarification that local deformations are acceptable when the car rests on its side, just as paragraph (b) specifies that some deformation is permitted to the roof when the car is resting thereon. In paragraph (b), FRA has specified that deformation to the roof sheathing and framing is allowed to the extent necessary for the vehicle to be supported directly on the top chords of the side frames and end frames. This type of deformation does not impinge on the volume normally occupied by passengers. However, side wall deformations pose a safety risk to passengers since seats and other interior fittings are typically attached to the side wall, and passenger limbs are at risk of entrapment or crushing. Therefore, FRA has modified this section in response to Talgo's comment only to permit local yielding of the outer skin of a passenger car provided the resulting deformations in no way intrude upon the occupied volume of the car.

As Bombardier suggested in its comments on the NPRM, FRA has also made a minor clarification to this section by substituting the words ''in the structural members of the'' in place of the word ''for'' in the phrase which originally read in the NPRM, ''the allowable stress for occupied volumes. . . .'' *See* 62 FR 49804–49805.

Section 238.217 Side Structure

This section contains car body side structure requirements. These requirements are intended to prevent the side panels of a passenger car from flexing excessively while in operation, and help to resist penetration of the passenger car's side structure by an outside object. These provisions essentially codify, with minor modifications, sections 16 and 17 of AAR Standard S–034–69, Specification for the Construction of New Passenger Equipment Cars.

This section was originally entitled ''Side impact strength'' in the NPRM. FRA has changed the section title because the requirements in this section principally refer to the stiffness of a car's side panel, rather than the panel's strength. That is, these provisions principally focus on preventing the side panel from flexing excessively under service loads. The greatest service loads acting on the sidewalls of a passenger car probably result from the aerodynamic loads of a train entering or exiting a tunnel, and from two trains passing each other at speed. Residually, these requirements will provide some protection in the event the passenger car's side panel is struck by an outside object.

FRA believes that a side structural strength requirement is necessary because approximately 13% of the grade crossing accidents involving a passenger train result from a highway vehicle striking the side of the passenger train. Further, passenger trains may be struck in the side by other trains, individual rail cars that roll out of sidings, or freight being transported on trains sharing common rights-of-way. In addition, during a derailment or train-to-train collision, trains frequently buckle, exposing the sides of cars to potential impacts during the collision.

In its comments on this section in the NPRM, Bombardier noted that the proposed requirement was based on AAR Standard 034, Section 20, and it believed that to be consistent with the AAR Standard and to take advantage of the higher strength steels currently used in carbody construction, the rule should specify in paragraph (a) that, ''Where minimum section moduli or thickness are specified, they shall be adjusted in proportion to the ratio of the yield strength of the material used, to that of mild open-hearth steel.'' FRA agrees that this comment is applicable to cars whose structural members are made of steel of higher strength than mild open-hearth steel. Accordingly, FRA has expressly provided that the minimum section moduli or thickness specified in paragraph (a) may be adjusted in proportion to the ratio of the yield strength of the material used to that of mild open-hearth steel only for a car whose structural members are made of a higher strength steel.

Talgo, in its comments on this section in the NPRM, believed that the requirement should be rewritten to specify the units used for each of the concepts discussed. For clarity, FRA states that the dimensional units in this paragraph are in inches, and the units for the section moduli are ''in inches^3'' (inches cubed) in paragraphs (a)(1) and (2).

In its comments on the NPRM, WDOT stated that it appeared FRA has continued to refuse to provide it with detailed information on the risks and true need for side impact standards. WDOT stated that it had previously asked FRA for documentation to support FRA's assertion that, as originally stated in the ANPRM, ''[d]esigns of some passenger equipment have floor levels low to the rail, creating the tendency for a heavy highway vehicle striking the side of the train to climb into the occupied passenger volume rather than being driven under the underframe of the passenger rail car'' (61 FR 30692). Without such detailed evidence, WDOT recommended that proposed § 238.217 be deferred until the second phase of the rulemaking.

The Volpe Center has analyzed a highway vehicle side impact into a single-level Amfleet car. The results of that analysis indicate that the Amfleet car will derail and push sideways before significant crushing of the car can occur. It is expected that rail cars having similar structures—side sill, body bolster, and center sill—at a similar height would behave in the same way in such a collision. This includes most passenger cars operating in the United States. However, other cars, such as Amtrak's bi-level cars and WDOT's single-level rail cars, have floor structures that are structurally different and positioned closer to the rail. Preliminary analysis indicates that significant crushing may occur if a highway vehicle collides into the side of one of these cars.

As a general principle in specifying a side impact strength requirement for a passenger car, the objective is to ensure that the side of the passenger car is strong enough so that the car derails and is pushed sideways—rather than collapses—when struck in the side by another rail vehicle or a highway vehicle. FRA believes that current practice may not be adequate to meet this goal, and that cars with low floors are particularly vulnerable to penetration when struck in the side. A more meaningful side structure requirement than contained in this section is necessary to address this concern. Such a requirement will include specifying minimum shear values at the car's floor as well as at some point above the floor to protect the car's occupants. This will be a priority in the second phase of the rulemaking. The requirement in this final rule is, therefore, an interim measure. As FRA believes that this section does not address in particular the vulnerability of low-floor passenger cars to a side impact by a heavy highway vehicle, FRA has, in effect, deferred consideration of a requirement to do so.

FRA notes that WDOT also commented as to the likelihood that a highway vehicle will strike the side of a passenger train. WDOT disagreed with FRA's analysis and conclusions on this issue as stated in the NPRM. *See* 62 FR 49730–1. WDOT stated that FRA had omitted mentioning that two-thirds of all the highway vehicle side impact collisions into a passenger train involved the highway vehicle striking the side of the locomotive. From this, WDOT estimated that one-half of one percent (0.5%) of all grade crossing accidents over the 10-year period shown in the NPRM may have involved a ''heavy'' highway vehicle striking the side of a passenger car.

FRA has gathered more recent data since publication of the NPRM on highway vehicle side impact collisions into passenger trains. Between January 1, 1990, and December 31, 1997, 1,572 collisions occurring at public highway-rail public grade crossings between passenger trains and highway vehicles were reported to FRA. In 202 of these instances (12.8%) highway vehicles struck the side of a passenger train. In other words, a highway vehicle struck the side of a passenger train an average of approximately 25 times each year in this period. Further, in this period 137 collisions involved the highway vehicle striking the first unit of the passenger train, and 65 collisions involved the highway vehicle striking a unit behind the first unit in the train. As a result, WDOT is correct insofar as approximately two-thirds of such collisions involved the highway vehicle striking the first unit in the passenger train, which ostensibly was a locomotive but could also have been a passenger car (cab control car or MU locomotive).

Over the same 8-year period, 31 of the 202 occurrences in which a highway vehicle struck a passenger train involved a ''heavy'' highway vehicle. For purposes of this analysis, FRA considered heavy highway vehicles to consist of all those vehicles identified as a ''Truck-Trailer'' (3) and one-half of those vehicles identified as ''Truck'' (55), as specified according to Form FRA F6180–57—Rail-Highway Grade Crossing Accident/Incident Report. In this period, then, a heavy highway vehicle struck the side of a passenger train an average of 4 times each year—and of these occurrences a heavy highway vehicle struck other than the lead unit in the train an average of 1 to 2 times each year.

In its comments on the NPRM, the WDOT noted that FRA had not provided a record of any injuries or deaths occurring from highway vehicle collisions into passenger trains. FRA states here that in the 8-year period from 1990 through 1997, highway vehicle collisions into passenger trains resulted in 7 total injuries reported to FRA—3 injuries to railroad employees, and 4 injuries to passengers—and no reported fatalities. FRA notes that reliance on this passenger injury data in the abstract is not appropriate when considering the risks associated with operating a particular rail passenger vehicle. For example, it is possible that a highway vehicle collision into the side of an Amfleet rail car that does not injure any passengers would instead cause injuries under the same circumstances in a collision involving a rail car with a different floor structure positioned closer to the rail. As noted above, most of the passenger cars in the United States possess floor structures similar to the Amfleet rail car, positioned at a similar height above the rail. FRA maintains that the potential for a highway vehicle to strike the side of a passenger train is real, as shown by the record of the frequency of highway vehicles striking the sides of passenger trains. FRA therefore advises railroads to consider the risks and consequences of such a collision, with particular attention to the different units of passenger equipment in their operations.

As noted above, the side strength of a passenger car is also highly pertinent to its crashworthiness in a side or raking collision with other railroad rolling stock. Examples could include a freight car rolling out of a siding or industrial spur into the side of a passenger train, or a locomotive moving in a terminal area passing through a switch and into the side of a passenger train. Recognizing these concerns, the Tier II provision on side strength does attempt to address the identified need. This provision was derived from discussions with Amtrak concerning development of specifications for its high-speed trainsets for the Northeast Corridor.

Section 238.219 Truck-to-car-body attachment

This section contains the truck-to-car-body attachment strength requirement for passenger equipment. The attachment is required to resist without failure a 2g vertical force on the mass of the truck and a force of 250,000 pounds in any horizontal direction on the truck.

The intent of the requirement for the attachment to resist without failure a minimum vertical force equivalent to 2g acting on the mass of the truck is to prevent the truck from separating from the car body if it is raised or rolls over. In effect, the attachment must resist, without failure, a force equal to twice the weight of the truck and all the components attached to the truck. Many types of keepers are used to keep trucks attached to car bodies. FRA believes that the majority of them are capable of meeting this requirement. The intent of the requirement for the attachment to resist without failure a minimum force of 250,000 pounds acting in any horizontal direction on the truck is to address the forces that act upon the truck during a derailment that would tend to shear the truck from the car body. The parameter selected represents the current design practice that has proven effective in preventing horizontal shear of trucks from car bodies.

If the truck separates from the car body in a collision or derailment it may become a hazardous projectile that will intrude upon the occupied volumes of the equipment involved in the collision or derailment. Further, if the truck separates from the car body it will not be able to serve, in effect, as an anti-climbing device in a collision or derailment. With the truck attached to the car body, the truck of an overriding rail vehicle is likely to be caught by the underframe of the overridden rail vehicle, thus arresting the override.

In its comments on the NPRM, Talgo recommended that the regulation be modified so that the strength of the attachment against horizontal force is also measured in gs. Specifically, Talgo suggested that the vertical force resistance limit of 2g could be employed rather than a fixed load measure that, according to Talgo, did not take into account individual truck mass. Talgo believed that this modification would not undermine the intent of the rule, which it noted as allowing the truck to act as an anti-climbing device during a collision, citing the NPRM at 62 FR 49767.

In addressing Talgo's comments, FRA would like to make clear that the fundamental reason for requiring the truck-to-car-body attachment to resist without failure a minimum force of 250,000 pounds acting in any horizontal direction on the truck is to prevent the truck from shearing off (separating from) the car body. (FRA believed this implicit in the preamble discussion of the NPRM, and is making it clear here to remove any doubt.) Whether the truck separates from the car body if the car rolls over, or whether the truck separates from the car body from being sheared off, the truck may become a hazardous projectile in either case. FRA did state in the NPRM, ''If the truck remains attached to the car body, the truck is less likely to be struck by [or strike] other units of the train.'' 62 FR 49767. Having the truck remain attached to the car body also allows the truck to serve, in effect, as an anti-climbing device to prevent one vehicle from overriding another in a collision. In this regard, FRA stated in the NPRM, ''*With the truck attached to the car body,* the truck of an overriding vehicle is likely to be caught by the underframe of the overridden vehicle, thus arresting the override.'' Id. (Emphasis added.) However, insofar as FRA's statement in the NPRM that the ''Arequirement for the [truck-to-car-body] attachment to resist a horizontal force is intended to allow the truck to act as an anti-climbing device during a collision'' has been understood to represent the only intent of the horizontal loading resistance requirement, FRA makes clear here that such an understanding of the requirement's intent is too narrow.

FRA believes it appropriate to specify that a passenger rail vehicle's truck-to-car-body attachment must resist without failure a minimum force of 250,000 pounds acting in any horizontal direction on the truck. This force may be possessed by one rail vehicle (Vehicle A) as it collides with the truck of another rail vehicle (Vehicle B) in a collision. Vehicle A is able to possess this force independent of the mass of Vehicle B's truck—or, for that matter, the mass of Vehicle B itself. Nonetheless, Vehicle B's truck-to-car-body-attachment must resist this force so that its truck does not separate from its body. In this regard, FRA believes it inappropriate to restate the horizontal force requirement in this section so that it is dependent on the mass of an individual rail vehicle's truck. FRA does note that it has related the mass of the truck to the vertical force that the truck-to-car-body attachment must resist: In this case, the mass of the truck necessarily determines how strong the truck-to-car-body attachment must be to prevent the truck from separating from the vehicle, as the weight of the truck essentially acts to ''pull'' the truck away from the rail vehicle.

Talgo, in further commenting on the requirements of this section, recommended that the rule should except articulated equipment utilizing a single-axle truck positioned between two car bodies. Talgo stated that in the event a compressive force is generated by a collision, the truck attached to articulated equipment would become embedded between the two car bodies. In this case, it believed the truck is not intended to serve as an anti-climbing device, and that the train's articulated joints would instead provide protection against climbing. WDOT also raised this point in its comments on the NPRM, and recommended that FRA work with Talgo to develop an appropriate alternative to the proposed rule for non-conventional equipment.

As noted, having the truck remain attached to the car body in a collision or derailment helps to prevent one vehicle from overriding another vehicle as the truck of the vehicle attempting the override is caught on the underframe of the other vehicle. Further, the opportunity of having the truck of one vehicle caught on the underframe of another vehicle in such a scenario should be less likely to occur in a collision involving single-axle articulated passenger rail cars than in the case of non-articulated, conventional rail equipment. Yet, as FRA has made clear, the requirements of this section are principally intended to prevent a truck from separating from a rail passenger vehicle. Trucks can and have separated from articulated rail equipment in a collision; and truck separation poses a direct threat to the safety of a passenger train's occupants, especially when the cars in which those passengers ride are structurally vulnerable to penetration. As a result, the requirements of this section must apply to all passenger rail equipment-whether articulated or not.

Section 238.221 Glazing

This section contains additional requirements concerning the safety glazing of passenger equipment subject to the requirements of 49 CFR part 223. Existing safety glazing requirements for windows have largely proven effective in passenger service at speeds up to 125 mph. However, part 223 does not address the performance of the frame which attaches the window glazing to the car body. Paragraph (b)(1) requires each exterior window on a locomotive cab or a passenger car to remain in place when subjected to the forces the glazing itself is required to resist in part 223 of this chapter. In this way, the window glazing must be secured in place so that it can both resist spalling when struck by a projectile, for example, and also resist being knocked out of the window frame. Paragraph (b)(2) requires each exterior window on a locomotive cab or a passenger car to remain in place when subjected to 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. This requirement is also intended to prevent the window from being forced from the window frame, potentially injuring passengers and crewmembers. FRA believes that most existing passenger equipment subject to part 223 meets these requirements.

FRA did not receive any specific comments on this section. However, for clarity, FRA has restated the requirements proposed in § 238.221(b) and (c) in the NPRM, *see* 62 FR 49085, as § 238.221(b) in this final rule. The focus in paragraph (b) in the final rule is clearly on the ability of each exterior window to remain in place, however the window may be secured, and not have the window become a potential projectile itself.

Section 238.223 Fuel tanks

This section contains the structural requirements for external and internal fuel tanks on passenger locomotives ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002.External fuel tanks must comply with the performance requirements for locomotive fuel tanks contained in Appendix D to this part, or an industry standard providing at least an equivalent level of safety if approved by FRA's Associate Administrator for Safety under § 238.21. The requirements in Appendix D are based on AAR Recommended Practice-506, Performance Requirements for Diesel Electric Locomotive Fuel tanks, as adopted on July 1, 1995. In the NPRM, FRA proposed incorporating the requirements of AAR RP–506 directly into the rule. *See* 62 FR 49805. In preparing the final rule, however, FRA determined that restating the requirements of RP–506 in Appendix D would facilitate FRA's administration of the external fuel tank performance requirement. RP–506 itself is not specifically written as a regulatory document, and one of its provisions on fueling does not appear to be a safety requirement. However, FRA does not intend to make any substantive change from the requirements of RP–506, except as noted in detail in the discussion of Appendix D.

FRA has included a definition of external fuel tank in the final rule to mean a fuel containment volume that extends outside the car body structure of the locomotive. An external fuel tank is distinguished from an internal fuel tank, which is defined in the rule as a fuel containment volume that does not extend outside the car body structure of the locomotive. As a result, a fuel tank that is built into the car body structure but is exposed in any way to the outside is considered an external fuel tank under the rule.

FRA has changed the title of paragraph (b) in the NPRM from *Integral fuel tanks* to *Internal fuel tanks,* reflecting the clarification in the definitions. This change is consistent with FRA's intent that, for purposes of the rule, locomotive fuel tanks must comply with one of two standards, depending upon the exposure of the fuel tank outside the car body structure. FRA has dispensed with the term ''integral'' fuel tank—i.e., a fuel tank that is essentially integrated with a structural member of the locomotive not designed as a fuel container—because, depending on its placement, an integral fuel tank either may or may not be exposed outside the locomotive car body structure.

In commenting on the NPRM, Bombardier noted that the requirements proposed in this section have not been applied by the industry to diesel multiple-unit locomotives (DMUs). Bombardier believed that the need and feasibility of applying these standards to DMUs must be evaluated specially because DMUs have much smaller enclosed and protected fuel tanks than those found on conventional North American locomotives. Accordingly, Bombardier recommended that FRA defer applying the requirements of this section to DMUs, until specific requirements for DMUs are developed.

Having considered Bombardier's comment, FRA does not recommend separately addressing requirements for DMU locomotives at this time. FRA has not been provided the operational or performance information necessary for an in-depth evaluation of DMU fuel tanks, and only a limited number of DMUs presently operate within the U.S. FRA will further consider formulating separate requirements for DMU fuel tanks in Phase II of the rulemaking, as operational and performance information is gained.

Section 238.225 Electrical System

FRA did not receive any specific comments on this section, and it is adopted as proposed. This section contains the requirements for the design of electrical systems on passenger equipment. In developing the proposed rule, the Working Group advised that no single, well-recognized electrical code or set of standards applied directly to the design of railroad passenger equipment. As a result, the Working Group recommended broad performance requirements which reflect common electrical safety practice and are widely recognized as good electrical design practice. FRA had offered for comment more detailed electrical system design requirements in the ANPRM, but as advocated by the Working Group the NPRM's approach was more performance-oriented and provided wide latitude in equipment design. FRA believes that this approach helps to ensure good electrical design practice without imposing unnecessary costs on the industry.

The electrical system requirements include provisions for:

- Electrical conductor sizes and properties to provide a margin of safety for the intended application;
- Battery system design to prevent the risk of overcharging or accumulation of dangerous gases that can cause an explosion;
- Design of resistor grids that dissipate energy produced by dynamic braking with sufficient electrical isolation and ventilation to minimize the risk of fires; and
- Electromagnetic compatibility within the intended operating environment to prevent electromagnetic interference with safety-critical equipment systems and to prevent interference of the rolling stock with other systems along the rail right-of-way.

Electrical standards currently under development by an APTA PRESS Task Force will help give effect to these requirements and supplement them as appropriate.

Section 238.227 Suspension System

This section contains the requirements for suspension system performance of all Tier I passenger equipment. In the ANPRM, FRA presented for comment a large set of detailed suspension system performance requirements. The Working Group advised that such an extensive set of requirements was not needed for Tier I passenger equipment, and the NPRM reflected this advice.

Overall, FRA is requiring that all passenger equipment shall exhibit freedom from hunting oscillations at all speeds. Further, FRA is requiring particular suspension system safety requirements for passenger equipment operating at speeds above 110 mph but not exceeding 125 mph, near the transition speed range from Tier I to Tier II requirements. Although FRA believes that for speeds not exceeding 110 mph existing equipment has not demonstrated serious suspension system stability problems, most of this same equipment is only operated at speeds that do not exceed 110 mph. Accordingly, when new or existing passenger equipment is intended for operation above 110 mph, this equipment must demonstrate stable operation during pre-revenue service qualification tests at all speeds up to 5 mph in excess of its maximum intended operating speed under worst-case conditions—including component wear—as determined by the operating railroad. The Working Group advised FRA that a single definition of worst-case conditions could not be applied generally to all railroads; and, as a result, the definition of worst-case conditions shall be determined by each railroad based upon its particular operating environment.

FRA has revised paragraph (a) based on a comment from Talgo by defining hunting oscillations in the rule text directly, and removing the definition of *hunting oscillations* from § 238.5. Further, FRA has clarified the intent of paragraph (a) that passenger equipment shall exhibit freedom from hunting oscillations at all ''operating'' speeds, by inserting the word ''operating'' as recommended by Bombardier in its comments on the rule. FRA has made a similar clarification in paragraph (b).

AAPRCO, in its comments on the NPRM, stated that ''hunting'' is a dynamic resonance phenomenon in which factors as diverse as car body characteristics, truck characteristics, suspension conditions, wheel tread contours and multiple rail alignment, profile, and lubrication conditions all interact to produce a condition in which the truck oscillates back and forth rapidly as the train moves down the track. AAPRCO recognizes that hunting may be dangerous because high forces can be generated between the wheels and the rails. However, according to AAPRCO, because complex interactions of many factors lead to hunting, there is no straightforward way for a car owner or railroad carrier to determine ahead of time whether hunting will occur without extensive, dynamic testing at operating speed and often on the particular track in question. AAPRCO believed that all cars which exhibit hunting when in service should be fixed at the first opportunity. Yet, AAPRCO recommended deleting from the rule the requirement that passenger equipment exhibit freedom from hunting oscillations at all speeds for lack of a practical, predictive method to determine whether an individual car meets this requirement.

FRA agrees with AAPRCO's comments to the extent that the onset of truck hunting cannot always be predicted. However, railroads should not use equipment that they know has a hunting problem; and FRA is retaining the proposed requirement in the final rule. FRA has added AAPRCO's suggestion that if hunting oscillations do occur, a railroad shall take immediate action (such as a reduction in speed and subsequent attention to wheel contours) to prevent derailment. FRA does note that private rail cars are typically heavy rail cars and, therefore, less likely to hunt than lighter rail cars.

FRA has added paragraph (c) to this section to make clear that the requirements of 49 C.F.R. part 213 concerning vehicle/track interaction apply by their own force to passenger equipment, notwithstanding any provision of this section. The requirements of 49 C.F.R. § 213.345 are more detailed than those that are contained in this section, and apply as specified in that section to the qualification of the vehicle/track system for track Classes 6 through 9 for passenger equipment operating above 90 mph (and freight equipment operating above 80 mph).

Section 239.229 Safety appliances

This section references current safety appliance requirements contained in 49 U.S.C. chapter 203 and 49 CFR part 231. These existing requirements continue to apply independently to all Tier I passenger equipment, and FRA is referencing them here for clarity.

Section 238.231 Brake system

This section contains general brake system performance requirements that apply on or after September 9, 1999 to Tier I passenger equipment except as otherwise provided. Paragraph (a) contains a requirement that the primary braking system be capable of stopping the train with a service application of the brakes from its maximum authorized operating speed within the signal spacing existing on the track. FRA believes that this requirement is the most fundamental performance standard for any train brake system. This section merely codifies a requirement which is current industry practice and is the basis for safe train operation in the United States.

Paragraph (b) requires that passenger equipment ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002 be designed not to require an inspector to place himself or herself on, under, or between components of the equipment to observe brake actuation or release. The requirement allows railroads the flexibility of using a reliable indicator in place of requiring direct observation of the brake application or piston travel, because the current designs of many passenger car brake systems make direct observation extremely difficult without the inspector placing himself or herself underneath the equipment. Brake system piston travel or piston cylinder pressure indicators have been used with satisfactory results for many years. FRA recognizes the concerns raised by certain labor representatives regarding the use of piston travel indicators, and although such indicators do not provide 100 percent certainty that the brakes are effective, FRA believes that they have proven themselves effective enough to be preferable to requiring an inspector to assume a dangerous position.

Paragraph (c) requires that an emergency brake application feature be available at any time and that it produce an irretrievable stop. This section merely codifies current industry practice and ensures that passenger equipment will continue to be designed with an emergency brake application feature. This provision recognizes the reality that most passenger brake equipment currently provides a deceleration rate with a full service application that is close to the emergency brake rate. The current design requirement contained in 49 CFR Part 232, Appendix B, requiring the emergency application feature increase a train's deceleration rate by 15 percent, would require the lowering of full service brake rates on passenger equipment, thereby compromising safety and lowering train speeds. Consequently, FRA will not require a specific deceleration rate that must be obtained through an emergency brake application.

Paragraph (d) requires that the train brake system respond as intended to brake control signals and that the brake control system be designed so that a loss of control signal causes a redundant control to take over or cause the brakes to apply. These provisions are fundamental requirements necessary for effective brake system performance, and a codification of current industry practice. FRA intends the requirement to apply to all types of brake control signals, including pneumatic, electric, and radio signals.

Paragraph (e) prohibits the introduction of alcohol or other chemicals into the brake line. During periods of extreme cold weather, railroad employees at times resort to adding alcohol or other freezing point depressants to the brake line in an attempt to prevent accumulated moisture in the line from freezing. Virtually every railroad has a policy against this practice because alcohol and other chemicals attack the o-rings and gaskets that seal the brake system, causing them to age or fail prematurely. This practice can lead to dangerous air leaks and it increases maintenance costs.

Paragraph (f) requires that the brake system be designed and operated to prevent dangerous cracks in wheels. Passenger equipment wheels are normally heat treated so that the wheel rim is in compression. This condition forces small cracks that form in the rim to be closed. Heavy tread braking can heat wheels to the point that a stress reversal occurs and the wheel rim is in tension to a certain depth. Rim tension is a dangerous condition because it promotes surface crack growth. In the 1994 NPRM on power brakes, FRA proposed a wheel surface temperature limit to prevent this condition. *See* 59 FR 47729. Several brake manufacturers and railroads objected to this approach, claiming that the temperature limit was too conservative and did not allow for the development of new materials that can withstand higher temperatures. Based on these comments and concerns, FRA proposed in the 1997 NPRM and is retaining a more flexible performance requirement rather than a wheel tread surface temperature limit. This is an extremely important safety requirement because a cracked wheel that fails at high speed can have catastrophic consequences. In addition to the safety concerns, FRA believes that this requirement will lead to longer wheel life, and thus should provide maintenance savings to the railroads.

Paragraph (g) requires that brake discs be designed and operated so that the disc surface temperature does not exceed manufacturer recommendations. In the 1994 NPRM, FRA proposed a disc surface temperature limit. *See* 59 FR 47729. As noted above, several brake manufacturers and railroads objected to this approach, claiming that the temperature limit was too conservative and did not allow for the development of new materials that can withstand higher temperatures. Based on these comments and concerns, FRA proposed in the 1997 NPRM and is retaining a more flexible requirement rather than a single disc surface temperature limit. FRA believes this requirement will lead to longer disc life, and thus will produce maintenance savings to railroads.

Paragraph (h) contains the requirements related to hand brakes and parking brakes on passenger equipment. A hand or parking brake is an important safety feature that prevents the rolling or runaway of parked equipment. In the 1997 NPRM, FRA proposed an all encompassing requirement that all locomotives, except those ordered and placed in service before certain dates, and all other passenger equipment be provided with a hand or parking brake that could be set and released manually and could hold the equipment on the maximum grade anticipated by the operating railroad. Based on the concerns of labor representatives, FRA recognizes that this proposed provision is somewhat at odds with the hand brake provisions currently contained in 49 CFR part 231, particularly the requirements that the hand brake be able to be operated while the equipment is in motion and that the hand brake operate in harmony with the brake system. As it is FRA's intent to remain consistent with the existing safety appliance requirements for Tier I passenger equipment, FRA has slightly modified the provisions requiring hand or parking brakes on passenger equipment.

FRA is retaining the requirement for equipping locomotives, except for MU locomotives, with either a hand brake or a parking brake that can be set and released manually and can hold the equipment on the maximum grade anticipated by the operating railroad. As there are currently no requirements for equipping locomotives with hand brakes, FRA will permit the use of a parking brake or hand brake which meets the above specifications on these vehicles. However, for all other passenger equipment and for MU locomotives, FRA is requiring that they be equipped with a hand brake or parking brake which meets the requirements contained in 49 CFR part 231 regarding hand brakes on passenger cars. Although part 231 does not currently require hand brakes on MU locomotives, FRA is requiring that the hand brake required to be installed on these locomotives under this paragraph comply with the requirements contained in part 231 for other passenger equipment. As these locomotives generally transport members of the general public, similar to passenger coaches, the necessity to apply the hand brake while the car is in motion becomes critical for passenger safety. Therefore, FRA believes that MU locomotives should be equipped with a hand brake which meets the design requirements contained in part 231 regarding passenger cars.

This paragraph contains the requirement that the hand brake or parking brake hold the loaded unit on the maximum grade anticipated by the operating railroad. FRA makes clear that the term ''loaded unit'' refers to the maximum weight and capacity that the unit will carry during its operation. Thus, such things as maximum fuel capacity, maximum passenger capacity, maximum train crew capacity, and the maximum weight of any lading that the locomotive or other unit will carry should be considered in determining the holding ability of any hand or parking brake utilized.

Paragraph (i) contains the requirement that passenger cars be equipped with a means for the emergency brake to be applied that is clearly identified and accessible to passengers. This is a longstanding industry practice and an important safety feature because crucial time may be lost requiring passengers sensing danger to find a member of the train crew to stop the train.

Paragraph (j) contains provisions to ensure that the dynamic brake does not become a safety-critical device. Railroads have consistently held that dynamic brakes are not safety devices because the friction brake alone is capable of safely stopping a train if the dynamic brake is not available. The provisions in this paragraph include requiring that the blending of the friction and dynamic brakes be automatic, that the friction brakes alone be able to stop the train in the allowable stopping distance, and that a failure of the dynamic brake does not cause thermal damage to wheels or discs due to the greater friction braking load. FRA believes that without these requirements the dynamic brake would most likely become a safety-critical item and railroads would not be permitted to dispatch trains unless the dynamic brake were fully operational.

Although FRA recognizes the concerns of labor representatives that dynamic brakes are safety critical and should be required to work at all times, FRA believes that in the context of blended braking labor's concerns are somewhat misplaced and are adequately addressed by various provisions contained in this final rule. In the blended brake context, unlike freight operation, there is not an independent dynamic brake: The dynamic brake and the pneumatic brake systems are automatically blended without separate action being taken by the locomotive engineer. Thus, the undue reliance on the dynamic brake is not a major concern when blended braking systems are utilized. In addition, the provisions contained in this paragraph ensure that blended brake systems are designed so that failure of the dynamic portion of the blended braking system does not impact the safe operation and stopping of the train. Furthermore, as part of the exterior calendar day mechanical inspection railroads are required to verify that all secondary braking systems are in operating mode and do not have any known defects. *See* § 238.303(e)(15). Consequently, the railroad must verify that the dynamic brakes are in operating mode and do not contain any known defects and take prescribed action whenever the dynamic brakes are found to be inoperative prior to releasing a locomotive from an exterior calendar day mechanical inspection.

Paragraph (k) requires that either computer modeling or dynamometer tests be performed to confirm that new brake designs not result in thermal damage to wheels or discs. Further, if the operating parameters of the new braking system change significantly, a new simulation must be performed. This requirement provides a means to ensure that the requirements in paragraphs (f) and (g) are being complied with by new brake designs.

Paragraph (l) requires that all locomotives ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, be equipped with effective air coolers or air dryers if equipped with air compressors. The coolers or dryers must be capable of providing air to the main reservoir with a dew point suppression at least 10 degrees F. below ambient temperature. FRA and most members in the industry agree that moisture is a major cause of brake line contamination. Consequently, reducing moisture leads to longer component life and better brake system performance. Currently, virtually all passenger railroads purchase only locomotives equipped with air dryers or coolers. Therefore, FRA is merely requiring the continuation of what it believes is good industry practice. Although labor representatives contend that a dew point suppression of 10 degrees below ambient temperature is insufficient to prevent condensation in the train line, these commenters provided no support for that contention other than the assertion that prior specifications called for a 35 degree dew point suppression. Based on available information, FRA believes that a 10 degree dew point suppression is adequate. Without further study into the issue, FRA is reluctant to impose a more burdensome standard than that which was proposed. This issue may be further considered in the second phase of this passenger equipment rulemaking process.

Paragraph (m) requires that when a train is operated in either direct or graduated release, the railroad shall ensure that all cars in the train consist are set-up in the same operating mode. This provision was added based upon the concerns of several labor commenters regarding trains operated by Amtrak which contain a mixture of traditional passenger equipment and freight-like equipment. Most passenger trains are operated in what is known as a graduated release mode, whereby brake cylinder pressure may be reduced in steps proportional to increments of brake pipe pressure build-up; however, when passenger trains operated by Amtrak contain certain freight-like equipment the train is operated in a direct release mode, whereby brake cylinder pressure is completely exhausted as a result of an increase in brake pipe pressure. As these two different types of operating modes are now being utilized on passenger trains, FRA agrees it is necessary to require a railroad to ensure that all the cars in the train are set-up in the same operating mode in order to prevent potential train handling problems.

Section 238.233 Interior Fittings and Surfaces

This section contains the requirements concerning interior fittings and surfaces that apply, as specified in this section, to passenger cars and locomotives ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002.

FRA and NTSB investigations of passenger train accidents have revealed that luggage, seats, and other interior objects breaking or coming loose is a frequent cause of injury to passengers and crewmembers. During a collision, the greatest decelerations and thus the greatest forces to cause potential failure of interior fitting attachment points are experienced in the longitudinal direction, *i.e.*, in the direction parallel to the normal direction of train travel. Current practice is to design seats and other interior fittings to withstand the forces due to accelerations of 6g in the longitudinal direction, 3g in the vertical direction, and 3g in the lateral direction. Due to the injuries caused by broken seats and other loose fixtures, FRA believes that the current design practice is inadequate.

Paragraph (a)(1) requires that each seat in a passenger car remain firmly attached to the car body when subjected to individually applied accelerations of 4g in the lateral direction and 4g in the upward vertical direction acting on the deadweight of the seat or seats, if held in tandem. Based on a comment from Simula in response to the NPRM, FRA has clarified this requirement from that proposed in the NPRM by specifying that the vertical loading is in the ''upward'' direction. Paragraph (a)(2) specifies that a seat attachment shall have an ultimate strength capable of resisting the longitudinal inertial force of 8g acting on the mass of the seat plus 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 decelerates with a triangular crash pulse having a peak of 8g and a duration of 250 milliseconds (msec). By resisting the force of an occupant striking the seat from behind, a potential domino effect of seats breaking away from their attachments is avoided. As used in this section, a 95th-percentile adult male has been defined in § 238.5 of the final rule based on the same characteristics for such a vehicle occupant specified by the National Highway Traffic Safety Administration (NHTSA) in its motor vehicle safety standards at 49 CFR § 571.208, S7.1.4. At the January 1998 Working Group meeting, the NTSB had recommended use of the NHTSA specifications for purposes of the rule's occupant protection requirements.

The requirement contained in paragraph (a)(2) represents a modification from FRA's original proposal that the seat attachment resist a longitudinal inertial force of 8g acting on the mass of the seat plus the impact force of the mass of a 95th-percentile male occupant(s) being decelerated from a relative speed of 25 mph and striking the seat from behind. *See* 62 FR 49806. The impact speed at which the occupant strikes the seatback ahead of him during a collision depends on the distance from the occupant to the seatback and the deceleration of the car (the crash pulse) during the collision. In drafting the rule, FRA has assumed a seat pitch, or distance from the occupant to the seatback ahead of him, consistent with the longest seat pitch currently used in intercity passenger train service. As a result, the final rule specifies the crash pulse and its duration, and need not specify the secondary impact velocity. This change is intended to clarify the rule by relating it more directly to how the rule is applied and allow for different seat pitches. Seat pitches are expected to reflect actual use of the seats and be less than that assumed by FRA. Consequently, secondary impact speeds of occupants striking the seatbacks ahead of them are expected to be 25 mph or less—a marginally less severe test condition than that provided for in the NPRM.

The revision to this paragraph is based in part on comments from Simula that the rule require the seat to resist a dynamic crash pulse, which it believed to be triangular with a 250 millisecond duration and an 8g peak, plus the impact of representative unrestrained occupants seated in a second row directly behind the test article. Simula noted that including a dynamic crash pulse in the longitudinal direction (parallel to the normal direction of train travel) provides a simulation of a typical train-to-train collision in which the seat would be involved. According to Simula, a dynamic crash pulse is more representative of the crash environment than the shock pulse defined by a peak acceleration only. Simula explained that the crash pulse is typically specified for seat testing in the aircraft and automotive industries. Specifying a crash pulse in essence specifies the operation of the test equipment. FRA notes that the seat testing proposed in the NPRM (and required in the final rule) is similar to such testing performed in the aircraft and automotive industries, and FRA expects that the actual testing of rail equipment will utilize the same test equipment as used in these other industries. FRA has, therefore, specified a crash pulse in this paragraph.

FRA notes that at the Working Group meeting in December 1997, APTA explained that it could not agree then to change any of the proposed seat testing requirements, and that it was conducting research in these matters. However, FRA does not believe the inclusion of a crash pulse in this paragraph and elimination of the 25 mph impact speed to significantly alter the required strength of the seats from that proposed in the NPRM. In fact, the original proposal was potentially more rigorous than that required under this final rule.

Simula additionally commented that each crash test dummy used to impact the seat back in testing the strength of the seat must be instrumented, and that the injury data gathered from each dummy then meet specified injury criteria. Simula explained that, like automotive and transport aircraft testing, rail seat design requirements should include the use of crash test dummies to measure specified loads and accelerations for meeting specified injury criteria. FRA believes that Simula's comment is significant and wholly appropriate for consideration in the second phase of rulemaking on passenger equipment safety standards. In this regard, FRA notes that Simula references in its comments on proposed § 238.435 (the Tier II counterpart to this section) the use of a future APTA standard to specify occupant injury criteria and other parameters. Accordingly, resolution of this issue in the second phase of the rulemaking should benefit from APTA's efforts in this area.

In its comments on the NPRM, Simula also suggested modifying the rule so that the requirements of paragraph (a) apply to each seat assembly and specify that each seat assembly not separate from its mountings or have any of its parts detach. FRA believes that Simula's suggested modification restates the requirements of this section, in effect, and FRA does not find it necessary to change the explicit wording of the rule text. Simula further recommended specifying in the rule that in sled testing the strength of the seat attachment to the car, the attachment that is tested must be representative of the actual structure and attachment. FRA agrees with Simula that testing a seat and its attachment of a design or structure not representative of that actually used in a passenger car would necessarily fail to demonstrate that the actual seat and its attachment comply with the requirements of the rule. FRA has made this explicit in paragraph (g). Of course, any tests of passenger equipment or components of a design or structure not representative of an actual rail vehicle or actual components subject to the requirements of this part would necessarily fail to demonstrate that such actual vehicle or components comply with the requirements of this part—whether or not FRA has made this explicit in the rule text.

Paragraph (b) requires that overhead storage racks provide longitudinal and lateral restraint for stowed articles to minimize the potential for these objects to come loose and injure train occupants. Further, to prevent overhead storage racks from breaking away from their attachment points to the car body, these racks shall have an ultimate strength capable of resisting individually applied accelerations of 8g longitudinally, 4g vertically, and 4g laterally acting on the mass of the luggage stowed. This mass shall be specified by each railroad. In commenting on the NPRM, the BRC did not believe that a railroad should be allowed to specify the mass of the luggage stowed for purposes of this requirement. However, each railroad is in the best position to determine the mass of the luggage that can be stowed in the stowage area.

Paragraph (c) requires that all other interior fittings in a passenger car be attached to the car body with sufficient strength to withstand individually applied accelerations of 8g longitudinally, 4g vertically, and 4g laterally acting on the mass of the fitting. FRA believes the attachment strength requirements for seats, overhead storage racks, and other interior fittings will help reduce the number of injuries to occupants in passenger cars.

Passenger car occupants may also be injured by protruding objects, especially if the occupants fall or are thrown against such objects during a train collision or derailment. As a result, FRA is requiring in paragraph (d) that, to the extent possible, all interior fittings in a passenger car, except seats, shall be recessed or flush-mounted. Fittings that are recessed or flush-mounted do not protrude above interior surfaces and thereby would help to minimize occupant injuries.

Paragraph (e) is a general, common sense prohibition against sharp edges and corners in a locomotive cab and a passenger car. Just as FRA is concerned about protruding objects, these surfaces could also injure passenger train occupants. If sharp edges and corners cannot be avoided in the equipment design, they should be padded to mitigate the consequences of occupant impacts.

The requirements of paragraph (f) apply to each floor-mounted seat in a locomotive cab as well as to any seat provided for an employee regularly assigned to occupy the cab. FRA is requiring the seat attachment to have an ultimate strength capable of resisting the loads due to individually applied accelerations of 8g longitudinally, 4g vertically, and 4g laterally acting on the combined mass of the seat and its occupant. When turned backwards during a collision, seats with head rests that are designed to this requirement can effectively restrain crewmembers and minimize or prevent injuries.

In the NPRM, FRA had proposed that the requirements of this section apply to each floor-mounted seat provided exclusively for a crewmember assigned to occupy the cab of a locomotive. *See* 62 FR 49806. Simula, in its comments on the NPRM, recommended that the requirements of this section not be limited to floor-mounted seats and instead suggested substituting the words ''car-mounted seat.'' Simula expressed concern that railroads may use wall-mounted seats for crewmembers that do not comply with these requirements. Yet, as noted below in the discussion of § 238.445(g) (this provision's Tier II counterpart), Bombardier observed that an additional seat—commonly a flip-up or a shelf-type seat—is in many cases provided in the cab for a train crewmember who is not normally in the cab. Bombardier believed these seats should not be subjected to the same requirements as for the train operators' seats.

FRA has revised paragraph (f) so that the requirements of this provision apply to floor-mounted seats and each seat provided for a crewmember regularly assigned to the locomotive cab. FRA recognizes that flip-down and other auxiliary seats are provided in locomotive cabs for the temporary use of employees not regularly assigned to the cab, such as a supervisor of locomotive engineers conducting an operational monitoring test of the engineer. These seats do not need to meet the requirements of this section.

In further commenting on this paragraph, Simula recommended specifying that the seat resist a triangular crash pulse of a 250 msec duration having an 8g peak. However, FRA believes that the static 8g load requirement proposed in the NPRM is a rational option, and has retained it in the final rule. As train operators' seats are not likely to be hit from behind, they are not likely to experience the impact forces that passenger seats experience. Adopting Simula's comment would result in a more expensive test without a corresponding increase in safety.

Simula additionally commented that, in conducting a test of the seat, the attachment of the seat to the sled fixture must be representative of the actual structure and attachment. FRA has adopted this comment, as noted above, in paragraph (g). Testing a seat and its attachment of a design or structure not representative of that actually used in a locomotive cab would necessarily fail to demonstrate that the actual seat and its attachment comply with the requirements of the rule.

Section 238.235 Doors

This section contains the requirements for exterior doors on passenger cars. These doors are the primary means of egress from a passenger train.

Paragraph (a) requires that 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: capable of releasing the door to permit it to be opened without power from inside the car; located adjacent to the door which it controls; and 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. Passenger cars subject to this requirement that are not already equipped with such manual override devices must be retrofitted accordingly. FRA notes that a vestibule is not partitioned from the passenger compartment of a passenger car solely by the presence of any windscreen which extends no more than one-quarter of the width across the car from the wall to which it is attached.

The requirements in paragraph (a) originally arose from the NTSB's emergency safety recommendations (R–96–7) as part of its investigation of the passenger train collision in Silver Spring, Maryland, on February 16, 1996. In the NPRM, FRA fully set out these emergency safety recommendations and FRA's response. *See* 62 FR 49734–5. As announced following its full investigation of the Silver Spring, Maryland passenger train collision, and stated here in particular among its final recommendations, the NTSB recommended that FRA:

> Require all passenger cars to have easily accessible interior emergency quick-release mechanisms adjacent to exterior passageway doors and take appropriate emergency action to ensure corrective action until these measures are incorporated into minimum passenger car safety standards.

(R–97–14) (See NTSB/RAR–97/02)

FRA received a number of comments as to the date by which passenger cars must be equipped with manual overrides to open exterior, side doors as specified in this section. In its comments on the NPRM, Septa asked that the date be set three years after the effective date of the final rule, citing funding reasons. Metra commented that the date be set four to six years from the effective date of the final rule. FRA notes that this comment may have been based on the assumption that the rule requires manual override devices to be installed on the exterior of existing passenger cars, which this section does not. The UTU commented that the proposal in the NPRM afforded railroads more than enough time to comply with the requirement, considering their advance notice of this issue. Finally, in its comments on the NPRM, the NTSB stated that a two-year period to accomplish the equipping of passenger cars with the manual override feature is too long.

Having considered the comments submitted, FRA has decided to require that compliance with this section be effected by December 31, 1999. FRA understands that a majority of the passenger cars are already in compliance with the rule as proposed. FRA recognizes that some entities may not be able to accomplish the total retrofit within the required time, to the extent their budget and acquisition process can only commence once the rule becomes final. However, these are self-imposed constraints that should not arrest progress in the industry as a whole. Any entity faced with such constraints should seek a waiver.

Paragraph (b) also provides that each powered, exterior side door have a manual override feature the same as that required in paragraph (a) for existing equipment, except that the manual override must also be capable of opening the door from outside the car. This requirement is intended to provide quick access to a passenger car by emergency response personnel, and represents the consensus recommendation of the Working Group. Paragraph (b) applies to each such door on a passenger car ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002. Paragraph (b)'s requirements for a minimum number and dimension of side doors on a passenger car is discussed earlier in the preamble.

Paragraph (c) permits a railroad to protect a manul override device with a cover or screen to safeguard such devices from casual or inadvertent use. The rule requires that such cover and screens be capable of being removed by passengers, however.

Paragraph (d) is reserved for door marking and operating instruction requirements. These requirements are addressed in the final rule on passenger train emergency preparedness (49 CFR part 239), specifically § 239.107. *See* 63 FR 24630; May 4, 1998.

Section 238.237 Automated Monitoring

This section requires on or after November 8, 1999 an operational alerter or a deadman control in the controlling locomotive of each passenger train operating in other than cab signal, automatic train control, or automatic train stop territory. This section further requires that such locomotives ordered on or after September 8, 2000, or placed in service for the first time on or after September 9, 2002, must be equipped with a working alerter. As a result, the use of a deadman control alone on these new locomotives would be prohibited.

An alerter will initiate a penalty brake application if it does not receive the proper response from the engineer. Likewise, a deadman control will initiate a penalty brake application if the engineer fails to maintain proper contact with the device. The Working Group discussed establishing specific setting requirements for alerters or deadman controls based on maximum train speed and the capabilities of the signal system. This discussion led to the conclusion that settings should be left to the discretion of individual railroads as long as they document the basis for the settings that they select. If the device fails en route, the rule requires a second person qualified on the signal system and brake application procedures to be stationed in the cab or the engineer must be in constant radio communication with a second crewmember until the train reaches the next terminal. This is intended to allow the train to complete its trip with the device's function of keeping the operator alert taken over by another member of the crew.

Alerters are safety devices intended to verify that the engineer remains capable and vigilant to accomplish the tasks that he or she must perform. Equipping passenger locomotives with an alerter is current industry practice. These devices have proven themselves in service, and the requirement will not impose an additional cost on the industry.

In the final rule, FRA has clarified the procedures a railroad must follow if the alerter or deadman control fails en route. In addition to the requirements of paragraph (d)(1), under paragraph (d)(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. Further, under paragraph (d)(2)(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.

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

Section 238.301 Scope

This subpart contains the requirements regarding the inspection, testing, and maintenance of all types of passenger equipment operating at speeds of 125 mph or less. This subpart is intended to address both MU locomotives and push-pull equipment.

This subpart includes the requirements for the inspection, testing, and maintenance of Tier I passenger equipment brake systems as well as the other mechanical and electrical safety components of Tier I passenger equipment.

Section 238.303 Exterior Calendar Day Mechanical Inspection of Passenger Equipment

This section contains the requirements for performing exterior calendar day mechanical inspections on passenger equipment and is patterned after a combination of the current calendar day inspection required for locomotives under the Railroad Locomotive Safety Standards and the pre-departure inspection for freight cars under the Railroad Freight Car Safety Standards. *See* 49 CFR 229.21 and 215.13, respectively. FRA intends for the exterior calendar day mechanical inspection to generally apply to all passenger cars and all unpowered vehicles used in passenger trains (which includes, e.g., not only coaches, MU locomotives, and cab cars but also any other rail rolling equipment used in a passenger train). However, paragraph (a) has been slightly modified to clarify that an inspection of secondary braking systems must be conducted on all passenger equipment, which includes all locomotives. A mechanical safety inspection of freight cars has been a longstanding Federal safety requirement, and FRA believes that the lack of a similar requirement for passenger equipment creates a serious void in the current Federal railroad safety standards.

As noted in the general preamble discussion, FRA has made minor changes and clarifications to the exterior calendar day mechanical inspection that was proposed in the 1997 NPRM. In paragraph (d) of this final rule, FRA is explicitly stating that the exterior mechanical inspection is to be performed to the extent possible without uncoupling the trainset and without placing the equipment over a pit or on an elevated track. This explicit statement has been added in response to APTA's concerns regarding what would constitute proper performance of these inspections. It was never FRA's intent to require this inspection to be conducted in such a manner. FRA intended the inspection to be very similar to the freight car safety inspection currently required pursuant to part 215.

FRA also recognizes that certain items contained in the proposed exterior mechanical inspection could not have been easily inspected without proper shop facilities. Therefore, FRA has moved some of the exterior mechanical inspection requirements related to couplers and trucks to the periodic mechanical inspection requirements as these periodic inspections will likely be performed at locations with facilities available that are more conducive to inspecting the specific components. The specific items which have been moved to the periodic mechanical inspection requirements include: all trucks are equipped with a device or securing arrangement to prevent the truck and car body from separating in case of derailment; all center castings on trucks are not cracked or broken; the distance between the guard arm and the knuckle nose is not more than 5⅛ inches on standard type couplers (MCB contour 1904) or more than 5⁵⁄₁₆ inches on D&E couplers; the free slack in the coupler or drawbar not absorbed by friction devices or draft gears is not more than ½ inch; and the draft gear is not broken. The changes made in this final rule were discussed with the Working Group at the December 15–16, 1997 meeting.

Paragraph (a) requires that each passenger car and each unpowered vehicle used in a passenger train receive an exterior mechanical safety inspection at least once each calendar day that the equipment is placed in service except under the circumstances described in paragraph (f). As noted above, this paragraph also recognizes that the requirement contained in paragraph (e)(15) that all secondary braking systems on all passenger equipment are in operating mode and do not have any known defects. FRA has amended this requirement from that proposed in the 1997 NPRM, which proposed to require that all secondary braking systems be working (62 FR 49808), in order to acknowledge that it is impossible to ascertain whether some secondary braking systems, such as dynamic brakes, are working unless the equipment is in use. Thus, FRA has modified the language of the requirement to ensure that all secondary braking systems are capable of working when released from the exterior mechanical inspection. Paragraph (a) and paragraph (e)(15) have also been modified to accurately reflect FRA's intent to ensure that all secondary braking systems are inspected. The requirements for an exterior calendar day mechanical inspection are generally applicable only to passenger cars and other unpowered vehicles used in a passenger trains. Thus, except for MU locomotives and cab cars, other locomotives would not fall within the requirements of this section. However, many locomotives contain secondary braking systems such as dynamic brakes. Thus, in order to effectuate FRA's intent that these secondary braking systems be inspected, paragraph (e)(15) has been modified to clarify that it is applicable to all passenger equipment, which includes all locomotives. Consequently, FRA intends for the secondary braking systems on all locomotives to be inspected and that it be known that those systems are in operating mode and do not contain any known defects.

Paragraph (b) is also a new provision being added to this final rule in order to address the inspections of vehicles that are added to a passenger train while en route. FRA is modifying the Class I brake test and exterior calendar day mechanical inspection requirements to ensure the proper operation of all cars added to a train while en route. In paragraph (b) FRA is requiring the performance of an exterior mechanical inspection on each car added to a passenger train at the time it is added to the train unless documentation is provided to the train crew that an exterior mechanical inspection was performed on the car within the previous calendar day. FRA is adding this requirement in order to address the concerns raised by various labor representatives that no provisions were provided in the 1997 NPRM to address circumstances when cars are added to an en route train. FRA believes that the added provision will ensure the integrity of the mechanical components on every car added to an existing train and should not be a burden for railroads since cars are generally added to passenger trains at major terminals with the facilities and personnel available for conducting such inspections. Furthermore, the inspection requirements contained in this paragraph are very similar to what is currently required when a freight car is added to a train while en route. *See* 49 CFR § 215.13.

Paragraph (c) requires that exterior calendar day mechanical inspections be performed by a qualified maintenance person. FRA believes the combination of a daily Class I brake test and a mechanical safety inspection performed by highly qualified personnel is a key to safer passenger railroad operations. Such a practice will most likely detect and correct equipment problems before they become the source of an accident or incident resulting in personal injuries or damage to property. As noted in previous discussions, FRA does not intend to provide any special provisions for weekend operations with regard to conducting calendar day mechanical inspections by QMPs as suggested in the comments submitted by some APTA representatives. The rationale for requiring daily mechanical attention by highly qualified inspectors, a proposition generally accepted by Working Group members, appears to apply equally to weekend periods. In fact, based on FRA's experience, equipment used on weekends is generally used more rigorously than equipment used during weekday operations.

At present, only one commuter operation (Metra) has raised significant concerns regarding weekend operations. Although there is no specific data suggesting that existing weekend operations on Metra have created a safety hazard, FRA has found it virtually impossible to draft and justify provisions providing limited flexibility for Metra that do not create potential loopholes that could be abused by other passenger train operations that have not had the apparent safety success of Metra. Moreover, based on FRA's independent investigation of Metra's operation, it is believed that the impact of this final rule on Metra's weekend operations will be significantly less than that indicated in APTA's written comments and originally perceived by Metra. FRA believes that most of the personnel needed by Metra to conduct its weekend operations in accordance with this final rule are available to Metra or its contractors and that minor adjustments could be made to its weekend operations that might avoid significant new expense. As the concerns regarding weekend operations appear to involve just one commuter operation and because the precise impact on that operation is not known or available at this time, FRA believes that the waiver process would be the best method for handling the concerns raised by that operator. This would afford FRA an opportunity to provide any relief that may be warranted based on the specific needs and the safety history of the individual railroad without opening the door to potential abuses by other railroads that are not similarly situated.

Paragraph (e) identifies the components that are required to be inspected as part of the exterior daily mechanical safety inspection and provides measurable inspection criteria for the components. The railroad is required to ascertain that each passenger car, and each unpowered vehicle used in a passenger train conforms with the conditions enumerated in paragraph (e) and that all passenger equipment conforms with the requirement contained in paragraph (e)(15). Deviation from any listed condition makes the passenger car or unpowered vehicle defective if it is in service. The Working Group members generally agreed that the components contained in this section represent valid safety-related components that should be frequently inspected by railroads. However, members of the Working Group had widely differing opinions regarding the criteria to be used to inspect these components. FRA selected and has retained inspection criteria based on the locomotive calendar day inspection and the freight car safety pre-departure inspection required by 49 CFR parts 229 and 215, respectively. FRA believes that, at a minimum, passenger cars should receive an inspection which is at least equivalent to that received by locomotives and freight cars.

As discussed in the 1997 NPRM, FRA intends for the daily mechanical inspection to serve as the time when the railroad repairs defects that occur en route. Thus, this section generally requires that safety components not in compliance with this part be repaired before the equipment is permitted to remain in or return to passenger service. (*See* § 238.9 for a discussion of the prohibitions against using passenger equipment containing defects; and §§ 238.15 and 238.17 for a discussion of movement of defective equipment for purposes of repair or sale). The purpose of the defect reporting and tracking system required in § 238.19 is to have the mechanical forces make all necessary safety repairs to the equipment before it is cleared for another day of operation. In other words, FRA generally intends for the flexibility to operate defective equipment in passenger service to end at the calendar day mechanical inspection.

In paragraph (e)(15), FRA has modified the requirements regarding secondary braking systems to clarify that secondary braking systems must be in operating mode and contain no known defective conditions. FRA has also included provisions to address the handling of defective dynamic brakes in order to specifically establish restrictions on the movement of equipment containing this type of defective secondary brake and to recognize the concerns raised by several commenters regarding the importance that these secondary brakes have in the operation of passenger equipment. FRA agrees that in many circumstances it is desirable to have operative dynamic brakes in order to prevent thermal stress to the wheels, which has the potential of occurring if certain passenger trains are operated for extended periods without dynamic brakes and compensating train control practices are not used. In developing the requirements for handling defective dynamic brakes, FRA has generally incorporated the current best practices of the industry.

This paragraph draws a distinction between dynamic brakes on MU locomotives and dynamic brakes on conventional locomotives, treating each slightly differently due to the safety implications involved in each type of operation. FRA intends to require that 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 be handled in the same manner as a running gear defect pursuant to § 238.17. Thus, MU locomotives found with defective dynamic brakes at the exterior calendar day mechanical inspection must have the dynamic brakes repaired prior to continuing in passenger service. FRA further intends that MU locomotives which experience a dynamic brake defect while en route be handled the same as a running gear defect pursuant to § 238.17. Thus, the locomotive would have to be inspected by a QMP and be properly tagged at the location it is found to be defective.

The requirements related to conventional locomotives found with dynamic brakes not to be in operating mode or containing a defective condition which prevents the proper operation of the dynamic brakes are somewhat less stringent than the movement requirements placed on MU locomotives. In these cases, the locomotive may remain in passenger service provided that the unit is properly tagged, each locomotive engineer taking charge of the train is informed as to the status of the locomotive, and the locomotive's dynamic brakes are repaired within three calendar days of being found defective.

FRA has treated MU and conventional locomotives slightly differently for several reasons. Past history has shown that failure to have operative dynamic brakes in MU operations increases the potential of causing thermal stress to the wheels of the vehicles to a much greater extent than inoperative dynamic brakes in conventional locomotive operations. MU locomotive operations generally tend to have a greater number of station stops, requiring the use of the brakes, than operations where conventional locomotives are utilized and, thus, the potential for thermal stress to the wheels is increased. Furthermore, operations utilizing conventional locomotives tend to operate for extended distances across the country and, thus, are further from locations where repairs to the dynamic brakes can be properly repaired. Therefore, these operations may need extra time to get a defective locomotive to a particular location for repair. Furthermore, FRA believes that the tagging and notification requirements imposed on conventional locomotives reduce the potential of an engineer's undue reliance on a secondary brake system which is not available. Finally, the handling requirements contained in this paragraph are consistent with the current practices within the industry and should have a minimal impact on passenger operations.

Paragraph (f) contains a narrow exception which allows long-distance intercity passenger trains that miss a scheduled exterior calendar day mechanical inspection due to a delay en route to continue in passenger service to the location where the inspection was scheduled to be performed. At that point, a calendar day mechanical inspection must be performed prior to returning the equipment to service of any kind. This flexibility applies only to the mechanical safety inspections of coaches. FRA does not intend to relieve the railroad of the responsibility to perform a locomotive calendar day inspection as required by 49 CFR part 229.

Paragraph (g) contains certain minimal recordkeeping requirements related to the performance of the exterior calendar day mechanical inspection provisions. FRA believes that proper and accurate recordkeeping is the cornerstone of any inspection process and is essential to ensuring the performance and quality of the required inspections. Without such records the inspection requirements would be difficult to enforce. Although recordkeeping was discussed in the Working Group and FRA believes it to be an integral part of any inspection requirement, FRA inadvertently omitted any such requirements in the NPRM specifically related to mechanical inspections. This omission was brought to FRA's attention through verbal and written comments provided by various interested parties and has now been corrected. This paragraph specifically permits a railroad to maintain the required records either in writing or electronically, and the record may be part of a single master report covering an entire group of cars. Whatever format the railroad elects to use to record the information, it must contain the specific information listed in this paragraph.

Paragraph (h) specifies an additional contingent component of the calendar day exterior mechanical inspection. If a car requiring a single car test is moved in a train carrying passengers or available to carry such passengers to a place where the test can be performed, then the single car test must be performed before or during the exterior calendar day mechanical inspection. This provision has been retained from the 1997 NPRM. The comments submitted by APTA suggested that the word ''next'' be inserted prior to ''calendar day mechanical inspection.'' FRA did not make this change as it would provide greater latitude than FRA intended. Paragraph (h) applies to equipment that is already in transit from the location where repairs were conducted that required the performance of a single car test. Thus, in order to remain consistent with the provisions contained in § 238.311(f) such cars must receive the single car test prior to, or as part of, the car's exterior calendar day mechanical inspection. Although FRA recognizes the concerns of labor representatives with regard to this provision, FRA believes that it is necessary to provide the railroads the flexibility to make the necessary repairs to a piece of equipment and then move it to a location which is most conducive to performing the required single car test. FRA currently permits such flexibility and is not aware of any significant safety problems that have arisen as a result of such a practice. However, in order to ensure the safe movement of such equipment, FRA has added various inspection and tagging requirements in § 238.311(f) that must be performed prior to hauling such equipment to another location for the performance of a single car test. (See section-by-section discussion of § 238.311.)

Section 238.305 Interior Calendar Day Mechanical Inspection of Passenger Cars

This section contains the requirements for the performance of interior mechanical inspections on passenger cars (which includes, e.g., passenger coaches, MU locomotives, and cab cars) each calendar day that the equipment is used in service except under the circumstances described in paragraph (d). Unlike the exterior calendar day mechanical inspection, FRA in paragraph (b) of this section permits the interior inspections of passenger cars to be performed by ''qualified persons,'' individuals qualified by the railroad to do so. Thus, these individuals need not meet the definition of a ''qualified maintenance person.''

As noted in the 1997 NPRM, FRA's original position was to require the interior inspections to be performed by qualified maintenance persons. However, after several discussions with members of the Working Group and several other representatives of passenger railroads, FRA determined that the training and experience typical of qualified maintenance persons is not necessary and often does not apply to inspecting interior safety components of passenger equipment. In addition, the flexibility created by permitting someone less qualified than a qualified maintenance person can reduce the cost of performing the mechanical safety inspection since the most economical way to accomplish the mechanical inspection is to combine the exterior inspection with the Class I brake test and then have a crewmember inspect on arrival at the final terminal or have a train coach cleaner combine the interior coach inspection with coach cleaning.

Paragraph (c) lists various components that are required to be inspected as part of the interior calendar day mechanical safety inspection. As a minimum, FRA requires that the following components be inspected: trap doors; end and side doors; manual door releases; safety covers, doors and plates; vestibule step lighting; and safety-related signs and instructions. Consistent with the discussions regarding the movement of defective equipment with non-running gear defects, all en route defects and all noncomplying conditions under this section must be repaired at the time of the daily interior inspection or the equipment would be required to be locked-out and empty in order to be placed or remain in passenger service with the exception of a defect under § 238.305(c)(5). (*See* § 238.9 for a discussion of the prohibitions against using passenger equipment containing defects, and § 238.17 for a discussion of the movement of defective equipment for purposes of repair.)

It should be noted that two of the items contained in paragraph (c) have been slightly modified in order to clarify FRA's intent and to ensure the safety of the traveling public. Paragraph (c)(5), regarding the continuing use of a car with a defective door, has been modified by the addition of subparagraph (c)(5)(iii), which requires that at least one operative and accessible door be available on each side of the vehicle in order for the car to continue to be used in passenger service. FRA believes the addition of this requirement is necessary to ensure that passengers have adequate egress from the equipment should an emergency occur.

Paragraph (c)(8) has also been modified to clarify that the inspection of the manual door releases, as proposed in the 1997 NPRM, need only be made to the extent necessary to verify that all D rings, pull handles, or other means to access manual door releases are in place based on a visual inspection. FRA recognizes that inspection of the actual manual door release would be overly burdensome, costly, and unnecessary due to the relative reliability of such devices. It should also be noted that the final rule contains a new paragraph (c)(9) which requires that the interior mechanical inspection ensure that all required emergency equipment, including fire extinguishers, pry bars, auxiliary portable lighting, and first aid kits be in place. These items are required pursuant to the regulations on passenger train emergency preparedness contained at 49 CFR part 239, and FRA believes that the inspection to ensure the presence of such equipment is appropriate under this section.

Paragraphs (d) and (e) contain provisions which are identical to certain requirements pertaining to exterior calendar day mechanical inspections. Paragraph (d) allows long-distance intercity passenger trains that miss a scheduled calendar day mechanical inspection due to a delay en route to continue in passenger service to the location where the inspection was scheduled. Paragraph (e) contains the recordkeeping requirements related to the performance of interior calendar day mechanical inspections. FRA believes that proper and accurate recordkeeping is the cornerstone of any inspection process and is essential to ensuring the performance and quality of the required inspections. Without such records the inspection requirements would be difficult to enforce. Although recordkeeping was discussed in the Working Group and FRA believes it to be an integral part of any inspection requirement, FRA inadvertently omitted any such requirements in the 1997 NPRM specifically related to mechanical inspections. This omission was brought to FRA's attention through verbal and written comments provided by various interested parties and has been corrected. This paragraph specifically permits a railroad to maintain the required records either in writing or electronically, and the record may be part of a single master report covering an entire group of cars. Whatever format the railroad elects to use to record the information, it must contain the specific information listed in this paragraph.

Section 238.307 Periodic Mechanical Inspection of Passenger Cars and Unpowered Vehicles Used in Passenger Trains

This section contains the requirements for performing periodic mechanical inspections on all passenger cars and all unpowered vehicles used in passenger trains. Paragraph (b) makes clear that the periodic mechanical inspections required under this section are to be performed by a qualified maintenance person as defined in § 238.5. In the 1997 NPRM, FRA proposed that the following components be inspected for proper operation and repaired, if necessary, as part of the periodic maintenance of the equipment: emergency lights; emergency exit windows; seats and seat attachments; overhead luggage racks and attachments; floor and stair surfaces; and hand-operated electrical switches. *See* 62 FR 49808–09. FRA further proposed that such periodic inspections be performed every 180 days. As noted above, FRA, with the intent of requiring their inspection on a periodic basis, removed certain items previously proposed in the exterior calendar day mechanical inspection as they could not be easily inspected without proper shop facilities.

After a review of the industry's practices regarding the performance of periodic mechanical-type inspections, FRA believes that some of the items removed from the exterior calendar day mechanical inspection as well as some of the items previously proposed in the 180 day periodic mechanical inspection should be and are currently inspected on a more frequent basis by the railroads. As it is FRA's intent in this proceeding to attempt to codify the current best practices of the industry, FRA believes that the current intervals for inspecting certain components should be maintained. Consequently, FRA is modifying the time interval for conducting periodic mechanical inspections to include a 92-day and a 368-day periodic inspection.

In paragraph (c), FRA requires the periodic inspection on a 92-day basis of certain mechanical components previously proposed as part of the exterior calendar day mechanical inspection, as well as an inspection of floors, passageways, and switches. The mechanical components to be inspected that were previously included as part of the calendar day mechanical inspection include verification that all trucks are equipped with a device or securing arrangement to prevent the truck and car body from separating in case of derailment and that all center castings on trucks are not cracked or broken. FRA will also require a 92-day inspection of emergency lighting systems as they are critical to the safety of passengers in the event of an accident or derailment. FRA is adding an inspection of the roller bearings to the 92-day inspection. Although this component was inadvertently left out of the NPRM, FRA believes that roller bearings are an integral part of the mechanical components and must be part of any mechanical inspection scheme. Furthermore, several labor commenters recommended inspections criteria similar to that contained in 49 CFR Part 215, which specifically addresses the condition of roller bearings. *See* 49 CFR § 215.115. As roller bearings are best viewed in a shop facility context, FRA is adding the inspection of this component to the 92-day periodic mechanical inspection which is consistent with the current practices of the industry. FRA is also adding the general conditions and components previously proposed in § 238.109(b) (62 FR 49801–802) to the 92-day periodic mechanical inspection contained in this paragraph. As the conditions previously proposed in § 238.109(b) were intended to ensure that the railroads had an inspection scheme in place to ensure that all systems and components of the equipment are free of conditions that endanger the safety of the crew, FRA believes that a specific inspection interval is better suited to address the general condition of the equipment and ensure the safety of the riding public and railroad employees. This paragraph also requires that all of the components inspected as part of the exterior and interior calendar day inspection be inspected at the 92-day periodic inspection.

Paragraph (d) of this section retains a semi-annual periodic inspection for certain components as proposed in the 1997 NPRM. In the NPRM, FRA proposed a 180-day periodic inspection, but in order to remain consistent with the 92-day inspection scheme this paragraph requires a 184-day periodic inspection of certain mechanical components. These include: seats; luggage racks; beds; and emergency windows. This paragraph also contains an added requirement related to the inspection of the couplers; couplers were removed from the calendar day inspection and have been inserted in the 184-day inspection scheme. FRA is placing the coupler inspection at this interval rather than at the 92-day interval in order to reduce the amount of coupling and uncoupling of equipment that will be required. In paragraph (e) FRA has extended the inspection interval related to manual door releases over that which was proposed in the 1997 NPRM. Due to the general reliability of these devices and because they are partially inspected on a daily basis, FRA believes that an annual inspection of the releases will ensure their proper operation. Thus, the final rule requires an inspection of the manual door releases every 368 days.

In paragraph (b) FRA has attempted to make clear that, although FRA has established certain periodic inspection intervals in order to establish a default interval, FRA will allow railroads to develop alternative intervals for performing such inspections for specific components or equipment based on a more quantitative reliability assessment completed as part of their system safety programs. FRA expects that railroads will utilize reliability-based maintenance programs as appropriate, given this opportunity to do so. As successful reliability based maintenance programs are dynamic, it is expected that, in the process of defining and documenting the reliable use of equipment or specific components, over time, continued assessments may indicate a need to increase or decrease inspection intervals. FRA will only permit lengthened inspection intervals beyond the default intervals when such changes are justified by a quantitative reliability assessment. The previously described inspection intervals are based on sound but limited information provided to FRA that FRA believes represents a combination of operating experience, analytical analyses, knowledge and intuition. FRA expects that railroads will collect and respond to additional data throughout the operating life of the equipment.

FRA believes that the approach taken to identify the stated default inspection intervals contained in this section combined both qualitative, or subjective, judgement with available quantitative information. FRA believes this approach is appropriate for the conservative default strategy defined. However, FRA recognizes that this mixed approach does not yield a quantified level of equipment reliability. The reliability of a system or component is defined as the probability that, when operating under stated environmental conditions, the system or component will perform its intended function adequately for a specified interval of time, number of cycles of operation, or number of miles. Reliability is a quantitative measure. FRA believes that quantified, high levels of reliability are desired for the continued safe operation of passenger equipment. Therefore, FRA encourages equipment owners to perform additional sensitivity analyses to determine which components or equipment has the greatest potential for introducing risk, thus requiring the most careful monitoring to increase reliability while reducing the consequences of failure. FRA believes that, in addition to component design reliability, quality assurance, as well as maintenance and inspection proficiency may be considered and evaluated by the equipment owners as a part of this process. When considering the reliable use of passenger equipment, elements such as couplers as well as suspension systems; trucks; side bearings; wheels; jumpers; cable connections; buffer plates; diaphragms; and secondary brake systems, and human factors as it relates to inspecting and maintaining these elements may be considered. Component level structural fatigue, corrosion, and wear are variables that may be considered to bound or introduce uncertainty in passenger equipment performance, effectively reducing reliability as well.

Given the limited quantitative information that is presently available regarding factors that influence the reliability of passenger equipment, the primary sources of information available for initial reliability assessments include: judgement; simulations; field, laboratory, and office experiments; operating environment and maintenance process reviews; and accident and near-miss investigations. FRA believes that in the operation of passenger equipment, where failure costs are high and casualties infrequent, accident data for informed decision making may be scarce or not fully applicable. Further, legal and punitive threats may provide significant impediments to identifying the contributing, initiating, and compounding causes of failures. Data from near-miss, or near-catastrophic incidents may be found to be instructive, but often not all of the parameters entering a quantitative analysis are recorded or communicated in these cases.

FRA believes that for the initial reliability assessments of passenger equipment and components qualified judgment will be an important source of quantitative information. Qualified judgment is based upon both the accumulation of experience and a mental synthesis of factors allowing the evaluator to assess the situation and produce results. Such judgment has a rightful place in making initial quantitative reliability assessments because current available data is often deficient for the evaluation of a particular situation. However, as adequately structured databases are developed and implemented for reliability center maintenance programs, FRA believes more reliance can be placed on objective data and reliability assessments will be based on a combination of data and judgment. FRA believes that, in the very near term, sole reliance cannot be placed on objective data sources to provide quantitative reliability assessments; instead, adequately qualified and unbiased judgment will continue to be required in conjunction with verifiable operating data for analysis purposes.

When planning the maintenance of a component or system to protect the safety and operating capability of the equipment, FRA expects that a number of items will be considered in the reliability assessment process, which include:

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 life or 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 will continue to govern 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.

FRA believes that a variety of qualitative approaches, such as a Failure Modes, Effects, Criticality Analysis (FMECA) may be useful in evaluating the potential consequences of a functional failure. FRA believes a qualitative approach may be used in complement and combined with a quantitative approach such as Probabilistic Risk Analyses (PRA) or Quantified Risk Analyses (QRA) which may include structured probabilistic Event Tree, Fault Tree, or Influence Diagram analyses to provide additional insight to railroads regarding the reliable use of their equipment. Quantitative approaches are useful to characterize the details of a system whereas qualitative approaches can provide characterization of the general performance quality of the system analyzed.[4] Component level reliability analysis centered around a quantitative, deterministic design approach such as Damage Tolerance Analysis (DTA) may be appropriate when information about the ability of a structural component to sustain anticipated loads in the presence of fatigue, corrosion, or accidental damage is required.[5]

FRA expects that analyses of individual components investigated as a part of the reliability assessment process may require equipment owners to collect and consider information regarding: a component's physical features and conditions; a component's actual operating use; the existence of manufacturing defects and tolerances; the effects of repairs or modifications made to the component; and capabilities of available nondestructive evaluation methods used for inspection. Management of effective reliability-based maintenance programs requires an organized information system for surveillance and analysis of the performance of each component under the known operating conditions. FRA believes that the information derived from such operating experience can provide information of failures that could affect operating safety; failures that have operational consequences; the failure modes of units removed as a result of failures; as well as the general condition of unfailed parts in units that have failed and serviceable units inspected as samples.

As stated above, at the time of the development of default maintenance intervals, FRA used the available information to determine the inspection intervals necessary to protect safety. However, FRA believes that the optimum inspection tasks, methods, and intervals as well as the applicability of age or life limits will be best obtained from reliability analyses based on additional service-based data collection, in some cases coupled with appropriate deterministic analyses to both ensure safety and maximize reliability. For further information regarding sources of reliability theory and analysis, FRA recommends that the following materials be considered:

- ANSI (American National Standards Institute)/ASQC (American Society for Quality) S2 (1995) Introduction to Attribute Sampling;
- ANSI/ASQC Z1.4 (1993) Sampling Procedures and Tables for Inspection by Attributes;
- ANSI/ASQC Z1.9 (1993) Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming;
- Handbook of Reliability Engineering and Management, W. G. Ireson, McGraw Hill, 1996;
- MIL–STD–414 (1957) Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming;
- MIL–STD–1234A (1974) Single and Multi-Level Continuous Sampling Procedures and Tables for Inspection by Attributes;
- Reliability-Centered Maintenance, F. S. Nowlan and H. F. Heap, Final Report for Contract MDA 903–75–C–0349, Office of Assistant Secretary of Defense, Washington, D.C., 1978;
- Reliability-Centered Maintenance, A. M. Smith, McGraw Hill, 1992;
- Reliability-Centered Maintenance, J. Moubray, McGraw Hill, 1997; and
- Reliability in Engineering Design, K.C. Kapur and L. R. Lamberson, John Wiley & Sons, 1977.

Paragraph (e) contains the recordkeeping requirements related to the performance of periodic mechanical inspections. FRA believes that proper and accurate recordkeeping is the cornerstone of any inspection process and is essential for ensuring the performance and quality of the required inspections. Without such records, the inspection requirements would be difficult to enforce. Although recordkeeping was discussed in the Working Group and FRA believes it to be an integral part of any inspection requirement, FRA inadvertently omitted any such requirements in the NPRM specifically related to mechanical inspections. This omission was brought to FRA's attention through verbal and written comments provided by various interested parties and has been corrected. This paragraph specifically permits a railroad to maintain the required records either in writing or electronically. Whatever format the railroad elects to use to record the information, it must contain the specific information listed in this paragraph.

Section 238.309 Periodic Brake Equipment Maintenance

This section contains the requirements related to the performance of periodic brake maintenance for various types of passenger equipment, referred to in the industry as clean, oil, test, and stencil (COT&S). Although FRA has considered the concerns raised by certain labor representatives during this rulemaking, FRA does not agree with the conclusions drawn by these commenters with regard to the testing and data submitted to FRA regarding modest extensions of the COT&S intervals for equipment utilizing certain types of brake valves. All of the COT&S intervals contained in this section are based, at least in part, on current operations under existing waivers and on data and information which FRA believes provide substantial support that the valves can be safely operated for the periods of time provided in this section. Furthermore, FRA believes that the stringent inspection and testing regiment and the single car test requirements contained in this final rule also provide sufficient additional safeguards to permit modest increases in the COT&S intervals for equipment outfitted with certain brake valves and other equipment having generally shown the ability to operate for longer periods without failure.

Paragraph (b) extends the periodic maintenance interval for MU locomotive fleets that are 100 percent equipped with air dryers and modern brake systems from 736 days to 1,104 days. The requirement remains 736 days for fleets that are not 100 percent equipped with air dryers or that are equipped with older brake systems. FRA bases this extension on tests conducted by Metro-North and monitored by FRA field inspectors. These tests revealed that after three years brake valves on MU locomotives equipped with air dryers were very clean and showed little or no signs of deterioration. Based on the results of these tests, FRA is confident that these valves can safely operate for three years between periodic maintenance. FRA believes this extension of the periodic maintenance interval will result in a cost savings to those railroads that operate MU locomotives equipped with air dryers.

Paragraph (c) extends the periodic maintenance interval on conventional locomotives equipped with 26–L or equivalent types of brakes from the current standard of 736 days to 1,104 days. The required periodic maintenance interval remains at 736 days for locomotives equipped with other types of brake systems. This requirement merely makes universal a practice that has been approved by waiver for several years. *See* H–80–7. FRA believes that locomotives equipped with 26–L brakes have demonstrated an ability to operate safely for three years between periodic maintenance.

Paragraph (d) extends the periodic maintenance interval on passenger coaches and other unpowered vehicles equipped with 26–C or equivalent brake systems from 1,104 days to 1,476 days. This extension is based on tests

[4] Evaluation Approaches & Quantification (Chapter 8), ''The Role of Human Error in Design, Construction, and Reliability of Marine Structures.'' Robert G. Bea, Report No. SSC–378, U.S. Coast Guard, Washington, D.C. 1994, pp. 127–149.

[5] ''Reliability and Risk Analysis for Design and Operations Planning of Offshore Structures.'' T. Moan, Sixth ICOSSAR, Innsbruck, August 1993.

performed by Amtrak. Based on these tests, FRA granted Amtrak a waiver for this extension on July 26, 1995. *See* FRA Docket No. PB 94–3. Amtrak has operated under the terms of this waiver for several years with no problems. Consequently, based on Amtrak's experience, FRA believes all passenger cars with 26–C equipment can safely be operated for four years between periodic maintenance.

Paragraph (e) recognizes that the same extensions applicable to locomotives and passenger coaches should be applied to control cab cars that use brake valves that are identical to the 26–C valves used in passenger cars or the 26–L valves used on locomotives. Consequently, based on the information and tests conducted on those valves as well as waivers currently existing, FRA is extending the periodic maintenance interval for cab cars to 1,476 days or 1,104 days for those cab cars that use brake systems identical to the 26–C and 26–L, respectively. This extension is consistent with recent requests for waivers received by FRA.

In paragraph (a)(2) FRA provides that a railroad may petition FRA, under § 238.21, to approve alternative maintenance procedures providing equivalent safety. Under this provision, railroads could propose using periodically scheduled single car tests to extend the time between required periodic maintenance on passenger coaches. FRA believes that the single car test provides a good alternative to more frequent periodic maintenance. In fact, in the 1994 NPRM on power brakes, FRA proposed the elimination of time-based COT&S and in its stead proposed time intervals for conducting single car tests, ranging from three to six months, depending on the utilization rate of the passenger equipment. *See* 59 FR 47690–91, 47710–11, and 47740–41. However, comments received and discussions with members of the Working Group revealed that many passenger railroads would rather perform periodic maintenance than more frequent single car tests. One reason for this is that some operators would rather take equipment out of service every few years and perform the overhaul of the brake system than have equipment out of service for shorter periods every few months. Therefore, FRA has retained periodic maintenance intervals but provided the alternative to railroads to propose single car testing intervals in order to reduce the frequency with which the periodic maintenance is performed. Consequently, railroads are afforded some flexibility to determine the type of maintenance approach that best suits their operations. However, in response to concerns raised by a labor commenter, it should be noted that FRA would likely not completely eliminate the need to perform COT&S on a periodic basis but might consider extending the interval between such attention depending on the frequency of the single car test intervals proposed by a railroad.

Section 238.311 Single Car Test

This section contains the requirements for performing single car tests on all nonself-propelled passenger cars and all unpowered vehicles used in passenger trains. As previously discussed in the general preamble, FRA is modifying the requirements related to the performance of single car tests from those that were proposed in the 1997 NPRM. In paragraph (a), based on the recommendations of representatives from both rail labor and rail management, FRA is referencing the single car testing procedures which were developed by APTA PRESS rather than the AAR single car testing procedures referenced in the 1997 NPRM. The single car test procedures were issued by APTA on July 1, 1998, and are contained in APTA Mechanical Safety Standard SS–M–005–98. The single car test procedures issued by APTA are more comprehensive and better address passenger equipment than the older AAR recommended practices. In paragraph (a), FRA is also slightly modifying the applicability of this section for clarity. In the 1997 NPRM, FRA proposed to require the performance of single car tests on all passenger cars and other unpowered vehicles used in passenger trains. However, the definition of passenger cars includes self-propelled vehicles such as MU locomotives, to which FRA did not intend the single car test requirements to apply. Consequently, FRA has modified the language of paragraph (a) to clarify that the testing requirements apply to nonself-propelled passenger cars and unpowered vehicles used in passenger trains.

Paragraph (b) requires that all single car tests be performed by a qualified maintenance person. A single car test is a comprehensive brake test that requires the skills and knowledge of a highly trained and skilled person with mechanical expertise. Railroads currently use personnel which would generally meet the definition of "qualified maintenance person" as defined by this part to perform single car tests, and FRA believes that this practice should continue.

FRA is also modifying some of the circumstances under which a single car test is required to be performed in paragraphs (c) through (e). FRA agrees with several of the commenters that the 1997 NPRM may have been over-inclusive in listing the components whose repair, replacement, or removal would trigger the performance of a single car test. Paragraph (c) lists the wheel defects that would trigger the requirement to perform a single car test. FRA believes that the wheel defects contained in this paragraph generally tend to indicate some type of braking equipment problem. FRA believes that merely changing a wheel to correct a wheel defect that is actually caused by a brake system problem will only lead to a continuation of the problem on the new wheel and will increase repair costs to the railroad. A test that checks for the root cause of the defect is not only a good safety practice, but is a good business practice that will lead to reduced operating costs. However, in accordance with the discussions conducted with the Working Group in mid-December of 1997, paragraph (d) makes clear that FRA will not mandate the performance of a single car test for wheel defects, other than a built-up tread, if the railroad can establish that the wheel defect is due to a cause other than a defective brake system. Thus, the burden will fall on the railroad to establish and maintain sufficient documentation that a wheel defect is due to something other than a brake-related cause. FRA makes clear that if the railroad cannot establish the specific non-brake related cause for a wheel defect, it is required to perform a single car test.

Paragraph (e) requires a railroad to conduct a single car test if one or more of the identified brake system components is removed, repaired, or replaced. This paragraph also requires that a single car test be performed if a passenger car or vehicle is placed in service after having been out of service for 30 or more days. FRA believes that these requirements will ensure that brake system repairs have been performed correctly and that the car's brake system will operate as intended after repairs are made or after the car has been in storage for extended periods. As noted above, FRA has amended the list of brake components to include only those circumstances where a relay valve, service portion, emergency portion, or pipe bracket is removed, repaired, or replaced. Whenever any other component previously contained in the 1997 NPRM is removed, repaired, or replaced, paragraph (g) requires that only that portion that is renewed or replaced be tested. FRA believes that the items contained in paragraph (g) can generally be removed, replaced, or repaired without affecting other portions of the brake system, thus reducing the need to perform a single car test. FRA believes that the requirements contained in paragraphs (e) and (g) are more consistent with the current practices of most passenger railroads than the requirement proposed in the 1997 NPRM.

Paragraph (f) provides that if a single car test cannot be made at the point where repairs are made, the car may be moved in service to the next forward location where the test can be made. This paragraph requires that at a minimum the single car test be completed prior to, or as a part of, the car's next calendar day mechanical inspection. As noted previously, labor representatives object to permitting cars to be used in passenger service after a repair is made without the required single car test being performed. These commenters contend that the performance of a single car test is necessary prior to using the vehicle in order to determine whether any other unknown defects to the brake system exist. Although FRA recognizes the concerns of labor representatives with regard to this provision, FRA believes that it is necessary to provide railroads the flexibility to make the necessary repairs to a piece of equipment and then move it to a location which is most conducive to performing the required single car test. However, in order to address labor's concerns and to ensure the safe movement of such equipment, FRA has added a visual inspection requirement and a tagging requirement that must be met prior to the railroad being allowed to haul a car in the fashion provided in this paragraph. Consequently, this paragraph requires that prior to moving a car in passenger service for the purposes of conducting a single car test, a visual inspection verifying the application and release of the brakes on both sides of the repaired car must be conducted and the car must be appropriately tagged to indicate the need to perform a single car test.

Section 238.313 Class I Brake Test

This section contains the requirements related to the performance of Class I brake tests. The requirements in this section apply to all passenger coaches, control cab cars, MU locomotives, and all nonself-propelled vehicles that are part of a passenger train. After consideration of the comments and information submitted, FRA intends to make very minor changes to the requirements regarding Class I brake tests from those that were previously proposed in the 1997 NPRM.

Paragraph (a) of this section requires that a Class I brake test be performed at least once each calendar day that a piece of equipment is placed in service. As noted previously in the 1997 NPRM, the Working Group discussed and debated when and how a Class I brake test should be performed. Labor representatives stressed the need for a thorough brake test performed by qualified mechanical inspectors on every passenger train. These representatives strongly contended that this brake test must be performed prior to the first daily departure of each passenger train. On the other hand, representatives of passenger railroads expressed the desire to have flexibility in conducting a comprehensive brake inspection, arguing that safety would be better served if railroads were permitted to conduct these inspections on a daily basis. Although FRA agrees with the position advanced by many labor representatives that some sort of car-to-car inspection must be made of the brake equipment prior to the first run of the day in most circumstances, FRA does not agree that it is necessary to perform a full Class I brake test in order to ensure the proper functioning of the brake equipment. As FRA views a Class I brake test as a comprehensive inspection of the braking system, FRA believes that commuter and short-distance intercity passenger train operations must be permitted some flexibility in conducting these inspections. Consequently, paragraph (a) requires that commuter and short-distance intercity passenger train operations perform a Class I brake test sometime during the calendar day in which the equipment is used.

FRA also recognizes the differences between commuter or short-distance intercity operations and long-distance intercity passenger train operations. Long-distance intercity passenger trains do not operate in shorter turnaround service over the same sections of track on a daily basis for the purpose of transporting passengers from major centers of employment. Instead, these trains tend to operate for extended periods of time, over long distances with greater distances between passenger stations and terminals. Further, these trains may operate well over 1,000 miles in any 24-hour period, somewhat diminishing the opportunity for conducting inspections on these trains. Therefore, FRA believes that a thorough inspection of the braking system on these types of operations must be conducted prior to the trains' departure from an initial starting terminal. Consequently, paragraph (b) retains the proposed requirement that a Class I brake inspection be performed on long-distance intercity passenger trains prior to departure from an initial terminal. FRA does not believe there would be any significant burden placed on these operations as the current regulations require that an initial terminal inspection be performed at these locations. Furthermore, virtually all of the initial terminal inspections currently conducted on these types of trains are performed by individuals who would be considered qualified maintenance persons pursuant to § 238.5.

Paragraph (b) also retains the requirements proposed in the 1997 NPRM related to the performance of Class I brake tests on long-distance intercity passenger trains every 1,500 miles or every calendar day, whichever comes first. After reviewing the information and comments submitted by labor representatives, the information and comments provided by Amtrak, and based upon the independent information developed by FRA, FRA believes that the enhanced inspection scheme contained in this final rule will ensure the continued safety of long-distance intercity passenger trains. (See previous discussion of comments in general preamble portion of this document.)

Contrary to the statements made in the comments submitted by some labor representatives, FRA is not merely increasing the distance between brake inspections for these types of trains. Rather, FRA is increasing both the quality and the content of the inspections that must be performed on long-distance intercity passenger trains and, thus, increasing the safety of such trains. Under the current regulations these passenger trains are required to receive an initial terminal brake inspection at the point where they are originally assembled, and from that point the train must receive an intermediate brake inspection every 1,000 miles. The current 1,000-mile inspection merely requires the performance of a leakage test, an application of the brakes and the inspection of the brake rigging on each car to ensure it is properly secured. *See* 49 CFR 232.12(b). The current 1,000-mile brake inspection does not require 100 percent operative brakes prior to departure and does not require piston travel to be inspected. The current regulations also do not require the performance of any type of mechanical inspection on passenger equipment at 1,000-mile inspection points or at any other time in the train's journey. Thus, under the current regulations a long-distance intercity passenger train can travel from New York to Los Angeles on one initial terminal inspection, a series of 1,000-mile inspections, and no mechanical inspections.

Whereas, this rule will require the performance of a Class I brake test, which is more comprehensive than the current initial terminal inspection, at the point where the train is originally assembled and will require the performance of another Class I brake test every 1,500 miles or every calendar day thereafter, whichever comes first, by highly qualified inspectors. Thus, at least every 1,500 miles or every calendar day a long-distance passenger train will be required to receive a brake inspection which is more comprehensive than the current initial terminal inspection and which requires that the train have 100 percent operative brakes and have piston travel set within established limits. Furthermore, this rule will require the performance of an exterior and interior mechanical inspection every calendar day that the train is in service. Consequently, the inspection scheme proposed in the 1997 NPRM and retained in this final rule will, in FRA's view, increase the safety and better ensure the integrity of the brake and mechanical components of long-distance passenger trains.

FRA also believes that some recognition must be given to the various types of advanced braking system technologies used on many long-distance intercity passenger trains. Many of these advanced technologies are not found with any regularity in freight operations and thus the reliability and performance of brake systems on these passenger trains enhance the safety of these trains and, when combined with other aspects of this discussion, support FRA's belief that these brake systems can safely be operated with the inspection intervals that were proposed in the 1997 NPRM. Dynamic brakes are typically employed on these types of trains to limit thermal stresses on friction surfaces and to limit the wear and tear on the brake equipment. Furthermore, the brake valves and brake components used on today's long-distance passenger trains are far more reliable than was the case several decades ago. Other technological advances utilized with regularity by these passenger trains include:

- The use of brake cylinder pressure indicators which provide a reliable indication of the application and release of the brakes.
- The use of disc brakes which provide shorter stopping distances and decrease the risk of thermal damage to wheels.
- The ability to effectuate a graduated release of the brakes due to a design feature of the brake equipment which permits more flexibility and more forgiving train control.
- The ability to cut out brakes on a per-axle or per-truck basis rather than a per car basis, thus permitting greater use of those brakes that are operable.
- Brake ratios that are 2½ times greater than the brake ratios of loaded freight cars.

Although some of the technologies noted above have existed for several decades, most of the technologies were not in wide spread use until after 1980. Furthermore, most of the noted technological advances just started to be integrated into one efficient and reliable braking system within the last decade. Consequently, the technology incorporated into the brake equipment used in today's long-distance intercity passenger trains has increased the reliability of the braking system and permits the safe operation of the equipment for extended distances even though a portion of the braking system may be inoperative or defective.

FRA also disagrees with the contentions raised by certain labor representatives that the facts and data do not support the 500 mile extension in the brake inspection interval even with the more comprehensive inspection scheme. These commenters recommend that the current 1,000-mile brake inspection interval be retained together with the increased inspection regiment. These commenters contend that due to the large number of defects being found at 1,000-mile inspections the need to retain the inspection is justified. As an example and support for this position, the BRC submitted information containing numerous defective conditions compiled by carmen stationed at Union Station in Washington D.C. from January 1996 through February of 1997 that the carmen allegedly found on trains traveling through Union Station. After reviewing the documentation submitted, FRA does not believe the information supports the conclusion that 1,000-mile brake inspections must be maintained and that it would be unsafe to extend the distance between brake inspections under the inspection scheme contained in this final rule.

Due to the lack of detail contained in the information submitted by the BRC, it is impossible to determine whether the vast majority of the alleged defective conditions were defective under the Federal regulations or whether the conditions were merely in excess of Amtrak's voluntary maintenance standards or operating practices. In addition, based on the description of some of the conditions, they would not be considered defective conditions under current Federal regulations. Furthermore, the vast majority of the conditions alleged in the document were not power brake defects, and thus, under the current regulations, would not have been required to have been inspected at a 1,000-mile inspection. Nor do the current regulations mandate any type of mechanical inspection on passenger equipment (other than on locomotives under 49 CFR part 229, of course). Moreover, as the vast majority of the alleged conditions were mechanical and wheel defects, FRA believes that these types of defective conditions will be addressed by the exterior calendar day mechanical inspection contained in this final rule which will be required to be performed every calendar day that a piece of equipment is in service.

FRA agrees with the comments submitted by the BRC that the data and information submitted by Amtrak regarding the allegedly defective equipment found at Washington, D.C., does not fully address whether the cars identified by carmen at that location were defective and does indicate that at least many of the cars were repaired for the defective condition noted within several days after moving through Washington, D.C. However, contrary to the conclusions reached by labor representatives, the fact that a car remained in service with an alleged defective mechanical or brake condition does not necessarily mean the train involved was in an unsafe condition or that the equipment was being moved illegally. The current regulations regarding freight mechanical equipment and the existing statutory mandates regarding the movement of equipment with defective safety appliances and brakes permit the movement of a certain amount of defective equipment to certain locations provided it is determined by a qualified person that such a movement can be made safely or that a sufficient percentage of the brakes remain operative. *See* 49 U.S.C. 20303, 49 CFR 215.9. As this final rule will specifically address the inspection of the mechanical components on passenger equipment and the movement of defective mechanical components, which is not covered by existing regulations, FRA believes that the amount of defective equipment being operated will be reduced significantly and/or handled safely in revenue trains. Although FRA agrees that the information submitted by Amtrak regarding the number of cars set out at 1,000-mile inspection points does not reflect the true number of defects being found during the inspections, FRA does find it significant that a very small percentage of cars set-out by Amtrak are set-out at 1,000-mile inspection locations and that most set-outs occur en route.

FRA also finds it necessary to make clear that the number of cars alleged to have been found in defective condition at Union Station in Washington, D.C. is not indicative of a safety problem on long-distance intercity passenger trains. Assuming that all of the cars contained in BRC's submission were in fact defective as alleged, it appears that approximately 750 cars were defective. However, the information also reveals that approximately 1,300 trains were inspected; thus, using a conservative estimate of 10 cars per train, approximately 13,000 cars were inspected. As a result, approximately only 6 percent of the cars inspected were found to contain either a mechanical or brake defect. Furthermore, of the approximate 750 cars alleged to have been found defective, only approximately 20 percent of those contained a power brake-related defect. Consequently, only about 1–2 percent of the total cars inspected contained a power brake-related defect. Moreover, from the information provided it appears that none of the trains contained in the BRC submission were involved in any type of accident or incident related to the defective conditions alleged.

FRA believes that the key to any inspection scheme developed for long-distance intercity passenger trains is the quality of the inspection which is performed at a train's point of origin. FRA is convinced that if a train is properly inspected with highly qualified inspectors and has 100 percent operative brakes at its point of origin, then the train can easily travel up to 1,500 miles between brake inspections without significant deterioration of the braking system. FRA independently monitored a few long-distance intercity passenger trains running from New York to Miami, New York to New Orleans, and New York to Chicago and found that when the trains departed from their points of origin with a brake system that was defect free they arrived at destination without any defective conditions existing in their brake systems. These findings are consistent with FRA's experience in inspecting long-distance intercity passenger trains over the last several years. It should be noted that during this independent monitoring, FRA did find some trains that after receiving initial terminal inspections still contained some defective conditions in the brake system. Although FRA believes that none of the defective conditions found would have prevented the safe operation of the trains, FRA recognizes that FRA as well as the railroads must be vigilant in ensuring that quality brake system inspections are performed on a train at its point of origin and at each location where a Class I brake test is required to be performed. Consequently, due to the comprehensive nature of Class I brake tests and the exterior calendar day mechanical inspection combined with the technological advances incorporated into the braking systems utilized in these types of trains and after a review of the data and information provided and based on FRA's experience with these types of operations, FRA is retaining the proposed 1,500 mile interval for the performance of Class I brake tests in this final rule.

Paragraph (c) contains a provision that was not proposed in the 1997 NPRM to address the inspection of cars added to an en route train. FRA has modified the Class I brake test requirements to ensure the proper operation of all cars added to a train while en route. This paragraph requires the performance of a Class I brake test on each car added to a passenger train at the time it is added to the train unless documentation 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. This requirement has been included in order to address the concerns raised by various labor representatives that no provisions were provided in the 1997 NPRM to address circumstances when cars are added to an en route train. Section 238.317 makes clear that if a car has received such inspection, the railroad will be required to perform a Class II brake test at the time the car is added to the train. FRA believes that these provisions are necessary to ensure the integrity of the brake system on every car added to an existing train and should not be a burden for railroads since cars are generally added to passenger trains at major terminals with the facilities and personnel available for conducting such inspections. Furthermore, these inspection requirements are very similar to what is currently required when a freight car is added to a train while en route. *See* 49 CFR § 232.13.

Paragraph (d) requires that the Class I brake tests be performed by qualified maintenance persons. As FRA intends for Class I brake tests to be in-depth inspections of the entire braking system, which most likely will be performed only one time in any given day in which the equipment is used, FRA believes that these inspections must be performed by individuals possessing the knowledge to not only identify and detect a defective condition in all of the brake equipment required to be inspected but also the knowledge to recognize the interrelational workings of the equipment and have a general understanding of what is necessary to repair the equipment. Furthermore, most passenger railroads currently have a daily brake test performed by highly qualified mechanically trained employees so this requirement is not really a departure from current industry practice. (For a detailed discussion of ''qualified maintenance person'' see the section-by-section analysis for § 238.5 and the general preamble discussion related to qualified maintenance persons.)

Paragraph (e) provides railroads with the option to perform the Class I brake test either separately or in conjunction with the calendar day mechanical inspections. FRA has retained this provision simply to clarify that the two inspections need not be done at the same time or location as long as they are both performed sometime during the calendar day that a piece of equipment is in use.

Paragraph (f) prohibits a railroad from using or hauling a passenger train in passenger service from a location where a Class I brake test has been performed, or was required to have been performed, with less than 100 percent operating brakes. (*See* section-by-section analysis of § 238.15 for a detailed discussion of movement of defective equipment for purposes of repair or sale.)

Paragraph (g) contains a list of the safety-related items that must be inspected, tested, or demonstrated as part of a Class I brake test. This list was developed based on the experience and knowledge of FRA's motive power and equipment field inspectors familiar with the operations and inspection practices of passenger operations. The Working Group extensively discussed the items contained in this paragraph. Very few comments were submitted which addressed the specific items contained in this paragraph. One commenter did recommend that a few of the provisions be clarified to specifically address tread brakes. Therefore, paragraph (g) generally retains all of the requirements proposed in the 1997 NPRM except to the extent that a few requirements have been slightly modified for clarity. Paragraph (g)(1) requires that an inspection be conducted on each side of each car to verify the application and release of each brake. This requirement is consistent with FRA's longstanding interpretation of what the current regulations require when conducting initial terminal and 1,000 mile brake inspections pursuant to § 232.12. For clarity and consistency, FRA has explicitly incorporated the requirement into this final rule. Minor modifications have been made to paragraphs (g)(3), (g)(5), and (g)(11) in order to clarify the intent of the requirements to brake systems utilizing tread brakes. It should be noted that the requirement contained in paragraph (g)(14) would bar the use of a train that current regulations allow to be placed in service. This paragraph requires that brake indicators must function as intended. Although this provision may require railroads to make more frequent repairs than are currently required, FRA believes these added costs are necessitated by—and offset by—the ability to use brake indicators during the performance of certain brake tests in lieu of direct observation of the brakes.

Paragraph (h) requires the qualified maintenance person that performs a Class I brake test to record the date, time and location of the test as well as the number of the controlling locomotive of the train. It should be noted that a requirement to record the total number of cars inspected during the Class I brake test has been added at paragraph (h)(4). FRA believes this information is necessary to ensure that the required inspection has been performed on all the cars in a train and provides a method for the tracking of cars added to en route trains. This minimal information is required to be available in the cab of the controlling locomotive to demonstrate to the train crew and future inspectors that the train is operating under a current Class I brake test. Furthermore, the use of such records or ''brake slips'' as they are known in the industry is the current practice of virtually all passenger railroads. FRA believes that this recordkeeping requirement adds necessary reliability, accountability, and enforceability to the inspection requirements contained in this section.

Paragraph (i) allows long distance, intercity passenger trains that miss a scheduled Class I brake test due to a delay en route to proceed to the point where the scheduled brake test was to be performed. This flexibility prevents Amtrak or other operators of long distance trains from having to dispatch qualified maintenance persons to the location of a delayed train merely to meet the calendar day Class I brake test requirement. This is a common sense exception that will not compromise safety.

Section 28.315 Class IA Brake Test

This section contains the requirements regarding the performance of Class IA brake tests. As mentioned previously, although FRA agrees with the position advanced by many labor representatives that some sort of car-to-car inspection must be made of the brake equipment prior to the first run of the day, FRA does not agree that it is necessary to perform a full Class I brake test in order to ensure the proper functioning of the brake equipment in all situations. However, contrary to the position espoused by several railroad representatives, FRA believes that something more than just a determination that the brakes on the rear car set and release is necessary in many situations.

Currently, the quality of initial terminal tests performed by train crews is likely adequate to determine that brakes apply on each car. However, most commuter equipment utilizes ''tread brake units'' in lieu of cylinders and brake rigging of the kind prevalent on freight and some intercity passenger cars. It is undoubtedly the case that train crewmembers do not verify application of the brakes by tapping brake shoes while the brakes are applied—the only effective means of determining that adequate force is being applied. This is one reason why the subject railroads typically conduct redundant initial terminal tests at other times during the day. Further, train crews are not asked to inspect for wheel defects and other unsafe conditions, nor should they be asked to do so, given the conditions under which they are asked to inspect and the training they receive.

As noted previously, FRA is modifying the requirements for when a Class IA brake test must be performed from that which was proposed in the 1997 NPRM. FRA continues to believe that some type of car-by-car inspection must be performed prior to a passenger train's first run of the day if the train was used in passenger service the previous day without any brake inspection being performed after it has completed service and before it lays-up for the evening. However, FRA tends to agree with the comments submitted by APTA representatives that the need for such an inspection is minimized if a Class I brake test is performed within a relatively short period of time prior to the first run of the day and the train has not been used in passenger service since the performance of that inspection. From a safety standpoint, it appears to be overkill to require the performance of a second comprehensive brake test when the equipment has not been used in passenger service and has remained on a source of compressed air since the last comprehensive brake test was performed. In such circumstances, FRA believes that the performance of a Class II brake test would be sufficient to determine if there are any problems with the braking system due to vandalism or other causes since the last comprehensive Class I brake test. Furthermore, as APTA's comments point out, commuter railroads have been safely operated in a fashion similar to this for a number of years. Consequently, paragraph (a)(1) of this section makes clear that a Class IA brake test is to be performed prior to the first morning departure of each commuter or short-distance intercity passenger train unless a Class I brake test was performed within the previous twelve hours and the train has not been used in passenger service and has not been disconnected from a source of compressed air for more than four hours since the performance of the Class I brake test. FRA believes that this exception is consistent with the concept of performing comprehensive brake and mechanical inspections at centralized locations as this provision affords railroads the ability to conduct a Class I brake test at the end of a train's daily operating cycle at a central location and then have the ability to move the train in non-passenger service to an outlying location without being required to perform a Class IA brake test prior to departure from the outlying terminal.

Paragraph (a)(2) requires that a Class IA brake test be performed prior to placing a train in service if that train has been off a source of compressed air for more than four hours. This requirement formalizes a long-standing agency interpretation of the existing power brake regulations but increases the time limit from two to four hours. Labor representatives maintain that any number of brake system problems can develop with equipment off air for only a short time, while management representatives contend that equipment can be left off air for extended periods of time with no problems. FRA believes the requirement contained in this paragraph is a fair compromise that allows railroads some operating flexibility, but does not allow equipment to be off air without a new brake test for extended periods of time. FRA agrees that its longstanding administrative interpretation of allowing cars to be ''off air'' for only two hours was established prior to the development of new equipment that has greatly reduced leakage problems. However, contrary to the contentions of some commenters, FRA does not believe that cars should be allowed to be ''off air'' for extended periods without being retested. The longer cars sit without a supply of compressed air attached, the greater the chances are that the integrity of the system will be compromised, either by weather conditions or vandalism.

Paragraph (b) allows a commuter or short-distance intercity passenger train that provides continuing late night service that began prior to midnight to complete its daily operating cycle after midnight without performing another Class I or Class IA brake test on the train prior to its first departure after midnight. This provision is included to make clear that a train is not required to be stopped during its operating cycle in order to receive a Class I or Class IA brake test prior to it first departure of a calendar day. FRA also makes clear that this provision does not relieve a railroad from its responsibility under § 238.313 to perform a Class I brake test on each calendar day that the train is in use. Thus, a train operating past midnight must receive a Class I brake test sometime on each of the two days it is in use.

Paragraph (c) allows a Class IA brake test to be performed at a shop or yard site without needing the test repeated at the first passenger terminal if the train remains on air and in the custody of the crew. This provision is an incentive for railroads to conduct the tests at locations where they can be performed more safely and easily. FRA believes that a shop or yard location is more conducive for conducting a proper brake test. Raised platforms and other conditions frequently found at terminals can make the performance of a brake test difficult, if not hazardous.

Paragraph (d) permits the Class IA test to be performed by either a qualified person or a qualified maintenance person. Paragraph (e) prohibits a railroad from using or hauling a passenger train from a location where a Class IA brake test has been performed, or was required to have been performed, with less than 100 percent operative brakes. (*See* section-by-section analysis of §§ 238.15–238.17 for a discussion of movement of defective equipment for purposes of repair or sale.) Paragraph (f) contains the specific tasks that must be performed when conducting a proper Class IA brake test. This paragraph makes clear that a Class IA brake test include: a check that each brake sets and releases; a test of the emergency brake application feature; a check of the deadman or other emergency control device; an observation that angle cocks and cutout cocks are properly set; an observation that brake pipe pressure changes are communicated to the rear of the train; and a test that the communicating signal system is known to be operative.

Paragraph (g) requires that the inspection of the set and release of the brakes be performed by walking the train so the inspector actually observes the set and release of each brake. Labor representatives strongly contended that this is the only way to do a proper brake test. They believe that observation of brake indicators does not give a reliable indication of effective brakes because the indicators sense brake cylinder pressure rather than the force of the brake shoe against the wheel or the pad against the disc. However, this paragraph allows an exception when railroads determine that direct observation of the set and release can place the inspector in danger. FRA acknowledges the contention of rail management representatives that conditions at certain locations where Class IA tests may be performed could place the inspector in danger if he or she is required to place himself or herself in a position to actually observe the set and release of each brake. Where railroads determine this to be the case, FRA will permit the use of brake indicators for the set and release step of the Class IA brake test as long as the inspector takes a position where an accurate observation of the indicators can be made.

Section 238.317 Class II Brake Test

This section contains the requirements regarding how a Class II brake test is to be performed and contains the conditions for when a railroad is required to perform the brake test. The Class II brake test provides passenger railroads the flexibility to continue to use train crew personnel to perform the limited brake tests required when minor changes to the train occur. Both labor and management representatives to the Working Group recognized that train crews are capable of performing the relatively simple checks required by a Class II brake test and that the operations of most commuter and passenger railroads require the flexibility of having operating personnel perform these tests.

Paragraph (a) contains the circumstances which require the performance of a Class II brake test. This paragraph has been modified from that which was proposed in the 1997 NPRM in order to clarify the requirements, to remain consistent with other provisions of this rule, and to address recent issues that have been raised with FRA regarding certain passenger train operations. Although paragraph (a)(1) retains the proposed requirement that a Class II brake test be performed whenever the control stand is changed, this paragraph has been modified in order to clarify that a Class II brake test need not be performed in circumstances where a train is being moved in non-passenger service from one track to another inside a terminal complex even though the changing of the control stand occurs during such movements. In order to effectuate such movements the control stand may be required to be changed several times. As these train movements are akin to switching movements in that they are performed over relatively short distances at very low speeds and pose minor safety hazards, FRA will not require the performance of multiple Class II brake tests in order to conduct such movements. It should be noted that § 238.319 requires the performance of a running brake test whenever the control stand is changed during these types of movements in order to ensure the operation of the brake system during these movements. This paragraph also requires the performance of a Class II brake test prior to the train's departure from the terminal complex with passengers.

Paragraph (a)(2) requires the performance of a Class II brake test prior to the first morning departure of a commuter or short-distance intercity passenger train where a Class I brake test remains valid as provided in § 238.315(a)(1). As discussed in the preceding section, FRA believes that in these limited circumstances the performance of a Class II brake test will adequately ensure the integrity of the brake system on the train since the performance of the last Class I brake test. Paragraph (a)(4) has been added in order to clarify that a Class II brake test is to be performed whenever cars or equipment are removed from a train. This provision is consistent with the concept that the proper operation of the brake system must be verified whenever an event occurs which may impact the integrity of the brake system and is consistent with current practice on virtually every railroad.

Paragraph (c) requires that passenger trains not depart from Class II brake tests which are performed at a terminal or a yard with any brakes cut-out, inoperative, or defective unless the equipment is moved in accordance with § 238.15. The language of this requirement has been slightly modified from the language proposed in the 1997 NPRM, in order to make the provision consistent with the movement for repair provisions contained in this final rule. *See* § 238.15. Many terminals and most yards are locations where brake repairs can be effectuated. Thus, passenger equipment containing defective brake equipment would not be permitted to depart those locations capable of making the necessary repairs until repaired. If the necessary repairs cannot be effectuated at such locations the equipment must be properly tagged and moved pursuant to the requirements contained in § 238.15.

Paragraph (d) requires that a Class II brake test consist of: a check that the brakes on the rear unit of the train apply and release in response to brake control signals or a check that brake pipe pressure changes are properly communicated at the rear of the train by observation of a gauge at the end of the train or in the cab of the rear unit; a test of the emergency brake application and a test of the deadman pedal or other emergency control device on MU equipment; and a test of the communicating signal system to ensure it is operating as intended. The proposed requirements for observing a set and release of the brakes on the rear car and for ensuring that brake pipe pressure changes are properly communicated at the rear of the train have been combined and stated in the alternative in this final rule, as FRA believes that the performance of either task indicates proper trainline continuity and to perform both would be redundant and unnecessary. It should also be noted that the requirement regarding the testing of the emergency application and deadman pedal or other emergency control devices is only applicable to MU equipment due to the ease of performing such an inspection on that equipment. The requirement that the communicating signal system be tested is part of both a Class I and a Class IA brake test and has been added to this brake inspection as FRA believes the proper operation of the communicating signal system is necessary for the safe operation of a train and can be easily tested in a very short amount of time. FRA believes that if the equipment receives a full Class I brake test and a calendar day mechanical inspection at some time during each operating day, then these simple checks are adequate to confirm brake system performance at intermediate terminals or turning points. This requirement basically codifies current industry practice.

Section 238.319 Running Brake Tests

This section contains the requirements for conducting running brake tests on the brakes of passenger trains. A running brake test is merely a brake application at the first safe opportunity to confirm that the brake system works as expected by the engineer. Paragraphs (a) and (c) require that a running brake test be performed in accordance with the railroad's established operating rules after the train has received a Class I, Class IA, or Class II brake test as safety permits. FRA believes that railroads are in the best position to determine when and where running tests can be safely performed. As most passenger railroads routinely conduct running brake tests, FRA believes that the requirements contained in this section capture an important safety check without changing current operating practice to any great extent. It should be noted that paragraph (b) has been added to this section to require the performance of a running brake test 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. As previously discussed, due to the special nature of these moves FRA believes that a running brake test adequately ensures the proper operation of the braking system during these movements and obviates the need to perform a Class II inspection each time the control stand is changed in these circumstances.

Subpart E—Specific Requirements for Tier II Passenger Equipment

Section 238.401 Scope

This subpart contains the design and performance requirements for Tier II passenger equipment—that is, passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph. For the most part, compliance with the requirements of this section will be demonstrated by one-time analysis or initial acceptance tests.

The requirements contained in this subpart have their basis in discussions between Amtrak and FRA involving safety requirements for the operation of passenger trainsets at speeds up to 150 mph on the Northeast Corridor (NEC). Aware that FRA was considering the development of safety standards for high-speed passenger rail equipment, Amtrak asked FRA for assistance in developing a set of safety specifications for the procurement of high-speed trainsets which would address FRA's safety concerns. As a result, Amtrak's high-speed trainsets, scheduled to begin regular passenger service in 1999, will very likely comply with all of the safety standards in this subpart.

Amtrak's discussions with FRA led it to sponsor a risk assessment of high speed rail passenger systems on the north end of the NEC—from New York to Boston. The discussions also prompted FRA to sponsor computer modeling to predict the performance of various equipment structural designs and configurations in collisions. A copy of the risk assessment performed by Arthur D. Little, Inc., for Amtrak is included in the docket of this rulemaking. The risk assessment was based on existing and predicted future right-of-way configurations and traffic density patterns. The risk assessment concluded that a significant risk of collisions at speeds below 20 mph and a risk of collisions at speeds exceeding 100 mph exist over the 20-year projected operational life of the HSTs—due to heavy and increasing conventional commuter rail traffic, freight rail traffic on the NEC, highway-rail grade crossings, moveable bridges, and a history of low speed collisions in or near stations and rail yards.

Based on the risk assessment and the results of the computer modeling, Amtrak and FRA determined that full reliance on collision avoidance measures rather than crashworthiness, though the hallmark of safe high-speed rail operations in several parts of the world, could not be implemented in corridors like the north end of the NEC. Existing traffic and right-of-way configurations do not permit implementation of the same collision avoidance measures that have proven successful in Europe and Japan. To compensate for the increased risk of a collision in the North American rail operating environment, a more crashworthy trainset design is needed. (FRA does note that on June 3, 1998, near Eschede in northern Germany, an ICE (Inter City Express) passenger train derailed at a speed of approximately 125 mph into the support structure of a highway bridge carrying traffic over the railroad right-of-way, collapsing the bridge. A number of the cars in the train were crushed, and 101 fatalities resulted from the derailment.) Accordingly, the set of structural requirements for Tier II passenger equipment in this final rule is more stringent than the current design practice for North American passenger equipment or for high-speed rail equipment in other parts of the world.

Section 238.403 Crash Energy Management Requirements

This section requires that each power car and trailer car be designed with a crash energy management system to dissipate kinetic energy during a collision.

During discussions with Amtrak for the safety provisions of its high-speed trainsets, FRA proposed very challenging crash energy management requirements based on predictions using computer modeling. Amtrak believed that meeting these requirements would be well beyond the current state of the art for passenger equipment design, and that an extensive and costly research and testing program would be required. As an alternative, Amtrak proposed a crash energy management design based on the demonstrated, commercially viable design developed in France and incorporated in the most recent design of the TGV trainset. FRA believes that Federal safety standards must be capable of implementation in the design of passenger equipment without driving the cost of implementation to the point that high-speed rail systems are no longer financially viable.

Paragraph (c) requires a Tier II train to have a crash energy management system capable of absorbing a minimum of 13 megajoules (MJ) of energy at each end of the train. The ability to absorb this energy must be partitioned as follows: a minimum of 5 MJ by the front end of the power car ahead of the operator's control compartment; a minimum of 3 MJ by the power car structure behind the operator's control compartment; and a minimum of 5 MJ by the unoccupied end of the first trailer car adjacent to the power car. This requirement can be met using existing technology. However, it will effectively prevent a conventional cab car from operating as the lead vehicle in a Tier II passenger train because such equipment cannot absorb 5 MJ of collision energy ahead of the train operator's position. Recent accidents involving trains operating with a cab car forward have demonstrated the vulnerability of this type of equipment in collisions. FRA believes such equipment should not be used in the forward position of a train that travels at speeds greater than 125 mph. FRA has also encouraged Amtrak to use an alternative lead vehicle where speeds exceed 110 mph and highway-rail grade crossings are prevalent. Further, FRA is specifically requiring in paragraph (f) that passenger seating be prohibited in the leading unit of a Tier II train.

In its comments on the NPRM, Talgo observed that the standards in this section may be unattainable using current technology. However, Amtrak's high-speed trainsets have been shown to meet the requirements of this section. Specifically, testing has shown the crash energy absorbing components of the power car and in the end of the first trailer car adjacent to the power car to absorb the energy as provided in paragraph (c).

Talgo further commented that because the kinetic energy of a running train is a function of its mass and speed, paragraph (c) should not state a fixed value of energy. Rather, it believed paragraph (c) should state a value with respect to a specified speed to allow some flexibility for trains of varying mass and yet preserve the same level of safety. FRA recognizes that the kinetic energy of a running train is a function of its mass and speed, and if Tier II trains were at no risk of colliding with other trains of greater weight, then adopting Talgo's comment may be possible. However, the Tier II safety standards are intended to apply to high-speed passenger trains that, as necessitated by the United States rail operating environment, will operate commingled with heavier trains, especially heavy and long freight trains that may themselves operate at speeds up to 80 mph. In the event of a collision with a heavier train, a Tier II passenger train must confront the energy possessed by that train. FRA believes that a Tier II passenger train must have a crash energy management system capable of absorbing the minimum energy levels specified in paragraph (c) to protect the train's occupants in light of the risks of colliding with heavier trains and other objects along the railroad right of way. As a result, FRA believes it is inappropriate to adopt Talgo's comment.

Additionally, in its comments on the NPRM, Talgo believed paragraphs (c)(1)–(3) should be rewritten so that the total energy that is required to be absorbed is dissipated through all inter-car connections, not just through the first few cars. FRA notes that one of the reasons the energy absorbing structures of the leading car in a Tier II passenger train (power car) and the adjacent trailer car must themselves absorb the energy specified in this section is to reduce the risk and effects of secondary collisions throughout the train's subsequent vehicles. Secondary collisions (i.e., impacts with interior objects) can seriously harm or, in extreme cases, kill train occupants. This risk of harm to a Tier II passenger train's occupants is, therefore, minimized overall by requiring the energy absorbing structures in the first two train cars to absorb collision energy before it poses a risk to the train's occupants.

Paragraph (d) requires that for a 30-mph collision of a train on tangent, level track with an identical stationary train, the deceleration of the occupied compartments of each trailer car shall not exceed 8g; and 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. A 50th-percentile adult male has been defined in § 238.5, based on the same characteristics for such a vehicle occupant's weight and dimensions specified in a NHTSA standard at 49 CFR § 571.208, S7.1.4. FRA does note that, for purposes of this requirement, the weight of the occupant is not particularly relevant, as weight generally should not affect how fast the occupant strikes the seat back ahead of him. In this regard, an occupant of heavier of lighter weight should be neither more nor less protected by the requirements of this paragraph.

In its comments on the NPRM, Simula did not recommend defining an occupant velocity in paragraph (d), noting that it is a function of the crash pulse, the distance between two rows of seats, as well as occupant position and size. FRA has specified that occupant velocity not exceed 25 mph in a secondary collision because an occupant travelling beyond that speed is at considerable risk of harm from a secondary impact. In fact, use of an occupant restraint system would likely have to be required to protect the train occupants in such a case. FRA believes that compliance with paragraph (d)(1) can be demonstrated, and that Amtrak's HTS complies with the rule based on information presented to FRA.

Simula additionally commented that if trailer cars are built to withstand 30 mph collisions and 10g decelerations, then the seats in these cars should also be designed to withstand these same forces. Specifically, Simula did not recommend requiring that the decelerations in trailer cars be limited in a 30 mph collision to 10g while requiring seats to withstand the impact of an occupant travelling at 25 mph and a longitudinal force of 8g, noting that the seats will not be able to withstand the 10g decelerations and consequently detach from the car.

FRA notes that Simula's comment relates to the seat strength requirements found in § 238.435. In the final rule, § 238.435(a) requires that the seat back and seat attachment in a passenger car 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. FRA agrees with Simula that it is possible that a seat in a trailer car may detach from the car when subjected to a force that is greater than that required to be withstood under proposed § 238.435(a) in the NPRM, and expressly permitted by proposed § 238.403(d). FRA has, therefore, decided to modify § 238.403(d) so as to limit the permissible decelerations in a trailer car to 8g under the conditions specified in that paragraph. FRA believes that meeting this requirement is feasible with current technology, and that Amtrak's HTS complies with § 238.403(d)(2) on the basis of information presented to FRA.

In its comments on the NPRM, Talgo believed that paragraph (d) should make allowances for the short-lived elevations in peak that may occur during a collision so that peaks exceeding 10g (as proposed) for a duration no longer than 10 milliseconds are acceptable. FRA believes that for purposes of demonstrating compliance with this paragraph through testing, deceleration measurements may be processed through a low-pass filter having a bandwidth of 50 Hz.

Paragraph (e) contains the analysis process to demonstrate that equipment meets these crash energy management performance requirements. The process allows simplifying assumptions to be made so that computer modeling techniques can be used to confirm compliance.

Section 238.405 Longitudinal Static Compressive Strength

This section contains the requirements for longitudinal compressive strength of power cars and trailer cars. Paragraph (a) requires the compressive strength of the underframe of the power car cab to be a minimum of 2,100,000 pounds without yielding. To form an effective crash refuge, this strength is needed to take advantage of the strength of the power car's two end frames. Alternate design approaches that provide equivalent protection are allowed, but the equivalent protection must be demonstrated through analysis and testing and be approved by FRA under the provisions of § 238.21.

In its comments on paragraph (a), Bombardier believed that a design requirement based on the ultimate strength of the structure, as proposed in the NPRM, makes the analysis more difficult and testing the structure impractical and potentially dangerous. According to Bombardier, the specified test load should be based on the yield strength of the structure rather than the ultimate strength, as this would also be consistent with the Amtrak high-speed trainset specifications. FRA has revised this section pursuant to Bombardier's comment. FRA notes that the effect of this revision is to require a stronger power car cab than originally proposed in the rule.

Bombardier additionally commented that clarifying text should be added to define the structural loading conditions so that the 2,100,000-pound load shall be resisted at the height of the underframe at the rear of the cab as follows: 300,000 pounds at each rear cab corner post location; and 750,000 pounds at each rear cab collision post location. FRA does not believe it necessary to incorporate Bombardier's comment into the rule, and doing so may result in confusion. As discussed in § 238.411, FRA believes that each corner post structure on the rear end of a power car cab must resist a 300,000-pound load at the structure's joint with the underframe, and each collision post structure must resist a 750,000-pound load in the same manner. These loads may not be resisted solely at the underframe as a test of the strength of the corner and collision post structures; otherwise, the actual ability of the collision and corner post structures to resist shearing would not be implicated. Further, the load testing criteria for corner and collision post structures in the rule is based on ultimate strength; whereas the longitudinal compressive strength requirement in this paragraph, as revised, is based on yield strength. In light of the separate requirements for testing corner and collision post structures, FRA believes it best not to expressly integrate those requirements with this section.

Paragraph (b) contains the requirements for the static compressive strength of the occupied volumes of trailer cars. This adopts the traditional North American design practice of a static strength of 800,000 pounds, without deformation of the underframe. Paragraph (c) makes clear that unoccupied volumes of power cars or trailer cars may have a static end strength of less than 800,000 pounds to accommodate crash energy management designs.

The crash energy management design requirement ensures that the stronger end structures and the stronger static compressive strength of the cab of a power car will not make Tier II passenger equipment incompatible with existing passenger equipment should a collision between the two different types of equipment occur. The crash energy management design causes a Tier II passenger train to appear as a softer collision surface to a conventionally designed train, owing to the collision energy absorbed by the Tier II train as its unoccupied volumes intentionally crush.

Section 238.407 Anti-Climbing Mechanism

This section contains the requirements for anti-climbing mechanisms on power and trailer cars. Paragraph (a) requires a power car to have a forward anti-climbing mechanism capable of resisting an upward or downward static vertical force of 200,000 pounds, without exceeding the ultimate strength of the material. This requirement is virtually identical to that required of locomotives by AAR S–580. However, designs are permitted that require the crash energy management controlled crushing to occur prior to the anti-climber fully engaging. FRA has revised this paragraph based on a comment from Bombardier that the rule text, as proposed, did not indicate that the 200,000-pound value is an ultimate load. Inasmuch as this requirement as stated in AAR S–580 is in fact based on an ultimate load acceptance criterion, FRA has modified the rule text accordingly.

Paragraph (b) requires that interior train coupling points between units, including between units of articulated cars or other permanently joined units of cars, have an anti-climbing device capable of resisting an upward or downward vertical force of 100,000 pounds without yielding. This is consistent with current design practice. FRA has revised this section based on a comment from Bombardier that the requirements in paragraph (b) are based on 49 CFR § 229.141(a)(2), and should thus include a yield strength acceptance criterion. FRA has modified the rule consistent with the requirements of 49 CFR § 229.141(a)(2).

Paragraph (c) requires the forward coupler of a power car to resist a vertical downward force of 100,000 pounds for any horizontal position of the coupler without yielding, and is virtually identical to that provided in 49 CFR § 229.141(a) for MU locomotives built new after April 1, 1956, and operated in trains having a total empty weight of 600,000 pounds or more.

Talgo commented on both this section and its Tier I counterpart in § 238.205. Talgo explained that it desired to avoid the implication that only couplers may properly function as anti-climbing mechanisms. Talgo also believed that in measuring the strength of the anti-climbing device, the operative variable should be vertical acceleration, expressed in gs, rather than load, expressed in pounds, to accommodate trains of different masses. FRA has discussed these comments earlier in the preamble.

Section 238.409 Forward End Structures of Power Car Cabs.

This section contains the requirements for forward end structures of power car cabs. The forward end structure of a power car cab is vital in a collision with another object. This structure must resist override, prevent the entry of fluids into occupied spaces of the cab, and allow the crash energy management system to function. The requirements in paragraphs (a)–(c) are based on a specific end structure design that consists of a full-height center collision post, two side collision posts located at approximately the one-third points laterally, and two full-height corner posts. This section also includes loading requirements that each of these structural members must withstand. However, the rule does permit flexibility for using other equipment designs that provide equivalent structural protection.

End structures meeting these requirements will provide considerably greater protection to the train operator than that provided by existing passenger equipment designs. For example, much stronger corner posts are required here than for Tier I passenger equipment. FRA believes these end structures help provide a degree of crashworthiness to compensate for the increased risk associated with operating at higher speeds.

The front end structure design also includes in paragraph (d) a skin requirement equivalent to that required by AAR S–580 and contained in § 238.209 for Tier I locomotives. FRA has revised paragraphs (a)(3) and (b)(2) based on a comment from Bombardier. Bombardier noted that the acceptance criterion proposed by FRA in these paragraphs is based on the yield or critical buckling stress; whereas the design of the forward end structures of the Amtrak high-speed power car cab is based on an ultimate load. FRA agrees that basing the acceptance criterion on ultimate strength is consistent with the Amtrak high-speed trainset design specification, and FRA has modified the rule in this regard.

Bombardier also commented that in paragraph (c)(2) FRA proposed requiring the corner post to resist a horizontal, lateral force of 100,000 pounds applied at a point 30 inches up from the underframe. Bombardier stated that the cab on the Amtrak high-speed trainset was designed to resist the 100,000-pound load at a point 18 inches up from the underframe, and believed this consistent with all current design practices for car end structural members. FRA has not modified the rule on this point. FRA has found no conflict between the proposal and the Amtrak high-speed trainset specification.

Both Bombardier and Talgo commented that FRA appeared to have specified the wrong value in paragraph (c)(3) of the proposed rule, as compared with the values contained in Figure 1. See 62 FR 49812–3. The commenters are correct that, as proposed, the paragraph wrongly required each forward corner post to resist a horizontal, longitudinal or lateral shear load of 150,000 pounds. As Figure 1 demonstrates, FRA intended each corner post to resist a horizontal, longitudinal or lateral shear load of 80,000 pounds. FRA has revised paragraph (c)(3) accordingly in the final rule.

Talgo additionally commented that in paragraph (d)(1), although the rule makes clear that its reference to a particular thickness of material does not preclude the use of thinner materials having a higher yield strength, it would be preferable to avoid specifying a thickness altogether. Instead, Talgo suggested that the skin strength requirement could be stated in terms of a specified impact resistance, as FRA proposed in § 238.421 on safety glazing. FRA recognizes that it may be possible to specify an impact resistance requirement, yet FRA has chosen a yield strength requirement based on AAR Standard No. 580 and the collective judgment of the railroad industry behind that standard. Accordingly, although FRA would not preclude an equipment design based on impact resistance that provides equivalent safety, FRA will defer consideration of specifying such an impact resistance until Phase II of the rulemaking. FRA does note that the strength of the material, in terms of its resistance to shear, is also important to ensure occupant protection.

Section 238.411 Rear end Structures of Power Car Cabs.

The rear end structure of a power car cab provides protection to crewmembers from intrusion of locomotive machinery or trailing cars into the cab's occupied volume as a result of a collision or derailment. The requirements in this section are based on a specific end structure design that consists of two full-height corner posts (paragraph (a)) and two full-height collision posts (paragraph (b)). In addition, this section specifies loading requirements that each of these structural members must withstand. Of course, the rule does permit flexibility for using other equipment designs that provide equivalent structural protection.

The required rear end structural protection will provide considerably greater protection to the train operator than that provided by existing passenger equipment designs. Together, the front and rear end structural protection required in this rule for a power car cab make the cab a highly survivable crash refuge.

In commenting on the NPRM, Bombardier recommended that in paragraph (b) the 750,000-pound force at the rear end cab structure collision posts be applied at the height of the centerline of the underframe, and not at the collision posts' joint with the underframe. FRA disagrees, and believes it necessary to test the strength of the collision post structure at its joint with the underframe to demonstrate the actual ability of the collision post structure to resist shearing. Otherwise, if the strength of the collision post structure were tested at the height of the centerline of the underframe, the collision post connection would not be loaded and the ability of the collision post structure to resist shearing would not be tested.

Bombardier also suggested that the horizontal, shear load value of 750,000 pounds specified in paragraph (b)(1) that the collision post is required to resist be changed to 500,000 pounds. Bombardier believed this modification necessary to be consistent with the shear strength requirements for the front collision posts specified both in the rule as well as in the Amtrak high-speed trainset specifications. FRA disagrees with this comment, and has not revised the rule on this point. The 750,000 pounds that each of the two collision posts at the rear of a power car cab must individually resist—1,500,000 pounds in the aggregate—is consistent with the 500,000 pounds that each of the three collision posts at the forward end of the power car cab must individually resist—again 1,500,000 pounds in the aggregate—under § 238.409(a) and (b) of this rule. Further, FRA believes these values to be consistent with the Amtrak high-speed trainset design specification.

Section 238.413 End Structures of Trailer Cars

The requirements in paragraph (a) are based on a specific end structure design that consists of two full-height corner posts and two full-height collision posts. The requirements include loading requirements that each of these structural members must withstand. The rule allows flexibility for other designs that provide protection structurally equivalent to the specified design.

Paragraph (b) in the final rule contains an additional requirement for trailer cars designed with an end vestibule. Such designs provide an opportunity for additional corner post structures inboard of the vestibule side doors. These corner posts can be supported by the side sill and therefore be structurally more substantial than the corner posts ahead of the side doors. This paragraph includes loading requirements that these additional full-height corner posts must withstand. Overall, the double corner post design provides significantly increased protection to passengers in trailer cars with end vestibules.

In its comments on the rule, Bombardier stated that, to be consistent with the design requirements for Amtrak's high speed trainsets, the corner post loads in paragraphs (a)(1)(ii), (b)(2), and (b)(3) (as numbered in the final rule) should be applied at 18 inches up from the underframe, rather than at 30 inches. FRA agrees that these values are consistent with Amtrak's previous undertakings for the high-speed trainsets, and has modified the final rule accordingly.

In the 1997 NPRM, FRA proposed an exception from the requirements of paragraph (a) for a trailer car (or, more appropriately, a consist of trailer cars) made up of multiple articulated units not designed for uncoupling other than in a maintenance shop. *See* 62 FR 49814, proposed § 238.413(b). FRA proposed that the end structure requirements in paragraph (a) apply only to the two ends of the entire articulated assembly (or consist) of units, and that the interior ends of the individual units of the articulated assembly need not be equipped with an end structure meeting the requirements in paragraph (a). Articulated assemblies have a history of remaining in line during derailments and collisions and, if not designed to be uncoupled, only the outside ends of the entire assembly should be exposed to the risks of override. (In this regard, FRA should have only proposed an exception for such equipment from the collision post requirements in paragraph (a) and not from the corner post requirements as well since collision posts—not corner posts—principally protect against override and telescoping of passenger equipment. Corner posts, by their very definition and location, protect against hazards along the railroad right-of-way in a way that collision posts cannot.) However, none of the relevant recent experience is on the North American continent, and the ability of articulated connections to remain intact during a high-speed collision with North American passenger equipment, freight rolling stock, or a fixed obstruction has not been demonstrated analytically. FRA noted the weakness in the proposed exception (§ 238.413(b) of the NPRM) while preparing the final rule. FRA has deleted proposed paragraph (b) in its entirety, and has not provided an exception due to the high operating speeds of Tier II passenger equipment.

Section 238.415 Rollover Strength

This section contains the requirements for the rollover strength of passenger cars and power cars. If the occupied volumes of these vehicles remain intact when they roll onto their side or roof structures, occupant injury from vehicle collapse will be avoided. This section essentially requires the vehicle structure to support twice the deadweight of the vehicle as it rests on its side or roof. Passenger equipment constructed to North American design practice performs well in rollover situations. FRA believes this requirement captures this industry practice.

FRA has revised paragraph (a) to make clear that its requirements apply to passenger cars. This revision is consistent with the section-by-section analysis of proposed § 238.415 in the NPRM, see 62 FR 49779, which explained that this section included rollover strength requirements for both power cars and trailer cars. (The term trailer car is in fact a more inclusive definition under the rule than the term passenger car.) FRA has also made clear in paragraph (a) that minor localized deformations to the outer side skin of the passenger car or power car are allowed provided such deformations in no way intrude upon the occupied volume of each car. As in the NPRM, paragraph (b) states that deformation to the roof sheathing and framing is allowed to the extent necessary for the vehicle to be supported directly on the top chords of the side frames and end frames.

As Bombardier suggested in its comments on the NPRM, FRA has also made a minor clarification to this section by substituting the words ''in the structural members of the'' in place of the word ''for'' in the phrase which originally read in the NPRM, ''the allowable stress for occupied volumes .* * *.'' *See* 62 FR 49816.

Section 238.417 Side Loads

This section contains the requirements intended to resist penetration of the side structure of a passenger car by a highway or rail vehicle. The objective is to make the side of the passenger car strong enough so that the car derails rather than collapses when struck in the side by a highway or rail vehicle. If the passenger car can move sideways (derail), less structural damage and potential to injure train occupants will result.

In its comments on the NPRM, Bombardier stated that for practical reasons and to be consistent with the Amtrak high-speed trainset design specifications, local yielding of the side sill should be allowed in calculating the allowable stress in paragraph (c). FRA agrees that 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 permissible. FRA has modified paragraph (c) accordingly, and notes that such local yielding is permissible provided the resulting deformations do not intrude upon the occupied volume of the passenger car.

Section 238.419 Truck-to-Car-Body and Truck Component Attachment

Paragraph (a) requires the truck-to-car-body attachment on Tier II passenger equipment to resist without failure a minimum vertical force equivalent to 2g acting on the mass of the truck and a minimum force of 250,000 pounds acting in any horizontal direction on the truck. The intent of the requirement to resist without failure the minimum vertical force equivalent to 2g acting on the mass of the truck is to prevent the truck from separating from the car body during a rollover. The intent of the requirement to resist without failure the minimum force of 250,000 pounds acting in any horizontal direction on the truck is to resist the forces that act upon the truck during a collision or derailment that would tend to shear the truck from the car body. If the truck separates from the car body it may become a hazardous projectile that will intrude upon the occupied volume of a passenger car or locomotive. Further, the truck will not be able to serve, in effect, as an anti-climbing device if it separates from the car body in a collision or derailment.

Paragraph (b) requires that each component of the truck must 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. Whereas paragraph (a) is intended to keep the truck attached to the car body, paragraph (b) is intended to keep truck components attached to the truck.

Bombardier, in its comments on the NPRM, requested that FRA modify paragraph (a) so that the truck-to-car-body attachment must resist the specified vertical and horizontal forces only as individual loads applied separately. However, FRA has retained the requirement that the truck-to-car-body attachment resist the specified vertical and horizontal forces as applied at the same time. Requiring the truck-to-car-body attachment to resist the vertical and horizontal forces applied at the same time reflects actual conditions experienced during a collision or derailment. For this reason, FRA believes it inappropriate to adopt Bombardier's comment.

Section 238.421 Glazing

This section contains the glazing requirements for Tier II passenger equipment. FRA believes that the higher speed of Tier II passenger equipment necessitates more stringent glazing standards than currently required by 49 CFR part 223. As a result, FRA proposed specific standards for end-facing exterior glazing, side-facing exterior glazing, and interior glazing (which is not addressed in part 223) on windows installed in Tier II passenger equipment. *See* 62 FR 49817. In response to the NPRM, however, FRA received a number of comments questioning the appropriateness of FRA's proposals, as well as the existing glazing standards in part 223. Having considered these comments, FRA has decided to focus the final rule principally on more stringent glazing requirements for end-facing exterior windows installed in Tier II passenger equipment. In the second phase of this rulemaking, FRA will reexamine the glazing requirements for all windows installed in Tier II passenger equipment. FRA notes that this final rule does not amend the requirements of 49 CFR part 223, although FRA had proposed to amend the application section of that part in the NPRM. *See* 62 FR 49791. Such an amendment is no longer appropriate in light of the requirements of this section (§ 238.421) in the final rule. The requirements of this section and the modifications from the proposed rule are discussed below in detail.

The requirements of paragraph (a) apply to all exterior windows on power car cabs and passenger cars. Windows on such equipment are required to meet the glazing standards contained in 49 CFR part 223, except as provided in paragraphs (b) and (c) of this section. Part 223 contains requirements for both end-facing and side-facing window glazing, and employs different testing methods than specified in this section. As recommended by Bombardier in its comments on the NPRM, instead of applying the glazing requirements in this section generally to power cars as proposed in the NPRM, FRA has decided to limit the application of the glazing requirements in this section to power car cabs. This modification is consistent with the glazing requirements in part 223, *see, e.g.*, 49 CFR § 223.9(a). Bombardier had noted that one of the side windows on the Amtrak high-speed power cars will lead to an equipment room, which FRA understands will not be occupied while the power car is in service.

Paragraph (a) relates to paragraph (b) in that paragraph (b) contains additional requirements for end-facing exterior window glazing on power car cabs and passenger cars. First, under paragraph (b)(1), end-facing exterior window glazing shall resist the impact of a 12-pound solid steel sphere traveling at the maximum speed of the vehicle in which the glazing will be installed. The test must be conducted so that the sphere strikes the window glazing at an angle of 90 degrees (perpendicular) to the window surface. To successfully pass the test, the window must neither spall nor be penetrated by the sphere. This test is similar to the requirements imposed under European glazing standards for high-speed trains, and should be much more repeatable than the cinder block test specified in 49 CFR part 223.

In the NPRM, FRA had proposed that end-facing exterior windows resist an impact with a 12-pound steel sphere at an angle equal to the angle between the window glazing surface as installed and the direction of travel of the train. *See* 62 FR 49817. In commenting on the NPRM, Automotive Glass Engineering (Automotive Glass) explained that impact angle depends upon variables such as the vector of the projectile, the vector of the train, and the angle at which the subject glazing is installed. Automotive Glass then observed that it would have no advance knowledge of the angle at which an object would strike the window glazing when installed in the train. Automotive Glass recommended that the rule require that tests be conducted at an angle perpendicular to the surface—noting this would constitute the most severe impact—unless the rule specifies the method for determining the angle of incidence. FRA has adopted the comment of Automotive Glass by revising the rule text to require that the window glazing resist the impact with the 12-pound steel sphere at an angle 90 degrees to the window surface. This should result in a requirement as strict or stricter than that proposed in the NPRM.

Under paragraph (b)(1), end-facing exterior window glazing shall demonstrate anti-spalling performance by the use of a 0.001 aluminum witness plate, placed 12 inches from the glazing surface during all impact tests. The witness plate must not contain any marks from spalled window glazing particles after any impact test. This requirement was originally proposed as § 238.421(a)(3)(ii) in the NPRM. When impacted on the exterior surface, window glazing currently used in railroad equipment tends to spall from the inside surface. Several eye injuries to crewmembers have resulted. FRA believes that the witness plates used in conducting the spalling tests to qualify current glazing are too thick and have allowed glazing that actually spalled to pass the test. The witness plate specified in this paragraph is much thinner and, therefore, more sensitive to detecting spall.

In commenting on the NPRM, Automotive Glass stated that the performance of a witness plate is critically dependent on the amount of tension in which it is held, and that a uniform tension procedure would enhance consistency. Automotive Glass therefore recommended that the test protocol specify the minimum tension of the foil in terms of some unit of measure, other than ''taut,'' which it considered an aspiration not a specification. FRA notes that in testing required under 49 CFR part 223, the witness plate must have a ''taut''surface. *See* 49 CFR part 223, Appendix A, b.(6). In the NPRM, proposed § 238.421(a)(3)(ii) is silent as to the tension of the witness plate. As ''taut'' has been the witness plate tension specification used in all safety glazing testing required by FRA, use of a ''taut'' witness plate is not inconsistent with the requirements of this section. FRA believes that this issue may be reexamined in the second phase of the rulemaking.

Automotive Glass also commented that total elimination of spalling will result in additional weight, additional cost, loss of durability, or some combination of these three. According to Automotive Glass, unessential weight above the center of gravity is detrimental because high-speed trains should have less inertia and a lower center of gravity. Automotive Glass believed FRA could sacrifice too much by averting the slight hazard created by the possibility of minor spalling in an extremely unlikely event. Under the final rule, of course, only end-facing exterior glazing on Tier II passenger equipment is subject to the particular requirements of this paragraph. Side-facing exterior glazing is subject to the requirements contained in 49 CFR part 223. As a result, only a relatively small number of the windows on a Tier II passenger train will be required to comply with the more stringent requirements specified in this paragraph. In this regard, FRA believes that the changes made to the final rule render these comments less significant.

Automotive Glass further commented that under the proposed rule no spalling of glass is allowed, and noted that under 49 CFR part 223 spalling is permitted unless it is severe enough to penetrate the prescribed foil witness plate. Additionally, Automotive Glass stated that constructing foil witness plates requires great care to avoid creating indentations in the foil, and that microscopic examination of the surface could be required to locate indentations to determine whether they were preexisting or produced by spall. To the extent no spalling is allowed, Automotive Glass suggested replacing the witness plate with a capture box that would capture glass fragments in the box. Automotive Glass believed that use of a capture box would result in a simpler and more reliable determination whether spalling occurred. In addition, if the rule would permit minor spalling, Automotive Glass recommended use of a thinner witness plate positioned closer to the glazing material to reduce the severity of allowable spalling and permit determination based on penetration instead of indentation.

FRA desires that no spalling occur, however, and recognizes that the specified requirement is stricter than that provided in part 223. Further, FRA believes that use of a capture box is not necessarily a superior method of testing for spalling, as the integrity of the test results depend in large part on the attentiveness of the operator examining the capture box for spalled glass. FRA notes that Automotive Glass also provided several other comments regarding the testing protocols specified in this section and 49 CFR part 223. To the extent that these comments address testing protocols in part 223, they concern issues affecting glazing tests for both freight and passenger equipment. Such issues need to be addressed in a broader regulatory forum than this final rule on passenger equipment safety. FRA does make clear, nevertheless, in response to a comment from Automotive Glass, that it is not proper to certify that a segment of window glazing meets the requirements of this section or part 223, or both, unless that window segment is composed of the same material and manufactured in the same manner as the window segment that underwent the testing required by this section or part 223, or both.

Paragraph (c) contains an alternative to the glazing standards specified in paragraphs (a) and (b). The alternative standards specified in paragraph (c) represent proposed '' §§ 238.421(a) and (b) in the NPRM. FRA has included this paragraph in the final rule in recognition that the safety glazing standards proposed in § 238.421 were developed in consultation with Amtrak for use on Amtrak's HTS, and FRA believed these standards would provide sufficient protection for the safety of the train occupants. However, the option to use the alternative standards in paragraph (c) only applies to exterior window glazing in passenger equipment ordered prior to May 12, 1999. Further, the option to comply with paragraph (c) is no longer available once the window needs to be replaced and the railroad has exhausted its inventory of glazed windows conforming to the requirements of paragraph (c) as held prior to May 12, 1999. In this manner, exterior window glazing complying with the requirements in this paragraph will be phased out over time.

Paragraph (d) is similar to § 238.221(b) in this final rule. FRA did not receive any specific comments on this section and, for clarity, FRA has restated the requirements proposed in §§ 238.421(c) and (d) in the NPRM, *see* 62 FR 49817, as § 238.421(d) in this final rule. The focus of paragraph (d) in the final rule is clearly on the ability of each exterior window to remain in place, however the window may be secured, and not have the window become a potential projectile itself. FRA notes that it is separately evaluating whether securement of window glazing in existing passenger equipment is sufficient to withstand pressure differences associated with passing high-speed trains.

Paragraph (e) is a stenciling requirement which FRA has revised in this final rule as proposed originally in § 238.421(f).

As noted, FRA has decided not to impose on all Tier II passenger equipment in this final rule the particular requirements for side-facing exterior window glazing on Tier II passenger equipment which FRA had proposed in the NPRM. Instead, Tier II power car cabs and passenger cars must comply with the existing side-facing exterior window glazing requirements specified in 49 CFR part 223, or comply with the alternative standards specified in paragraph (c), as appropriate. However, FRA has included the following comments received on the proposed side-facing exterior window glazing standards for purposes of advancing the discussion of these standards in the second phase of the rulemaking.

FRA had generally proposed requiring that side-facing exterior window glazing in Tier II passenger equipment resist the impact of a 12-pound solid steel sphere traveling at 15 mph and impacting at an angle of 90 degrees to the surface of the glazing, with no penetration or spall. *See* proposed § 238.421(a)(2)(i), 62 FR 49817. FRA intended this test to be more stringent than the large object impact test required for side-facing exterior glazing under 49 CFR part 223, and to demonstrate whether the side-facing glazing can protect occupants from a relatively heavy object thrown against the side of the train. In response to this proposal, GE Plastics (of the General Electrical Company) commented that, although the energy resulting from the proposed test would be greater than that required under part 223, the momentum produced would not be greater. Noting that tests have shown momentum to be as significant a factor as energy in the consequences of an impact, GE Plastics did not believe the proposed test could be considered more stringent than the current requirement in 49 CFR part 223. Instead of FRA's proposed test, GE Plastics recommended a test involving a steel sphere weighing 24 to 25 pounds travelling at 15 mph, so that energy and momentum would be greater than the current requirement.

FRA had also proposed generally requiring that side-facing exterior window glazing in all Tier II passenger equipment resist the impact of a granite ballast stone weighing a minimum of 0.5 pounds, traveling at 75 mph, at a 90-degree angle to the glazing surface, with no penetration or spall. *See* proposed § 238.421(a)(2)(ii). FRA intended this test to demonstrate whether the glazing could protect occupants against impact from a common stone found along the railroad thrown at a speed slightly faster than a human could throw such an object. In response, Automotive Glass commented that, because ballast stones are irregular geometrically and structurally, reproducible tests would not be possible unless the granite spheres used in the tests were machined and polished. Second, Automotive Glass stated that the proposed test would not impose a significantly higher kinetic energy load than that imposed by the test involving a 12-pound steel sphere impacting the glazing surface at 15 mph, and also it would not have greater spall generation potential than the proposed test involving a 9 mm bullet. Automotive Glass added that, if a higher kinetic energy test is desired, it would be more reasonable to increase the impact velocity of the proposed test involving the 12-pound steel sphere to at least 16 mph.

FRA has also decided to defer imposing a new requirement for ballistic testing of exterior window glazing on all power car cabs and passenger cars. In the NPRM, FRA proposed requiring that all exterior glazing resist the 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. See proposed § 238.421(a)(3)(i). FRA noted that this bullet is a much more common handgun round than the 22-caliber bullet specified in 49 CFR part 223. In response to the proposal, GE Plastics commented that it had seen no data indicating that people shoot at trains more frequently with 9 mm bullets, although it agreed that a 9 mm bullet is a more common handgun round than a .22 caliber bullet. Further, GE Plastics questioned why a 147 grain bullet was specified, noted that a bullet's shape and composition affect its penetrating ability, and believed that more detail is needed to determine which bullet is appropriate. Moreover, GE Plastics expressed concern about the wording of the proposed test in that it believed a bullet will rarely be travelling exactly at 900 feet per second during testing. GE Plastics recommended specifying a minimum and a maximum velocity, instead, as well as examining the wording of existing ballistic test standards.

In commenting on the proposal, Automotive Glass noted its belief that the .22 caliber projectile specified in 49 CFR part 223 represents the threat of accidental injury from young people hunting or ''plinking'' along a railroad right-of-way, while the proposed 9 mm projectile represents the threat of injury intentionally inflicted by vandals or terrorists. Automotive Glass believed that if FRA were to adopt a policy of requiring any level of protection against intentionally inflicted injury, it would seem to constitute a departure from previous policy. If FRA were to adopt this approach, then Automotive Glass recommended that the proposed test protocol require each subject glazing specimen to withstand three 9 mm bullets within a circle eight inches in diameter, as vandals or terrorists are more likely to fire short bursts. Further, Automotive Glass observed that any level of ballistic resistance required of glazing which exceeds that provided by the body panel construction below the glazing would contribute only to a false sense of security. In the end, Automotive Glass suggested that individual railroads be given the discretion whether to utilize glazing with greater ballistic resistance based on the threat and severity of vandalism or terrorism each faces. Again, FRA has decided to defer until the second phase of the rulemaking consideration of imposing a new requirement for ballistic testing on all exterior window glazing used on power car cabs and passenger cars. Of course, a railroad may avail itself of the alternative requirements specified in paragraph (c) at its option, to the extent paragraph (c) is applicable.

The final rule does not contain a standard covering interior window glazing, as FRA has decided to defer consideration of imposing such a standard until the second phase of this rulemaking. In the NPRM, FRA had proposed requiring that interior glazing meet the minimum requirements of AS1 type laminated glass as defined in American National Standard ''Safety Code for Glazing Materials for Glazing Motor Vehicles Operating on Land Highways,'' ASA Standard Z26.1–1966. *See* 62 FR 49817. (Bombardier commented that it believed the latest revision to this standard occurred in 1990 rather than 1966.) FRA intended that the proposed requirement would alleviate the need for interior window glazing to meet the stringent impact resistance requirements placed on exterior glazing, while ensuring that the glazing will shatter in a safe manner like automotive glazing. In response to this proposal, GE Plastics commented that requiring the glass to meet the AS1 requirements would exclude recognized safety glazing materials for reasons unrelated to the glazing's ability to break safely, such as light transmission, light distortion, and abrasion resistance. GE plastics further commented that specifying a requirement for laminated glass would exclude many established safety glazing materials. GE Plastics recommended that, if safety glazing is desired, FRA incorporate instead the 1984 version of the ANSI Z97.1 safety glazing standard for use in buildings, which defines safety glazing as ''Glazing materials so constructed, treated, or combined with other materials that, if broken by human contact, the likelihood of cutting and piercing injuries that might result from such contact is minimized.''

AtoHaas Americas, Inc., (AtoHaas) similarly commented that the AS1 standard incorporated in FRA's interior glazing proposal is an external glazing standard that contains requirements which may not be needed for internal glazing, such as light stability, luminous transmittance, and abrasion resistance. Likewise, AtoHaas commented that specifying a requirement for laminated glass would exclude other materials able to meet the safety needs here for internal glazing. AtoHaas noted that there are many types of glazing that would shatter or break in a safe manner, and urged FRA to examine the American National Standard for Safety Glazing Used in Buildings for products meeting FRA's safety needs. FRA will consider these recommendations with the Working Group in the second phase of the rulemaking, and presents them here to advance discussion on potential requirements for interior window glazing in Tier II passenger equipment.

Section 238.423 Fuel Tanks

This section contains the requirements for fuel tanks for fossil-fueled Tier II passenger equipment. This section should be read with the discussion of locomotive fuel tanks in the preamble. This section contains separate requirements for external fuel tanks, which extend outside the car body structure, and for internal tanks, which do not extend outside the car body.

In commenting on the proposed rule, Bombardier recommended that the same requirements proposed for Tier I fuel tanks apply to Tier II equipment as well. Bombardier stated that early consensus was reached to do so in the Tier II working group during development of the NPRM. Bombardier maintained that this consensus was based on the fact that there are no fuel tanks on the electric trainsets being built for the NEC; the maximum speed for a fossil-fueled version of the trainsets would be 125 mph; and no data exists to support the need for different fuel tank requirements for Tier I and Tier II equipment. Further, Bombardier stated that the requirements for Tier I fuel tanks incorporate the most current industry practices for diesel electric locomotive fuel tanks.

In response to Bombardier's comment, FRA believes that different fuel tank requirements for Tier I and Tier II equipment may be appropriate based on the different maximum speeds at which the equipment can travel. However, FRA recognizes that the specific differences between the proposed Tier I and Tier II fuel tank requirements have not been tightly justified. Accordingly, the final rule requires compliance with Tier I requirements for internal fuel tanks, and includes a requirement for

FRA review and approval of any Tier II external fuel tank for safety equivalence with Tier I performance.

As Bombardier pointed out in its comments, the NPRM did contain a technical mistake in proposed § 238.223(b)(2), which had as its Tier II counterpart proposed § 238.423(b)(3). Accordingly, these paragraphs have been corrected in the final rule to reflect that the 25,000-lb yield strength described in the proposals is in fact a 25,000-lb per-square-inch yield strength.

Section 238.425 Electrical System.

FRA did not receive any specific comments on this section, and it is adopted as proposed. This section contains the requirements for the electrical system design of Tier II passenger equipment. These requirements reflect common electrical safety practice and are widely recognized as good electrical design practice. They include provisions for:

• Circuit protection against surges, overload and ground faults;

• Electrical conductor sizes and properties to provide a margin of safety for the intended application;

• Battery system design to prevent the risk of overcharging or accumulation of dangerous gases that can cause an explosion;

• Design of resistor grids that dissipate energy produced by dynamic braking with sufficient electrical isolation and ventilation to minimize the risk of fires; and

• Electromagnetic compatibility within the intended operating environment to prevent electromagnetic interference with safety-critical equipment systems and to prevent interference of the rolling stock with other systems along the right-of-way.

Section 238.427 Suspension System

In response to comments on the 1997 NPRM and for purposes of clarification, FRA has revised the requirements of this section. Changes from the NPRM are noted below in the general discussion of this section.

As explained in the NPRM, safety requirements concerning the wheel-rail interface have traditionally been addressed as part of the track safety standards. In parallel with the Tier II Equipment Subgroup's effort to develop high-speed equipment safety standards, the RSAC Track Working Group developed a final rule on track safety standards which includes high-speed track standards. *See* 63 FR 33992, June 22, 1998. In October 1996, FRA sponsored a joint meeting of the Tier II Equipment Subgroup and members of the Track Working Group focusing on the development of high-speed track standards to ensure that the two sets of standards not conflict at the wheel-rail interface, where they overlap. FRA did receive a comment on the passenger equipment NPRM that the two sets of standards do in fact conflict, and this comment is addressed in particular in the discussion of Appendix C to this part (Suspension System Safety Performance Standards).

To ensure safe, stable performance and ride quality, paragraph (a) requires suspension systems to be designed to reasonably prevent wheel climb, wheel unloading, rail rollover, rail shift, and a vehicle from overturning. These requirements must be met in all operating environments, and under all track and loading conditions as determined by the operating railroad. In addition, these requirements must be met under all track speeds and track conditions consistent with the Track Safety Standards (49 CFR part 213), up to the maximum operating speed and maximum cant deficiency of the equipment. These broad suspension system performance requirements address the operation of equipment at both high speed over well maintained track and at low speed over lower classes of track. Suspension system performance requirements are needed at both high and low speeds as exemplified by incidents where stiff, high-speed suspension systems caused passenger equipment to derail while negotiating curves in yards at low speeds.

Compliance with paragraph (a) must be demonstrated during pre-revenue service acceptance testing of the equipment and by complying with the safety performance standards for suspension systems contained in Appendix C to this part. Because better ways to demonstrate suspension system safety performance may be developed in the future, the rule allows the use of alternative standards to those contained in Appendix C if they provide at least equivalent safety and are approved by the FRA Associate Administrator for Safety under the provisions of § 238.21.

Paragraph (b) requires the steady-state lateral acceleration of passenger cars to be less than 0.1g, as measured parallel to the car floor inside the passenger compartment, under all operating conditions.

Paragraph (c) requires each truck to be equipped with a permanently installed lateral accelerometer mounted on the truck frame. If hunting oscillations are detected, the train must be slowed. FRA has revised this section to specify that 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. In its comments on the rule, Talgo had recommended that the permissible limits of hunting oscillations be specified in the rule text and not in the definitions section, § 238.5, as proposed in the NPRM. See definition of *hunting oscillations* in proposed § 238.5, 62 FR 49793. FRA has adopted Talgo's suggestion for clarity. However, FRA has not adopted Talgo's alternative specification. Talgo commented that, using the formulation in the NPRM in defining hunting oscillations for Tier II passenger equipment, lateral oscillations should apply on a peak basis, rather than on a peak-to-peak basis. Talgo explained that oscillations would be considered dangerous if the amplitude of six consecutive peaks exceeded 0.8g. Talgo added that this approach is followed in Europe, citing UIC–515, and believed it more reasonable than the proposed formulation. FRA has revised the definition of hunting oscillations to make it consistent with the definition of truck hunting in 49 CFR § 213.333, Note 4 to the table of Vehicle/Track Interaction Safety Limits. FRA determined that the approach using the root mean square (mean-removed) was the preferred indicator of the forces associated with truck hunting, and takes into consideration the oscillatory nature of truck hunting. FRA believes this definition of truck hunting removes the uncertainty in counting the number of sustained oscillations.

FRA has further revised the rule to specify that the accelerometer measurements shall be processed through a filter having a band pass of 0.5 to 10 Hz. Talgo also commented the rule should state that in measuring the amplitude of lateral oscillations, the signal should be filtered with a band pass of 4 to 8 Hz so that irrelevant signals are excluded. FRA has adopted Talgo's recommendation in general, yet has specified a pass band consistent with the track safety standards. *See* 49 CFR § 213.333, Note 3 to table of Vehicle/Track Interaction Safety Limits.

Paragraph (d) provides ride vibration (quality) limits for vertical accelerations, lateral accelerations, and the combination of lateral and vertical accelerations. These limits must be met while the equipment is traveling at the maximum operating speed over its intended route. In commenting on the NPRM, Bombardier noted that the values proposed in this paragraph were not fully consistent with the values found in the then-proposed track safety standards, and requested that they be made consistent. FRA has revised the requirements of this paragraph accordingly. For clarity, as used in paragraph (d)(1)(iii), the formula ($a_L^2+a_V^2$) can be restated as the sum of the square of both accelerations.

FRA has combined paragraph (e) of proposed § 238.427 into paragraph (d) of the final rule as paragraph (d)(2). This provision requires that compliance with the requirements of this paragraph be demonstrated during the equipment's pre-revenue service qualification tests required under § 238.111 and § 213.345 of the federal track safety standards. One of the most important objectives of pre-revenue service qualification testing is to demonstrate that suspension system performance requirements have been met. FRA makes clear that the requirements of paragraph (d)(2) need only be shown during pre-revenue service qualification testing of the equipment.

FRA has added paragraph (d)(3) to make clear that, for purposes of paragraph (d), acceleration measurements shall be processed through a filter having a band pass of 0.5 to 10 Hz. In its comments on the NPRM, Talgo observed that the signal filter to use in performing the limit calculations had not been specified in this paragraph, and suggested using a band pass filter of 0.4 to 10 Hz. FRA has effectively adopted Talgo's comment.

Paragraph (e) requires wheelset journal bearing overheat sensors to be provided either on board the equipment or at reasonable intervals along the railroad's right-of-way. FRA prefers sensors to be on board the equipment to eliminate the risk of a hotbox that develops between wayside locations. However, FRA does recognize that onboard sensors have a history of falsely detecting overheat conditions, causing significant operating difficulties for some passenger railroads.

FRA has clarified paragraph (e) based on a comment from Bombardier that this provision should apply to each wheelset journal bearing, and not to each equipment bearing as stated in § 238.427(f), *see* 62 FR 49818. This is in accord with FRA's original intent.

Section 238.429 Safety Appliances

This section contains the requirements for safety appliances for Tier II passenger equipment. FRA has attempted to simplify and clarify how the Safety Appliance Standards contained in 49 CFR part 231 and 49 U.S.C. 20302(a) will be applied to Tier II passenger equipment. The requirements contained in this section are basically a restatement of existing requirements but tailored specifically for application to this new and somewhat unconventional equipment. They represent the consensus recommendation of the Tier II Equipment Subgroup.

This final rule has retained all of the requirements proposed in the 1997 NPRM. The only modification to the safety appliance requirements is in response to one commenter's recommendation that the requirements related to sill steps be made more consistent with existing regulations. As a result, the requirement contained in paragraph (e)(7), regarding the maximum height of the lowest sill step tread, has been changed to be consistent with existing regulations and practice.

This same commenter also recommended that a specific grade of steel be designated in the requirements for the steel or other materials used for handrails, handholds, and sill steps, and that the grade of SAE (Society of Automotive Engineers) bolt to be used as mechanical fasteners be specified as well. FRA believes that steel or other materials used for handrails, handholds, and sill steps should at least be equivalent to specification ASTM A–576, Grade 1015–1020 steel. However, to the extent this need be specified as a requirement, FRA believes it would be more appropriate to consider doing so for safety appliances on all passenger equipment—not just Tier II passenger equipment. FRA had not made such a proposal in the NPRM; and this issue may be reexamined in Phase II of the rulemaking. As for the strength of mechanical fasteners, the final rule states that mechanical fasteners must have a mechanical strength at least equivalent to that of a ½ inch diameter SAE grade steel bolt, as FRA had proposed in the NPRM. FRA believes that any SAE grade of steel bolt will satisfy this requirement, and, as a result, FRA has not modified the final rule in this regard.

Paragraph (b) deserves special mention; it requires that Tier II passenger trains be provided with a parking or hand brake that can be set and released manually and can hold the equipment on a 3-percent grade. A hand brake is an important safety feature that prevents the rolling or runaway of parked equipment.

Section 238.431 Brake System

This section contains the brake system design and performance requirements for Tier II passenger equipment, and, except for one provision, represents the consensus recommendation of the Tier II Equipment Subgroup. The provisions contained in this section are virtually identical to the requirements proposed in the 1997 NPRM. Except for one commenter's recommendation that leeway be provided on the number of locations in a vehicle that must be equipped with a means to effectuate an emergency brake application on shorter equipment, no substantive adverse comments were received on the provisions contained in this section and, thus, they have been retained without change.

As noted in the 1997 NPRM, the main issue of concern among Subgroup members involved the capability of sensor technology used to monitor the application and release of brakes. Labor representatives maintained that a technology that actually measures the force of brake shoes and pads against wheels and brake discs is required for a reliable indication of brake application and release. Railroad operators contended that this technology is not commercially available and that monitoring pressure in brake cylinders does provide a reliable indication of brake application and release, particularly when those cylinders are directly adjacent to the point where brake friction surfaces are forced together. FRA agrees that the technology suggested by certain labor commenters is not currently available and that brake system piston travel or piston cylinder pressure indicators have been used with satisfactory results for many years. Although FRA agrees that these indicators do not provide 100 percent certainty that the brakes are effective, they have proven effective enough to be preferable to requiring an inspector to assume a dangerous position while inspecting a train's brake system.

Aside from this issue, the rest of the brake system design and performance requirements contained in this section received widespread support. In fact, several of the requirements were contained in written positions provided by both rail labor and management members of the Subgroup, and virtually all of the requirements were discussed in the high-speed passenger equipment section of the 1994 NPRM on power brakes. *See* 59 FR 47693–94, 47699–47700, and 47730. Many of the requirements in this section are similar to the requirements for Tier I passenger equipment contained in § 238.231, thus the discussion related to that section should be read in conjunction with the following discussion.

Paragraph (a) of this section is virtually identical to the requirement related to the braking systems of Tier I passenger equipment in § 238.231(a).

Paragraph (b) contains a requirement similar to that in § 238.231(b) and is intended to protect railroad employees. FRA believes that inspectors of equipment must be able to ascertain if brakes are applied or released without placing themselves in a vulnerable position. This final rule allows railroads the flexibility of using a reliable indicator in place of requiring direct observation of the brake application or piston travel because the designs of many of the brake systems used on passenger equipment make direct observation of the brakes extremely difficult. Brake system piston travel or piston cylinder pressure indicators have been used with satisfactory results for many years. Although indicators do not provide 100 percent certainty that the brakes are effective, they have proven effective enough to be preferable to requiring an inspector to assume a dangerous position.

Paragraph (c) is virtually identical to the requirement contained in § 238.231(c), and is a fundamental brake system performance requirement that an emergency brake application feature be available at any time and produce an irretrievable stop. This paragraph contains an additional requirement that a means to actuate the emergency brake be provided at two locations in each unit of the train. This additional requirement ensures the availability of the emergency brake feature and is in accordance with the current available design of high-speed passenger equipment. FRA received comments from Renfe Talgo recommending that FRA change this requirement to permit shorter equipment to provide only one location in each unit of a train with a means to actuate the emergency brake. This commenter recommends such leeway due to the fewer number of passengers in these units and due to the distance any one passenger would be to the actuation device when compared to the distance in standard length passenger train units. FRA has modified this paragraph to provide that equipment that is 45 feet or less in length (approximately one-half the length of standard passenger equipment) need provide a means to actuate the emergency brake at only one location in each such unit of the train.

Paragraph (d) requires the brake system to be designed to prevent thermal damage to wheels and brake discs.

Paragraph (e) contains requirements related to blended braking systems. These requirements are similar to those contained in § 238.231(j). The only additional requirement is that the operational status of the electric portion of the blended brake be displayed in the operator's cab. Operators of this high-speed equipment may use different train handling procedures when the electric portion of blended brake is not available. Therefore, a dangerous situation could arise when an operator of these high-speed trainsets expects the electric portion of the blended brake to be available and it is not. FRA believes that when operations exceed 125 mph either the train must not be used if the electric portion of the blended brake is not available, or the train operator must know that the electric portion of the blended brake is not available so he or she can be prepared to use compensating train handling procedures. Further, FRA believes that if the additional heat input to wheels or discs caused by lack of the electric portion of the blended brake causes thermal damage to these braking surfaces, then the electric portion of the blended brake should be considered a required safety feature and, unless it is available, the equipment should not be used.

Paragraph (f) requires the brake system to allow a disabled train's pneumatic brakes to be controlled by a conventional locomotive during rescue operations.

Paragraph (g) requires that Tier II passenger trains be equipped with an independent brake failure detection system that compares brake commands to brake system outputs to determine if a failure has occurred. This paragraph also requires that the brake failure detection system report failures to the automated monitoring system, which is contained in § 238.445, thus alerting the train operator to potential brake system degradation so that the operator can take corrective action such as slowing the train.

Paragraph (h) requires that all Tier II passenger equipment be provided with an adhesion control system designed to automatically adjust the braking force on each wheel to prevent sliding during braking. This paragraph also requires that the train operator be alerted in the event of a failure of this system with a wheel slide alarm that is visual or audible, or both. This feature ties the adhesion control system to the automated monitoring system and prevents dangerous wheel slide flat conditions that can be caused when wheels lock during braking.

Section 238.433 Draft System

FRA is requiring that leading and trailing automatic couplers of Tier II trains be compatible with standard AAR couplers with no special adapters used. FRA believes that compatibility with standard couplers is necessary in order that a conventional locomotive could assist in the rescue of disabled Tier II passenger equipment. In addition, couplers must include an automatic coupling feature as well as an uncoupling device that complies with 49 U.S.C. chapter 203, 49 CFR part 231, and 49 CFR § 232.2. FRA believes that automatic uncoupling devices are necessary in order to comply with the intent of the statute so that employees will not have to place themselves between equipment in order to perform coupling or uncoupling operations.

Section 238.435 Interior Fittings and Surfaces

This section contains the requirements for interior fittings and surfaces. Once survivable space is ensured by basic vehicle structural strength and crash energy management requirements, the design of interior features becomes an important factor in preventing or mitigating injuries resulting from collisions or derailments. Loose seats, equipment, and luggage are a significant cause of injuries in passenger train collisions and derailments.

Paragraphs (a) through (c) contain requirements for the design of passenger car seats and the strength of their attachment to the car body. These requirements are based on sled tests of passenger coach seats, seat tests conducted for other modes of transportation, and computer modeling to predict the results of passenger train collisions. These provisions include a requirement for shock absorbent material on the backs of seats to cushion the impacts of passengers with the seats ahead of them.

FRA has modified paragraph (a) based on comments received in response to the NPRM. In the NPRM, FRA proposed requiring a seat back in a passenger car to be designed to withstand, with deflection but without total failure, the load of a seat occupant who is a 95th-percentile male accelerated at 8g who impacts the seat back. *See* 62 FR 49819. Simula, in commenting on the NPRM, suggested that the seat back in a passenger car should be designed to withstand, with deflection but without total failure, the impact of unrestrained occupant(s) seated behind the test article (seat back) and subjected to the same crash pulse. Further, in its comments on the NPRM, Bombardier noted that the design of the seats in Amtrak's HTS is based on a 185-pound occupant according to Amtrak's specification, while paragraph (a) specified the occupant size as a 95th-percentile male.

In the final rule, paragraph (a) requires that the design of the seat back and seat attachment 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, 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. (As used in this section, a 95th-percentile adult male has been defined in § 238.5.) This modification clarifies the intent of the proposal, and specifies a crash pulse. As noted by Simula, specifying a crash pulse recognizes the importance of testing seats dynamically to represent actual conditions in a train collision. Paragraph (a) has also been modified to incorporate paragraph (c)(1) of the proposed rule by stating that the seat attachment must also resist the specified load as well, and this is discussed below.

In response to Bombardier's comment on the size of the occupant seated behind the seat being tested for purposes of determining the required strength of the seat, FRA notes that the specification for Amtrak's HTS does provide for use of a smaller occupant than is specified in the rule. However, the Amtrak specification also provides that the occupant be subjected to a more severe crash pulse than that specified in the rule. As a result, FRA believes that under paragraph (a) the energy required to be absorbed by the seat being tested is not greater than that provided for in the Amtrak specification, and FRA has not modified the rule on this point.

As noted above, FRA has modified paragraph (c) in the final rule by incorporating proposed paragraph (c)(1) into paragraph (a) of the final rule and retaining, as renumbered in paragraph (c) of the final rule, proposed paragraphs (c)(2) and (c)(3) in the NPRM. See 62 FR 49819. FRA has incorporated proposed paragraph (c)(1) into paragraph (a) of the final rule based in part on a comment from Simula that the ultimate strength of a seat attachment to a passenger car body shall be sufficient to withstand a crash pulse representing a typical train accident (275 msec triangular pulse, peak acceleration 10 G) and the impact of an unrestrained occupant(s) behind the test article. Incorporating the longitudinal strength requirement proposed for the seat attachment in paragraph (c)(1) of the NPRM into paragraph (a) of the final rule rationalizes the rule and recognizes that the seat attachment requirement and the seat back requirement both take into account the force of a train occupant impacting the seat from behind. However, FRA has not adopted Simula's recommendation to increase the g loading that the seat attachment is required to withstand or specify a crash pulse as long as 275 milliseconds, triangular. Simula's recommendation appears to be based on the assumption that higher speed train collisions will result in greater decelerations of longer duration in a trailer car. Yet, FRA believes that the resulting decelerations will have only a longer duration. As the duration for which an occupant impacts an interior surface has a negligible influence on potential injury, the 8g force and 250 msec crash pulse specified in this paragraph is appropriate for Tier II passenger equipment.

The lateral and vertical loading requirements in paragraph (c) remain unchanged from the NPRM other than being renumbered.

FRA has not incorporated two other comments from Simula on this section for the reasons noted below. First, Simula suggested adding a requirement that two rows of seats should be included in the seat testing and positioned to represent the row-to-row pitch for installation. FRA has not modified the rule in this regard, because FRA believes it evident that in testing seats to show compliance with the requirements of this section the positioning of the seats must represent the actual positioning of the seats in the passenger car subject to the requirements of this section. In addition, Simula recommended that instrumented Hybrid III dummies be seated in the row behind the test article to determine occupant injury potential during a dynamic test, and that the data measured by the dummies meet specified injury criteria available in a pending APTA standard. Simula further recommended that the number and size of unrestrained occupants (crash test dummies) to be used in testing be defined in the APTA standard. Simula noted that the results of ongoing research will be used to complete the standard, and that to meet injury performance criteria the railroad may have to use some form of occupant restraint system. As evidenced by Simula's comments, specifying occupant injury criteria is an ongoing issue and, as such, is best deferred to the second phase of this rulemaking. FRA does recognize that pursuing the specification of occupant injury criteria is both sound and technically appropriate, and encourages research in this regard for use in the second phase of the rulemaking, in addition to examining the use of NHTSA occupant injury criteria.

Paragraph (d) contains the requirements for strength of attachment of interior fittings and is similar to that required in § 238.233(c). Similar to its comment noted above, Bombardier remarked that proposed paragraph (d) specified a 95th-percentile male for use in determining the required strength of certain interior fittings. *See* 62 FR 49819–20. Bombardier explained that the design of tables for Amtrak's HTS does not follow this approach, and that, based on research conducted within the rail industry, it relates to impact velocities of a 185-pound occupant. Bombardier was unsure how the proposed rule compared to the way tables were being designed and constructed for Amtrak's HTS, and requested that the practicality of the proposed approach be first considered. As FRA responded above to Bombardier's similar comment, FRA believes that specifying a larger occupant size will not in itself increase the strength that the fitting is required to withstand since the Amtrak specification provides that the 185-pound occupant must resist a more severe crash pulse than that provided in the rule. FRA believes the requirement in paragraph (d) is not greater than that required under the Amtrak specification for HTS.

Paragraph (e) contains a special requirement for the ultimate strength of seats and other fittings in the cab of a power car. Due to the extra strength of the cab, its structure is capable of resisting forces caused by accelerations that exceed 10g. As a result, benefit can be gained from a greater longitudinal strength requirement for seat and other interior fitting attachments. FRA is therefore requiring that seats and equipment in the cab be attached to the car body with sufficient strength to resist longitudinal forces caused by an acceleration of 12g. The lateral and vertical requirements remain 4g. These requirements do not apply to equipment located outside the cab.

In its comments on the NPRM, Simula also recommended that the 12g longitudinal requirement be supplemented by a 250-millisecond dynamic crash pulse. However, FRA believes that this will result in a more expensive test without a corresponding increase in safety. Simula further suggested that the 4g lateral and vertical loading requirements apply to the combined mass of the seat and the seat occupant. FRA notes that such a requirement is provided in § 238.447(f)(2).

Paragraphs (f) and (g) contain requirements representing good safety design practice for any type of vehicle.

FRA believes the luggage restraint requirement in paragraph (h) will prevent many of the injuries caused by flying luggage that are typical of passenger train collisions and derailments.

FRA has included paragraph (i) in the final rule, consistent with its parallel requirement in § 238.233(g) for Tier I passenger equipment.

Section 238.437 Emergency Communication

This section requires an emergency communication system with back-up power within a Tier II train. This safety feature will allow the train crew to provide evacuation and other instructions to passengers, and help prevent panic that can occur during emergency situations.

FRA's principal revision to this section allows passenger cars 45 feet or less in length to have only one emergency communication transmission location. FRA had proposed that transmission locations be placed at both ends of each passenger car. In response to the proposal, Talgo commented that in considering the placement of transmission locations, the operative factor should be the distance from any point on the train to the nearest transmission unit—rather than specifying that they be placed at the ends of each passenger car. Talgo believed this necessary to accommodate cars which are half the length in size of conventional cars.

As the length of a conventional railroad passenger car is typically between 85 and 90 feet, FRA believes it appropriate to require a car not more than half that length to have only one emergency communication transmission unit. However, FRA is not prepared to specify a requirement to place such transmission units solely on the distance from any point on the train to the nearest transmission unit. By taking into account the location of transmission units on a train level, the nearest transmission unit to a passenger seated in one car may in fact be a transmission unit located in an adjoining car. However, having to pass into an adjoining car to access the transmission unit, although nearer linearly, may at a minimum be impracticable in certain situations. FRA believes that each Tier II passenger car, no matter its size, must have its own emergency communication transmission unit.

This section also requires that emergency communication transmission locations be marked with luminescent material, that clear instructions be provided for the use of the emergency communication system, and that the emergency communication system have back-up power for a minimum period of 90 minutes.

In commenting on the rule, the NTSB noted that FRA had not proposed emergency communication requirements for Tier I operations. The NTSB believed that emergency communication requirements are necessary for Tier I operations because the majority of passenger train accidents have occurred in those operations. The NTSB also stated that emergency communication requirements should not be limited to intra-train operations, but include as well the ability to communicate from the train to outside sources. In a similar comment on the NPRM, the UTU stated that passenger trains should not be dispatched without working head end radios and a reliable backup system. The UTU also commented that all conductors and crewmembers should be issued portable radios capable of communicating with each other, the head end, and the dispatcher or control center.

FRA is not applying the Tier II requirements for intra-train emergency communication to Tier I operations at this time. FRA agrees with the NTSB's comment that emergency communication requirements should not be a function of speed, but rather a function of the design and configuration of the train and the terrain in which the train operates. Yet, FRA's decision here is not based on speed. FRA initially proposed to limit this proposal to Tier II passenger trains because such trains are intended to operate as a fixed unit, unlike most Tier I passenger trains. Whereas an emergency system to communicate throughout the train may be more easily provided for in a train which remains as a fixed unit, the interchangeability of passenger cars and locomotives raises practical considerations about the compatibility of communications equipment in a Tier I passenger train. FRA believes it best to address these considerations and further examine requirements concerning emergency communication within a Tier I train in the second phase of the rulemaking, following consideration of these issues by the APTA PRESS Task Force.

As to requirements for emergency communication from a train to an outside source, FRA has addressed such requirements in the Railroad Communications final rule, designated as Docket No. RSOR–12. *See* 63 FR 47182; Sept. 4, 1998. FRA recognizes that the ability to communicate in an emergency is important for all trains—freight and passenger. In particular, because passenger trains operate commingled with freight trains, the ability of a freight train crew to notify a railroad control center of an emergency involving its train may prevent a collision with an oncoming passenger train. The railroad communications rulemaking was supported by a working group, established through RSAC, which specifically addressed communication facilities and procedures, with a strong emphasis on passenger train emergency requirements. In general, section 220.209 of the Railroad Communications final rule provides that, for each railroad having no fewer than 400,000 employee work hours, each occupied controlling locomotive in a train shall have a working radio that can communicate with the control center of the railroad, and each train shall also have communications redundancy, i.e., a working radio on another locomotive in the consist or other means of working wireless communication. *See* 49 CFR § 220.9; 63 FR 47195–6. Moreover, in addition to the requirements of the Railroad Communications rule, FRA notes that intercity passenger and commuter railroads already make extensive provision for ensuring communication capabilities during emergencies. FRA believes that other communications issues have been resolved either in the railroad communications rulemaking, the passenger train emergency preparedness rulemaking, or this final rule. However, any final issues can be addressed in the second phase of this rulemaking.

Section 238.439 Doors

This section contains the requirements for doors on Tier II passenger cars. This section should be read with the discussion of passenger car doors earlier in the preamble. As stated, FRA has modified the requirement for the number of exterior side doors per passenger car (contained in paragraph (a)) by specifying that each car shall have a minimum of two such doors.

The requirements in paragraph (b) are similar to those contained in § 238.235(b) for Tier I passenger equipment. However, the requirements of paragraph (c) have no counterpart in § 238.235. This paragraph requires the status of powered, exterior side doors to be displayed to the crew in the operating cab and, if door interlocks are used, the sensors to detect train motion must nominally be set to operate at not more than 3 mph. Such equipment is well within current technology. Paragraph (d) requires that powered, exterior side doors be connected to an emergency back-up power system.

Paragraph (e) is identical to that provided for Tier I passenger equipment in § 238.235(c).

Paragraph (f) requires passenger compartment end doors to be equipped with a kick-out panel, pop-out window, or other means of egress in the event the doors will not open, or be so designed as to pose a negligible probability of becoming inoperable in the event of carbody distortion following a collision or derailment. This paragraph does not apply to such doors providing access to the exterior of a trainset, however, as in the case of an end door in the last car of a train. In the NPRM, FRA discussed that the requirements in this paragraph originally arose out of the NTSB's emergency safety recommendations following its investigation of the February 16, 1996, collision between a MARC commuter train and an Amtrak passenger train in Silver Spring, Maryland. *See* 62 FR 49734–5. Specifically, as stated in its final railroad accident report, the NTSB recommended that FRA:

> Require all passenger cars to have either removable windows, kick panels, or other suitable means for emergency exiting through the interior and exterior passageway doors where the door could impede passengers exiting in an emergency and take appropriate emergency measures to ensure corrective action until these measures are incorporated into minimum passenger car safety standards. (NTSB/RAR–97/02) (R–97–15)

As explained in the NPRM, FRA proposed that the first practical application of the NTSB's recommendation be made with respect to Tier II passenger car end doors. *See* 62 FR 49735. FRA has been assisting APTA through its PRESS task force examine the full range of options for implementing the NTSB recommendation in Tier I passenger equipment, in addition to the Volpe Center's work on emergency egress on a systems level. These complementary efforts will be brought together in the second phase of the rulemaking.

FRA notes that it has modified paragraph (f) from the proposal in the NPRM, *see* 62 FR 49820 (proposed § 238.441(d)), to permit Tier II passenger car doors to be designed without a kick-out panel, pop-out window, or like feature, provided that the doors pose a negligible probability of becoming inoperable in the event of carbody distortion following a collision or derailment. FRA believes this modification is consistent with the NTSB's safety recommendation (R–97–15).

Paragraph (g) is reserved for door marking and operating instruction requirements. These requirements are currently provided in the rule on passenger train emergency preparedness at 49 CFR § 239.107. See 63 FR 24630, 24680. In phase II of the rulemaking, FRA will consider integrating the door marking and operating instruction requirements found in part 239 with this part. Additionally, FRA will consider revising those requirements as necessary.

Section 238.441 Emergency Roof Entrance Location

This section requires that Tier II passenger equipment either have a roof hatch or a clearly marked structural weak point in the roof to provide quick access for properly equipped emergency personnel. Such features will aid in removing passengers and crewmembers from a vehicle that is either on its side or upright.

In the NPRM, FRA proposed that each Tier II passenger car be equipped with a minimum of two such emergency roof entrance locations. *See* 62 FR 49820. Talgo, in its comments on this proposal, remarked that a passenger car half the length of a conventional passenger car should require only one roof hatch or structural weak point. Further, Bombardier commented that the high-speed trainsets it is constructing for Amtrak will have only one structural weak point located in the center of the passenger cars due to the location of roof-mounted air conditioning units at each end of the cars.

In the final rule, each Tier II passenger car and each cab of a power car is required to have at least one emergency roof entrance location to permit the evacuation of the vehicle's occupants through the roof. Beyond the issue of the sufficiency of the number of emergency roof entrance locations for Tier II passenger equipment is the larger issue of applying requirements for emergency roof entrance locations to Tier I passenger equipment. The final rule does not contain such requirements for Tier I passenger equipment, and there was no consensus within the Working Group to do so. *See* 62 FR 49750–1. However, FRA believes that work within the APTA PRESS Task Force will lead to reconciliation of Tier I and Tier II requirements on this issue. FRA intends to reexamine the requirements of this section in the second phase of the rulemaking with a view to applying emergency roof entrance locations requirements to Tier I passenger equipment. In the meantime, the public is entitled to the protection afforded by the Tier II standard. High-speed derailments may be more severe because of the total energy involved and a potentially longer ''ride down'' during which injuries may occur, rendering occupants incapable of exiting the train under their own power.

Paragraph (b) is reserved for marking and instruction requirements to be specified as necessary in the second phase of this rulemaking.

Section 238.443 Headlights

FRA received no comments on this provision, and it is adopted as proposed. Because of the high speeds at which Tier II passenger equipment operates, FRA is requiring that a headlight be directed farther in front of the train to illuminate a person than is currently required for existing equipment under 49 CFR § 229.125(a). A Tier II passenger train will travel distances more quickly than a Tier I passenger train, and the train operator will have less time to react, thereby necessitating earlier awareness of objects on the track.

FRA notes that, as further specified in 49 CFR § 229.125(d)–(h), locomotives operated at speeds greater than 20 miles per hour over one or more public highway-rail crossings are required to be equipped with operative auxiliary lights. The requirements contained in § 229.125(d)–(h) do apply, according to their terms, to Tier II passenger equipment. Any proposal to the contrary in the NPRM was made in error.

Section 238.445 Automated Monitoring

This section contains the requirements related to the automated monitoring of the status or performance of various safety-related systems on Tier II passenger trains. A number of passenger train accidents have been either fully or partly caused by human error. The faster operating speeds of Tier II passenger equipment will afford the train operator less time to evaluate and react to potentially dangerous situations, thereby increasing the potential for accidents. Automated monitoring systems can decrease the risk of accidents by alerting the train operator to abnormal conditions and advising the operator as to necessary corrective action. Such systems can even be designed to take corrective action automatically in certain situations.

FRA received no comments on this section as proposed, and paragraphs (a) and (c) have been adopted without substantive change. However, FRA has modified paragraph (b) to make clear when immediate corrective action must be taken in the event a system or component required to be monitored is operating outside of its predetermined safety limits.

Paragraph (a) requires a Tier II passenger train to be equipped to monitor the performance of a minimum set of safety-related systems and components. The monitoring system can also be used to provide information for trouble-shooting and maintenance and to accumulate reliability data to form the basis for setting required periodic maintenance intervals.

Paragraph (b) requires the train operator to be alerted when any of the systems or components required to be monitored is operating outside of predetermined safety parameters. When any such system or component is operating outside of its predetermined safety parameters, immediate corrective action must be taken if the system or component defect impairs the train operator's ability to safely operate the train. Accordingly, a report of a system or component defect may not require immediate corrective action. The need to take such action would be determined by the railroad based on whether the defective system or component impairs the train operator's ability to safely operate the train. Further, in the event immediate corrective action must be taken, the rule does not require that intervention be automatic. Of course, the railroad should have a valid basis for either leaving response in the hands of the train operator or making the corrective action automatic.

Paragraph (c) requires the monitoring system to be designed with an automatic self-test feature that notifies the train operator that the monitoring capability is functioning correctly and alerts the operator that a system failure has occurred. Because train operators can become dependent on automated monitoring systems, they need to know when their vigilance must be heightened to compensate for a malfunction in such an automated safety tool.

Section 238.447 Train Operator's Controls and Power Car Cab Layout

This section contains a set of requirements for interior features in Tier II power car cabs. FRA has clarified and revised this section, based on comments received in response to the proposal, in two principal ways: The seat requirements in paragraph (f) apply to any floor-mounted seat and each seat provided for an employee regularly assigned to occupy the power car cab, instead of to each crewmember in the cab; and such seats will not require seatbelts. FRA has also combined proposed paragraphs § 238.447(a) and (b) in the NPRM, *see* 62 FR 49820–1, into paragraph (a) of this section in the final rule for economies of space. Subsequent paragraphs have been renumbered accordingly.

In its comments on the NPRM, Bombardier explained that an additional seat—commonly a flip-up or a shelf-type seat—is in many cases provided in the cab for a train crewmember who is not normally in the cab. Bombardier believed these seats should not be subjected to the same requirements as for the train operators' seats, as that was not the intent of discussions within the Working Group. Accordingly, Bombardier recommended making clear that the requirements in paragraph (f) apply only to each seat provided for the train operators.

FRA agrees with Bombardier's comment that the requirements proposed in § 238.447(g) of the NPRMBnow § 238.447(f) of the final rule—need not apply to each seat provided for a crewmember in a power car cab. FRA recognizes that flip-down and other auxiliary seats are provided in locomotive cabs for the temporary use of employees not regularly assigned to the cab. These employees may include a supervisor of locomotive engineers conducting an operational monitoring test of the engineer(s). Such seats are typically attached to an interior wall and placed behind those seats used by the train operators. FRA believes it appropriate to clarify the application of paragraph (f) in the final rule so that its requirements apply only to each seat provided for an employee regularly assigned to occupy the power car cab, and to any floor-mounted seat in the cab. Accordingly, paragraph (f) does not apply to a wall-mounted, flip-down seat occupied by an employee such as a supervisor of locomotive engineers who occasionally rides in the cab.

FRA has also modified paragraph (f) by not requiring that seats subject to that provision be equipped with a single-acting, quick-release lap belt and shoulder harness as defined in 49 CFR § 571.209. FRA had proposed such a requirement in the NPRM because the crew may experience high decelerations in a collision from the cab's high strength and forward location near the expected point of impact in many different collision scenarios. *See* § 238.447(g)(1), 62 FR 49821. In its comments on the NPRM, the BLE stated that its experience did not support the need to require a lap belt and shoulder harness, and that its member engineers were overwhelmingly against such a requirement. The BLE explained that engineers need to rapidly exit from the seat to a place of safety in the event of an impending accident or act of vandalism. In such instances, the primary defense of the engineer is to move quickly from harms way, according to the BLE, and operating at speeds of 150 mph will decrease the time a locomotive engineer has to react to such incidents. The BLE noted that it would change its position on this issue if there is overwhelming evidence that the force of deceleration on Tier II equipment would be so severe as to cause injury to engineers or interfere with their operation.

In its comments on the rule, Simula remarked that formal research is needed to determine both the feasibility of incorporating active restraints in a cab and the potential for the crew to actually use them. Simula also noted the option of exploring passive restraints such as air bags or compartmentalization, as opposed to active restraints such as lap belts and shoulder harnesses. Simula explained that cost effectiveness considerations for implementing both compartmentalization and active and passive restraints are markedly different for the crew in the cab compared to passengers. Simula asserted that the relatively high cost of passive restraints may be justified for one or two crewmembers in a extremely severe environment.

In light of the comments received, FRA has decided to defer until Phase II of the rulemaking the issue of requiring seats in a power car cab to be equipped with seat belts and shoulder harnesses. FRA will continue to explore strategies for train occupant protection—both for passengers and employees—and FRA will be able to focus on these strategies with the members of the Working Group in Phase II.

In other statements on the NPRM, commenters recommended applying the requirements in this section to Tier I passenger equipment. The NTSB stated that the minimum elements proposed in this section for operator's controls and cab layout design are sufficient and should also be included in Tier I operations for ergonomic design and to minimize the chance of human error in both types of operations. The NTSB cited safety recommendations arising out of an accident in Kelso, California, concerning the dangers posed by improperly located safety-significant controls and switches in locomotives and the need to relocate and/or protect such controls and switches so they cannot be inadvertently activated or deactivated. FRA has not fully explored extension of these concepts with the working group and will take the issue under advisement for incorporation into

Tier I standards during Phase II of the rulemaking.

The BLE commented that the proposed requirements for seating in this section also be applied to Tier I equipment. The BLE stated that existing seating on some Tier I equipment is woefully inadequate. In particular, the BLE noted that some cab car seats are not adjustable; have no suspension; are severely limited in their cushioning; have no lumbar support; and are injuring their occupants. The BLE also recommended that both Tier I and Tier II equipment be provided with a cab temperature control system which maintains a minimum temperature of 65 degrees and a maximum of 85 degrees F.

FRA in not requiring that the detailed provisions in this section be imposed in full on Tier I passenger equipment. FRA believes these provisions are more necessary for Tier II passenger equipment because the higher operating speeds will press human reaction time, and such requirements will contribute to the ability of the crew to operate the train as safely as possible. In addition, several members of the Working Group opposed applying such requirements to Tier I passenger equipment, asserting that a number of the requirements involved ergonomic issues which do not directly affect safety. FRA notes that certain requirements concerning locomotive cab interior safety are provided in § 238.233 of the final rule.

Through RSAC's working group on Locomotive Cab Working Conditions, FRA and members of the regulated community have been evaluating issues concerning locomotive cab working conditions. As a number of issues concern both passenger and freight operations, FRA believes that such issues may best be addressed in this RSAC working group. Of course, FRA does recognize that the concern involving crew seats in cab cars is more unique to passenger operations, and FRA is therefore pleased by APTA's voluntary effort to improve crew seats on cab cars.

FRA notes that, for purposes of paragraph (f)(1) in this section, it has specified the crewmember occupying the seat as a 95th-percentile adult male, consistent with the use of a 95th-percentile adult male elsewhere in this rule. In the NPRM, the characteristics of the crewmember occupying the seat had not been specified, *per se. See* proposed § 238.447(g)(2); 62 FR 49821.

FRA further notes that, for purposes of paragraph (f)(2), it has not specified particular measurements or a particular survey on which to base the necessary characteristics of persons ranging from a 5th-percentile adult female to a 95th-percentile adult male. Instead, these characteristics may be drawn from any recognized survey after 1958 of weight, height, and other body dimensions of U.S. adults, corrected for clothing as appropriate. Data from such a survey is presented in Public Health Service Publication No. 1000, Series 11, No. 8, ''Weight, Height, and Selected Body Dimensions of Adults,'' June 1965. (A copy of this document has been placed in the public docket for this rulemaking.) The definition of 95th-percentile adult male used elsewhere in the rule is too narrow to apply in this context.

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

Section 238.501 Scope

This subpart contains the inspection, testing, and maintenance requirements for passenger equipment that operates at speeds exceeding 125 mph but not exceeding 150 mph. As discussed in the 1997 NPRM, there is currently no operating history with regard to Tier II equipment, and thus there are no regulations or industry standards establishing detailed testing, inspection, or maintenance procedures, criteria, and intervals for the equipment. The railroads and the rail labor organizations differ on the approach that should be taken in establishing inspection, testing, and maintenance requirements. Railroads have long appealed to FRA to move away from detailed ''command and control'' regulations and instead to provide broad safety performance requirements that afford railroads wide latitude to develop the operational details. Rail labor organizations, on the other hand, believe that specific inspection, testing, and maintenance criteria that cannot be unilaterally changed by railroads are the only way that safe railroad operation can be assured.

FRA believes that the introduction of a new type of passenger equipment offers the opportunity for a fresh start, where perhaps both of these seemingly conflicting concerns can be resolved. This final rule retains the approach taken in the 1997 NPRM and contains general guidelines on the process to be used by the operating railroad, together with the system developer, to develop an inspection, testing, and maintenance program. The operating railroad and the system developer together have the best information, expertise, and resources necessary to develop the details of an effective inspection, testing, and maintenance program. The operating railroad is thereby granted some latitude to develop the operational details of the program, using the system safety process to justify the safety decisions that are made. However, FRA intends to exercise final approval of the inspection, testing, and maintenance program proposed by the operating railroad; rail labor organizations will be given an opportunity to discuss their concerns with FRA during the approval process set forth in § 238.505. Tier II equipment may not be used prior to FRA approval of an inspection, testing, and maintenance program. Further, this final rule makes clear that FRA intends to enforce the safety-critical inspection, testing, and maintenance procedures, criteria, and maintenance intervals that result from the approval process.

Labor commenters recommended that if FRA is to permit the railroads to develop inspection and testing criteria and procedures for Tier II passenger equipment, then rail labor must be involved in the process as a full partner. These commenters also believed that any procedures developed must provide an equivalent level of safety to the inspection and testing procedures provided for conventional passenger equipment. Furthermore, these commenters believed that any testing and inspection procedures developed must be fully enforceable to the same extent as federal regulations.

Although FRA recognizes and appreciates labor's desire to be a full partner in the development of any inspection and testing procedures, and FRA fully endorses and recommends collaboration with appropriate labor forces, FRA does not believe it appropriate to mandate labor's participation in the initial stages of the development of such procedures. As the equipment for which the inspection and testing programs are being developed will be new, with little operating history, FRA believes that the operating railroad and the system developer have the best information, expertise, and resources necessary to develop the details of an effective inspection, testing, and maintenance program. Moreover, FRA believes this final rule provides the industry's labor forces with an adequate avenue for raising any issues and providing input on any criteria or procedure developed by a railroad. Section 238.505 ensures that designated representatives of a railroad's employees are provided a copy of any inspection, testing, and maintenance criteria or procedures submitted by the railroad for FRA approval and provides an opportunity for these parties to present their views on the submitted plans and procedures prior to FRA's approval or rejection of any program. Furthermore, this section addresses all of the major inspections and test provisions related to conventional passenger equipment and ensures that any program developed by a railroad regarding the inspection, testing, and maintenance of Tier II passenger equipment incorporate these major requirements. Finally, paragraph (b) of this section, as discussed in detail below, makes clear that the provisions of any program approved by FRA related to the inspection and testing of power brakes or other inspection, test, or maintenance procedure, criteria, and interval that is deemed to be safety-critical will be enforceable to the same extent as any other requirement contained in this part.

Section 238.503 Inspection, Testing, and Maintenance Requirements

This section requires the establishment by the railroad of an FRA-approved inspection, testing, and maintenance program based on a daily complete brake system test and mechanical safety inspection of the equipment performed by qualified maintenance persons, coupled with a periodic maintenance program based on a system safety analysis. Although paragraph (a) contains some basic requirements to be included in a program, FRA does not intend to prescribe every detail of what a program must contain. FRA requires the operating railroad to develop and justify the details of any program it adopts based on the specific safety needs and operating environment of the high-speed rail system being developed.

Paragraph (b) intends to make enforceable, subject to civil penalties and other enforcement action, the inspection and testing of power brakes and the other safety-critical inspection, testing, and maintenance requirements that are identified in the railroad's program and approved by FRA. ''Safety-critical'' requirements are those that, if not fulfilled, increase ''the risk of damage to equipment or personal injury to a passenger, crewmember, or other person.'' *See* § 238.5. Under paragraph (l), the railroad must identify which items in its inspection, testing, and maintenance program are safety-critical. The railroad must submit the program to FRA under the procedures contained in § 238.505. Once these programs are approved by FRA, this section makes clear those items identified as safety-critical are enforceable by FRA. FRA agrees with labor representatives to the Working Group that safety standards are stronger when they contain specific provisions that can be enforced.

Paragraph (c) requires that the operating railroad develop an inspection, testing, and maintenance program to ensure that all systems and components of Tier II passenger equipment are free of general conditions that endanger the safety of the crew, passengers, or equipment. FRA has identified the various conditions enumerated in paragraph (c) that would need to be addressed in the railroad's program. Consequently, FRA has defined what the inspection, testing, and maintenance program must accomplish, but not how to accomplish it.

Paragraph (d) contains the more specific requirements that any inspection, testing, and maintenance program must incorporate. In paragraph (d)(1), FRA requires that Tier II equipment receive the equivalent of a Class I brake test, as described in § 238.313, before its departure from an originating terminal and every 1,500 miles after that or once each calendar day the equipment remains in service. The test must be performed by a qualified maintenance person. For example, a Tier II train must receive the equivalent of a Class I brake test at its originating terminal and must receive a second Class I equivalent brake test after traveling 1,500 miles from the time of the original Class I brake test, whether or not it is the same calendar day. Furthermore, a Tier II train must receive the equivalent of a Class I brake test each calendar day it is used in service even if it has not traveled 1,500 miles since the last Class I equivalent brake test. Due to the speeds at which this equipment is permitted to operate, FRA believes that a comprehensive brake test must be performed prior to the equipment being placed in service.

Paragraph (d)(2) requires that a complete exterior and interior mechanical inspection be conducted by a qualified maintenance person at least once each calendar day that the equipment is used. In order to perform a quality mechanical inspection, railroads must be provided some flexibility in determining the locations where these inspections can best be performed. FRA believes that permitting railroads to conduct these mechanical inspections at any time during the calendar day provides adequate flexibility to move equipment to appropriate locations. Trains that miss a scheduled Class I brake test or mechanical inspection due to a delay en route may proceed to the location where the Class I brake test or mechanical inspection was scheduled to be performed. FRA recognizes that, due to the specialized nature of this equipment, proper inspections can only be conducted at a limited number of locations. FRA also recognizes that trains become delayed en route due to problems which are not readily foreseeable. Thus, FRA will permit the continued use of such equipment to the location where the required inspection was scheduled to be performed.

Paragraph (e) restates § 238.15 and provides a cross-reference to that section. The paragraph provides that trains developing en route defective, inoperative, or insecure primary brake equipment be moved in accordance with the requirements of that section.

Paragraph (f) restates § 238.17 and adds a narrow exception to that section. The paragraph requires that Tier II equipment that develops a defective condition not related to the primary brake be moved and handled in accordance with the requirements contained in § 238.17, with one exception. The exception to these requirements applies to a failure of the secondary portion of the brake that occurs en route. In those circumstances, the train may proceed to the next scheduled equivalent Class I brake test at a speed no greater than the maximum safe operating speed demonstrated through analysis and testing for braking with the friction brake alone. At that location the brake system shall be restored to 100 percent operation before the train continues in service. This final rule allows extensive flexibility for the movement of equipment with defective brakes, but also contains a hard requirement that all brake components be repaired and the brake system, including secondary brakes, be restored at the location of the train's next major brake test. FRA believes that this approach recognizes the secondary role played by the electric portion of blended brakes. If the railroad has demonstrated that the friction brake alone can stop the train within signal spacing without thermal damage to braking surfaces, then the train may be used at normal maximum speed in the event of an electric brake failure. This final rule essentially limits the use of trains without available secondary braking systems to no more than 48 hours. FRA believes that § 238.17 strikes the correct balance between the need of railroads to transport passengers to their destination and the need to have equipment with defects that could lead to more serious safety problems quickly repaired. This requirement places a heavy responsibility on qualified maintenance persons to exercise their judgment on when and how equipment is safe to move.

Paragraph (g) requires that scheduled maintenance intervals be based on the analysis conducted pursuant to the railroad's safety plan, and be approved by FRA under the procedures of § 238.505. The rule allows the maintenance intervals for safety-critical components to be changed only when justified by accumulated acceptable operating data. Changes in maintenance cycles of safety-critical components must be based on verifiable data made available to all interested parties and shall be reviewed by FRA. This paragraph is another attempt to balance the needs of the operating railroad to run efficiently and the concern of rail labor organizations that railroads not have the ability to unilaterally make safety decisions. For a new system, with no operating history, a formal system safety analysis is the only justifiable way to set initial maintenance intervals. The paragraph recognizes that as time passes and an operating history is developed, a basis for changing maintenance intervals can be established. However, the decision to make these changes must have the participation of all the affected parties.

Paragraph (h) requires that the operating railroad establish a training, qualification, and designation program as defined in the training program plan under § 238.109 to qualify individuals to perform safety inspections, tests, and maintenance on the equipment. If the railroad deems it safety-critical, then only qualified individuals may perform the safety inspection, test, or maintenance of the equipment. This paragraph does not prescribe a detailed training program or qualification and designation process. Those details are left to the operating railroad, but FRA must approve the program proposed by the operating railroad under procedures contained in § 238.505.

Paragraph (i) requires the operating railroad to establish standard procedures for performing all safety-critical inspections, tests, maintenance, or repair. This paragraph also makes clear that the inspection, testing, and maintenance program required by this section 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. FRA intends for the program required by this section to detail only those tasks required to be performed in order to conduct the inspections, tests, and maintenance necessary to ensure that the equipment is in safe and proper condition for use. In proposing the creation of these plans, FRA did not intend to enter into the area of addressing employee safety while conducting the inspections, tests, and maintenance covered by the programs. FRA is always concerned with the safety of employees while conducting their duties, but employee safety in maintenance and servicing areas generally falls within the jurisdiction of OSHA. It is not FRA's intent to oust OSHA's jurisdiction with regard to the safety of employees while performing the inspections, tests and maintenance required by this part, except where FRA has already addressed workplace safety issues, such as blue signal protection. Therefore, in order to prevent any uncertainty as to FRAs intent, FRA has modified this paragraph by eliminating any language or provision which could have been potentially perceived as displacing the jurisdiction of OSHA and has added a specific clarification that FRA does not intend for the program required by this section to address employee safety while conducting the inspections and tests described. Consequently, the specific elements that FRA proposed to be included in the inspection, testing, and maintenance plan have been eliminated for the reasons noted above and because they were merely duplicative of the general requirements contained in paragraph (a) of this section and are unnecessary.

Paragraph (k) requires that the operating railroad establish an inspection, testing, and maintenance quality control program enforced by railroad or contractor supervisors. In essence, this creates the need for the operating railroad to perform spot checks of the work performed by its employee and contract equipment maintainers to ensure that the work is performed in accordance with established procedures and Federal requirements. FRA believes this is an important management function that has a history of being neglected in the railroad industry.

Paragraph (l) requires the operating railroad to identify each inspection and testing procedure and criterion and each maintenance interval that the railroad considers safety-critical.

Section 238.505 Program Approval Procedure

This section contains the procedures a railroad shall follow in securing FRA approval of its inspection, testing, and maintenance program for Tier II passenger equipment. As no substantive adverse comments were received on this section, FRA has retained this section as proposed in the 1997 NPRM.

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

Section 238.601 Scope

This subpart contains specific requirements for Tier II passenger equipment safety planning. These safety planning requirements include 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.

The discussion of this subpart should be read in conjunction with the general discussion of safety planning earlier in the preamble. FRA is retaining more extensive safety planning requirements for Tier II railroad operations, as these will be operations with new characteristics that require special attention and have heightened safety risks due to the speed of the equipment.

Section 238.603 Safety Planning Requirements

Paragraph (a) requires that, 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 a pre-revenue service acceptance testing plan required under § 238.111, and any other plan required under this part provided that the individual planning elements required under this part are addressed. The plan shall be updated at least every 365 days.

Paragraph (b) requires that for each 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 also be combined with a pre-revenue service acceptance testing plan required under § 238.111, and any other plan required under this part provided that the individual planning elements required under this part are addressed.

As noted earlier in the preamble, Bombardier, in its comments on the NPRM, believed that the proposed rule confused the requirements for a railroad's system safety plan with those required for equipment acquisition. Bombardier recommended that they be separately addressed. This section in the final rule reflects these comments in that paragraph (a) addresses requirements for an overall safety plan for Tier II passenger equipment, while paragraph (b) addresses planning requirements for equipment acquisition and upgrade.

Paragraph (c) requires that each railroad 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 also maintain sufficient documentation to track how safety issues are raised and resolved.

Paragraph (d) requires that each railroad 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. This section does not in itself require FRA approval of a plan. However, FRA approval would be required for those sections of a plan intended to comply with the requirements of § 238.111, for example.

Appendix A—Schedule of Civil Penalties

This appendix contains a schedule of civil penalties to be used in connection with this part. Because such penalty schedules are statements of policy, notice and comment are not required prior to their issuance. *See* 5 U.S.C. 553(b)(3)(A). Commenters were invited to submit suggestions to FRA describing the types of actions or omissions under each regulatory section that would subject a person to the assessment of a civil penalty. Commenters were also invited to recommend what penalties may be appropriate, based upon the relative seriousness of each type of violation. FRA received no specific comments in response.

Appendix B—Test Methods and Performance Criteria for the Flammability and Smoke Emission Characteristics of Materials Used in Passenger Cars and Locomotive Cabs

The table of test methods and performance criteria contained in Appendix B has been revised to address concerns related to their adoption as a regulation. These revisions include reorganization of categories and function of materials listed in the table in Appendix B; inclusion of a note to permit the substitution of seat and mattress assembly tests for individual material tests; inclusion of a note to require dynamic tests to be performed for seat cushions prior to fire tests; revision of performance criteria for certain materials; inclusion of a note to permit a testing exception for small parts; inclusion of a note to permit the use of an alternative heat release rate and smoke generation test for small miscellaneous, discontinuous parts; and addition of a category for wire and cable insulation requirements. Three definitions which relate to heat release rate were added to those previously listed in Appendix B of the NPRM. A new category of structural components other than structural flooring which may be exposed to fire hazards and associated notes was also added. The complete list of notes has also been renumbered from that contained in the NPRM to reflect these revisions.

The revisions were selected based on the results of analysis of input from several resources. (A detailed rationale for all revisions is also contained in a supporting document prepared under contract to the Volpe Center and placed in the public docket for this rulemaking.[6]) First, the comments of the parties who responded to the NPRM were reviewed. As raised in particular by Fire Cause Analysis in its comments on the NPRM, the current classification of items listed in the categories and functions in the table contained in Appendix B in the NPRM (based on FRA's 1989 guidelines) has caused confusion and conflict as to what materials should be tested according to what test methods. Second, a document containing the rationale for the development of the original flammability and smoke emission tests and performance criteria was reviewed.[7] Third, the previous **Federal Register** notices pertaining to tests and performance criteria published as the 1989 FRA guidelines (54 FR 1837; Jan 17, 1989) and published as recommended practices by FTA (then-UMTA) for rail transit vehicles (47 FR 53559, Nov. 26, 1982; 49 FR 32482, Aug. 14, 1984) and for transit buses and vans (55 FR 27402, July 2, 1990; 57 FR 1360, Jan 13, 1992; 58 FR 54250, Oct. 20, 1993) were reviewed. Fourth, the input from railroad operators, carbuilders, and consultants who participated in a Workshop held at the NIST Building and Fire Research Laboratory in July 1997 was considered.[8] Fifth, documentation prepared by the NFPA Railroad Task Force for the NFPA 130 Committee was reviewed.[9,10] Sixth, the results of the ongoing FRA-sponsored NIST fire safety research project were reviewed; as well as the results of tests jointly funded by Amtrak and FRA using alternative seat assemblies considered for use in Amtrak's high-speed trainsets. Seventh, the results of the NTSB-sponsored fire tests conducted for MARC commuter rail cars were reviewed.[11] All of these inputs and further analysis were used as the basis to simplify the table in Appendix B of the NPRM and reduce confusion and duplication in revising the list of tests and performance criteria and related notes.

Most of the items listed under ''Function of Material'' in the table in Appendix B of the NPRM have identical (or nearly identical) flammability pass/fail performance criteria. For example, although they were listed separately in the NPRM under function of material in the table, ''Seat and/or Mattress Frame''; ''Seat and Toilet Shroud''; ''Wall''; ''Ceiling''; ''Windscreen''; ''Partition, Tables and Shelves''; ''HVAC Ducting''; ''Window''; ''Light Diffuser''; ''End Cap [and] Roof Housings''; and ''Interior [and] Exterior Boxes'' all were subject to the same ASTM E 162 test procedure and performance criteria for flame spread. Accordingly, in the final rule, all of these items have been combined under the single category of ''Vehicle Components'' in the table in Appendix B. Overall, the items listed under ''Category'' and ''Function of Material'' have been decreased from seven to six and from twenty-eight to ten, respectively, from the same table in the NPRM. The majority of entries have also been re-titled. The new ''Category'' and ''Function of Material'' titles streamline the table presentation while retaining all the actual material functions used in an intercity or commuter rail passenger car

[6] ''Recommendations for Revising the Fire Safety Performance Requirements in Federal Railroad Administration Notice of Proposed Rulemaking (NPRM) For Passenger Equipment, September 23, 1997,'' Prepared by J. Zicherman and S. Markos. Draft Project Memorandum. December, 1998.

[7] ''Rationale for Recommended Fire Safety Practices for Rail Transit Materials Section.'' Transportation Systems Center. Report nos: MA–06–0098–82–1, and DOT–TSC–UMTA 81–74, January, 1983. A copy of this document has been placed in the public docket for this rulemaking.

[8] ''Follow-UP Notes: NIST/CFR FRA Project, Meeting/Workshop of 7/23/97,''above.

[9] ''Proposed Revision of NFPA 130, Table 4–2.4, Recommendations for Testing the Flammability and Smoke Emission Characteristics of Rail Transit Vehicle Materials; Review Paper—Status Update.'' NFPA 130 Press Working Group Meeting of 8/15/97. Prepared by J. Zicherman. A copy of this document has been placed in the public docket for this rulemaking.

[10] ''Proposed Revision of NFPA 130 Table 4–2.4, Recommendations for Testing the Flammability and Smoke Emission Characteristics of Rail Transit Vehicle Materials; Review Paper—Status Update.'' NFPA 130 Press Working Group Meeting of 10/15/97. Prepared by J. Zicherman. A copy of this document has been placed in the public docket for this rulemaking.

[11] ''Interpretive Report: Flammability and Smoke Compliance and Fire Analysis (MARC/Amtrak Collision, February 16, 1996).'' Prepared for National Transportation Safety Board. Prepared by J. G. Quintiere, University of Maryland. Final Report. December 19, 1996. A copy of this document has been placed in the public for this rulemaking.

or locomotive cab. Some revisions have also been made to acknowledge that certain existing performance criteria are so close as to be indistinguishable based on the precision of the test methods used (*e.g.*, flame spread values of 25 vs. 35 using test procedure ASTM E 162). Of course, some material categories or subcategories could not be combined since they require different test methods, *e.g.*, fabrics versus cushions. In addition, other considerations (such as ballistic test requirements for plastic window glazing) have precluded the combination of (and thus identical performance criteria for) some categories and material functions.

Specific revisions to the table in Appendix B of the NPRM are summarized in the following text. In addition, the notes to the table have been revised and renumbered to reflect the table's reorganization, and the text for several new notes has been added. The notes to the table will be discussed where appropriate in the discussion of the table below, and a discussion of the complete list of notes is also provided.

''Cushions, Mattresses'' is a new category in the table which was formerly listed under the function of material column and included under the previously used category ''Passenger seats, Sleeping and dining car components.'' *See* 62 FR 49823. Note 1 to the table which concerns flaming dripping or running is virtually identical to Note 1 as proposed in the NPRM. Note 2 is virtually identical to Note 5 as proposed in the NPRM, and pertains to ASTM E 662 smoke emission limits. The note renumbering provides consecutive numbering logic within the revised categories and function of materials.

As explained, FRA has been investigating the testing of assemblies of materials for performance in a fire, rather than individually testing the materials which comprise such assemblies, to more accurately reflect the interaction of materials in a fire. As part of the FRA-sponsored fire safety research program managed by the Volpe Center, six full-scale alternative seat assemblies being considered for the Amtrak high-speed train sets were tested in March, 1997, using a furniture calorimeter (ASTM E 1537).[12] The tests, jointly funded by FRA and Amtrak, used current Amtrak upholstery and different cushion foams; fire blocking layers were used in some trials. The test results showed that fire blocking layers can significantly prevent fire ignition, and limit flame spread, fire growth, and smoke generation.

Note 3 permits the testing of seat and mattress assemblies incorporating heat release rate methods developed by consensus. Testing the performance of a seat or mattress assembly as an integrated unit, which is more representative of an actual condition, will be an alternative to individually testing the components that comprise the seat or mattress assembly. Seat assemblies and mattresses to be tested in this alternative manner shall use ASTM E 1537, ''Standard Test Method for Fire Testing of Upholstered Seating Furniture,'' and shall use pass/fail criteria specified in California Technical Bulletin (CAL TB) 133, ''Flammability Test Procedure for Seating Furniture for Use in Public Occupancies.'' CAL TB 133 has a successful history of use at state and municipal levels for high-hazard occupied places, such as nursing homes. Results of the March, 1997 tests using the ASTM E 1537 test procedure on seat assemblies being considered for Amtrak's high-speed trainsets showed that certain assemblies met the Cal TB 133 test criteria and exhibited a total lack of flame spread as well as low heat and smoke release. *Id.* In addition, data from Amtrak-funded tests showed that seat assemblies selected for use on Amtrak's high-speed trainsets passed both the ASTM D 3675 and FAA ''oil burner'' tests.

Acceptance of results using the alternative test approach in Note 3 for seat and mattress assemblies requires an accompanying fire hazard analysis for the specific application. This analysis may take the form of a specific system safety or fire protection analysis. The analysis must provide for necessary quality control of components used in these assemblies in actual day-to-day use. Quality control must be part of the daily operating plans for a system to ensure that individual substandard materials or components are not substituted within a given component assembly for parts having an identical function which are of acceptable quality. In conducting the fire hazard analysis, the operating environment within which seat and mattress assemblies qualified by assembly tests will be used must also be considered in relation to the risk of vandalism, puncture, cutting, or other acts or external forces which may expose the individual components of the assemblies. Seats and mattresses using certain types of foams must resist vandalism, puncture, cutting, and other acts and external forces. Robust blocking layer(s), resistant to both fire (as used to meet FAA fire seat regulations), as well as to cutting and puncture, may be required. If used, these blocking layers must be applied in a manner which seals the seams (*e.g.*, using bonding or ceramic thread with binding tape) and ensures that the foam does not leak or drip out and become exposed to ignition. The U.S. Coast Guard has issued a Navigation and Vessel Inspection Circular (NAVIC) for structural fire protection which permits the use of fire blockers if tested according to Cal TB 133; the NAVIC states that these materials have proven effective in protecting combustible foams from being involved in a fire.[13]

FRA notes that the ASTM E 1537 test procedure was not expressly referenced in the NPRM to allow testing of seat and mattress assemblies in this alternative manner. However, FRA did intend to permit use of alternative test procedures to demonstrate flammability and smoke emission characteristics of materials (upon special approval by FRA). *See* 62 FR 49803. FRA has, in effect, granted approval to any party to use the ASTM E 1537 test procedure to demonstrate the flammability and smoke emission characteristics of seat and mattress assemblies in accordance with the requirements of Note 3, in lieu of utilizing the testing methods otherwise required by the table in Appendix B.

Note 4 applies to seat cushion testing without upholstery and is identical to Note 9 as proposed in the NPRM. The note renumbering provides consecutive numbering logic within the revised categories and function of materials.

Note 5 requires the dynamic testing of seat cushions to address the retention of fire retardant characteristics of foams after the materials have been in service for a period of time. The precedent for the addition of Note 5 requiring the performance of an endurance test (ASTM D 3574, 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) for seat cushions is noted in the FTA notices relating to transit bus and van materials (58 FR 54250, 57 FR 1360). The concern that fire and smoke emission characteristics of materials may change over time will be more fully examined in the second phase of this rulemaking.

A new category title ''Fabrics'' includes seat upholstery, mattress ticking and covers, and curtains, as formerly included under the category

[12] ''Passenger Rail Car Seat Fire Tests; ASTME E 1357/CAL TB 133.'' J. Zicherman and S. Markos. Draft Project Memorandum. December 1998. A copy of the report has been placed in the public docket for this rulemaking.

[13] ''Navigation and Inspection Circular No. 9–97. Guide to Structural Fire Protection.'' US Coast Guard. COMDTPUB P16700.4, October 31, 1997.

''Passenger seats, Sleeping and dining car components'' in the table in Appendix B of the NPRM. The term ''All'' under function of material eliminates confusion as to what must be tested; if composed of fabric, window shades, draperies and wall coverings are required to be tested. The test procedure for purposes of the burn test is an FAA test found at 14 CFR part 25, Appendix F, Part I (vertical test). FRA has referenced this test procedure directly in the table and, thereby, removed the intermediate reference to 14 CFR § 25.853(a), as stated in the NPRM. Formerly, smoke emission requirements were limited to ≤250 for ''coated'' and ≤100 for ''uncoated'' fabrics at four minutes. The latter is typically PVC vinyl-based upholstery fabric. It was determined that a uniform criteria of ≤200 at four minutes for the smoke emission rate would be appropriate for both classes of fabrics, based in part on the known performance of the range of fabrics available, and the definition of coated and uncoated used by the ASTM, rather than the terms used in the above-cited report, ''Rationale for Recommended Fire Safety Practices for Rail Transit Materials Selection,'' prepared by the Volpe Center in the early 1980s. Moreover, allowing a higher smoke emission performance criteria for coated fabrics—more than twice that allowed for uncoated fabrics—provides an inconsistent level of safety. In addition, the NFPA 130 Committee has accepted a recommendation for the identical change in its revised table requirements.

Notes 6 and 7, which pertain to washing and dry cleaning of materials, are almost identical to Notes 2 and 3 as proposed in the NPRM. These notes were renumbered to reflect consecutive numbering logic within the revised categories and function of materials. In addition, some upholstery materials must be dry cleaned. Accordingly, Note 7 applies to upholstery materials.

Note 8 was formerly the second sentence in Note 3 as proposed in the NPRM. However, since that sentence also included the words ''washed,'' as well as ''dry cleaned,'' this text was separated into a new Note 8 to ensure that the labeling requirement would be clearly understood to apply whatever cleaning method is used.

The new category ''Vehicle Components'' includes the majority of those materials formerly listed in the NPRM under the categories of ''Panels,'' ''Flooring'' (except structural), thermal and acoustical ''Insulation'' (see discussion below), ''Elastomers,'' ''Exterior Plastic Components,'' and ''Component Box Covers.'' Note 9 specifies, as a minimum, which combustible component materials must be tested, and is based on the components listed in the table in Appendix B of the NPRM.

Note 10 provides that testing of vehicle component miscellaneous, discontinuous small parts may not be necessary if such parts do not contribute materially to fire growth and the surface area of any individual small part is not greater than or equal to 16 square inches (100 cm^2) in end use configuration. A fire hazard analysis is required that considers both the quantity of the parts (*e.g.,* limited) and the location of the parts (*e.g.,* at discontinuous, or isolated locations, or both), as well as the vulnerability of the parts to ignition and contribution to flame spread. As an example, grommets used on seats or window shades present an insignificant fire threat and could logically and safely be exempted from testing. Such small parts have been selectively exempted through the use of similar language in rail car specification documents for many years. On the other hand, other materials, such as those used to produce wire ties (of which hundreds or thousands may be included in a single car to mount power and low voltage cable bundles) shall not be exempted from testing, as specified in Note 11.

Note 11 relates to Note 10. If the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration, such small part must be tested using the ASTM E 1354–97 test procedure, ''Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter'' (e.g., Cone Calorimeter), unless such small part has been shown not to contribute materially to fire growth following an appropriate fire hazard analysis as specified in Note 10. ASTM E 1354 measures heat release rate (HRR) at a prescribed heat flux using oxygen depletion techniques and produces information including data for time of ignition and peak HRR. The quotient of these two parameters has been evaluated as part of the current FRA-funded NIST research program, as well as in other research, and has been shown to reliably predict ignitability (*see* Hirschler, 1992, 1995 [14] [15]). Ignitability is also a parameter of importance for certain small parts used in rail passenger cars. In addition, such parts, because of their small size and end uses, may be important from an ignition perspective, but not from a flame spread perspective. The pass/fail criterion:

$t_{ig} / \dot{q}''_{max} \leq 1.5$

is defined by the ratio of a given sample's sustained time in seconds (s) to ignition (t_{ig}) to its peak (maximum) heat release rate ($\dot{q}''_{max}$), as measured in the Cone Calorimeter under the stipulated exposure conditions. This quantity has been demonstrated to be a direct measure of a material's sensitivity to ignition, which is important since the class of parts referred to here will not, due to their small size, contribute markedly to fire growth and heat release. However, these parts may, if capable of showing sustained ignition, cause secondary ignition of surrounding materials subsequent to their own ignition. The required heat flux exposure of 50 kW/m^2 is sufficiently high to ignite materials which have a reasonable degree of intrinsic ignition resistance. The pass/fail criterion is based on relatively current research, including that conducted by NIST for passenger railroad materials cited earlier. FRA notes that the ASTM E 1354 test method was not expressly referenced in the NPRM. However, as identified by the Volpe Center during its fire safety research, this test procedure is an appropriate way to address the flammability and smoke emission characteristics of small parts and its use in this final rule complements the exemption from testing otherwise provided for small parts as specified in Note 10. Note 12 relates to Note 11. If, in accordance with Note 11, small miscellaneous, discontinuous parts are tested using ASTM E 1354 and an appropriate fire hazard analysis accompanies the test results, such small parts do not have to be tested for smoke generation using the ASTM E 662 test procedure.

Flexible cellular foam products not used for seat and mattress applications are now included in the separate ''Vehicle Components'' category to address the unique fire-related properties represented when used for arm rests, seatback ''crash'' padding, and thermal and acoustical insulation. The different armrest test requirements in Note 8 in the NPRM have been deleted. The differentiation is no longer necessary since the new Function of Material ''Flexible Cellular Foams'' requires that armrest foam material be tested according to ASTM D 3675. If

[14] ''Tools Available to Predict Full Scale Fire Performance of Furniture,'' Fire and Polymers II. Hirschler, M.M. Ed. G. L. Nelson, ACS Symp. Series 599. Ch. 36, pp. 593–608.

[15] ''Effect of a Single Furnishing Product on Fire Hazard in Actual Occupancies Based on Heat Release Rate.'' Hirschler, M.M. Proceedings, NFPRF Symposium and FIre Risk & Hazard, San Francisco, June 25–27, 1997.

hard plastic, the armrest test requirement is ASTM E 162. Tests conducted by NIST in 1983 of Amtrak interior materials showed that foam armrests assist flame spread from seat cushions to wall liners.

Thermal and acoustical insulation materials were previously included as a separate table category in the NPRM, with values identical to cushions and mattresses for flame spread (less than or equal to 25) and smoke emission (less than or equal to 100 for 1.5 minutes). (Thermal and acoustical insulation did not expressly contain a smoke emission criterion for 4 minutes in the NPRM, though intended to be less than or equal to 200.) Flexible cellular foam is sometimes used as thermal and acoustical insulation; if so used, the requirements remain unchanged (25, 100, and 200, respectively). Otherwise, the performance criteria for insulation materials are now 35, 100, and 200, respectively, to be consistent with other vehicle components.

Note 13 relates to the use of carpet on walls and ceilings and is virtually identical to Note 10 as proposed in the NPRM. Note 14 concerns floor coverings and is virtually identical to Note 7 as proposed in the NPRM.

Two items having identical test performance criteria relating to use of plastics in light transmitting assemblies under the function of material column in the table in Appendix B in the NPRM have been combined into a new ''Light transmitting plastics'' function of material column in the final rule. This terminology is consistent with use of the term for identical plastics in the construction industry and building codes. The test performance criteria remain unchanged from the NPRM. In addition, this category also provides for uniform acceptance criteria for transparent plastics used in windscreens, which formerly were not clearly addressed. Note 15 pertains to window glazing and is virtually identical to that in Note 4 as proposed in the NPRM. Renumbering of the note reflects consecutive numbering logic.

The separate category of ''Elastomers'' in the table in the NPRM has been included under the function of material column in the ''Vehicle Components'' category in the table in the final rule. As indicated in Note 16, the flammability test method for elastomers has been revised to reference ASTM C 1166, which has superseded ASTM C 542 as proposed in the NPRM. As specified in Note 16, only elastomeric parts with surface areas equal to or more than 16 square inches (100 cm^2) in end use configuration are required to be tested using ASTM C 1166; elastomeric parts with smaller surface areas need not be tested using ASTM C 1166. Accordingly, diaphragms, window gaskets, door nosing, and roof mats would continue to be tested; in addition, due to their size, flexible flat seat ''springs'' or suspension membranes are also required to be tested using ASTM C 1166. Testing requirements for miscellaneous small parts comprised of elastomeric composition having a surface area less than 16 square inches are discussed in Notes 10, 11, and 12.

The test requirement differentiation in Notes 10, 11,12, and 16 according to part size is based on several factors. Many small miscellaneous parts used in car construction may be composed of elastomeric materials. These parts include cleats, blocks, abrasion and vibration damping pads. As such, these parts are frequently molded and are not readily available for testing in sizes required for either the ASTM E 162 or ASTM C 1166 test methods without undergoing special fabrication. Moreover, as noted in the discussion concerning Note 11, ASTM E 1354 is sensitive to ignition properties rather than flame spread. The later parameter would be a critical variable if such parts were used in applications with larger exposed surface areas.

The subject of ''Wire and Cable'' has been addressed by the addition of a new category in the table which requires smoke and flammability emission screening for wire and cable insulation. This is especially important due to the greater quantities of wire and cable used in electrically-powered intercity and commuter rail passenger cars. Fire-related tests and performance criteria for wire and cable insulation were not expressly included in the table proposed in Appendix B of the NPRM. The test methods of the IEEE, Insulated Cable Engineers Association (ICEA), National Electrical Manufacturers Association (NEMA), and Underwriters Laboratories Inc. (UL) specified in the final rule have long and successful histories of use, and have also been specified in the existing NFPA 130 requirements. In Note 17, one set of test methods is comprised of NEMA WC 3/ ICEA S–19–1981, paragraph 6.19.6, and the second set is comprised of UL 44 and UL 83. The ICEA and NEMA jointly issued NEMA WC 3/ICEA S–19–1981, and it includes testing for both thermosetting wire insulation and for thermoplastic wire insulation. In Note 18, in addition to passing ANSI/IEEE Standard 383, section 2.5, the power cable must also demonstrate continued circuit integrity for 5 minutes to allow continued short term operation of power when exposed to ignition.

FRA notes that, in its comments on the NPRM, the IEEE (like the NFPA) referred to the National Technology Transfer and Advancement Act of 1995, above, and the provision which requires, in general, that Federal agencies ''use technical standards that are developed or adopted by voluntary consensus standards bodies.'' The IEEE cited its own development of voluntary consensus standards and their potential for integration in this rulemaking. In the second phase of the rulemaking, FRA will consider with the Working Group the appropriate use of other IEEE standards in this and other subject areas, in addition to the IEEE standard contained in this rule for fire safety.

The new category ''Structural Components'' addresses the structural integrity of floor assemblies and other structural elements. In Appendix B of the NPRM, only the performance of structural flooring was expressly addressed in the table itself and in the text of former Note 6. The first sentence of text relating to penetrations as proposed in Note 6 in the NPRM has been separated and inserted as Note 19 in the final rule. Note 19 requires that penetrations be tested as part of floor assemblies and other structural elements. The text in the second sentence of Note 6 as proposed in the NPRM specifically pertained to structural flooring assemblies, and it has been separated and inserted into Note 20 in the final rule.

Note 21 addresses the structural integrity of less well defined and design dependent rail car structural elements, other than floors. These structural elements may carry significant weight loads or have important fire barrier functions in protecting train occupants, or both. Examples include extensive HVAC or power-conditioning equipment installed on roofs or electrical equipment lockers, which may become involved in fires. Such fires may result from mechanical failures, electrical insulation breakdown, or from other hazards. Accordingly, Note 21 requires that portions of the vehicle body (other than floors but including the roof) which separate major ignition sources, or sources of fuel load from the vehicle interior, demonstrate fire endurance by a fire hazard analysis acceptable to the railroad.

The following summary lists the changes to the content of the notes and their numbering from the NPRM, reflecting both the table reorganization in the final rule as well as additional requirements: Note 1 is virtually identical to that in the NPRM. Note 2 is virtually identical to Note 5 in the NPRM. Note 3 permits the testing of seat and mattress assemblies according to ASTM E 1537 using Cal TB 133 performance criteria. Note 4 is identical to Note 9 in the NPRM. Note 5 requires dynamic testing of seat cushions. Notes 6 and 7 are virtually identical to Notes 2 and 3 in the NPRM. The text of Note 8 is virtually identical to the second sentence of Note 3 in the NPRM. Note 9 lists vehicle component materials which must be tested, at a minimum. Note 10 allows a testing exception for materials used to fabricate small, discontinuous parts that will not contribute materially to fire growth in end use configuration, provided an appropriate fire hazard analysis is conducted. Note 11 requires that if the surface area of any individual small part is less than 16 square inches (100 cm^2) in end use configuration, such small part must be tested using the ASTM E 1354 test procedure, unless such small part has been shown not to contribute materially to fire growth following an appropriate fire hazard analysis as specified in Note 10. Note 12 relates to Note 11. If, in accordance with Note 11, small parts are tested using ASTM E 1354 and an appropriate fire hazard analysis accompanies the test results, such small parts do not have to be tested for smoke generation using the ASTM E 662 test procedure. Note 13 is virtually identical to Note 10 in the NPRM. Note 14 is virtually identical to Note 7 in the NPRM. Note 15 is virtually identical to Note 4 in the NPRM. Note 16 provides test requirements for elastomeric materials greater than 16 square inches (100 cm^2) in end use configuration and requires that, at a minimum, window gaskets, door nosings, diaphragms, and roof mats be tested. Notes 17 and 18 apply to wire and cable insulation. Note 19 is based on the last sentence of text formerly in Note 6 in the NPRM. Note 20 contains the first part of text of Note 6 in the NPRM. Note 21 addresses new test requirements for other structural components, such as car roofs and electrical cabinets, in addition to the floor assembly.

The list of standards contained in Appendix B, paragraph (c), in the NPRM has been revised and updated.

Appendix C—Suspension System Safety Performance Standards

The purpose of Appendix C is to prevent the occurrence of a variety of derailments due to forces on wheels. FRA has revised and clarified the requirements of this appendix based on comments received in response to the NPRM.

First, Bombardier commented that as proposed by FRA some differences existed between Appendix C and the requirements of the then-proposed Track Safety Standards, § 213.333. Consequently, Bombardier recommended that FRA change Appendix C to resolve the discrepancies; or eliminate Appendix C and reference the track safety standards' table of vehicle/track interaction performance limits in § 213.333 and incorporate Bombardier's proposed changes submitted as part of its September 15, 1997 hearing testimony on the track safety standards.

At the Working Group meeting in January 1998, a Volpe Center representative explained that the discrepancy between proposed Appendix C and the proposed track safety standards may be justifiable because Appendix C would apply only to new passenger equipment; whereas the then-proposed standards in the track safety rule would apply to both new and existing equipment. Appendix C's standards could therefore be necessarily stricter. In this regard, FRA has retained Appendix C and not simply referenced the track safety standards' table of vehicle/track interaction performance limits in 49 CFR § 213.333. Points 4 and 6 in Appendix C are not found in the track safety standards' table of vehicle/track interaction safety limits, and thus need to be retained in this passenger equipment rule to ensure the safety of new passenger equipment. However, FRA has otherwise reconciled Appendix C with the track safety standards' table in § 213.333.

Talgo, in its comments on proposed Appendix C, suggested that FRA reword the second paragraph in the Appendix to clarify that the performance standards are meant to apply to the average values for the parameters recorded during the time the train travels six feet. FRA has not adopted Talgo's suggestion, however. FRA intended that the performance standards apply to the maximum values for the parameters recorded to ensure that the passenger equipment operates within outer safety limits. Use of average values would mask real safety concerns.

Talgo also recommended that FRA define the method for signal filtering. FRA has adopted Talgo's recommendation and specified that, 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.

Finally, Talgo recommended that points 4 and 5 in the appendix be revised to acknowledge that they should not be applied to single-axle trucks. FRA has not adopted Talgo's recommendation with respect to points 4 and 5, to the extent that an exemption for rail cars with single-axle trucks was sought. However, FRA provides the following clarification of points 4 and 5. Point 4 provides that 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, and that this shall include the effect of a crosswind allowance as specified by the railroad for the intended service of the equipment. Whether the rolling assembly is a single-axle or a double-axle truck, or whether solid or stub axles are used to configure the truck, the risk of wheel unloading is still present. If the vehicle is subjected to forces that reduce the static vertical load per truck side to 20% or less of the static axle load, an unsafe condition may exist. Point 4, therefore, requires that the sum of vertical wheel loads on any side of any truck (or any other suspension configuration per car end or between two car ends) be always greater than 20% of the static vertical axle load. For stub (non-solid) axles, an equivalent static vertical axle load may be computed by adding the static vertical wheel loads on opposite sides. If the rolling assembly has only one axle per suspension unit, as in the case of Talgo equipment, then any single wheel load is required to be always greater than 20% of its static value. As a result, point 4 of this appendix will constitute a more stringent requirement than provided in point 3. Point 5 of the appendix requires that the maximum truck side L/V ratio not exceed 0.6. If the rolling assembly has only one axle per suspension unit, as in the case of Talgo equipment, then the corresponding L/V ratio computed for each consecutive pair of axles shall be similarly limited to 0.6.

Appendix D to Part 238—Requirements for External Fuel Tanks on Tier I Locomotives

This appendix contains the performance requirements for external fuel tanks on Tier I locomotives, as adapted from AAR Recommended Practice (RP) 506, ''Performance Requirements for Diesel Electric Locomotive Fuel Tanks,'' effective July 1, 1995. In incorporating this industry practice into Federal regulation, FRA has rephrased the text of RP–506 in part. Yet, no substantive change is intended, except as noted below. RP–506, a copy of which is available in the public docket of this rulemaking, is comprised of sections entitled ''Scope,'' ''Background,'' ''Limitations,'' and ''Structural Strength Requirements.'' Appendix D represents the section entitled ''Structural Strength Requirements,'' or Section 4 in RP–506.

FRA has not included Section 4.4 of RP–506 in Appendix D. Section 4.4 (''Fueling'') states, ''Internal structures of [the] tank must not impede the flow of fuel through the tank while fueling at a rate of 300 gpm [gallons per minute].'' The rate at which a fuel tank may be fueled is only a safety concern in the broad sense that the fuel not spill from the tank while fueling. Of course, FRA recognizes that railroad fuel dispensers utilize automatic shut-off devices that will stop the flow of fuel before the fuel spills out of the tank if the fuel is dispensed too readily for the tank to process. The ability of the tank to accept fuel at a certain rate per minute therefore appears to be more of an operational concern than a safety concern for a railroad in that the process of fueling locomotives not be unnecessarily delayed.. As a result, FRA will not make Section 4.4. of RP–506 a safety requirement of this rule, even though a railroad is free to make it its own requirement in acquiring locomotives.

X. Regulatory Impact

A. Executive Order 12866 and DOT Regulatory Policies and Procedures

This rule has been evaluated in accordance with existing policies and procedures and is considered to be significant under both Executive Order 12866 and DOT policies and procedures (44 FR 11034; Feb. 26, 1979). FRA has prepared and placed in the docket a full regulatory evaluation of the rule (only a summary is provided below). This evaluation estimates the costs and consequences of the rule as well as its anticipated economic and safety benefits. The evaluation may be inspected and photocopied during normal business hours by visiting the FRA Docket Clerk at the Office of Chief Counsel, FRA, Seventh Floor, 1120 Vermont Avenue, in Washington, D.C. Photocopies may also be obtained by submitting a written request by mail to the FRA Docket Clerk at the Office of Chief Counsel, FRA, 1120 Vermont Ave, Mail Stop 10, Washington, D.C. 20590.

Certain requirements in the rule reflect current industry practices or restate existing regulations, or both. As a result, in calculating the costs of this rule, FRA has neither included the cost of those actions that would have been performed voluntarily in the absence of this rule, nor the costs of those actions that would have been required by the existing regulations that have been restated in this rule. Further, in calculating the benefits arising from this rule, FRA has not included as a benefit any good resulting from such actions.

FRA expects that overall this rule will save the passenger rail industry approximately $20 million Net Present Value (NPV) over the next twenty years. Rail passengers are expected to benefit from reduced delays totaling approximately $11 million (twenty-year NPV). FRA expects the NPV of the total twenty-year costs incurred associated with the rule to be $68.5 million. The NPV of the total twenty-year savings expected to accrue to the industry from the rule is approximately $87 million. For some passenger rail operators, the total costs incurred will exceed the total cost savings. For others, the cost savings will outweigh the costs. Expected safety benefits coupled with reduced passenger train delays outweigh the estimated costs of compliance with this rule.

The following tables present the estimated twenty-year costs and savings (NPV) associated with the specific requirements in this final rule. To the best of FRA's ability, FRA has apportioned the total costs and savings in the following tables between Amtrak, commuter railroads, and the State of Washington to more precisely show the effects of this final rule on these different entities. In commenting on the NPRM, APTA had recommended that FRA segregate the costs and benefits to commuter railroads from those involving Amtrak—and not represent both Amtrak and commuter railroads together. FRA has separately identified the State of Washington in the tables below because of the unique concerns involving its operation of Talgo passenger equipment, discussed above in the preamble.

Ideally, FRA would separately show the costs and savings for commuter railroads from those involving Amtrak for each requirement in the rule. However, FRA cannot separate some of the twenty-year costs and savings of this rule with any degree of accuracy between Amtrak and commuter railroads, especially for passenger equipment that is not yet in service. For instance, FRA does not know how often Amtrak will order new equipment or what specific type of equipment that may be. To a certain extent, railroads will be able to control their level of expenditures in response to this rule by choosing to overhaul or rebuild equipment they own or by purchasing existing equipment from other railroads instead of ordering new equipment. Of course, FRA can more precisely apportion the costs and savings between Amtrak and commuter railroads for the inspection, testing, and maintenance requirements in this rule; those requirements will most significantly impact the existing fleet of passenger equipment, which is readily identifiable.

NPV 20-YEAR COSTS INCURRED

Requirement category	Amtrak	Commuter rail	Washington State	Total
Fire Safety—Materials	$0	$0	$0	$0
Certification	(*)			84,752
New Equipment				253,625
Existing Equipment				675,004
Inspect/Test/Maint.				142,056
Train Hardware & Software	0	0	0	0
Inspect/Test/Maint. Program:				
Existing Equipment				277,816
New Equipment				167,958
Training Program:				
Course Development				1,720,629
Exterior Mech. Inspect.				5,081,250
Interior Mech. Inspect.				3,408,940
Pre-Revenue Service Testing:				
Equip w/Prev. Op. Exp.				16,950
Equip w/Out Prev. Op. Exp.				233,373
Rim-Stamped Straight-Plate Wheels	0	0	0	0

NPV 20-YEAR COSTS INCURRED—Continued

Requirement category	Amtrak	Commuter rail	Washington State	Total
Emergency Lighting	0	0	0	0
Talgo—Risk Assessment	0	0	280,634	280,634
Anticlimber & Link to Car Body	0	129,296	0	129,296
Forward End Structures	0	8,190,145	0	8,190,145
Corner Posts	0	1,532,517	0	1,532,517
Rollover Strength				29,305
Side Structure	0	0	0	0
Truck to Car Body Attachment	0	0	0	0
Glazing				1,303,894
Fuel Tanks	0	0	0	0
Electrical System	0	0	0	0
Suspension System	0	0	0	0
Brake System—Ease of Inspection				32,179
Interior fittings and Surfaces				2,608,856
Emergency Window Exits	0	0	0	0
Doors—Manual Door Release	0	3,968,598	0	3,968,598
Automated Monitoring				30,503
Mvmt Defective Equip—Non Brakes				25,934
Mvmt Defective Equip—Brakes				735,249
Reporting and Tracking System	0	5,371,054	0	5,371,054
Daily Exterior Mech. Inspections	3,009,223	16,712,854	0	19,722,077
Qualified Maintenance Person	0	1,447,370		1,447,370
Daily Interior Mech. Inspections				10,861,361
Periodic Mechanical Inspection				201,639
Single Car Test	0	0	0	0
Total Costs				68,532,966

NPV 20-YEAR SAVINGS

Requirement category	Amtrak	Commuter rail	Washington State	Total
COT&S Interval Extensions:				
Coaches	$0	$9,227,510	$0	$9,227,510
MU locomotives	0	33,368,421	0	33,368,421
Cab cars	0	7,191,358	0	7,191,358
1,500-mile brake inspection	31,852,373	0	0	31,852,373
Class IA brake tests	0	4,360,701	0	4,360,701
Mvmt Defect Brakes—RR				632,592
Mvmt Defect Brakes—Passengers				11,368,651
Total Savings				98,019,605
Total Twenty-Year Net Impact: $29,486,639 (Savings).				

(* In the above tables, a "—" indicates that total costs or savings, as appropriate, could not be apportioned between Amtrak, commuter railroads, and the State of Washington.)

FRA notes that as a result of the final rule's requirement to conduct fire safety analyses of existing passenger equipment, the analyses may indicate that modifications to existing equipment are necessary to reduce the level of risk of fire or smoke to an acceptable level. Although costs associated with performing the analyses are included in the calculations above, costs associated with performing any equipment modifications are not. If costs associated with equipment modifications are incurred, they will be incurred over the first four years of the rule and could total between $8.75 million and $14 million for existing equipment. If costs associated with installation of additional fire and smoke detection and suppression systems are incurred for new equipment, total twenty-year costs (NPV) could increase by up to $3.9 million. These costs are not included in the calculations presented above because FRA cannot predict with any degree of precision the results of the fire safety analyses. Should equipment modifications, and fire and smoke detection and suppression systems be required, the total net impact of the rule could be reduced from a savings of $29.5 million to a savings of $11.6 million (NPV). Rail operators would experience a minimal savings.

Intercity passenger and commuter railroads generally offer the travelling public one of the safest forms of transportation available. However, the history of passenger train accidents shows that the potential for injury and loss of life is significant. Between January 1, 1990, and December 31, 1997, there were a total of 93 passenger fatalities on intercity passenger and commuter railroads, representing a total economic loss of $251 million. Sixty-eight passenger fatalities occurred when the trains carrying the passengers were involved in derailments or collisions. FRA believes that it is reasonable to expect that the measures called for in this rule will prevent or mitigate the severity of casualties greater in value than the costs to rail carriers of implementing the requirements of this rule.

The unique circumstances surrounding each future passenger train accident will determine the ultimate effectiveness of this rule and FRA's other strategies to improve passenger rail safety. Similar accidents have unique characteristics which ultimately determine an accident's severity in terms of casualties. As a result, we cannot at this time forecast future accident scenarios with a level of precision that would allow us to predict the actual need for the particular measures in this rule. However, this rule protects railroad employees and passengers against known hazards that can be mitigated in a cost-effective manner. For each cost associated with a requirement in this rule, FRA has examined the potential safety benefits accruing from the requirement. Certain elements of the rule, such as the structural requirements, will directly improve safety by decreasing threats to life and property. Other elements of the rule will provide savings to the rail industry while maintaining or improving the industry's excellent safety record overall.

In its comments on the proposed rule, the NCDOT stated that the summary economic analysis contained in the NPRM did not include an analysis of the impact on individual States. The NCDOT believed the cost summary to be understated and not include an operator by operator analysis. The above summary does specify this rule's impact on Washington State. Further, as noted, a copy of the full regulatory evaluation of this rule is available through the FRA Docket Clerk. That evaluation does include, where appropriate, discussions of the rule's impact on particular railroads or groups of railroads. The evaluation also takes into consideration that individual States will contract with Amtrak for the provision of rail service on their behalf. In this regard, for example, a State may utilize Amtrak's inspection forces trained under the rule, and thus not have to train inspection forces on its own.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires an assessment of the impacts of proposed rules on small entities. FRA has conducted a regulatory flexibility assessment of this final rule's impact on small entities, and the assessment has been placed in the public docket for this rulemaking. FRA certifies that the final rule will not have a significant impact on a substantial number of small entities. This final rule affects intercity passenger and commuter railroads, rapid transit operations that operate on the general system of transportation, and certain private car owners. FRA notes that the standards contained in this rule were developed in consultation with a Working Group that included Amtrak, individual commuter railroads, APTA, and the AAPRCO. APTA represents the interests of commuter railroads and rapid transit systems in regulatory matters. The AAPRCO represents the interests of private car owners in regulatory matters.

Except for private car owners, the entities impacted by the final rule are governmental jurisdictions, known as transit authorities, none of which are small for purposes of the prevailing law. The statutory definition of ''small governmental jurisdictions'' is a governmental entity that serves a population center of 50,000 or less. *See* 5 U.S.C. 601(5). The transit authorities subject to the requirements of this rule do not fall within the class established by statute. Nevertheless, FRA considered the impacts of this final rule on the smaller entities subject to the rule. Commuter railroads and rapid transit systems are part of larger transit organizations that receive Federal funds. The level of costs incurred by each organization should generally vary in proportion to either the size of the organization or the extent to which the organization purchases newly manufactured passenger equipment. For instance, railroads with fewer employees and passenger equipment will have lower costs associated with employee training and the inspection, testing, and maintenance of passenger equipment. FRA notes that this rule offers railroads the opportunity to experience savings in the areas of inspection, testing, and maintenance of passenger equipment. The extent of these savings will generally vary proportionally with the size of the fleet of each railroad.

FRA is making only certain requirements in this rule applicable to private cars that are operated in passenger trains subject to this rule. FRA considered the potential burdens associated with applying the various requirements in this rule to private car owners and operators. FRA is limiting the application of this rule only to those requirements necessary to ensure the safe operation of the passenger train in which the private cars operate, as well as the safety of railroad personnel handling or inspecting the cars. The economic impacts to private cars owners are expected to be minimal, however. Among the provisions applicable to private cars are daily mechanical inspection requirements; brake inspection, testing, and maintenance requirements; and a prohibition concerning rim-stamped straight-plate wheels on tread-braked passenger equipment.

FRA recognizes that private cars affected by this final rule are principally hauled by Amtrak, which imposes its own safety requirements on the operation of private cars. As a result, the daily exterior mechanical inspection requirements in this final rule, though new Federal requirements, are only minimally more stringent than the mechanical inspections currently performed by Amtrak on its own. The final rule does offer the flexibility to move equipment with power brake defects, as well as the flexibility to perform daily brake tests and mechanical inspections at locations best suited for performing such tests and inspections. To the extent that all passenger equipment is subject to daily exterior mechanical inspections, private cars will not be affected disproportionately.

Generally, the final rule requires that rim-stamped straight-plate wheels not be used as replacement wheels on tread-braked private cars. Amtrak has established a private car policy which does not allow the use of rim-stamped straight-plate wheels as replacement wheels on private cars. Further, Amtrak will decline to move any tread-braked private car with a rim-stamped straight-plate wheel after June 30, 2000. Because Amtrak holds private cars to standards as high or higher than those contained in this rule, there will be no additional economic impact imposed on private cars operated in Amtrak trains from this rule's rim-stamped straight-plate wheel provision. Private cars are also subject to provisions in this final rule concerning protection against personal injury, suspension system safety, safety appliances, and brake system safety. These requirements represent either current industry practice or current Federal safety requirements (which are being restated in this final rule).

Smaller passenger rail operations such as tourist, scenic, excursion, and historic railroads are exempt from this final rule. A joint FRA/industry Working Group will be developing recommendations regarding the applicability of FRA regulations, including this one, to tourist, scenic, historic, and excursion railroads. Based on that Working Group's recommendations, portions of the final rule may apply to some or all of these railroads.

C. Paperwork Reduction Act

This rule contains information collection requirements. FRA has submitted these information collection requirements to the Office of Management and Budget (OMB) for review and approval in accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). The sections that contain the new or revised information collection requirements, or both, and the estimated time to fulfill each requirement are as follows:

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
216.14—Special notice for repairs—passenger equipment.	19 railroads	12 forms	5 minutes	1 hour	$39
238.1—Earlier application—rule requirements—sections 238.15, 238.17, 238.19, 238.107, 238.109.	19 railroads	15 notifications	45 minutes	11 hours	429
238.7—Waivers	19 railroads	12 waivers	2 hrs/25 hrs	70 hours	2,730
238.11—Penalties	19 railroads	1 falsified rept	15 minutes	.25 hr.	9
238.15—Movement of passenger equipment with power brake defects, and	19 railroads	1,000 cards/tags	3 minutes	50 hours	2,500
—Movement of passenger equipment with power brake defects develop en route.	19 railroads	288 cards/tags	3 minutes	14 hours	700
—Conditional requirement	19 railroads	144 notifications	3 minutes	7 hours	350
238.17—Movement of passenger equipment with other than power brake defects.	19 railroads	200 tags/cards	3 minutes	10 hours	340
—Movement of passenger equipment with safety appliance defects.	19 railroads	76 tags	3 minutes	4 hours	136
	19 railroads	38 notifications	30 seconds	19 min.	11
238.19—Reporting and tracking defective passenger equipment.	19 railroads	N/A	Usual and customary procedure.	N/A	N/A
—List of power brake repair points.	1 railroad	1 list	2 hours	2 hours	78
—Amendments to list	1 railroad	1 update	1 hour	1 hour	39
238.21/238.103/238.223(a)/238.309(2)/238.311(a)/238.405(a)/238.427(a):					
—Petitions for special approval of alternative standard.	19 railroads	1 petition	16 hours	16 hours	624
—Petitions for special approval of alternative compliance.	19 railroads	1 petition	120 hours	120 hours	4,680
—Petitions for special approval of pre-revenue service acceptance testing plan.	19 railroads	1 petition	24 hours	24 hours	936
—Comments on the petitions.	Unknown	2 comments	1 hour	2 hours	140
238.103—Fire Safety:					
—Plan	6 equipment manufacturers.	2.4 eq. design (5 yr. average).	200 hours	480 hours	33,360
—Subsequent equipment orders.	6 equipment manufacturers.	2.4 eq. design (5 yr. average).	60 years	144 hours	14,400
—Preliminary fire safety analysis.	19 railroads	19 documents	119 hours	2,264 hours	501,241
—Final fire safety analysis	18 railroads	6 documents (3 yr. average).	135 hours	811 hours	81,067
—Fire safety analysis on equipment transfer.	19 railroads	1 document	8 hours	8 hours	800
—Written procedures—fire safety system and fire safety equipment.	19 railroads	19 written procedures	80 hours	1,520 hours	106,400
238.105—Train hardware and software safety.	197 railroads	N/A	Usual and customary procedure.	N/A	N/A
238.107—Inspection, testing, and maintenance plan:					
—Plan	19 railroads	N/A	Usual and Customary procedure.	N/A	N/A
—Annual plan review by railroads.	19 railroads	19 reviews	60 hours	1,140 hours	44,460
238.109 Training, qualification, and designation program:					

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Training employees to perform brake-related inspections, tests, or maintenance.	17 railroads	N/A	Usual and customary procedure.	N/A	N/A
—Training employees to perform daily mechanical inspections.	19 railroads	6,020 trained employees/241 instructors.	2 hours	12,522 hours	421,410
—Development of training program.	19 railroads	19 programs	520 hours	9,880 hours	360,620
—Recordkeeping	19 railroads	6,020 records	3 minutes	301 hours	11,739
238.111—Pre-revenue service acceptance testing plan—equip. prev. in revenue service.	6 equipment manufacturers.	2.4 plans (5 yr. average).	16 hours	38 hours	2,641
—Pass equip. that has not been in revenue service in U.S.	6 equipment manufacturers.	2.4 plans (5 yr. average).	200 hours	480 hours	42,144
—Subsequent equipment orders.	6 equipment manufacturers.	2.4 plans (5 yr. average).	60 hours	144 hours	11,472
—Major upgrades/intro. new tech.—Tier II.	1 equipment manuf	None likely	N/A	N/A	N/A
238.201—Alternative compliance.	19 railroads	Incl. in 238.21	Inc. 238.21	Incl. 238.21	Incl. 238.21
238.203—Static end strength:					
—Grandfathering non-compliant equip.	19 railroads	1 petition	300 hours	300 hours	21,000
—Comment	Unkown	6 comments	20 hours	120 hours	8,400
238.211—Collision posts	19 railroads	Incl. in 238.21	Incl. 238.21	Incl. 238.21	Inc. 238.21
238.223—Locomotive fuel tanks—alt. std.	19 railroads	Incl. in 238.21	Incl. 238.21	Incl. 238.21	Inc 238.21
238.231—Brake system—identified & marked.	2 brake manufacturers.	N/A	N/A	Usual and cust.	N/A
238.237—Automated monitoring:					
—Alerter/Deadman control—documentation.	19 railroads	19 documents	2 hours	38 hours	1,482
—Defective alerter/ Deadman control.	19 railroads	100 tags	3 minutes	5 hours	250
238.301—Scope—requirements—earlier application.	19 railroads	Incl. in 238.1	Incl. in 238.1	Incl. in 238.1	Incl. 238.1
238.303—Exterior calendar day mechanical inspection of passenger equipment—door and cover plates guarding high voltage equip.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—MU locomotives w/ inoperative dyn. brakes.	19 railroads	50 tags/cards	3 minutes	3 hours	150
—Conventional locos. w/ inoper. dyn. brakes.	19 railroads	50 tags/cards	3 minutes	3 hours	150
—Written notice—inoperative dyn. brakes.	19 railroads	25 written not	3 minutes	1 hour	34
—Records—ext. calendar day mech. insp.	19 railroads	2,022,436 recd	1 minute	33,707 hours	1,146,038
238.305—Interior calendar day mechanical inspection of passenger cars:					
—Stenciling or marking emergency brake valve.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Stenciling or marking high voltage equipment.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Tagging of defective doors.	10 railroads	600 tags	1 minute	10 hours	340
—Safety related signage	N/A	N/A	Usual and customery customery procedure.	N/A	N/A
—Records	19 railroads	1,866,904 recds	1 minute	31,115 hours	1,057,910
238.307—Periodic mechanical inspection of passenger cars:					
—Written notification—alt. periodic insp. int.	5 railroads	5 notifications	5 hours	25 hours	975
—Switches—markings	N/A	N/A	Usual and customary procedure.	N/A	N/A

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Records	6 railroads	15 records	3 minutes	.75 hours	29
—Detailed documentation—alt. insp. interval.	5 railroads	5 documents	100 hours	500 hours	19,500
238.309—Alternative maintenance proc.	19 railroads	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc. 238.21
—Records of periodic maintenance.	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.311—Single car test—alt. procedure.	19 railroads	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc.—238.21
—Tagging to indicate need—single car test.	19 railroads	25 tags	3 minutes	1 hour	34
238.313—Class I brake test	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Documentation—test already performed.					
—Qualif. maint. Person.—statement in cab.					
238.315—Class IA brake test:					
—Brake pipe pressure—communications.	19 railroads	365,000 comm	3 seconds	304 hours	10,336
—Communicating signal system—tests.	19 tests	365,000 tests	15 seconds	1,521 hours	51,714
238.317—Class II Brake Test:					
—Brake pipe pressure—communications.	19 railroads	365,000 comm	3 seconds	304 hours	10,336
—Communicating signal system—tests.	19 railroads	365,000 tests	15 seconds	1,521 hours	51,714
238.403—Crash energy management requirements.	1 railroad	1 design	120 hours	120 hours	12,000
238.405—Longitudinal static compressive.	1 railroad	Incl. in 238.21	Incl.—238.21	Incl.—238.21	Inc.—238.21
238.421—Gazing:					
—Marking of glazing material.	N/A	N/A	Usual and customary procedure.	N/A	N/A
—Stenciling requirement	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.423—Fuel tanks—equiv. level of safety.	N/A	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Inc.—238.21
238.427—Suspension system—alt. stds.	N/A	Incl. in 238.21	Incl. in 238.21	Incl. in 238.21	Incl.—238.445
—Hunting oscillations—alarms to train oper.	1 railroad	Incl. in 238.445	Inc.—238.445	Inc.—238.445	In.—238.445
238.431—Brake system	1 railroad	1 analysis	40 hours	40 hours	1,560
—Brake system failures	1 railroad	Incl. 238.445	Incl. 238.445	Incl. 238.445	In 238.445
—Wheel slide alarms	1 railroad	Incl. 238.445	Incl. 238.445	Incl. 238.445	In 238.445
238.437—Emergency communication.	3 car manufacturers	3 instructions	1 hour	3 hours	102
238.441—Emergency roof entrance location.	3 car manufacturers	16 cars marked	15 minutes	4 hours	136
—Markings					
238.445—Automated monitoring.	1 railroad	200 alerts	1 second	3 minutes	2
—Self test feature—notifications to train operator.	1 railroad	6,300 notifications	1 second	2 hours	68
238.447—Train operator's controls and power car cab layout.	N/A	N/A	Usual and customary procedure.	N/A	N/A
238.503—Inspection, testing, and maintenance requirements:					
238.505—Program approval procedures:					
—Submission of program	1 railroad	1 program	80 hours	80 hours	3,120
—Amendments to program.	1 railroad	1 amendment	8 hours	8 hours	312
—Comments	4 unions/individuals	4 comments	1 hour	4 hours	276
—Approval	N/A	N/A	No disapprovals expected at this time.	N/A	N/A
238.603—Safety planing requirements—Process to introduce new technology.	1 railroad	1 safety plan	100 hours	100 hours	3,900
Appendix B to Part 238—labeling requirement.	5–6 seat manufacturers.	N/A	Usual customary procedure.	N/A	N/A

CFR section	Respondent universe	Total annual responses	Average time per response	Total annual burden hours	Total annual burden cost
—Seat/Mattress assemblies—fire haz. analysis.	5–6 manuf	Incl. 238.103	Incl. 238.103	Incl. 238.103	In 238.103
—Disc. small parts—fire hazard analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Surface any small part—fire haz. analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Small elastomers/misc. parts—fire haz. anal.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103
—Portions vehicle body—fire hazard analysis.	5–6 manuf	Incl. in 238.103	Incl. 238.103	Incl. 238.103	In238.103

All estimates include the time for reviewing instructions; searching existing data sources; gathering or maintaining the needed data; and reviewing the information. For information or a copy of the paperwork package submitted to OMB contact Mr. Robert Brogan, Office of Safety, Planning and Evaluation Division, RRS–21, Federal Railroad Administration, 1120 Vermont Ave., N.W., Mail Stop 17, Washington, D.C. 20590 (telephone: (202) 493–6292) or Ms. Dian Deal, Office of Information Technology and Productivity Improvement, RAD–20, Federal Railroad Administration, 1120 Vermont Ave., N.W., Mail Stop 35, Washington, D.C. 20590 (telephone: (202) 493–6133).

FRA cannot impose a penalty on persons for violating information collection requirements which do not display a current OMB control number, if required. The information collection requirements contained in this rule have been approved under OMB control number 2130–0544.

D. Environmental Impact

FRA has evaluated these regulations in accordance with its procedures for ensuring full consideration of the environmental impact of FRA actions, as required by the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*), other environmental statutes, Executive Orders, and DOT Order 5610.1c. This final rule meets the criteria that establish this as a non-major action for environmental purposes.

E. Federalism Implications

This rule has been analyzed in accordance with the principles and criteria contained in Executive Order 12612, and it has been determined that the rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment. The fundamental policy decision providing that Federal regulations should govern aspects of service provided by municipal and public benefit corporations (or agencies) of State governments is embodied in the statute quoted above (49 U.S.C. 20133). Further, FRA has consulted with commuter railroad authorities in developing this rule.

F. Compliance With the Unfunded Mandates Reform Act of 1995

Pursuant to the Unfunded Mandates Reform Act of 1995 (Pub. L. 104–4) each Federal agency ‘‘shall, unless otherwise prohibited by law, assess the effects of Federal Regulatory actions on State, local, and tribal governments, and the private sector (other than to the extent that such regulations incorporate requirements specifically set forth in law).’’ Sec. 201. Section 202 of the Act further requires that ‘‘before promulgating any general notice of proposed rulemaking that is likely to result in promulgation of any rule that includes any Federal mandate that may result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more (adjusted annually for inflation) in any 1 year, and before promulgating any final rule for which a general notice of proposed rulemaking was published, the agency shall prepare a written statement . . .’’ detailing the effect on State, local and tribal governments and the private sector. The final rules issued today will not result in the expenditure, in the aggregate, of $100,000,000 or more in any one year, and thus preparation of a statement was not required.

G. Effects on the Year 2000 Computer Problem

This rule does not mandate business process changes nor require modifications to computer systems that will detract from resources railroads will apply toward addressing any possible Year 2000 computer problems. Although business process changes and modifications to computer systems may occur as this rule is implemented, railroads would only voluntarily make such changes and modifications before the year 2000.

Implementation of certain inspection, testing, and maintenance requirements, as well as recordkeeping and tracking of defective equipment requirements, would require use of the same resources railroads will apply toward resolving Year 2000 computer problems. However, FRA will not require that such implementation occur before July, 2000. FRA will apply requirements for inspection, testing, and maintenance of equipment, and recordkeeping and tracking, at an earlier date only to those railroads that indicate a desire for this to occur. Because certain of the requirements for inspection, testing, and maintenance offer railroads an opportunity to achieve efficiencies and savings, some railroads may voluntarily choose to have these requirements applied to them earlier. FRA notes that its implementation schedule for inspection, testing, and maintenance requirements, as well as recordkeeping and tracking requirements, was also developed taking into consideration the time generally needed for railroads to develop maintenance programs and implement training requirements as required by this rule.

XI. List of Subjects

49 CFR Part 216

Penalties, Railroad safety, Reporting and recordkeeping requirements, Special notice for repairs.

49 CFR Part 223

Glass and glass products, Glazing, Penalties, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 229

Locomotives, Penalties, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 231

Penalties, Railroad safety, Safety appliances.

49 CFR Part 232

Penalties, Power brakes, Railroad safety, Reporting and recordkeeping requirements.

49 CFR Part 238

Fire prevention, Incorporation by reference, Passenger equipment, Penalties, Railroad safety, Reporting and recordkeeping requirements.

The Rule

In consideration of the foregoing, chapter II, subtitle B of title 49, Code of Federal Regulations is amended as follows:

PART 216—[AMENDED]

1. The authority citation for part 216 is revised to read as follows:

Authority: 49 U.S.C. 20102–04, 20111, 20133, 20137–38, 20141, 20143, 20301–02, 20701–02, 21301–02, 21304; 49 CFR 1.49(c), (m).

2. Section 216.1(a) is revised to read as follows:

§ 216.1 Application.

(a) This part applies, according to its terms, to each railroad that uses or operates—

(1) A railroad freight car subject to part 215 of this chapter;

(2) A locomotive subject to 49 U.S.C. chapter 207 (49 U.S.C. 20701–03); or

(3) Railroad passenger equipment subject to part 238 of this chapter.

* * * * *

§ 216.3 [Amended]

3. Section 216.3(b) is amended by removing the phrase ''section 206 of the Federal Railroad Safety Act of 1970 (45 U.S.C. 435)'' and adding in its place the phrase ''49 U.S.C. 20105''.

§ 216.5 [Amended]

4. Section 216.5(c) is amended by adding after ''216.13,'': ''216.14,''.

§ 216.13 [Amended]

5. The first sentence of § 216.13(a) is removed and a new sentence is added in its place to read as follows: ''When an FRA Motive Power and Equipment Inspector or State Equipment Inspector determines a locomotive is not safe to operate in the service to which it is put, whether by reason of nonconformity with the FRA Railroad Locomotive Safety Standards set forth in part 229 of this chapter or the FRA Railroad Locomotive Inspection Regulations set forth in part 230 of this chapter or by reason of any other condition rendering the locomotive unsafe, he or she will notify the railroad in writing that the locomotive is not in serviceable condition.''

5a. The third sentence of § 216.13(a) is amended by removing the phrase ''part 230'' and adding in its place the phrase ''parts 229 and 230''.

6. Section 216.14 is added to read as follows:

§ 216.14 Special notice for repairs—passenger equipment.

(a) When an FRA Motive Power and Equipment Inspector or a State Equipment Inspector determines that railroad passenger equipment is not in conformity with one or more of the requirements of the FRA Passenger Equipment Safety Standards set forth in part 238 of this chapter and that it is unsafe for further service, he or she will issue a written Special Notice to the railroad that the equipment is not in serviceable condition. The Special Notice describes the defect or defects that cause the equipment to be in unserviceable condition. After receipt of the Special Notice, the railroad shall remove the equipment from service until it is restored to serviceable condition. The equipment may not be deemed in serviceable condition until it complies with all applicable requirements of part 238 of this chapter.

(b) The railroad shall notify in writing the FRA Regional Administrator for the FRA region in which the Special Notice was issued when the equipment is returned to service, specifying the repairs completed.

(c) Railroad passenger equipment subject to a Special Notice may be moved from the place where it was found to be unsafe for further service to the nearest available point where the equipment can be repaired, if such movement is necessary to make the repairs. However, the movement is subject to the further restrictions of §§ 238.15 and 238.17 of this chapter.

§ 216.17 [Amended]

7. Section 216.17(a) is amended as follows:

a. By adding, after ''216.13'', ''216.14,'';

b. By adding, after the word ''locomotive,'' in the third sentence, the phrase ''railroad passenger equipment,''; and

c. By revising the fifth sentence to read as follows:

''If upon reinspection, the railroad freight car, locomotive, or passenger equipment is found to be in serviceable condition, or the track is found to comply with the requirements for the class at which it was previously operated by the railroad, the FRA Regional Administrator or his or her agent will immediately notify the railroad, whereupon the restrictions of the Special Notice cease to be effective.''

Subpart B—[Amended]

8. In subpart B of part 216, the phrases ''the FRA Regional Director for Railroad Safety'', ''the FRA Regional Director of Railroad Safety'', ''a Regional Director'' and ''the Regional Director'' are removed, and the phrase ''the FRA Regional Administrator'' is added in their place.

PART 223—[AMENDED]

9. The authority citation for part 223 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20701–20702, 21301–02, 21304; 49 CFR 1.49(c), (m).

10. Section 223.8 is added to subpart B to read as follows:

§ 223.8 Additional requirements for passenger equipment.

In addition to the requirements contained in this part, requirements for emergency window exits and window safety glazing on passenger equipment, as defined in § 238.5 of this chapter, are also found in part 238 of this chapter.

PART 229—[AMENDED]

11. The authority citation for part 229 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20137–38, 20143, 20701–03, 21301–02, 21304; 49 CFR 1.49(c), (m).

12. Section 229.3 is amended by revising paragraph (a) and adding new paragraphs (c), (d), and (e) to read as follows:

§ 229.3 Applicability.

(a) Except as provided in paragraphs (b) through (e) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Paragraphs (a) and (b) of § 229.125 do not apply to Tier II passenger equipment as defined in § 238.5 of this chapter (*i.e.*, passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

(d) On or after November 8, 1999, paragraphs (a)(1) and (b)(1) of § 229.141 do not apply to ''passenger equipment'' as defined in § 238.5 of this chapter, unless such equipment is excluded from the requirements of §§ 238.203 through 238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

(e) Paragraphs (a)(2) through (a)(4), and (b)(2) through (b)(4) of § 229.141 do not apply to ''passenger equipment'' as defined in § 238.5 of this chapter that is placed in service for the first time on or after September 8, 2000, unless such equipment is excluded from the requirements of §§ 238.203 through

238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

PART 231—[AMENDED]

13. The authority citation for part 231 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20131, 20301–03, 21301–02, 21304; 49 CFR 1.49(c), (m).

14. Section 231.0 is amended by redesignating paragraphs (c) through (e) as paragraphs (d) through (f), respectively; by revising paragraph (a); and by adding a new paragraph (c) to read as follows:

§ 231.0 Applicability and penalties.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Except for the provisions governing uncoupling devices, this part does not apply to Tier II passenger equipment as defined in § 238.5 of this chapter (*i.e.*, passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

* * * * *

PART 232—[AMENDED]

15. The authority citation for part 232 is revised to read as follows:

Authority: 49 U.S.C. 20102–03, 20133, 20141, 20301–03, 20306, 21301–02, 21304; 49 CFR 1.49 (c), (m).

16. Section 232.0 is amended by redesignating paragraphs (c) through (e) as paragraphs (d) through (f), respectively; by revising paragraph (a); and by adding a new paragraph (c) to read as follows:

§ 232.0 Applicability and penalties.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage railroads.

(b) * * *

(c) Except for §§ 232.2 and 232.21 through 232.25, this part does not apply to a ''passenger train'' or ''passenger equipment'' as defined in § 238.5 of this chapter that is subject to the inspection and testing requirements contained in part 238 of this chapter.

* * * * *

17. Part 238 is added to read as follows:

PART 238—PASSENGER EQUIPMENT SAFETY STANDARDS

Subpart A—General

Sec.

Subpart B—Safety Planning and General Requirements

Subpart C—Specific Requirements for Tier I Passenger Equipment

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

Subpart E—Specific Requirements for Tier II Passenger Equipment

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

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

Appendix A to Part 238—Schedule of Civil Penalties

Appendix B—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, 20302–03, 20306, and 20701–02; 49 CFR 1.49.

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 July 12, 2001.

(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 shall apply beginning September 9, 1999.

§ 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.

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 design retarding force on the train. A rail car's air brake is not considered effective if its piston travel is in excess of the maximum prescribed limits.

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.

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

Emergency window means that segment of a side-facing glazing panel which has been designed to permit rapid and easy removal 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 volume that extends outside the car body structure of a locomotive.

Fuel tank, internal means a fuel containment volume 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; and

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

(i) Is being handled in accordance with §§ 238.15, 238.17, 238.305(c)(5), 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.

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.

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.

MIL–STD–882C 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.

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.

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.

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 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.

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 at least 50 percent of the time. 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 day engaged in any one readily identifiable type of activity.

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 determined by a railroad to have the knowledge and skills necessary to perform one or more functions required under this part. The railroad determines the qualifications and competencies for employees designated to perform various functions in the manner set forth in this part.

Railroad means any form of nonhighway 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.

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

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 propulsion system 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.

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.

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.

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.

§ 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 $500 and not more than $11,000 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 $22,000 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.

§ 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 July 12, 2001 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 found during a Class I or IA brake test.* 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 found during a Class I or IA brake test (or, for Tier II trains, the equivalent) 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 a 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.* At the place where the railroad first discovers the defect, 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 equipment with 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.

(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 are not considered inoperative power brakes for purposes of this section:

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

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

(C) Excessive piston travel that does not render the power brakes ineffective; 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 train shall be operated at restricted speed not to exceed 20 mph; 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.

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

Beginning July 12, 2001 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) and 238.305(c)(5), 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) *Usual limitations on movement of passenger equipment that develops defects en route.* Except as provided in §§ 238.303(e)(15) and 238.503(f), passenger equipment that develops en route to its destination, after its calendar day inspection was performed and before its next calendar day mechanical inspection is performed, any defect 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 and, if applicable, the special 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 by:

(i) Visual examination to determine whether it shows any sign of damage; and

(ii) Spinning freely its wheel set or manually rotating the bearing to determine whether the bearing makes any unusual noise.

(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 or 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 200 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.

§ 238.19 Reporting and tracking defective passenger equipment.

(a) *General.* Beginning July 12, 2001 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 occurred;

(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.

§ 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, 238.309, 238.311, 238.405, or 238.427; for approval of alternative compliance under § 238.201; 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); 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) Three copies of 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, 1120 Vermont Ave., N.W., Mail Stop 25, Washington, D.C. 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) or (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) Three copies of each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D. C. 20590.

(3) The commenter shall certify that a copy of the comment was served on each petitioner.

(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.

§ 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.

(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 equipment.* In procuring new passenger equipment, each railroad shall ensure that fire safety considerations and features in the design of the equipment reduce the risk of personal injury and equipment damage caused by fire to an acceptable level using MIL–STD–882C as a guide or an alternative, formal safety methodology. 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) Take effective steps to design the equipment to be sufficiently fire resistant so that fire detection devices permit evacuation of all passengers and crewmembers before fire, smoke, or toxic fumes cause injury to any passenger or crewmember.

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

(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, the railroad shall 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 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) Describe the analysis and testing necessary to—

(i) Demonstrate that the fire protection approach taken in the design of the equipment will meet the fire protection requirements of this part, and

(ii) Select materials which help provide sufficient fire resistance to reasonably ensure adequate time to detect a fire and safely evacuate the passengers and crewmembers.

(9) Explain how safety issues are resolved in relation to cost and performance issues in the design of the equipment to reduce the risk of each fire hazard.

(d) *Fire safety analysis for existing passenger equipment.* (1) Not later than July 10, 2000, each passenger railroad shall complete a preliminary fire safety analysis for each category of existing rail equipment and current 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 equipment and 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 fire safety analysis for all categories of equipment and 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 equipment to a new category of 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, ''category of rail equipment and current 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.

§ 238.105 Train hardware and software safety.

These requirements of this section apply to 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 computer 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 software functions as intended.

(c) Under the hardware and software safety program, software that controls or monitors safety functions shall be considered safety-critical unless a completely redundant, failsafe, non-software means ensuring the same function is provided. The hardware and software safety program shall include a description of how the following will be accomplished, achieved, carried out, or implemented to ensure software safety and reliability:

(1) The software design process;

(2) The software design documentation;

(3) The software hazard analysis;

(4) Software safety reviews;

(5) Software hazard monitoring and tracking;

(6) Hardware and software integration safety tests; and

(7) Demonstration of overall software safety as part of the pre-revenue service tests of equipment.

(d) Hardware and software that controls or monitors passenger equipment safety functions shall include design feature(s) that result in a safe condition in the event of a computer hardware or software failure.

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

§ 238.107 Inspection, testing, and maintenance plan.

(a) *General.* Beginning July 12, 2001 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.

§ 238.109 Training, qualification, and designation program.

(a) Beginning July 12, 2001 each railroad shall have adopted a training, qualification, and designation program for employees and contractors that perform safety-related inspections, tests, or maintenance of passenger equipment, and 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 that must be performed on each type of equipment that the railroad operates;

(2) Develop written procedures for the performance of the tasks identified;

(3) Identify the skills and knowledge necessary to perform each task;

(4) Develop or incorporate a training curriculum that includes classroom and

''hands-on'' lessons designed to impart the skills and knowledge identified as necessary to perform each task. The developed or incorporated 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 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 a written examination covering the equipment and tasks for which they are responsible 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 to 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;

(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.

§ 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) The following requirements apply on or after Novermber 8, 1999—

(1) Each passenger car shall have a minimum of four emergency window exits, either in a staggered configuration where practical or with one exit located in each end of each side of the passenger car. If the passenger car has multiple levels, each main level shall have a minimum of four emergency window exits, either in a staggered configuration where practical or with one exit located in each end of each side on each level.

(2) Each sleeping car, and any similarly designed car having a number of separate compartments intended to be occupied by passengers or train crewmembers, shall have at least one emergency window exit in each compartment.

(3) Each emergency window exit shall be designed to permit rapid and easy removal during an emergency situation without requiring the use of a tool or other implement.

(b) Each emergency window exit in a passenger car, including a sleeper 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 unobstructed opening with dimensions of 26 inches horizontally by 24 inches vertically.

(c) *Marking and instructions.* [Reserved]

§ 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.

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 (§ 238.203B-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.

(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).

§ 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.* Three copies of each petition shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D.C. 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) Three copies of each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D. C. 20590.

(3) The commenter shall certify that a copy of the comment was served on each petitioner.

(h) *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 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.

§ 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) 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 an upward or downward vertical force of 200,000 pounds without failure, in lieu of the forward end anti-climbing mechanism requirements described in paragraph (a) of this section.

§ 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. 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.

(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.

§ 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 a force of 2g vertical on the mass of the truck and a force of 250,000 pounds in any horizontal direction on the truck. 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 components attached to the truck by design.

§ 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.

(a) *External fuel tanks.* External locomotive fuel tanks shall comply with the requirements contained in Appendix D to this part, or an industry standard providing at least an equivalent level of safety if approved by FRA under § 238.21.

(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 ⅜-inch thick 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. Skid plates are not required.

§ 238.225 Electrical system.

All passenger equipment shall comply with the following:

(a) *Conductors.* Conductor sizes shall be selected on the basis of current-carrying capacity, mechanical strength, temperature, flexibility requirements, and maximum allowable voltage drop. 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 over-voltage 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 pre-revenue 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.

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 and § 232.2 of this chapter.

§ 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) The brake system 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.

(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.

(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 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, the railroad shall ensure that all the cars in the train consist are set up in the same operating mode.

§ 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) 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.

§ 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.

(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) *Marking and instructions.* [Reserved]

§ 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:

(1)(i) A second person qualified on the signal system and brake application procedures 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.

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 July 12, 2001 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.

§ 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 at the time it is added to the train unless documentation is provided to the train crew that an exterior mechanical inspection was performed on the car the previous calendar day.

(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 carry weight; 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 $\frac{5}{16}$ 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) 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 the same manner as a running gear defect pursuant to § 238.17.

(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.

(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 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.

§ 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 paragraph (c)(5) 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) The words ''Emergency Brake Valve'' are legibly stenciled or marked near each brake pipe valve or shown on an adjacent badge plate.

(3) 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.

(4) All trap doors safely operate and securely latch in place in both the up and down position.

(5) All end doors and side doors operate safely and as intended. If a door is defective and all of the following conditions are satisfied, the car may remain in passenger service until the next interior calendar day mechanical inspection is due at which time the appropriate repairs shall be made:

(i) A qualified person or a qualified maintenance person determines that the repairs necessary to bring a door into compliance cannot be performed at the time the interior mechanical inspection is conducted;

(ii) A qualified person or a qualified maintenance person determines that it is safe to move the equipment in passenger service;

(iii) At least one operative and accessible door is available on each side of the car; and

(iv) A notice is prominently displayed directly on the defective door indicating that the door is defective.

(6) All safety-related signage is in place and legible.

(7) All vestibule steps are illuminated.

(8) All D rings, pull handles, or other means to access manual door releases are in place based on a visual inspection.

(9) All emergency equipment, including a fire extinguisher, pry bar, auxiliary portable lighting, and first aid kits, as applicable, are in place.

(d) 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.

(e) *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 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.

§ 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) As part of the periodic mechanical inspection the railroad shall verify the condition of the following interior and exterior mechanical components, which shall be inspected not less frequently than every 92 days. At a minimum, this inspection shall determine that:

(1) 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.

(2) Emergency lighting systems are operational.

(3) 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''.

(4) All trucks are equipped with a device or securing arrangement to prevent the truck and car body from separating in case of derailment.

(5) All center castings on trucks are not cracked or broken.

(6) 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.

(7) 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.

(8) 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.

(9) 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.

(d) 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.

(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) Each coupler is in the following condition:

(i) The distance between the guard arm and the knuckle nose is not more than 5½ 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.

(e) The periodic mechanical inspection shall specifically include the manual door releases, which shall be inspected not less frequently than every 368 days. At a minimum, this inspection shall determine that all manual door releases operate as intended.

(f) *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 date and place of the periodic inspection shall be recorded and the person performing the inspection and that person's supervisor shall sign the form, if possible. This record shall be kept in the railroad's files, the cab of the locomotive, or a designated location in the passenger car until the next periodic mechanical inspection of the same type is performed.

(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.

(g) Nonconformity with any of the conditions set forth in this section renders the car or vehicle defective whenever discovered in service.

§ 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 1,476 days for a coach or vehicle equipped with a 26–C or equivalent brake system; and

(2) Every 1,104 days for a coach or vehicle equipped with other than a 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.

§ 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, N.W., Washington, D.C. 20005. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1120 Vermont Avenue, N.W., Suite 7000, Washington, D.C. or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C.

(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) The 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.

§ 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 car added to a passenger train shall receive a Class I brake test at the time it is added to the train unless documentation 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.

(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 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 an actuator, or by observation of the clearance between the brake shoe and the wheel or between the brake pad and the brake disc with the brakes released;

(4) The communicating signal system is tested and known to be operating as intended;

(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 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.

(h) A qualified maintenance person that performs a Class I brake test on a train shall place in the cab of the controlling locomotive of the train a written statement, which shall be retained in the cab until the next Class I brake test is performed and which shall contain the following information:

(1) The date and time the Class I brake test was performed;

(2) The location where the test was performed;

(3) The identification number of the controlling locomotive of the train; and

(4) The total number of cars inspected during the Class I brake test.

(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.

§ 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 I or Class IA brake test may be performed at a shop or yard site and need not be repeated at the first passenger terminal if the train remains on a source of compressed air and in the custody of the train crew.

(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) In performing a Class IA brake test, it shall be determined 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) On MU equipment, the emergency brake application and the deadman pedal or other emergency control devices function as intended;

(4) Each angle cock and cutout cock is properly set;

(5) Brake pipe pressure changes at the rear of the train are properly communicated to the controlling locomotive; and

(6) The communicating signal system is tested and known to be operating as intended;

(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.

§ 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 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) On MU equipment, the emergency brake application and deadman pedal or other emergency control devices function as intended; and

(3) The communicating signal system is tested and known to be operating as intended.

§ 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.

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 750,000 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.

§ 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 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.

(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.

§ 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 on a passenger car and a power car cab shall also:

(1) Resist the impact of a 12-pound solid steel sphere at the maximum speed at which the vehicle will operate, at an angle of 90 degrees to the window's surface, with no penetration or spall; and

(2) Demonstrate anti-spalling performance by the use of a 0.001 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.

(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 the alternative of the requirements specified in paragraphs (a) and (b) of this section, until the window is replaced and the railroad has exhausted its inventory of replacement windows conforming to the requirements of this paragraph that it held as of May 12, 1999.

(1) Each end-facing exterior window shall resist the impact of a 12-pound solid steel sphere at the maximum speed at which the vehicle will operate, at an angle equal to the angle between the window's surface as installed and the direction of travel, with no penetration or spall.

(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 0.001 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.

(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.

§ 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 non-combustible 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 over-voltage 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) *Lateral accelerations.* Passenger cars shall not operate under conditions that result in a steady-state lateral acceleration of 0.1g (measured parallel to the car floor inside the passenger compartment) or greater.

(c) *Hunting oscillations.* 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) *Ride vibration (quality).* (1) 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 1 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.

(2) *Compliance.* Compliance with the requirements contained in this paragraph shall be demonstrated during the equipment pre-revenue service acceptance tests required under § 238.111, and § 213.345 of this chapter.

(3) For purposes of this paragraph, acceleration measurements shall be processed through a filter having a band pass of 0.5 to 10 Hz.

(e) *Overheat sensors.* Overheat sensors for each wheelset journal bearing shall be provided. The sensors may be placed either on-board the equipment or at reasonable intervals along the railroad's right-of-way.

§ 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 hand brakes, sill steps, end handholds, and side handholds that meet the requirements contained in § 231.14 of this chapter. If the trainsets are semi-permanently coupled, these safety appliances are 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.

§ 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 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.

§ 238.437 Emergency communication.

A means of emergency communication throughout a train shall be provided and shall include the following:

(a) Except as further specified, transmission locations at each end of each passenger car, adjacent to the car's end doors, and accessible to both passengers and crewmembers without requiring the use of a tool or other implement. If the passenger car does not exceed 45 feet in length, only one transmission location is required;

(b) Transmission locations that are clearly marked with luminescent material;

(c) Clear and understandable operating instructions at or near each transmission location; and

(d) Back-up power for a minimum period of 90 minutes.

§ 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) *Marking and instructions.* [Reserved]

§ 238.441 Emergency roof entrance location.

(a) Each passenger car and power car cab shall have a minimum of one roof hatch emergency entrance location with a minimum opening of 18 inches by 24 inches, or at least one clearly marked structural weak point in the roof having a minimum opening of the same dimensions to provide quick access for properly equipped emergency response personnel.

(b) *Marking and instructions.* [Reserved]

§ 238.443 Headlights.

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 focused to illuminate a person standing between the rails 800 feet ahead of the power car under clear weather conditions. The other headlight shall be focused to illuminate a person standing between the rails 1500 feet ahead of the power car under clear weather conditions.

§ 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.

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Figure 1—to Subpart E

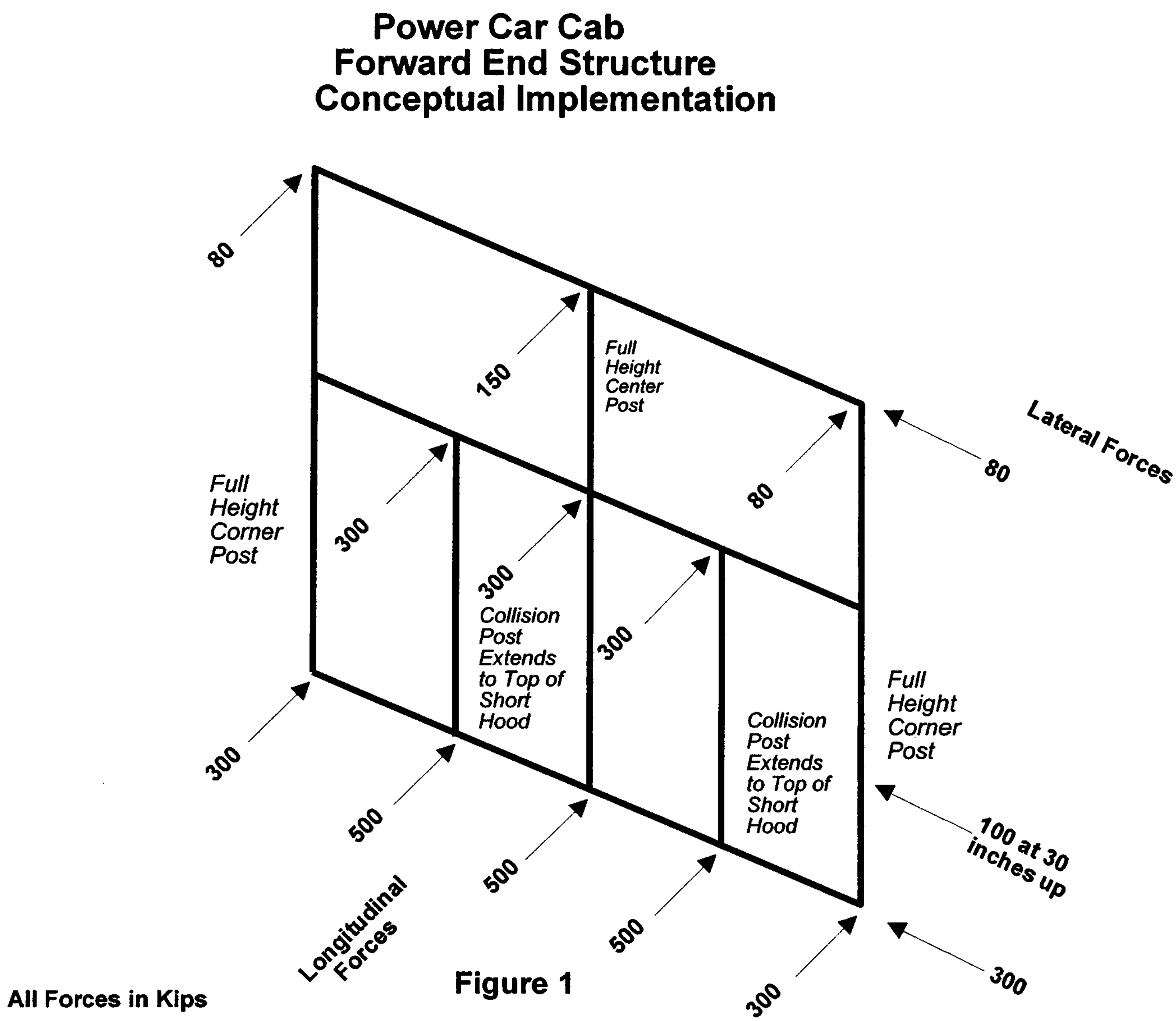

Figure 1

Figure 2—to Subpart E

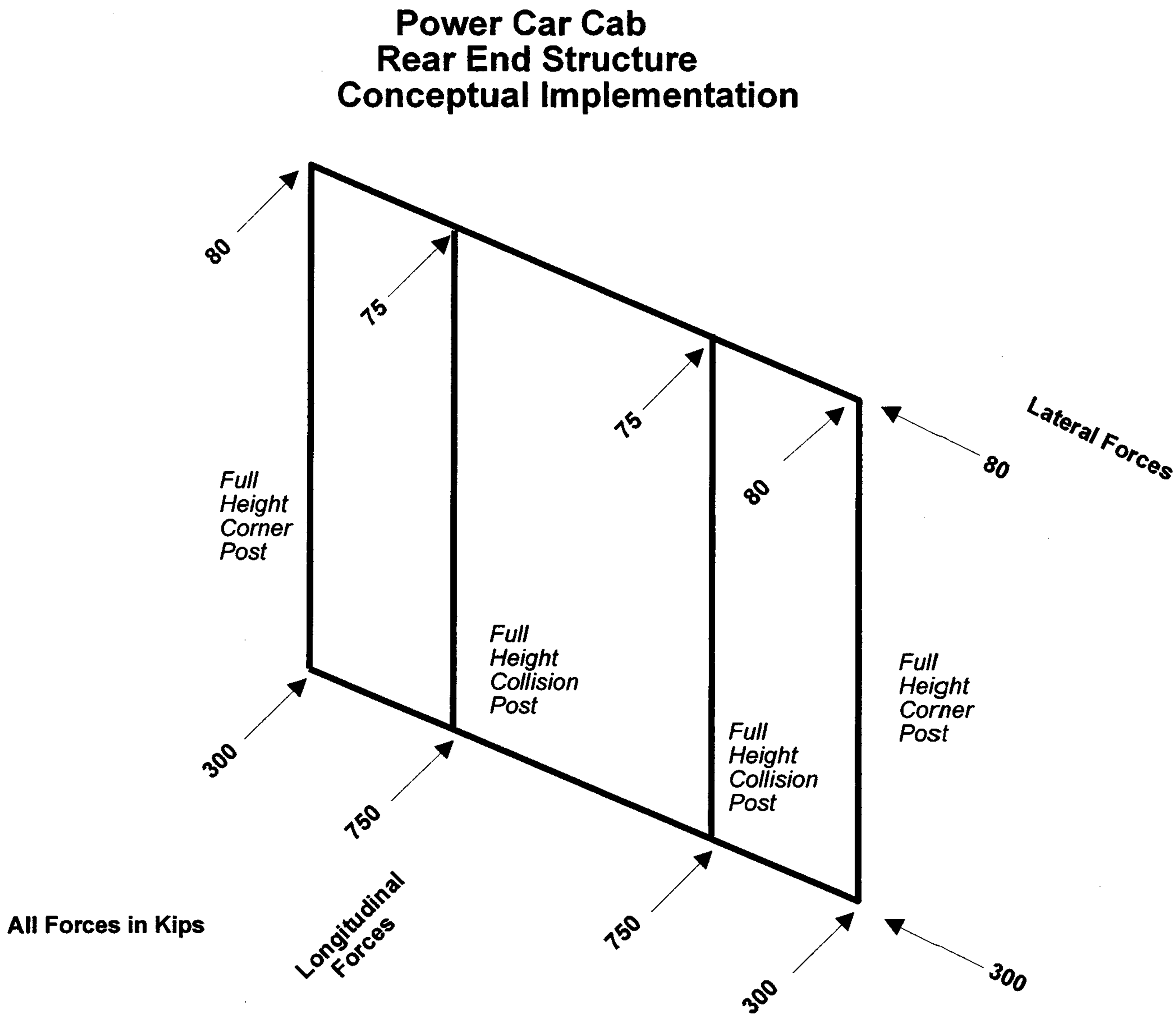

Figure 2

Figure 3—to Subpart E

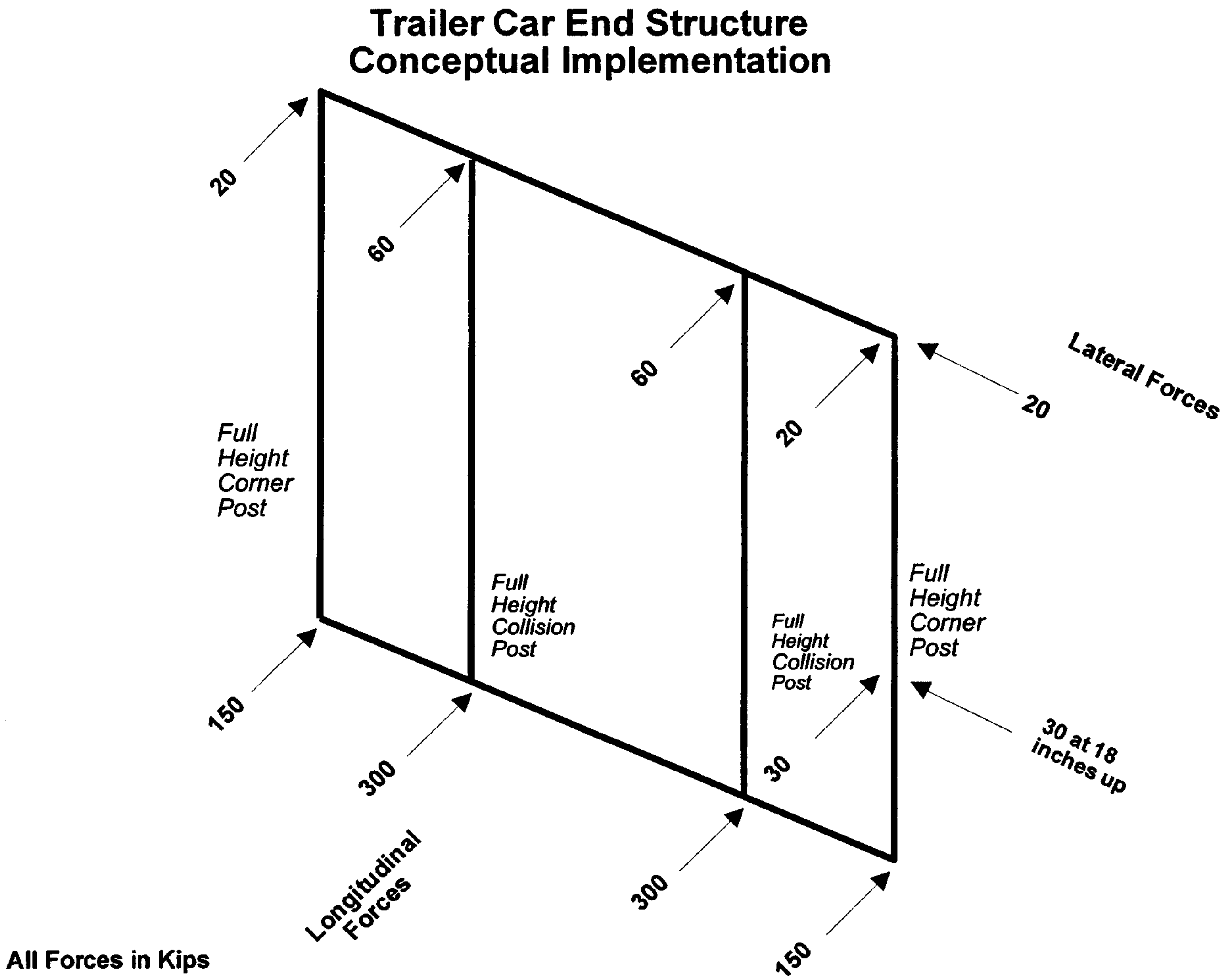

Figure 3

Figure 4—to Subpart E

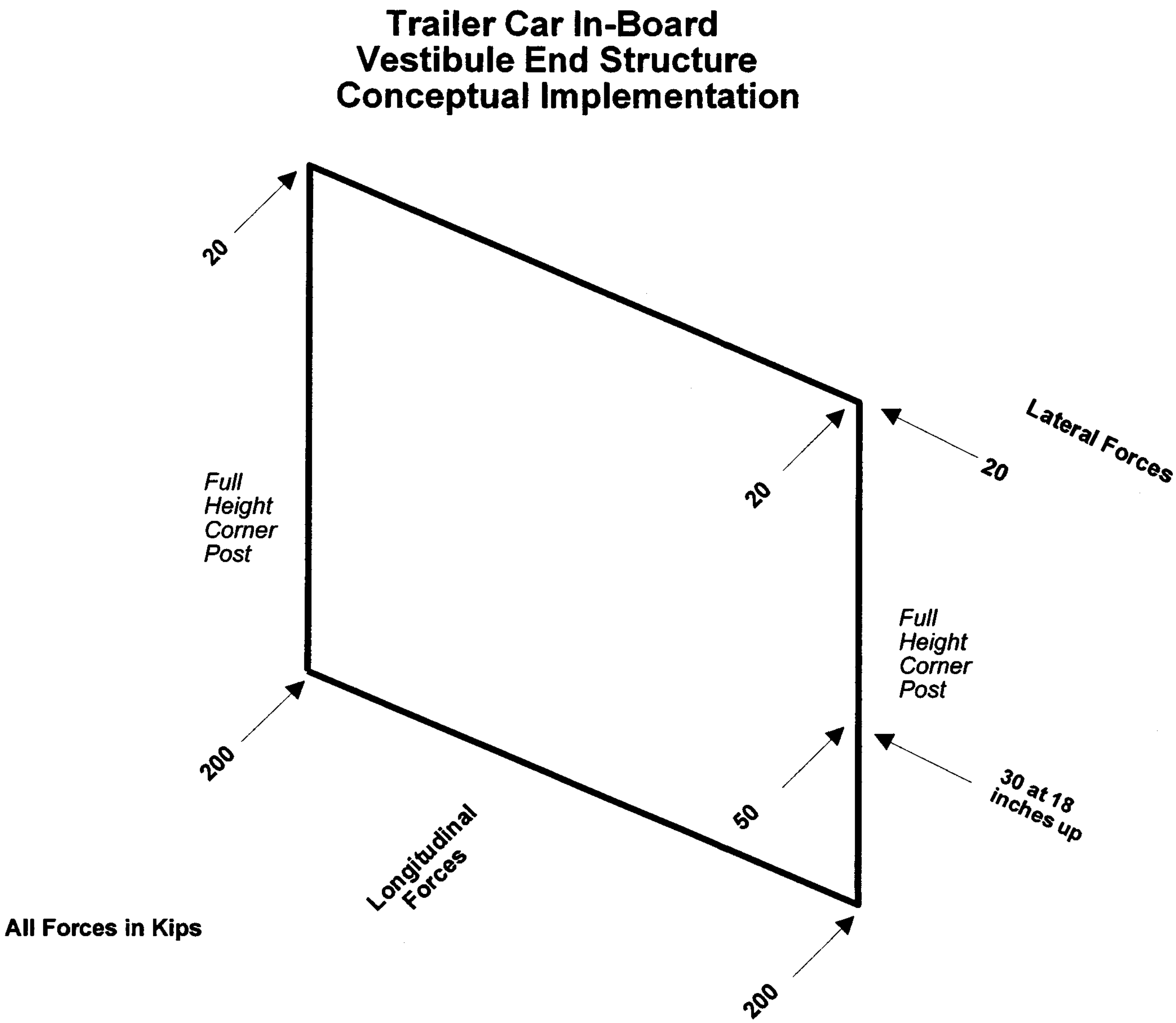

Figure 4

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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.* Movement of a train with a defect other than a power brake defect shall be conducted in accordance with § 238.17, with the following exception: When a failure of the 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.

§ 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, 1120 Vermont Ave, Mail Stop 25, Washington, D.C. 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) Three copies of each comment shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1120 Vermont Ave., Mail Stop 25, Washington, D.C. 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.

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 MIL–STD–882C as a guide or an alternative formal, safety methodology; 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 MIL–STD–882C as a guide or an alternative, formal safety methodology;

(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.

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 hardware and software safety:		
(a), (b), (c) Failure to develop and maintain hardware and software safety program	7,500	11,000
(d) Failure to include required design features in hardware and software	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
(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
238.115 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
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
238.231 Brake system: (a)–(g), (i)–(m)	2,500	5,000
(h) Hand or parking brake missing or inoperative	5,000	5,000
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

APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES[1]—Continued

Section	Violation	Willful violation
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 2½″ 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
(vi) Flange thickness of:	2,500	5,000
(A) ⅞″ or less but more than 13/16″.		
(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
(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) Emergency brake valve not stenciled or marked	2,500	5,000
(c)(3) Door or cover plates not properly marked	2,500	5,000
(c)(4) Trap door unsafe or improperly secured	2,500	5,000
(c)(5) Doors not safely operate as intended	2,500	5,000
(i)–(iv) Condition for operating defective door not satisfied	2,000	4,000
(c)(6) Safety signage not in place or legible	1,000	2,000
(c)(7) Vestibule steps not illuminated	2,000	4,000
(c)(8) Access to manual door release not in place	2,000	4,000
(c)(9) Emergency equipment not in place	1,000	2,000
(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
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) Floors not free of condition that creates hazard	2,500	5,000
(c)(2) Emergency lighting not operational	2,500	5,000
(c)(3) Switches not in proper condition	2,500	5,000

APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES[1]—Continued

Section	Violation	Willful violation
(c)(4) Truck not equipped with securing arrangement	2,500	5,000
(c)(5) Truck center casting cracked or broken	5,000	7,500
(c)(6) 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
(c)(7) General conditions endangering crew, passengers	2,500	5,000
(d)(1) Seat or seat attachment broken or loose	2,500	5,000
(d)(2) Luggage rack broken or loose	2,500	5,000
(d)(3) Bed, bunks, or restraints broken or loose	2,500	5,000
(d)(4) Emergency window exit not properly operate	2,500	5,000
(d)(5) Coupler not in proper condition	2,500	5,000
(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:		
(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
(h) 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
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:		

APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES[1]—Continued

Section	Violation	Willful violation
(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:		
(a) General design	2,500	5,000
(b) Lateral accelerations	2,500	5,000
(c) Hunting Oscillations	2,500	5,000
(d) Ride vibrations	2,500	5,000
(e) Overheat sensors	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
(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 Emergency communication	2,500	5,000
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 hatch entrance location	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

APPENDIX A TO PART 238—SCHEDULE OF CIVIL PENALTIES[1]—Continued

Section	Violation	Willful violation
(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 $10,000 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 $22,000 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.

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 provides 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, 1120 Vermont Ave., N.W., Suite 7000 or at the Office of the Federal Register, 800 North Capitol Street, N.W., Suite 700, Washington, D.C. 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 1166–91, 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 3675–95, Standard Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source.

(v) ASTM E 119–98, 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 648–97, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

(viii) ASTM E 662–97, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.

(ix) ASTM E 1354–97, Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.

(x) ASTM E 1537–98, Standard Test Method for Fire Testing of Upholstered Seating Furniture.

(2) General Services Administration, Federal Supply Service, Specification Section, 470 E. L'Enfant Plaza, S.W., Suite 8100, Washington, D.C., 20407. FED–STD–191A—Textile Test Method 5830, Leaching Resistance of Cloth; Standard Method (July 20, 1978).

(3) National Electrical Manufacturers Association (NEMA), 1300 North 17th St, Suite 1847, Rosslyn, VA 22209. NEMA WC 3/ICEA S–19–1981, Rubber Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy (part 6, section 19, paragraph 6), Revision 1, Sixth Edition (February, 1994).

(4) State of California, Department of Consumer Affairs, Bureau of Home Furnishings and Thermal Insulation, 3485 Orange Grove Avenue, North Highlands, CA 95660. California Technical Bulletin 133, Flammability Test Procedure for Seating Furniture for Use in Public Occupancies (January, 1991).

(5) The Institute of Electrical and Electronics Engineers, Inc. (IEEE), 345 East 47th Street, New York, New York 10017. ANSI/IEEE Std. 383–1974, IEEE Standard for Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations (1974).

(6) Underwriters Laboratories, Inc. (UL), 333 Pfingsten Road, Northbrook, IL 60062–2096.

(i) UL 44, Standard for Safety for Thermoset-Insulated Wires and Cables, 14th edition (January 27, 1997).

(ii) UL 83, Standard for Safety for Thermoplastic-Insulated Wires and Cables, 12th edition (September 29, 1998).

(b) *Definitions.* As used in this appendix—

Critical radiant flux (C.R.F.) means, as defined in ASTM E 648, 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, 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.

Peak heat release rate ($\dot{q}''_{max}$) means, as defined in ASTM E 1354, the maximum heat release rate per unit (kW/m^2).

Specific optical density (D_s) means, as defined in ASTM E 662, 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.

Time to ignition (t_{ig}) means, as defined in ASTM E 1354, the time in seconds (s) to sustained flaming.

Time to ignition/Peak heat release rate ($t_{ig}/\dot{q}''_{max}$) means the ratio of a given material's time to ignition to its peak (maximum) heat release rate as measured in the Cone Calorimeter (ASTM E 1354) under the stipulated exposure conditions.

(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:

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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 3675-95	$I_S \leq 25$
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 175$
Fabrics	All [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 662-97	$D_S (4.0) \leq 200$
Vehicle Components [9, 10, 11, 12]	All except flexible cellular foams, floor coverings, light transmitting plastics, and items addressed under other specific categories [1, 2]	ASTM E 162-98	$I_S \leq 35$
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 200$
	Flexible cellular foams [1, 2]	ASTM D 3675-95	$I_S \leq 25$
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 175$
	Floor covering [13, 14]	ASTM E 648-97	C.R.F. ≥ 5 kW/m^2
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 200$
	Light transmitting plastics [2, 15]	ASTM E 162-98	$I_S \leq 100$
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 200$
	Elastomers [16]	ASTM C 1166-91	Pass
		ASTM E 662-97	$D_S (1.5) \leq 100$ $D_S (4.0) \leq 200$
Wire and Cable	Low voltage wire and cable	NEMA WC 3/ ICEA S-19-1981, paragraph 6.19.6; or UL 44 and UL 83 [17]	Pass
		ASTM E 662-97	$D_S (4.0) \leq 200$ (flaming) $D_S (4.0) \leq 75$ (non-flaming)
	Power cable	ANSI/IEEE Std 383-1974 [18]	Pass
		ASTM E 662-97	$D_S (4.0) \leq 200$ (flaming) $D_S (4.0) \leq 75$ (non-flaming)
Structural Components [19]	Flooring [20], Other [21]	ASTM E 119-98	Pass

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[1] Materials tested for surface flammability shall not exhibit any flaming running or dripping.

[2] The ASTM E 662–97 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 or mattress assembly (including cushions, fabric layers, upholstery) according to ASTM E 1537–98 with application of pass/fail criteria of California Technical Bulletin 133 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 assemblies will be used in relation to the risk of vandalism, puncture, cutting, or other acts which may expose the individual components of the assemblies.

[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.

[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] As a minimum, combustible component materials required to be tested include seat and mattress frames, wall and ceiling panels, seat and toilet shrouds, tray and other tables, partitions, shelves, windscreens, HVAC ducting, thermal and acoustic insulation, exterior plastic components, and interior and exterior box covers.

[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 may be exempted from fire and smoke emission performance requirements, provided that the surface area of any individual small part is not ≥16 square inches (100 cm²) 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 of flame spread.

[11] If the surface area of any individual small part is less than 16 square inches (100 cm²) in end use configuration, materials used to fabricate such small part shall be tested in accordance with ASTM E 1354–97, unless such small part has been shown not to contribute materially to fire growth following an appropriate fire hazard analysis as specified in Note 10. Materials tested in accordance with ASTM E 1354–97 shall meet the performance criteria of $t_{ig}/q_{max} \leq 1.5$. Testing shall be at 50 kW/m² applied heat flux.

[12] Assessment of smoke generation by small miscellaneous, discontinuous parts may be made by utilizing the results from the ASTM E1354–97 test procedure conducted in accordance with Note 11, rather than the ASTM E 662–97 test procedure, if an appropriate fire hazard analysis is provided which addresses the location and quantity of the materials used, and the vulnerability of the materials to ignition and contribution of smoke spread.

[13] Carpeting used as a wall or ceiling covering shall be tested as a vehicle component.

[14] Floor covering shall be tested with padding in accordance with ASTM E 648–97, if the padding is used in the actual installation.

[15] For double window glazing, only the interior glazing is required to meet the materials requirements specified herein. (The exterior glazing need not meet these requirements.)

[16] Elastomeric materials used for parts having a surface area ≥16 square inches (100 cm²) shall be tested in accordance with ASTM C 1166–91. As a minimum, parts required to be tested include window gaskets, door nosing, diaphragms, and roof mats.

[17] Testing shall be conducted in accordance with NEMA WC 3/ICEA S–19–1981, paragraph 6.19.6; or UL 44 for thermosetting wire insulation and UL 83 for thermoplastic wire insulation.

[18] Testing shall be conducted in accordance with ANSI/IEEE Standard 383–1974, section 2.5, with the additional requirement that circuit integrity shall continue for 5 minutes after the start of the test.

[19] Penetrations (ducts, etc.) shall be designed to prevent fire and smoke from entering a vehicle, and representative penetrations shall be included as part of test assemblies.

[20] Structural flooring assemblies 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 the specimen represents a true test of 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.

[21] Portions of the vehicle body (including equipment carrying portions of a vehicle's roof but not including floors) 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.

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.

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Jolene M. Molitoris,

Federal Railroad Administrator.

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