TESTING AND INSPECTIONS OF POWER BRAKES

Because of the complexity of the power brake regulations, I will first summarize the rule and then reproduce the entire rule from the Code of Federal Regulations.

HIGHLIGHTS of the new rule include:

1. The four existing types of brake inspections have been given new identifications—

   The initial terminal test will now be called a Class I brake test; the former 1,000 mile test is now Class IA; the intermediate terminal test is Class II; and the brake pipe continuity test is now Class III. In addition, there is a new fifth type test required for so-called “extended haul trains”.

2. A Class I brake test-initial terminal inspection is required at the following locations:

   (1) The location where the train is originally assembled ("initial terminal");

   (2) A location where the train consist is changed other than by:

       (i) Adding a single car or a solid block of cars;

       (ii) Removing a single car or a solid block of cars;

       (iii) Removing cars determined to be defective under this chapter; or

       (iv) A combination of the changes listed above.

   (3) A location where the train is off air for a period of more than four hours;

   (4) A location where a unit or cycle train has traveled 3,000 miles since its last Class I brake test; and

   (5) A location where the train is received in interchange if the train consist is changed other than by:

       (i) Removing a car or a solid block of cars from the train;

       (ii) Adding a previously tested car or a previously tested solid block of cars to the train;
(iii) Changing motive power;
(iv) Removing or changing the caboose; or
(v) Any combination of the changes listed in (5) of this section.

(A) If changes other than those contained in (5) are made to the train consist when it is received in interchange and the train will move 20 miles or less, then the railroad may conduct a Class II brake test.

3. Class IA brake tests-1,000-mile inspection requirements:

Except as provided for extended haul trains, each train shall receive a Class IA brake test performed by a qualified person at a location that is not more than 1,000 miles from the point where any car in the train last received a Class I or Class IA brake test. The most restrictive car or block of cars in the train shall determine the location of this test.

4. (a) A Class II-intermediate test- shall be conducted at a location, other than the initial terminal of a train, on the following equipment when added to a train:

(1) Each car or solid block of cars that has not previously received a Class I brake test or that has been off air for more than four hours;

(2) Each solid block of cars that is comprised of cars from more than one previous train; and

(3) Each solid block of cars that is comprised of cars from only one previous train but the cars of which have not remained continuously and consecutively coupled together with the train line remaining connected, other than for removing defective equipment, since being removed from its previous train.

5. (a) A Class III brake test-trainline continuity inspection- shall be performed on a train to test the train brake system when the configuration of the train has changed as follows:

(1) Where a locomotive or a caboose is changed;

(2) Where a car or a block of cars is removed from the train with the consist otherwise remaining intact;

(3) At a point other than the initial terminal for the train, where a car or a solid block of cars that is comprised of cars from only one previous
train the cars of which have remained continuously and consecutively coupled together with the trainline remaining connected, other than for removing defective equipment, since being removed from its previous train that has previously received a Class I brake test and that has not been off air for more than four hours is added to a train;

(4) At a point other than the initial terminal for the train, where a car or a solid block of cars that has received a Class I or Class II brake test at that location, prior to being added to the train, and that has not been off air for more than four hours is added to a train; or

(5) Whenever the continuity of the brake pipe is broken or interrupted.

6. Class III brake tests-trainline continuity inspection is required when the configuration of the train has changed as follows:

(1) Where a locomotive or a caboose is changed;

(2) Where a car or a block of cars is removed from the train with the consist otherwise remaining intact;

(3) At a point other than the initial terminal for the train, where a car or a solid block of cars that is comprised of cars from only one previous train the cars of which have remained continuously and consecutively coupled together with the trainline remaining connected, other than for removing defective equipment, since being removed from its previous train that has previously received a Class I brake test and that has not been off air for more than four hours is added to a train;

(4) At a point other than the initial terminal for the train, where a car or a solid block of cars that has received a Class I or Class II brake test at that location, prior to being added to the train, and that has not been off air for more than four hours is added to a train; or

(5) Whenever the continuity of the brake pipe is broken or interrupted.

7. Tests of extended haul trains:

The 1,000 mile inspection test was not extended to 1,500 miles as proposed by AAR. However, a railroad may designate in writing to the FRA certain trains as “extended haul” trains, in which case any such train will be permitted to move up to 1,500 miles between brake tests and inspections.

(a) A railroad may be permitted to move a train up to, but not exceeding, 1,500 miles between brake tests and inspections if the railroad designates a
train as an extended haul train. In order for a railroad to designate a train as an extended haul train, all of the following requirements must be met:

(1) The railroad must designate the train in writing to FRA’s Associate Administrator for Safety. This designation must include the following:

(i) The train identification symbol or identification of the location where extended haul trains will originate and a description of the trains that will be operated as extended haul trains from those locations;

(ii) The origination and destination points for the train;

(iii) The type or types of equipment the train will haul; and

(iv) The locations where all train brake and mechanical inspections and tests will be performed.

(2) A Class I brake test shall be performed at the initial terminal for the train by a qualified mechanical inspector.

(3) A freight car inspection pursuant to part 215 shall be performed at the initial terminal for the train and shall be performed by an inspector designated under §215.11.

(4) All cars having conditions not in compliance with part 215 (freight car standards) at the initial terminal for the train shall be either repaired or removed from the train. Except for a car developing such a condition en route, no car shall be moved of this chapter in the train.

(5) The train shall have no more than one pick-up and one set-out en route, except for the set-out of defective equipment pursuant to the requirements of this chapter.

(i) Cars added to the train en route shall be inspected pursuant to the requirements contained in paragraphs (a)(2) through (a)(5) of this section at the location where they are added to the train.

(ii) Cars set out of the train en route shall be inspected pursuant to the requirements contained in paragraph (a)(6) of this section at the location where they are set out of the train.
(6) At the point of destination, if less than 1,500 miles from the train’s initial terminal, or at the point designated by the railroad pursuant to paragraph (a)(1)(iv) of this section, not to exceed 1,500 miles, an inbound inspection of the train shall be conducted by a qualified mechanical inspector to identify any defective, inoperative, or ineffective brakes or any other condition not in compliance with this part as well as any conditions not in compliance with part 215 (freight car regulations) and part 231 (safety appliance standards) of this chapter.

(7) The railroad shall maintain a record of all defective, inoperative, or ineffective brakes as well as any conditions not in compliance with part 215 and part 231 of this chapter discovered at anytime during the movement of the train. These records shall be retained for a period of one year and made available to FRA upon request. The records required by this section may be maintained either electronically or in writing.

(8) In order for an extended haul train to proceed beyond 1,500 miles, the following requirements shall be met:

(i) If the train will move 1,000 miles or less from that location before receiving a Class IA brake test or reaching destination, a Class I brake test shall be conducted to ensure 100 percent effective and operative brakes. The inbound inspection required by paragraph (a)(6) of this section may be used to meet this requirement provided it encompasses all the inspection elements contained in the Class I inspections.

(ii) If the train will move greater than 1,000 miles from that location without another brake inspection, the train must be identified as an extended haul train for that movement and shall meet all the requirements contained in paragraphs (a)(1) through (a)(7) of this section. Such trains shall receive a Class I brake test by a qualified mechanical inspector to ensure 100 percent effective and operative brakes, a freight car inspection pursuant to part 215 by an inspector designated under §215.11, and all cars containing non-complying conditions under part 215 shall either be repaired or removed from the train. The inbound inspection required by paragraph (a)(6) of this section may be used to meet these inspection requirements provided it encompasses all the inspection elements contained paragraphs (a)(2) through (a)(4) of this section.
(9) FRA inspectors shall have physical access to visually observe all brake and freight car inspections and tests required by this section.

(b) Failure to comply with any of the requirements contained in paragraph (a) of this section will be considered an improper movement of a designated priority train for which appropriate civil penalties may be assessed as outlined in Appendix A to this part. Furthermore, FRA’s Associate Administrator for Safety may revoke a railroad’s ability to designate any or all trains as extended haul trains for repeated or willful noncompliance with any of the requirements contained in this section. Such a determination will be made in writing and will state the basis for such action.

8. When performing the initial terminal test (i.e., Class I), both sides of the car must be observed during the inspection process. Both sides of the equipment do not need to be inspected at the same time the brakes are applied, so long as proper inspection of the brake components was conducted on both sides sometime during the inspection process. Piston travel on each car must be inspected while the brakes are applied.

9. Cars that have been previously tested must be retested if the equipment is removed from a source of compressed air for longer than 4 hours.

10. In performing a brake test to determine if the brakes apply, any obvious defect may be corrected and the brakes retested. If there is a retest, the brakes must remain applied for at least 3 minutes.

11. A defective car may be moved to the nearest repair point where necessary repairs can be performed. At locations where a railroad uses repair trucks in the same manner as a fixed facility, this may be considered a location where necessary repairs can be made. The FRA will determine on a case by case basis what constitutes the nearest location where repairs can be made.

12. The railroads will be permitted to use an automated tracking system in lieu of required tagging of defective equipment, if the railroad’s system is first approved by FRA.

13. The final rule retained existing requirements that a train have 100% operative brakes when departing an initial terminal. (This does not apply to transfer trains, unless such train originates at a location where repairs can be made). The only exception is for movement of defective cars for repair, but in such case there is an absolute prohibition on moving a train with more than 15% of the cars with brakes cut out, or have inoperative brakes.

14. The new rule does not mandate that dynamic brakes be placed on locomotives. However, where they exist, the locomotive engineer must be notified in writing as to the condition of the dynamic brakes on the controlling locomotive. An inoperative dynamic brake must be repaired within 30 days, at the locomotive’s next periodic inspection,
whichever occurs first. When operating a locomotive with an inoperative dynamic brake, such locomotive must have the capability to control the dynamic brakes on trailing units. Also, the locomotive must have the capability to display to the engineer the deceleration rate of the train or the total train dynamic brake retarding force. The dynamic brake requirements must be incorporated into the engineer certification training program.

15. Railroads are required to include in their operating rules a requirement that a train must be immediately stopped if it exceeds maximum authorized speed more than 5 mph when descending a grade of 1% or greater.

16. The new regulations contain detailed training requirements for each person who will be required to perform any of the brakes tests and inspections. The training must provide the employee with the necessary skills and knowledge necessary to perform any required tasks. Refresher training is required every 3 years. The requirements of the FRA regulations must be spelled out so that the employees can distinguish federal requirements from individual railroad rules. Detailed records must be maintained by the railroads on the training which is provided. Prior training and testing received by an employee may be taken into consideration in determining whether an employee is qualified. Any previous training must be clearly documented, or it cannot be considered. Because some of the rules are new, all employees will need some additional training. The railroads are given 3 years to develop and complete the required training.

17. The use of chemicals in a train air brake system which are known to degrade or harm brake system components, such as alcohol, are prohibited. Yard air sources must be inspected at least twice annually and that two of the inspections be no less than 5 months apart.

18. Regarding single car and repair track tests, the FRA set out the requirements for when and how these tests are to be performed. Where fully equipped mobile repair trucks perform the same type of repairs that were previously performed in the shop or repair tracks, such will be considered shop or repair tracks. However, repair or shop tracks must be at locations that have fixed repair facilities and where all types of repairs are performed on a regular basis. In such case, this would require the car to have its brakes inspected and the car is required to receive a repair track air brake test. The final rule does not increase the frequency at which single car or repair track air brake tests are currently to be performed. A repair track test is required on cars that have inoperative or cut-out brakes when removed from a train, not when just minor repairs are made to the brake system. Cars are permitted to be moved from a location where necessary repairs can be made to a location where single car or repair track repairs are conducted. When being moved to such a location, the cars must be tagged.

19. The FRA will continue to permit roll-by inspections of the release of brakes on trains, and the train speed cannot exceed 10 mph.

20. If a railroad’s collective bargaining agreement provides that carmen alone are to perform the initial terminal test and inspection, carmen will be considered the only
qualified employee to perform such work. The parties to such an agreement would first have to obtain a decision from the Railroad Adjustment Board interpreting the agreement giving the work exclusively to the carmen.

21. Where a railroad intends to put into service new brake system technologies or major upgrades, the railroad must petition FRA for approval.

22. Piston travel for standard 12-inch stroke brake cylinders continues to be 10 1/2 inches. For standard 8 1/2 inch and 10 inch diameter brake cylinders, piston travel found to be less than 7 inches or more than 9 inches must be adjusted to 7 1/2 inches. For non standard equipment, such as WABCOPAC or NYCOPAC truck mounted brake cylinders, the cylinders must have a badge plate, sticker, or marker indicating both the permissible piston travel range for Class I brake tests and the lengths at which the piston travel renders the brake ineffective. The railroads are given 3 years to implement the marking requirement. The railroads are allowed to use indicators for measuring piston travel and brake actuation in place of direct observation. All new equipment must be designed so that it will not be necessary for an inspector to place himself between, on, or under the car to observe brake application or release.

23. The new rules address the issue of “bottling air” on unattended equipment by requiring an emergency brake application be initiated on all equipment prior to its being left unattended.

24. The railroads are encouraged, but not required, to equip yard air sources with air dryers.

25. When a train crew takes charge of a train, the weight and length of the train must be provided to the crew.

POWER BRAKE REGULATIONS REPRODUCED FROM THE CODE OF FEDERAL REGULATIONS:

PART 232--BRAKE SYSTEM SAFETY STANDARDS for FREIGHT and OTHER NON-PASSENGER TRAINS and EQUIPMENT; END-of-TRAIN DEVICES

Subpart A--General

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**Subpart A--General**

§ 232.1 -- Scope.
(a) This part prescribes Federal safety standards for freight and other non-passenger train brake systems and equipment. Subpart E of this part prescribes Federal safety standards not only for freight and other non-passenger train brake systems and
equipment, but also for passenger train brake systems. This part does not restrict a railroad from adopting or enforcing additional or more stringent requirements not inconsistent with this part.

(b) Except as otherwise specifically provided in this paragraph or in this part, railroads to which this part applies shall comply with all the requirements contained in subparts A through C and subpart F of this part beginning on April 1, 2004. Sections 232.1 through 232.13 and 232.17 through 232.21 of this part will become applicable to all railroads to which this part applies beginning on April 1, 2001. Subpart D of this part will become applicable to all railroads to which this part applies beginning on August 1, 2001. Subpart E of this part will become applicable to all trains operating on track which is part of the general railroad system of transportation beginning on April 1, 2001.

(c) A railroad may request earlier application of the requirements contained in subparts A through C and subpart F of this part 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 requirements contained in those subparts.

(d) Except for operations identified in § 232.3(c)(1), (c)(4), and (c)(6) through (c)(8), all railroads which are part of the general railroad system of transportation shall operate pursuant to the requirements contained in this part 232 as it existed on April 1, 2001 and included as Appendix B to this part until they are either required to operate pursuant to the requirements contained in this part or the requirements contained in part 238 of this chapter or they elect to comply earlier than otherwise required with the requirements contained in this part or the requirements contained in part 238 of this chapter.

§ 232.3 -- Applicability.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all railroads that operate freight or other non-passenger train service on standard gage track which is part of the general railroad system of transportation. This includes the operation of circus trains and private cars when hauled on such railroads.

(b) Subpart E of this part, "End-of-Train Devices," applies to all trains operating on track which is part of the general railroad system of transportation unless specifically excepted in that subpart.

(c) Except as provided in § 232.1(d) and paragraph (b) of this section, this part does not apply to:

1. A railroad that operates only on track inside an installation that is not part of the general railroad system of transportation.
2. Intercity or commuter passenger train operations on standard gage track which is part of the general railroad system of transportation;
3. Commuter or other short-haul rail passenger train operations in a metropolitan or suburban area (as described by 49 U.S.C. 20102(1)), including public authorities operating passenger train service;
4. Rapid transit operations in an urban area that are not connected with the general railroad system of transportation;
5. Tourist, scenic, historic, or excursion operations, whether on or off the general railroad system;
6. Freight and other non-passenger trains of four-wheel coal cars;
(7) Freight and other non-passenger trains of eight-wheel standard logging cars if the height of each car from the top of the rail to the center of the coupling is not more than 25 inches; or

(8) A locomotive used in hauling a train referred to in paragraph (c)(7) of this subsection when the locomotive and cars of the train are used only to transport logs.

(d) The provisions formerly contained in Interstate Commerce Commission Order 13528, of May 30, 1945, as amended, now revoked, are codified in this paragraph. This part is not applicable to the following equipment:

   (1) Scale test weight cars.

   (2) Locomotive cranes, steam shovels, pile drivers, and machines of similar construction, and maintenance machines built prior to September 21, 1945.

   (3) Export, industrial, and other cars not owned by a railroad which are not to be used in service, except for movement as shipments on their own wheels to given destinations. Such cars shall be properly identified by a card attached to each side of the car, signed by the shipper, stating that such movement is being made under the authority of this paragraph.

   (4) Industrial and other than railroad-owned cars which are not to be used in service except for movement within the limits of a single switching district (i.e., within the limits of an industrial facility).

   (5) Narrow-gage cars.

   (6) Cars used exclusively in switching operations and not used in train movements within the meaning of the Federal safety appliance laws (49 U.S.C. 20301-20306).

§ 232.5 -- Definitions.
For purposes of this part-

AAR means the Association of American Railroads.

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

Air Flow Indicator, AFM means a specific air flow indicator required by the air flow method of qualifying train air brakes (AFM). The AFM Air Flow Indicator is a calibrated air flow measuring device which is clearly visible and legible in daylight and darkness from the engineer's normal operating position. The indicator face displays:

   (1) Markings from 10 cubic feet per minute (CFM) to 80 CFM, in increments of 10 CFM or less; and

   (2) Numerals indicating 20, 40, 60, and 80 CFM for continuous monitoring of air flow.

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

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 resistor grids or into the catenary or third rail system.

Brake, effective means a brake that is capable of producing its required designed retarding force on the train. A car's air brake is not considered effective if it is not capable of producing its designed retarding force or if its piston travel exceeds:

   (1) 10 1/2 inches for cars equipped with nominal 12-inch stroke brake cylinders; or
(2) the piston travel limits indicated on the stencil, sticker, or badge plate for that brake cylinder.

*Brake, hand* means a brake that can be applied and released by hand to prevent or retard the movement of a locomotive.

*Brake indicator* means a device which indicates the brake application range and indicates whether brakes are applied and released.

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

*Brake, inoperative dynamic* means a dynamic brake that, for any reason, no longer provides its designed retarding force on the train.

*Brake, parking* means a brake that can be applied by means other than by hand, such as spring, hydraulic, or air pressure when the brake pipe air is depleted, or by an electrical motor.

*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 railroad cars for the passage of compressed air.

*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 wheels.

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

*End-of-train device, one-way* means two pieces of equipment linked by radio that meet the requirements of § 232.403.

*End-of-train device, two-way* means two pieces of equipment linked by radio that meet the requirements of §§ 232.403 and 232.405.

*Foul* means any condition which restricts the intended movement of one or more brake system components because the component is snagged, entangled, or twisted.

*Freight car* means a vehicle designed to carry freight, or railroad personnel, by rail and a vehicle designed for use in a work or wreck train or other non-passenger train.

*Initial terminal* means the location where a train is originally assembled.

*Locomotive* means a piece of railroad on-track 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-

1. With one or more propelling motors designed for moving other railroad equipment;
2. With one or more propelling motors designed to transport freight or passenger traffic or both; or
3. Without propelling motors but with one or more control stands.

*Locomotive cab* means that portion of the superstructure designed to be occupied by the crew operating the locomotive.

*Locomotive, controlling* means the locomotive from which the engineer exercises control over the train.
Off air means not connected to a continuous source of compressed air of at least 60 pounds per square inch (psi).

Ordered date or date ordered means the date on which notice to proceed is given by a procuring railroad to a contractor or supplier for new equipment.

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.

Pre-revenue service acceptance testing plan means a document, as further specified in §232.505, prepared by a railroad that explains in detail how pre-revenue service tests of certain equipment demonstrate that the equipment meets Federal safety standards and the railroad’s own safety design requirements.

Previously tested equipment means equipment that has received a Class I brake test pursuant to §232.205 and has not been off air for more than four hours.

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 the day engaged in any one readily identifiable type of activity.

Qualified mechanical inspector means a qualified person who has received, as a part of the training, qualification, and designation program required under §232.203, 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 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 components for which the person is assigned responsibility. Further, the qualified mechanical inspector shall be a person whose primary responsibility includes work generally consistent with the functions listed in this definition.

Qualified person means a person who has received, as a part of the training, qualification, and designation program required under §232.203, instruction and training necessary to perform one or more functions required under this part. The railroad is responsible for determining that the person has the knowledge and skills necessary to perform the required function for which the person is assigned responsibility. The railroad determines the qualifications and competencies for employees designated to perform various functions in the manner set forth in this part. Although the rule uses the term "qualified person" to describe a person responsible for performing various functions required under this part, a person may be deemed qualified to perform some functions but not qualified to perform other functions. For example, although a person may be deemed qualified to perform the Class II/intermediate brake test required by this part, that same person may or may not be deemed qualified to perform the Class I/initial Terminal brake test or authorize the movement of defective equipment under this part. The railroad will determine the required functions for which an individual will be deemed a "qualified person" based upon the instruction and training the individual has received pursuant to §232.203 concerning a particular function.

Railroad means any form of non-highway ground transportation that runs on rails or electromagnetic guideways, including:
Commuter or 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

High speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads. The term "railroad" is also intended to mean a person that provides transportation by railroad, whether directly or by contracting out operation of the railroad to another person. The term does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

Rebuilt equipment means equipment that has undergone overhaul identified by the railroad as a capital expense under the Surface Transportation Board's accounting standards.

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

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

"Roll-by" inspection means an inspection performed while equipment is moving.

Service application means a brake application that results from one or more service reductions or the equivalent.

Service reduction means a decrease in brake pipe pressure, usually from 5 to 25 psi at a rate sufficiently rapid to move the operating valve to service position, but at a rate not rapid enough to move the operating valve to emergency position.

Solid block of cars means two or more freight cars consecutively coupled together and added to or removed from a train as a single unit.

State inspector means an inspector of a participating State rail safety program under part 212 of this chapter.

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.

Tourist, scenic, historic, or excursion operations are railroad operations that carry passengers, often using antiquated equipment, with the conveyance of the passengers to a particular destination not being the principal purpose.

Train means one or more locomotives coupled with one or more freight cars, except during switching service.

Train line means the brake pipe or any non-pneumatic system used to transmit the signal that controls the locomotive and freight car brakes.

Train, unit or train, cycle means a train that, except for the changing of locomotive power and the removal or replacement of defective equipment, remains coupled as a consist and continuously operates from location A to location B and back to location A.

Transfer train means a train that travels between a point of origin and a point of final destination not exceeding 20 miles. Such trains may pick up or deliver freight equipment while en route to destination.

Yard air means a source of compressed air other than from a locomotive.
§ 232.7 -- Waivers.
(a) Any 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 that person's responsibility for compliance with that requirement while the petition is being considered.
(b) Each petition for waiver must 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. If a waiver is granted, the Administrator publishes a notice in the Federal Register containing the reasons for granting the waiver.

§ 232.9 -- Responsibility for compliance.
(a) A railroad subject to this part shall not use, haul, permit to be used or hauled on its line, offer in interchange, or accept in interchange any train, railroad car, or locomotive with one or more conditions not in compliance with this part; however, a railroad shall not be liable for a civil penalty for such action if such action is in accordance with § 232.15. For purposes of this part, a train, railroad car, or locomotive will be considered in use prior to departure but after it has received, or should have received, the inspection required for movement and is deemed ready for service.
(b) Although many of the requirements of this part are stated in terms of the duties of a railroad, when any person performs any function required by this part, that person (whether or not a railroad) is required to perform that function in accordance with this part.
(c) Any person performing any function or task required by this part shall be deemed to have consented to FRA inspection of the person's operation to the extent necessary to determine whether the function or task is being performed in accordance with the requirements of this part.

§ 232.11 -- Penalties.
(a) Any person (including but not limited to a railroad; any manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any employee of such owner, manufacturer, lessor, lessee, or independent contractor) 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, but 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. Appendix A to this part contains a schedule of civil penalty amounts used in connection with this rule.
(b) Any person who knowingly and willfully falsifies a record or report required by this part is subject to criminal penalties under 49 U.S.C. 21311.
§ 232.13 -- Preemptive effect.
(a) Under 49 U.S.C. 20106, issuance of the regulations in this part preempts any State law, rule, regulation, order, or standard covering the same subject matter, except for a provision necessary to eliminate or reduce a local safety hazard if that provision is not incompatible with this part and does not impose an undue burden on interstate commerce.
(b) Preemption should also be considered pursuant to the Locomotive Boiler Inspection Act (now codified at 49 U.S.C. 20701-20703), the Safety Appliance Acts (now codified at 49 U.S.C. 20301-20304), and the Commerce Clause based on the relevant case law pertaining to preemption under those provisions.
(c) FRA does not intend by issuance of the regulations in this part to preempt provisions of State criminal law that impose sanctions for reckless conduct that leads to actual loss of life, injury, or damage to property, whether such provisions apply specifically to railroad employees or generally to the public at large.

§ 232.15 -- Movement of defective equipment.
(a) General provision. Except as provided in paragraph (c) of this section, a railroad car or locomotive with one or more conditions not in compliance with this part may be used or hauled without civil penalty liability under this part only if all of the following conditions are met:

(1) The defective car or locomotive is properly equipped in accordance with the applicable provisions of 49 U.S.C. chapter 203 and the requirements of this part.

(2) The car or locomotive becomes defective while it is being used by the railroad on its line or becomes defective on the line of a connecting railroad and is properly accepted in interchange for repairs in accordance with paragraph (a)(7) of this section.

(3) The railroad first discovers the defective condition of the car or locomotive prior to moving it for repairs.

(4) The movement of the defective car or locomotive for repairs is from the location where the car or locomotive is first discovered defective by the railroad.

(5) The defective car or locomotive cannot be repaired at the location where the railroad first discovers it to be defective.

(6) The movement of the car or locomotive is necessary to make repairs to the defective condition.

(7) The location to which the car or locomotive is being taken for repair is the nearest available location where necessary repairs can be performed on the line of the railroad where the car or locomotive was first found to be defective or is the nearest available location where necessary repairs can be performed on the line of a connecting railroad if:

(i) The connecting railroad elects to accept the defective car or locomotive for such repair; and

(ii) The nearest available location where necessary repairs can be performed on the line of the connecting railroad is no farther than the nearest available location where necessary repairs can be performed on the line of the railroad where the car or locomotive was found defective.

(8) The movement of the defective car or locomotive for repairs is not by a train required to receive a Class I brake test at that location pursuant to § 232.205.
(9) The movement of the defective car or locomotive for repairs is not in a train in which less than 85 percent of the cars have operative and effective brakes.

(10) The defective car or locomotive is tagged, or information is recorded, as prescribed in paragraph (b) of this section.

(11) Except for cars or locomotives with brakes cut out en route, the following additional requirements are met:

(i) A qualified person shall determine-
   (A) That it is safe to move the car or locomotive; and
   (B) The maximum safe speed and other restrictions necessary for safely conducting the movement.

(ii) The person in charge of the train in which the car or locomotive is to be moved shall be notified in writing and inform all other crew members of the presence of the defective car or locomotive and the maximum speed and other restrictions determined under paragraph (a)(11)(i)(B) of this section. A copy of the tag or card described in paragraph (b) of this section may be used to provide the notification required by this paragraph.

(iii) The defective car or locomotive is moved in compliance with the maximum speed and other restrictions determined under paragraph (a)(11)(i)(B) of this section.

(12) The defective car or locomotive is not subject to a Special Notice for Repair under part 216 of this chapter, unless the movement of the defective car is made in accordance with the restrictions contained in the Special Notice.

(b) Tagging of defective equipment.

(1) At the place where the railroad first discovers the defect, a tag or card shall be placed on both sides of the defective equipment or locomotive and in the cab of the locomotive, or an automated tracking system approved for use by FRA shall be provided with 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 and job title of the inspector;
   (iv) The inspection location and date;
   (v) The nature of each defect;
   (vi) A description of any movement restrictions;
   (vii) The destination of the equipment where it will be repaired; and
   (viii) The signature, or electronic identification, of the person reporting the defective condition.

(2) The tag or card required by paragraph (b)(1) of this section shall remain affixed to the defective equipment until the necessary repairs have been performed.

(3) An electronic or written record or a copy of each tag or card attached to or removed from a car or locomotive shall be retained for 90 days and, upon request, shall be made available within 15 calendar days for inspection by FRA or State inspectors.

(4) Each tag or card removed from a car or locomotive shall contain the date, location, reason for its removal, and the signature of the person who removed it from the piece of equipment.

(5) Any automated tracking system approved by FRA to meet the tagging requirements contained in paragraph (b)(1) of this section shall be capable of being
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 authority to utilize an approved 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 and monitor the movement of defective equipment. FRA will record such a determination in writing, include a statement of the basis for such action, and provide a copy of the document to the railroad.

(c) Movement for unloading or purging of defective cars. If a defective car is loaded with a hazardous material or contains residue of a hazardous material, the car may not be placed for unloading or purging unless unloading or purging is consistent with determinations made and restrictions imposed under paragraph (a)(11)(i) of this section and the unloading or purging is necessary for the safe repair of the car.

(d) Computation of percent operative power brakes.

(1) The percentage of operative power brakes in a train shall be based on the number of control valves in the train. The percentage shall be determined by dividing the number of control valves that are cut-in by the total number of control valves in the train. A control valve shall not be considered cut-in if the brakes controlled by that valve are inoperative. Both cars and locomotives shall be considered when making this calculation.

(2) The following brake conditions not in compliance with this part are not considered inoperative power brakes for purposes of this section:

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

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

(iii) Piston travel that is in excess of the Class I brake test limits required in § 232.205 but that does not exceed the outside limits contained on the stencil, sticker, or badge plate required by § 232.103(g) for considering the power brakes to be effective; and

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

(e) Placement of equipment with inoperative brakes.

(1) A freight car or locomotive with inoperative brakes shall not be placed as the rear car of the train.

(2) No more than two freight cars with either inoperative brakes or not equipped with power brakes shall be consecutively placed in the same train.

(3) Multi-unit articulated equipment shall not be placed in a train if the equipment has more than two consecutive individual control valves cut-out or if the brakes controlled by the valves are inoperative.

(f) Guidelines for determining locations where necessary repairs can be performed. The following guidelines will be considered by FRA when determining whether a location is a location where repairs to a car's brake system or components can be performed and whether a location is the nearest location where the needed repairs can be effectuated.

(1) The following general factors and guidelines will be considered when making determinations as to whether a location is a location where brake repairs can be performed:

(i) The accessibility of the location to persons responsible for making repairs;
(ii) The presence of hazardous conditions that affect the ability to safely make repairs of the type needed at the location;
(iii) The nature of the repair necessary to bring the car into compliance;
(iv) The need for railroads to have in place an effective means to ensure the safe and timely repair of equipment;
(v) The relevant weather conditions at the location that affect accessibility or create hazardous conditions;
(vi) A location need not have the ability to effectuate every type of brake system repair in order to be considered a location where some brake repairs can be performed;
(vii) A location need not be staffed continuously in order to be considered a location where brake repairs can be performed;
(viii) The ability of a railroad to perform repair track brake tests or single car tests at a location shall not be considered; and
(ix) The congestion of work at a location shall not be considered.

(2) The general factors and guidelines outlined in paragraph (f)(1) of this section should be applied to the following locations:
(i) A location where a mobile repair truck is used on a regular basis;
(ii) A location where a mobile repair truck originates or is permanently stationed;
(iii) A location at which a railroad performs mechanical repairs other than brake system repairs; and
(iv) A location that has an operative repair track or repair shop;

(3) In determining whether a location is the nearest location where the necessary brake repairs can be made, the distance to the location is a key factor but should not be considered the determining factor. The distance to a location must be considered in conjunction with the factors and guidance outlined in paragraphs (f)(1) and (f)(2) of this section. In addition, the following safety factors must be considered in order to optimize safety:
(i) The safety of the employees responsible for getting the equipment to or from a particular location; and
(ii) The potential safety hazards involved with moving the equipment in the direction of travel necessary to get the equipment to a particular location.

(g) Based on the guidance detailed in paragraph (f) of this section and consistent with other requirements contained in this part, a railroad and the representatives of the railroad's employees may submit, for FRA approval, a joint proposal containing a plan designating locations where brake system repairs will be performed. Approval of such plans shall be made in writing by FRA’s Associate Administrator for Safety and shall be subject to any modifications or changes determined by FRA to be necessary to ensure consistency with the requirements and guidance contained in this part.

§ 232.17 -- Special approval procedure.
(a) General. The following procedures govern consideration and action upon requests for special approval of an alternative standard under §§ 232.305 and 232.307; and for special approval of pre-revenue service acceptance testing plans under subpart F of this part.
Petitions for special approval of an 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
   requirement of this part;

3. Appropriate data or analysis, or both, for FRA to consider in determining
   whether 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.

Petitions for special approval of pre-revenue service acceptance testing plan.
Each petition for special approval of a pre-revenue service acceptance testing plan shall
contain:

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

2. The elements prescribed in § 232.505.

Service.

1. Each petition for special approval under paragraph (b) or (c) of this section
   shall be submitted in triplicate to the Associate Administrator for Safety, Federal
   Railroad Administration, 400 7th Street, SW., Washington, DC 20590.

2. Service of each petition for special approval of an alternative standard under
   paragraph (b) of this section shall be made on the following:

   i. Designated employee representatives responsible for the equipment's
      operation, inspection, testing, and maintenance under this part;

   ii. Any organizations or bodies that either issued the standard
      incorporated in the section(s) of the rule to which the special approval pertains or
      issued the alternative standard that is proposed in the petition; and

   iii. Any other person who has filed with FRA a current statement of
      interest in reviewing special approvals under the particular requirement of this
      part at least 30 days but not more than 5 years prior to the filing of the petition. If
      filed, a statement of interest shall be filed with FRA's Associate Administrator for
      Safety and shall reference the specific section(s) of this part in which the person
      has an interest.

Federal Register notice. FRA will publish a notice in the Federal Register
concerning each petition under paragraph (b) of this section.

Comment. Not later than 30 days from the date of publication of the notice in the
Federal Register concerning a petition under paragraph (b) of this section, any person
may comment on the petition.

1. A 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. The comment shall be submitted in triplicate to the Associate Administrator
   for Safety, Federal Railroad Administration, 400 7th Street, SW., Washington, DC
   20590.

3. The commenter shall certify that a copy of the comment was served on each
petitioner.
(g) **Disposition of petitions.**

1. If FRA finds that the petition complies with the requirements of this section and that the proposed alternative standard or pre-revenue service plan is acceptable and justified, 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 any petition. Following the approval of a petition, FRA may reopen consideration of the petition for cause.
2. If FRA finds that the petition does not comply with the requirements of this section and that the alternative standard or pre-revenue service plan is not acceptable or justified, the petition will be denied, normally within 90 days of its receipt.
3. When FRA grants or denies a petition, or reopens consideration of the petition, written notice is sent to the petitioner and other interested parties.

§ 232.19 -- Availability of records.

Except as otherwise provided, the records and plans required by this part shall be made available to representatives of FRA and States participating under part 212 of this chapter for inspection and copying upon request.

§ 232.21 -- 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 2130-0008.


Subpart B--General Requirements

§ 232.101 -- Scope.

This subpart contains general operating, performance, and design requirements for each railroad that operates freight or other non-passenger trains and for specific equipment used in those operations.

§ 232.103 -- General requirements for all train brake systems.

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

(b) If the integrity of the train line of a train brake system is broken, the train shall be stopped. If a train line uses other than solely pneumatic technology, the integrity of the train line shall be monitored by the brake control system.

(c) A train brake system shall respond as intended to signals from the train line.

(d) One hundred percent of the brakes on a train shall be effective and operative brakes prior to use or departure from any location where a Class I brake test is required to be performed on the train pursuant to § 232.205.
(e) A train shall not move if less than 85 percent of the cars in that train have operative and effective brakes.

(f) Each car in a train shall have its air brakes in effective operating condition unless the car is being moved for repairs in accordance with § 232.15. The air brakes on a car are not in effective operating condition if its brakes are cut-out or otherwise inoperative or if the piston travel exceeds:

1. 10 1/2 inches for cars equipped with nominal 12-inch stroke brake cylinders; or

2. The piston travel limits indicated on the stencil, sticker, or badge plate for the brake cylinder with which the car is equipped.

(g) Except for cars equipped with nominal 12-inch stroke (8 1/2 and 10-inch diameters) brake cylinders, all cars shall have a legible decal, stencil, or sticker affixed to the car or shall be equipped with a badge plate displaying the permissible brake cylinder piston travel range for the car at Class I brake tests and the length at which the piston travel renders the brake ineffective, if different from Class I brake test limits. The decal, stencil, sticker, or badge plate shall be located so that it may be easily read and understood by a person positioned safely beside the car.

(h) All equipment ordered on or after August 1, 2002, or placed in service for the first time on or after April 1, 2004, shall have train brake systems designed so that an inspector can observe from a safe position either the piston travel, an accurate indicator which shows piston travel, or any other means by which the brake system is actuated. The design shall not require the inspector to place himself or herself on, under, or between components of the equipment to observe brake actuation or release.

(i) All trains shall be equipped with an emergency application feature that produces an irretrievable stop, using a brake rate consistent with prevailing adhesion, train safety, and brake system thermal capacity. An emergency application shall be available at all times, and shall be initiated by an unintentional parting of the train line or loss of train brake communication.

(j) A railroad shall set the maximum main reservoir working pressure.

(k) The maximum brake pipe pressure shall not be greater than 15 psi less than the air compressor governor starting or loading pressure.

(l) Except as otherwise provided in this part, all equipment used in freight or other non-passenger trains shall, at a minimum, meet the Association of American Railroads (AAR) Standard S-469-47, "Performance Specification for Freight Brakes," contained in the AAR Manual of Standards and Recommended Practices, Section E (April 1, 1999). The incorporation by reference of this AAR 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 Association of American Railroads, 50 F Street, NW, Washington, DC. 20001. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1120 Vermont Avenue, NW, Suite 7000, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW, Suite 700, Washington, DC 20408.

(m) If a train qualified by the Air Flow Method as provided for in subpart C of this part experiences a brake pipe air flow of greater than 60 CFM or brake pipe gradient of greater than 15 psi while en route and the movable pointer does not return to those limits
within a reasonable time, the train shall be stopped at the next available location and be inspected for leaks in the brake system.

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

1. A sufficient number of hand brakes shall be applied to hold the equipment. Railroads shall develop and implement a process or procedure to verify that the applied hand brakes will sufficiently hold the equipment with the air brakes released.
2. Where possible, an emergency brake application of the air brakes shall be initiated prior to leaving equipment unattended.
3. The following requirements apply to the use of hand brakes on unattended locomotives:
   i. All hand brakes shall be fully applied on all locomotives in the lead consist of an unattended train.
   ii. All hand brakes shall be fully applied on all locomotives in an unattended locomotive consist outside of yard limits.
   iii. At a minimum, the hand brake shall be fully applied on the lead locomotive in an unattended locomotive consist within yard limits.
4. A railroad shall adopt and comply with a process or procedures to verify that the applied hand brakes will sufficiently hold an unattended locomotive consist. A railroad shall also adopt and comply with instructions to address throttle position, status of the reverse lever, position of the generator field switch, status of the independent brakes, position of the isolation switch, and position of the automatic brake valve on all unattended locomotives. The procedures and instruction required in this paragraph shall take into account winter weather conditions as they relate to throttle position and reverser handle.
5. Any hand brakes applied to hold unattended equipment shall not be released until it is known that the air brake system is properly charged.

(o) Air pressure regulating devices shall be adjusted for the following pressures:

<table>
<thead>
<tr>
<th>Locomotives</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Minimum brake pipe air pressure:</td>
<td></td>
</tr>
<tr>
<td>Road Service .................</td>
<td>90</td>
</tr>
<tr>
<td>Switch Service ...............</td>
<td>60</td>
</tr>
<tr>
<td>(2) Minimum differential between brake pipe and main reservoir air pressures, with brake valve in running position........</td>
<td>15</td>
</tr>
<tr>
<td>(3) Safety valve for straight air brake......</td>
<td>30-55</td>
</tr>
<tr>
<td>(4) Safety valve for LT, ET, No. 8-EL, No. 14 El, No. 6-DS, No. 6-BL and No. 6-SL equipment.....</td>
<td>30-68</td>
</tr>
<tr>
<td>(5) Safety valve for HSC and No. 24-RL equipment...</td>
<td>30-75</td>
</tr>
<tr>
<td>(6) Reducing valve for independent or straight air brake..</td>
<td>30-50</td>
</tr>
<tr>
<td>(7) Self-lapping portion for electro-pneumatic brake</td>
<td></td>
</tr>
</tbody>
</table>
(minimum full application pressure) …… 50
(8) Self-lapping portion for independent air brake
(full application pressure)……… 30
(9) Reducing valve for high-speed brake (minimum)… 50

(p) Railroad or contract supervisors shall be held jointly responsible with the inspectors and train crew members they supervise for the condition and proper functioning of train brake systems to the extent that it is possible to detect defective equipment by the inspections and tests required by this part.

§ 232.105 -- General requirements for locomotives.
(a) The air brake equipment on a locomotive shall be in safe and suitable condition for service.
(b) All locomotives ordered on or after August 1, 2002, or placed in service for the first time on or after April 1, 2004, shall be equipped with a hand or parking brake that is:
   (1) Capable of application or activation by hand;
   (2) Capable of release by hand; and
   (3) Capable of holding the unit on a three (3) percent grade.
(c) On locomotives so equipped, the hand or parking brake as well as its parts and connections shall be inspected, and necessary repairs made, as often as service requires but no less frequently than every 368 days. The date of the last inspection shall be either entered on Form FRA F 6180-49A or suitably stenciled or tagged on the locomotive.
(d) The amount of leakage from the equalizing reservoir on locomotives and related piping shall be zero, unless the system is capable of maintaining the set pressure at any service application with the brakes control valve in the freight position. If such leakage is detected en route, the train may be moved only to the nearest forward location where the equalizing-reservoir leakage can be corrected. On locomotives equipped with electronic brakes, if the system logs or displays a fault related to equalizing reservoir leakage, the train may be moved only to the nearest forward location where the necessary repairs can be made.
(e) Use of the feed or regulating valve to control braking is prohibited.
(f) The passenger position on the locomotive brake control stand shall be used only if the trailing equipment is designed for graduated brake release or if equalizing reservoir leakage occurs en route and its use is necessary to safely control the movement of the train until it reaches the next forward location where the reservoir leakage can be corrected.
(g) When taking charge of a locomotive or locomotive consist, an engineer must know that the brakes are in operative condition.

§ 232.107 -- Air source requirements and cold weather operations.
(a) Monitoring plans for yard air sources.
   (1) A railroad shall adopt and comply with a written plan to monitor all yard air sources, other than locomotives, to determine that they operate as intended and do not introduce contaminants into the brake system of freight equipment.
   (2) This plan shall require the railroad to:
(i) Inspect each yard air source at least two times per calendar year, no less than five months apart, to determine it operates as intended and does not introduce contaminants into the brake system of the equipment it services.

(ii) Identify yard air sources found not to be operating as intended or found introducing contaminants into the brake system of the equipment it services.

(iii) Repair or take other remedial action regarding any yard air source identified under paragraph (a)(2)(ii) of this section.

(3) A railroad shall maintain records of the information and actions required by paragraph (a)(2). These records shall be maintained for a period of at least one year from the date of creation and may be maintained either electronically or in writing.

(b) Condensation and other contaminants shall be blown from the pipe or hose from which compressed air is taken prior to connecting the yard air line or motive power to the train.

(c) No chemicals which are known to degrade or harm brake system components shall be placed in the train air brake system.

(d) Yard air reservoirs shall either be equipped with an operable automatic drain system or be manually drained at least once each day that the devices are used or more often if moisture is detected in the system.

(e) A railroad shall adopt and comply with detailed written operating procedures tailored to the equipment and territory of that railroad to cover safe train operations during cold weather. For purposes of this provision, "cold weather" means when the ambient temperature drops below 10 degrees Fahrenheit (F) (minus 12.2 degrees Celsius).

§ 232.109 -- Dynamic brake requirements.

(a) Except as provided in paragraph (i) of this section, a locomotive engineer shall be informed of the operational status of the dynamic brakes on all locomotive units in the consist at the initial terminal or point of origin for a train and at other locations where a locomotive engineer first begins operation of a train. The information required by this paragraph may be provided to the locomotive engineer by any means determined appropriate by the railroad; however, a written or electronic record of the information shall be maintained in the cab of the controlling locomotive.

(b) Except as provided in paragraph (e) of this section, all inoperative dynamic brakes shall be repaired within 30 calendar days of becoming inoperative or at the locomotive's next periodic inspection pursuant to § 229.23 of this chapter, whichever occurs first.

(c) Except as provided in paragraph (e) of this section, a locomotive discovered with inoperative dynamic brakes shall have a tag bearing the words "inoperative dynamic brake" securely attached and displayed in a conspicuous location in the cab of the locomotive. This tag shall contain the following information:

(1) The locomotive number;
(2) The name of the discovering carrier;
(3) The location and date where condition was discovered; and
(4) The signature of the person discovering the condition.
(d) An electronic or written record of repairs made to a locomotive's dynamic brakes shall be retained for 92 days.

(e) A railroad may elect to declare the dynamic brakes on a locomotive deactivated without removing the dynamic brake components from the locomotive, only if all of the following conditions are met:

1. The locomotive is clearly marked with the words "dynamic brake deactivated" in a conspicuous location in the cab of the locomotive; and
2. The railroad has taken appropriate action to ensure that the deactivated locomotive is incapable of utilizing dynamic brake effort to retard or control train speed.

(f) If a locomotive consist is intended to have its dynamic brakes used while in transit, a locomotive with inoperative or deactivated dynamic brakes or a locomotive not equipped with dynamic brakes shall not be placed in the controlling (lead) position of a consist unless the locomotive has the capability of:

1. Controlling the dynamic braking effort in trailing locomotives in the consist that are so equipped; and
2. Displaying to the locomotive engineer the deceleration rate of the train or the total train dynamic brake retarding force.

(g) All locomotives equipped with dynamic brakes and ordered on or after August 1, 2002, or placed in service for the first time on or after April 1, 2004, shall be designed to:

1. Test the electrical integrity of the dynamic brake at rest; and
2. Display the available total train dynamic brake retarding force at various speed increments in the cab of the controlling (lead) locomotive.

(h) All rebuilt locomotives equipped with dynamic brakes and placed in service on or after April 1, 2004, shall be designed to:

1. Test the electrical integrity of the dynamic brake at rest; and
2. Display either the train deceleration rate or the available total train dynamic brake retarding force at various speed increments in the cab of the controlling (lead) locomotive.

(i) The information required by paragraph (a) of this section is not required to be provided to the locomotive engineer if all of the locomotives in the lead consist of a train are equipped in accordance with paragraph (g) of this section.

(j) A railroad operating a train with a brake system that includes dynamic brakes shall adopt and comply with written operating rules governing safe train handling procedures using these dynamic brakes under all operating conditions, which shall be tailored to the specific equipment and territory of the railroad. The railroad’s operating rules shall:

1. Ensure that the friction brakes are sufficient by themselves, without the aid of dynamic brakes, to stop the train safely under all operating conditions.
2. Include a "miles-per-hour-overspeed-stop" rule. At a minimum, this rule shall require that any train, when descending a grade of 1 percent or greater, shall be immediately brought to a stop, by an emergency brake application if necessary, when the train's speed exceeds the maximum authorized speed for that train by more than 5 miles per hour. A railroad shall reduce the 5 mile per hour overspeed restriction if validated research indicates the need for such a reduction. A railroad may increase the 5 mile per hour overspeed restriction only with approval of FRA and based upon verifiable data and research.
(k) A railroad operating a train with a brake system that includes dynamic brakes shall adopt and comply with specific knowledge, skill, and ability criteria to ensure that its locomotive engineers are fully trained in the operating rules prescribed by paragraph (j) of this section. The railroad shall incorporate such criteria into its locomotive engineer certification program pursuant to Part 240 of this chapter.

§ 232.111 -- Train handling information.

(a) A railroad shall adopt and comply with written procedures to ensure that a train crew employed by the railroad is given accurate information on the condition of the train brake system and train factors affecting brake system performance and testing when the crew takes over responsibility for the train. The information required by this paragraph may be provided to the locomotive engineer by any means determined appropriate by the railroad; however, a written or electronic record of the information shall be maintained in the cab of the controlling locomotive.

(b) The procedures shall require that each train crew taking charge of a train be informed of:

1. The total weight and length of the train, based on the best information available to the railroad;
2. Any special weight distribution that would require special train handling procedures;
3. The number and location of cars with cut-out or otherwise inoperative brakes and the location where they will be repaired;
4. If a Class I or Class IA brake test is required prior to the next crew change point, the location at which that test shall be performed; and
5. Any train brake system problems encountered by the previous crew of the train.

Subpart C--Inspection and Testing Requirements

§ 232.201 -- Scope.

This subpart contains the inspection and testing requirements for brake systems used in freight and other non-passenger trains. This subpart also contains general training requirements for railroad and contract personnel used to perform the required inspections and tests.

§ 232.203 -- Training requirements.

(a) Each railroad and each contractor shall adopt and comply with a training, qualification, and designation program for its employees that perform brake system inspections, tests, or maintenance. For purposes of this section, a "contractor" is defined as a person under contract with the railroad or car owner. The records required by this section may be maintained either electronically or in writing.

(b) As part of this program, the railroad or contractor shall:

1. Identify the tasks related to the inspection, testing, and maintenance of the brake system required by this part that must be performed by the railroad or contractor and identify the skills and knowledge necessary to perform each task.
2. Develop or incorporate a training curriculum that includes both 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.

(3) Require all employees to successfully complete a training curriculum that covers the skills and knowledge the employee will need to possess in order to perform the tasks required by this part that the employee will be responsible for performing, including the specific Federal regulatory requirements contained in this part related to the performance of a task for which the employee will be responsible;

(4) Require all employees to pass a written or oral examination covering the skills and knowledge the employee will need to possess in order to perform the tasks required by this part that the employee will be responsible for performing, including the specific Federal regulatory requirements contained in this part related to the performance of a task for which the employee will be responsible for performing;

(5) Require all employees to individually demonstrate "hands-on" capability by successfully applying the skills and knowledge the employee will need to possess in order to perform the tasks required by this part that the employee will be responsible for performing to the satisfaction of the employee's supervisor or designated instructor;

(6) Consider training and testing, including efficiency testing, previously received by an employee in order to meet the requirements contained in paragraphs (b)(3) through (b)(5) of this section; provided, such training and testing can be documented as required in paragraph (e) of this section;

(7) Require supervisors to exercise oversight to ensure that all the identified tasks are performed in accordance with the railroad's written procedures and the specific Federal regulatory requirements contained in this part;

(8) Require periodic refresher training at an interval not to exceed three years that includes classroom and "hands-on" training, as well as testing. Efficiency testing may be used to meet the "hands-on" portion of this requirement; provided, such testing is documented as required in paragraph (e) of this section; and

(9) Add new brake systems to the training, qualification and designation program prior to its introduction to revenue service.

(c) A railroad that operates trains required to be equipped with a two-way end-of-train telemetry device pursuant to Subpart E of this part, and each contractor that maintains such devices shall adopt and comply with a training program which specifically addresses the testing, operation, and maintenance of two-way end-of-train devices for employees who are responsible for the testing, operation, and maintenance of the devices.

(d) A railroad that operates trains under conditions that require the setting of air brake pressure retaining valves shall adopt and comply with a training program which specifically addresses the proper use of retainers for employees who are responsible for using or setting retainers.

(e) A railroad or contractor shall maintain adequate records to demonstrate the current qualification status of all of its personnel assigned to inspect, test, or maintain a train brake system. The records required by this paragraph may be maintained either electronically or in writing and shall be provided to FRA upon request. These records shall include the following information concerning each such employee:

(1) The name of the employee;
(2) The dates that each training course was completed;
(3) The content of each training course successfully completed;
(4) The employee's scores on each test taken to demonstrate proficiency;
(5) A description of the employee's "hands-on" performance applying the skills and knowledge the employee needs to possess in order to perform the tasks required by this part that the employee will be responsible for performing and the basis for finding that the skills and knowledge were successfully demonstrated;
(6) A record that the employee was notified of his or her current qualification status and of any subsequent changes to that status;
(7) The tasks required to be performed under this part which the employee is deemed qualified to perform; and
(8) Identification of the person(s) determining that the employee has successfully completed the training necessary to be considered qualified to perform the tasks identified in paragraph (e)(7) of this section.
(9) The date that the employee's status as qualified to perform the tasks identified in paragraph (e)(7) of this section expires due to the need for refresher training.

(f) A railroad or contractor shall adopt and comply with a plan to periodically assess the effectiveness of its training program. One method of validation and assessment could be through the use of efficiency tests or periodic review of employee performance.

§ 232.205 -- Class I brake test-initial terminal inspection.
(a) Each train and each car in the train shall receive a Class I brake test as described in paragraph (b) of this section by a qualified person, as defined in § 232.5, at the following points:
   (1) The location where the train is originally assembled ("initial terminal");
   (2) A location where the train consist is changed other than by:
      (i) Adding a single car or a solid block of cars;
      (ii) Removing a single car or a solid block of cars;
      (iii) Removing cars determined to be defective under this chapter; or
      (iv) A combination of the changes listed in paragraphs (a)(2)(i) through (a)(2)(iii) of this section (See §§ 232.209 and 232.211 for requirements related to the pick-up of cars and solid blocks of cars en route.);
   (3) A location where the train is off air for a period of more than four hours;
   (4) A location where a unit or cycle train has traveled 3,000 miles since its last Class I brake test; and
   (5) A location where the train is received in interchange if the train consist is changed other than by:
      (i) Removing a car or a solid block of cars from the train;
      (ii) Adding a previously tested car or a previously tested solid block of cars to the train;
      (iii) Changing motive power;
      (iv) Removing or changing the caboose; or
      (v) Any combination of the changes listed in paragraphs (a)(5) of this section.
   (A) If changes other than those contained in paragraph (a)(5)(i)-(a)(5)(v) of this section are made to the train consist when it is received in
interchange and the train will move 20 miles or less, then the railroad may conduct a brake test pursuant to § 232.209 on those cars added to the train.

(B) Reserved.

(b) A Class I brake test of a train shall consist of the following tasks and requirements:

1. Brake pipe leakage shall not exceed 5 psi per minute or air flow shall not exceed 60 cubic feet per minute (CFM).

   (i) Leakage Test. The brake pipe leakage test shall be conducted as follows:

      (A) Charge the air brake system to the pressure at which the train will be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure at which the train will be operated, but not less than 75 psi, as indicated by an accurate gauge or end-of-train device at the rear end of train;

      (B) Upon receiving the signal to apply brakes for test, make a 20-psi brake pipe service reduction;

      (C) If the locomotive used to perform the leakage test is equipped with a means for maintaining brake pipe pressure at a constant level during a 20-psi brake pipe service reduction, this feature shall be cut out during the leakage test; and

      (D) With the brake valve lapped and the pressure maintaining feature cut out (if so equipped) and after waiting 45-60 seconds, note the brake pipe leakage as indicated by the brake-pipe gauge in the locomotive, which shall not exceed 5 psi per minute.

   (ii) Air Flow Method Test. When a locomotive is equipped with a 26-L brake valve or equivalent pressure maintaining locomotive brake valve, a railroad may use the Air Flow Method Test as an alternate to the brake pipe leakage test. The Air Flow Method (AFM) Test shall be performed as follows:

      (A) Charge the air brake system to the pressure at which the train will be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure at which the train will be operated, but not less than 75 psi, as indicated by an accurate gauge or end-of-train device at the rear end of train; and

      (B) Measure air flow as indicated by a calibrated AFM indicator, which shall not exceed 60 cubic feet per minute (CFM).

   (iii) The AFM indicator shall be calibrated for accuracy at periodic intervals not to exceed 92 days. The AFM indicator calibration test orifices shall be calibrated at temperatures of not less than 20 degrees Fahrenheit. AFM indicators shall be accurate to within #3 standard cubic feet per minute (CFM).

2. The inspector shall position himself/herself, taking positions on each side of each car sometime during the inspection process, so as to be able to examine and observe the functioning of all moving parts of the brake system on each car in order to make the determinations and inspections required by this section. A "roll-by" inspection of the brake release as provided for in paragraph (b)(8) of this section shall not constitute an inspection of that side of the train for purposes of this requirement;
(3) The train brake system shall be charged to the pressure at which the train will be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure at which the train will be operated, but not less than 75 psi, angle cocks and cutout cocks shall be properly positioned, air hoses shall be properly coupled and shall not kink, bind, or foul or be in any other condition that restricts air flow. An examination must be made for leaks and necessary repairs made to reduce leakage to the required minimum. Retaining valves and retaining valve pipes shall be inspected and known to be in proper condition for service;

(4) The brakes on each car shall apply in response to a 20-psi brake pipe service reduction and shall remain applied until a release of the air brakes has been initiated by the controlling locomotive or yard test device. The brakes shall not be applied or released until the proper signal is given. A car found with brakes that fail to apply or remain applied may be retested and remain in the train if the retest is conducted at the pressure the train will be operated from the controlling locomotive, head end of the consist, or a suitable test device, as described in §232.217(a) of this part, positioned at one end of the car(s) being retested and the brakes remain applied until a release is initiated after a period which is no less than three minutes. If the retest is performed at the car(s) being retested with a suitable device, the compressed air in the car(s) shall be depleted prior to disconnecting the hoses between the car(s) to perform the retest;

(5) For cars equipped with 8 1/2-inch or 10-inch diameter brake cylinders, piston travel shall be within 7 to 9 inches. If piston travel is found to be less than 7 inches or more than 9 inches, it must be adjusted to nominally 7 1/2 inches. For cars not equipped with 8 1/2-inch or 10-inch diameter brake cylinders, piston travel shall be within the piston travel stenciled or marked on the car or badge plate. Minimum brake cylinder piston travel of truck-mounted brake cylinders must be sufficient to provide proper brake shoe clearance when the brakes are released. Piston travel must be inspected on each freight car while the brakes are applied;

(6) Brake rigging shall be properly secured and shall not bind or foul or otherwise adversely affect the operation of the brake system;

(7) All parts of the brake equipment shall be properly secured. On cars where the bottom rod passes through the truck bolster or is secured with cotter keys equipped with a locking device to prevent their accidental removal, bottom rod safety supports are not required; and

(8) When the release is initiated by the controlling locomotive or yard test device, the brakes on each freight car shall be inspected to verify that it did release; this may be performed by a "roll-by" inspection. If a "roll-by" inspection of the brake release is performed, train speed shall not exceed 10 MPH and the qualified person performing the "roll-by" inspection shall communicate the results of the inspection to the operator of the train. The operator of the train shall note successful completion of the release portion of the inspection on the record required in paragraph (d) of this section.

(c) Where a railroad's collective bargaining agreement provides that a carman is to perform the inspections and tests required by this section, a carman alone will be considered a qualified person. In these circumstances, the railroad shall ensure that the carman is properly trained and designated as a qualified person or qualified mechanical inspector pursuant to the requirements of this part.
(d) A railroad shall notify the locomotive engineer that the Class I brake test was satisfactorily performed and provide the information required in this paragraph to the locomotive engineer or place the information in the cab of the controlling locomotive following the test. The information required by this paragraph may be provided to the locomotive engineer by any means determined appropriate by the railroad; however, a written or electronic record of the information shall be retained in the cab of the controlling locomotive until the train reaches its destination. The written or electronic record shall contain the date, time, number of freight cars inspected, and identify the qualified person(s) performing the test and the location where the Class I brake test was performed.

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

(f) Except as provided in § 232.209, each car or solid block of cars, as defined in § 232.5, that has not received a Class I brake test or that has been off air for more than four hours and that is added to a train shall receive a Class I test when added to a train. A Class III brake test as described in § 232.211 shall then be performed on the entire new train.

§ 232.207 -- Class IA brake tests--1,000-mile inspection.

(a) Except as provided in § 232.213, each train shall receive a Class IA brake test performed by a qualified person, as defined in § 232.5, at a location that is not more than 1,000 miles from the point where any car in the train last received a Class I or Class IA brake test. The most restrictive car or block of cars in the train shall determine the location of this test.

(b) A Class IA brake test of a train shall consist of the following tasks and requirements:

   (1) Brake pipe leakage shall not exceed 5 psi per minute or air flow shall not exceed 60 cubic feet per minute (CFM). The brake pipe leakage test or air flow method test shall be conducted pursuant to the requirements contained in § 232.205(b)(1);

   (2) The inspector shall position himself/herself, taking positions on each side of each car sometime during the inspection process, so as to be able to examine and observe the functioning of all moving parts of the brake system on each car in order to make the determinations and inspections required by this section;

   (3) The air brake system shall be charged to the pressure at which the train will be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure at which the train will be operated, but not less than 75 psi, as indicated by an accurate gauge or end-of-train device at rear end of train;

   (4) The brakes on each car shall apply in response to a 20-psi brake pipe service reduction and shall remain applied until the release is initiated by the controlling locomotive. A car found with brakes that fail to apply or remain applied may be retested and remain in the train if the retest is conducted as prescribed in § 232.205(b)(4); otherwise, the defective equipment may only be moved pursuant to the provisions contained in § 232.15, if applicable;
(5) Brake rigging shall be properly secured and shall not bind or foul or otherwise adversely affect the operation of the brake system; and
(6) All parts of the brake equipment shall be properly secured.

c) A railroad shall designate the locations where Class IA brake tests will be performed, and the railroad shall furnish to the Federal Railroad Administration upon request a description of each location designated. A railroad shall notify FRA's Associate Administrator for Safety in writing 30 days prior to any change in the locations designated for such tests and inspections.
   (1) Failure to perform a Class IA brake test on a train at a location designated pursuant to this paragraph constitutes a failure to perform a proper Class IA brake test if the train is due for such a test at that location.
   (2) In the event of an emergency that alters normal train operations, such as a derailment or other unusual circumstance that adversely affects the safe operation of the train, the railroad is not required to provide prior written notification of a change in the location where a Class IA brake test is performed to a location not on the railroad's list of designated locations for performing Class IA brake tests, provided that the railroad notifies FRA's Associate Administrator for Safety and the pertinent FRA Regional Administrator within 24 hours after the designation has been changed and the reason for that change.

§ 232.209 -- Class II brake tests--intermediate inspection.
(a) At a location other than the initial terminal of a train, a Class II brake test shall be performed by a qualified person, as defined in § 232.5, on the following equipment when added to a train:
   (1) Each car or solid block of cars, as defined in § 232.5, that has not previously received a Class I brake test or that has been off air for more than four hours;
   (2) Each solid block of cars, as defined in § 232.5, that is comprised of cars from more than one previous train; and
   (3) Each solid block of cars that is comprised of cars from only one previous train but the cars of which have not remained continuously and consecutively coupled together with the train line remaining connected, other than for removing defective equipment, since being removed from its previous train.
(b) A Class II brake test shall consist of the following tasks and requirements:
   (1) Brake pipe leakage shall not exceed 5 psi per minute or air flow shall not exceed 60 cubic feet per minute (CFM). The brake pipe leakage test or air flow method test shall be conducted on the entire train pursuant to the requirements contained in § 232.205(b)(1);
   (2) The air brake system shall be charged to the pressure at which the train will be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure at which the train will be operated, but not less than 75 psi, as indicated by an accurate gauge or end-of-train device at the rear end of train;
   (3) The brakes on each car added to the train and on the rear car of the train shall be inspected to ensure that they apply in response to a 20-psi brake pipe service reduction and remain applied until the release is initiated from the controlling locomotive. A car found with brakes that fail to apply or remain applied may be retested and remain in the train if the retest is conducted as prescribed in § 232.205(b)(4); otherwise, the defective
equipment may only be moved pursuant to the provisions contained in § 232.15, if applicable;

(4) When the release is initiated, the brakes on each car added to the train and on the rear car of the train shall be inspected to verify that they did release; this may be performed by a "roll-by" inspection. If a "roll-by" inspection of the brake release is performed, train speed shall not exceed 10 MPH, and the qualified person performing the "roll-by" inspection shall communicate the results of the inspection to the operator of the train; and

(5) Before the train proceeds the operator of the train shall know that the brake pipe pressure at the rear of the train is being restored.

(c) As an alternative to the rear car brake application and release portion of the test, the operator of the train shall determine that brake pipe pressure of the train is being reduced, as indicated by a rear car gauge or end-of-train telemetry device, and then that the brake pipe pressure of the train is being restored, as indicated by a rear car gauge or end-of-train telemetry device. (When an end-of-train telemetry device is used to comply with any test requirement in this part, the phrase "brake pipe pressure of the train is being reduced" means a pressure reduction of at least 5 psi, and the phrase "brake pipe pressure of the train is being restored" means a pressure increase of at least 5 psi). If an electronic communication link between a controlling locomotive and a remotely controlled locomotive attached to the rear end of a train is utilized to determine that brake pipe pressure is being restored, the operator of the train shall know that the air brakes function as intended on the remotely controlled locomotive.

(d) Each car or solid block of cars that receives a Class II brake test pursuant to this section when added to the train shall receive a Class I brake test at the next forward location where facilities are available for performing such a test. A Class III brake test as described in § 232.211 shall then be performed on the entire train.

§ 232.211 -- Class III brake tests-trainline continuity inspection.

(a) A Class III brake test shall be performed on a train by a qualified person, as defined in § 232.5, to test the train brake system when the configuration of the train has changed in certain ways. In particular, a Class III brake test shall be performed at the location where any of the following changes in the configuration of the train occur:

(1) Where a locomotive or a caboose is changed;
(2) Where a car or a block of cars is removed from the train with the consist otherwise remaining intact;
(3) At a point other than the initial terminal for the train, where a car or a solid block of cars that is comprised of cars from only one previous train the cars of which have remained continuously and consecutively coupled together with the trainline remaining connected, other than for removing defective equipment, since being removed from its previous train that has previously received a Class I brake test and that has not been off air for more than four hours is added to a train;
(4) At a point other than the initial terminal for the train, where a car or a solid block of cars that has received a Class I or Class II brake test at that location, prior to being added to the train, and that has not been off air for more than four hours is added to a train; or

(5) Whenever the continuity of the brake pipe is broken or interrupted.
(b) A Class III brake test shall consist of the following tasks and requirements:
   (1) The train brake system shall be charged to the pressure at which the train will
       be operated, and the pressure at the rear of the train shall be within 15 psi of the pressure
       at which the train will be operated, but not less than 75 psi, or 60 psi for transfer trains, as
       indicated at the rear of the train by an accurate gauge or end-of-train device;
   (2) The brakes on the rear car of the train shall apply in response to a 20-psi brake
       pipe service reduction and shall remain applied until the release is initiated by the
       controlling locomotive;
   (3) When the release is initiated, the brakes on the rear car of the train shall be
       inspected to verify that it did release; and
   (4) Before proceeding the operator of the train shall know that the brake pipe
       pressure at the rear of freight train is being restored.

(c) As an alternative to the rear car brake application and release portion of the test,
    it shall be determined that the brake pipe pressure of the train is being reduced, as
    indicated by a rear car gauge or end-of-train telemetry device, and then that the brake
    pipe pressure of the train is being restored, as indicated by a rear car gauge or end-of-
    train telemetry device. If an electronic or radio communication link between a controlling
    locomotive and a remotely controlled locomotive attached to the rear end of a train is
    utilized to determine that brake pipe pressure is being restored, the operator of the train
    shall know that the air brakes function as intended on the remotely controlled locomotive.

§ 232.213 -- Extended haul trains.
(a) A railroad may be permitted to move a train up to, but not exceeding, 1,500 miles
    between brake tests and inspections if the railroad designates a train as an extended haul
    train. In order for a railroad to designate a train as an extended haul train, all of the
    following requirements must be met:
    (1) The railroad must designate the train in writing to FRA's Associate
        Administrator for Safety. This designation must include the following:
        (i) The train identification symbol or identification of the location where
            extended haul trains will originate and a description of the trains that will be
            operated as extended haul trains from those locations;
        (ii) The origination and destination points for the train;
        (iii) The type or types of equipment the train will haul; and
        (iv) The locations where all train brake and mechanical inspections and
            tests will be performed.
    (2) A Class I brake test pursuant to § 232.205 shall be performed at the initial
        terminal for the train by a qualified mechanical inspector as defined in § 232.5.
    (3) A freight car inspection pursuant to part 215 of this chapter shall be performed
        at the initial terminal for the train and shall be performed by an inspector designated
        under § 215.11 of this chapter.
    (4) All cars having conditions not in compliance with part 215 of this chapter at
        the initial terminal for the train shall be either repaired or removed from the train. Except
        for a car developing such a condition en route, no car shall be moved pursuant to the
        provisions of § 215.9 of this chapter.
    (5) The train shall have no more than one pick-up and one set-out en route, except
        for the set-out of defective equipment pursuant to the requirements of this chapter.
(a) Cars added to the train en route shall be inspected pursuant to the requirements contained in paragraphs (a)(2) through (a)(5) of this section at the location where they are added to the train.

(ii) Cars set out of the train en route shall be inspected pursuant to the requirements contained in paragraph (a)(6) of this section at the location where they are set out of the train.

(6) At the point of destination, if less than 1,500 miles from the train's initial terminal, or at the point designated by the railroad pursuant to paragraph (a)(1)(iv) of this section, not to exceed 1,500 miles, an inbound inspection of the train shall be conducted by a qualified mechanical inspector to identify any defective, inoperative, or ineffective brakes or any other condition not in compliance with this part as well as any conditions not in compliance with part 215 and part 231 of this chapter.

(7) The railroad shall maintain a record of all defective, inoperative, or ineffective brakes as well as any conditions not in compliance with part 215 and part 231 of this chapter discovered at anytime during the movement of the train. These records shall be retained for a period of one year and made available to FRA upon request. The records required by this section may be maintained either electronically or in writing.

(8) In order for an extended haul train to proceed beyond 1,500 miles, the following requirements shall be met:

(i) If the train will move 1,000 miles or less from that location before receiving a Class IA brake test or reaching destination, a Class I brake test shall be conducted pursuant to § 232.205 to ensure 100 percent effective and operative brakes. The inbound inspection required by paragraph (a)(6) of this section may be used to meet this requirement provided it encompasses all the inspection elements contained in § 232.205.

(ii) If the train will move greater than 1,000 miles from that location without another brake inspection, the train must be identified as an extended haul train for that movement and shall meet all the requirements contained in paragraphs (a)(1) through (a)(7) of this section. Such trains shall receive a Class I brake test pursuant to § 232.205 by a qualified mechanical inspector to ensure 100 percent effective and operative brakes, a freight car inspection pursuant to part 215 of this chapter by an inspector designated under § 215.11 of this chapter, and all cars containing non-complying conditions under part 215 of this chapter shall either be repaired or removed from the train. The inbound inspection required by paragraph (a)(6) of this section may be used to meet these inspection requirements provided it encompasses all the inspection elements contained paragraphs (a)(2) through (a)(4) of this section.

(9) FRA inspectors shall have physical access to visually observe all brake and freight car inspections and tests required by this section.

(b) Failure to comply with any of the requirements contained in paragraph (a) of this section will be considered an improper movement of a designated priority train for which appropriate civil penalties may be assessed as outlined in Appendix A to this part. Furthermore, FRA's Associate Administrator for Safety may revoke a railroad's ability to designate any or all trains as extended haul trains for repeated or willful noncompliance with any of the requirements contained in this section. Such a determination will be made in writing and will state the basis for such action.
§ 232.215 -- Transfer train brake tests.
(a) A transfer train, as defined in § 232.5, shall receive a brake test performed by a qualified person, as defined in § 232.5, that includes the following:
   (1) The air brake hoses shall be coupled between all freight cars;
   (2) After the brake system is charged to not less than 60 psi as indicated by an accurate gauge or end-of-train device at the rear of the train, a 15-psi service brake pipe reduction shall be made; and
   (3) An inspection shall be made to determine that the brakes on each car apply and remain applied until the release is initiated by the controlling locomotive. A car found with brakes that fail to apply or remain applied may be retested and remain in the train if the retest is conducted as prescribed in § 232.205(b)(4); otherwise, the defective equipment may only be moved pursuant to the provisions contained in § 232.15, if applicable.
(b) Cars added to transfer trains en route shall be inspected pursuant to the requirements contained in paragraph (a) of this section at the location where the cars are added to the train.
(c) If a train's movement will exceed 20 miles or is not a transfer train as defined in § 232.5, the train shall receive a Class I brake test in accordance with § 232.205 prior to departure.

§ 232.217 -- Train brake tests conducted using yard air.
(a) When a train air brake system is tested from a yard air source, an engineer's brake valve or a suitable test device shall be used to provide any increase or reduction of brake pipe air pressure at the same, or slower, rate as an engineer's brake valve.
(b) The yard air test device must be connected to the end of the train or block of cars that will be nearest to the controlling locomotive. However, if the railroad adopts and complies with written procedures to ensure that potential overcharge conditions to the train brake system are avoided, the yard air test device may be connected to other than the end nearest to the controlling locomotive.
(c) Except as provided in this section, when a yard air is used the train air brake system must be charged and tested as prescribed by § 232.205(b) and when practicable should be kept charged until road motive power is coupled to train, after which, a Class III brake test shall be performed as prescribed by § 232.211.
   (1) If the cars are off air for more than four hours, these cars shall be retested in accordance with § 232.205(b) through (e).
   (2) At a minimum, yard air pressure shall be 60 psi at the end of the consist or block of cars opposite from the yard test device and shall be within 15 psi of the regulator valve setting on yard test device.
   (3) If the air pressure of the yard test device is less than the pressure at which the train will be operated, then a leakage or air flow test shall be conducted at the operating pressure of the train when the locomotives are attached in accordance with § 232.205(b)(1).
(d) Mechanical yard air test devices and gauges shall be calibrated every 92 days. Electronic yard test devices and gauges shall be calibrated annually. Mechanical and
electronic yard air test devices and gauges shall be calibrated so that they are accurate to within #3 psi.
(e) If used to test a train, a yard air test device and any yard air test equipment shall be accurate and function as intended.

§ 232.219 -- Double heading and helper service.
(a) When more than one locomotive is attached to a train, the engineer of the controlling locomotive shall operate the brakes. In case it becomes necessary for the controlling locomotive to give up control of the train short of the destination of the train, a Class III brake test pursuant to § 232.211 shall be made to ensure that the brakes are operative from the automatic brake valve of the locomotive taking control of the train.
(b) When one or more helper locomotives are placed in a train, a visual inspection shall be made of each helper locomotive brake system to determine that the brake system operates as intended in response to a 20-psi reduction initiated from the controlling locomotive of the train. A helper locomotive with inoperative or ineffective brakes shall be repaired prior to use or removed from the train.
(c) If a helper locomotive utilizes a Helper Link device or a similar technology, the locomotive and device shall be equipped, designed, and maintained as follows:
   (1) The locomotive engineer shall be notified by a distinctive alarm of any loss of communication between the device and the two-way end-of-train device of more than 25 seconds;
   (2) A method to reset the device shall be provided in the cab of the helper locomotive that can be operated from the engineer's usual position during operation of the locomotive;
   (3) The device shall be tested for accuracy and calibrated if necessary according to the manufacturer's specifications and procedures every 365 days. This shall include testing radio frequencies and modulation of the device. A legible record of the date and location of the last test or calibration shall be maintained with the device.

Subpart D--Periodic Maintenance and Testing Requirements

§ 232.301 -- Scope.
This subpart contains the periodic brake system maintenance and testing requirements for equipment used in freight and other non-passenger trains.

§ 232.303 -- General requirements.
(a) Definitions. The following definitions are intended solely for the purpose of identifying what constitutes a shop or repair track under this subpart.
   (1) Shop or repair track means:
      (i) A fixed repair facility or track designated by the railroad as a shop or repair track;
      (ii) A fixed repair facility or track which is regularly and consistently used to perform major repairs;
      (iii) track which is used at a location to regularly and consistently perform both minor and major repairs where the railroad has not designated a certain portion of that trackage as a repair track;
(iv) A track designated or used by a railroad to regularly and consistently perform minor repairs during the period when major repairs are being conducted on such a track; and
(v) The facilities and tracks identified in paragraphs (a)(1)(i) through (a)(1)(iv) shall be considered shop or repair tracks regardless of whether a mobile repair vehicle is used to conduct the repairs.

(2) Major repair means a repair of such a nature that it would normally require greater than four man-hours to accomplish or would involve the use of specialized tools and equipment. Major repairs would include such things as coupler replacement, draft gear repair, and repairs requiring the use of an air jack.

(3) Minor repair means repairs, other than major repairs, that can be accomplished in a short period of time with limited tools and equipment. Minor repairs would include such things as safety appliance straightening, handhold replacement, air hose replacement, lading adjustment, and coupler knuckle or knuckle pin replacement.

(b) A car on a shop or repair track shall be tested to determine that the air brakes apply and remain applied until a release is initiated.

(c) A car on a shop or repair track shall have its piston travel inspected. For cars equipped with 8 1/2-inch or 10-inch diameter brake cylinders, piston travel shall be within 7 to 9 inches. If piston travel is found to be less than 7 inches or more than 9 inches, it must be adjusted to nominally 7 1/2 inches. For cars not equipped with 8 1/2-inch or 10-inch diameter brake cylinders, piston travel shall be within the piston travel stenciled or marked on the car or badge plate.

(d) Before a car is released from a shop or repair track, a qualified person shall ensure:
   (1) The brake pipe is securely clamped;
   (2) Angle cocks are properly located with suitable clearance and properly positioned to allow maximum air flow;
   (3) Valves, reservoirs, and cylinders are tight on supports and the supports are securely attached to the car;
   (4) Hand brakes are tested, inspected, and operate as intended; and
   (5) Brake indicators, on cars so equipped, are accurate and operate as intended.

(e) If the repair track air brake test or single car test required in §§ 232.305 and 232.307 cannot be conducted at the point where repairs can be made to the car, the car may be moved after the repairs are effectuated to the next forward location where the test can be performed. Inability to perform a repair track air brake test or single car test does not constitute an inability to effectuate the necessary repairs.

   (1) If it is necessary to move a car from the location where the repairs are performed in order to perform a repair track air brake test or a single car test required by this part, a tag or card shall be placed on both sides of the equipment, or an automated tracking system approved for use by FRA, with the following information about the equipment:
      (i) The reporting mark and car number;
      (ii) The name of the inspecting railroad;
      (iii) The location where repairs were performed and date;
      (iv) Indication whether the car requires a repair track brake test or single car test;
The location where the appropriate test is to be performed; and

The name, signature, if possible, and job title of the qualified person approving the move.

(2) The tag or card required by paragraph (e)(1) of this section shall remain affixed to the equipment until the necessary test has been performed.

(3) An electronic or written record or copy of each tag or card attached to or removed from a car or locomotive shall be retained for 90 days and, upon request, shall be made available within 15 calendar days for inspection by FRA or State inspectors.

(4) The record or copy of each tag or card removed from a car or locomotive shall contain the date, location, and the signature or identification of the qualified person removing it from the piece of equipment.

(f) The location and date of the last repair track brake test or single car test required by §§ 232.305 and 232.307 of this part shall be clearly stenciled, marked, or labeled in two-inch high letters or numerals on the side of the equipment. Alternatively, the railroad industry may use an electronic or automated tracking system to track the required information and the performance of the tests required by §§ 232.305 and 232.307 of this part.

1. Electronic or automated tracking systems used to meet the requirement contained in this paragraph shall be capable of being 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 the railroad industry's authority to utilize an electronic or automated tracking system in lieu of stenciling or marking if FRA finds that the electronic or automated tracking system is not properly secure, is inaccessible to FRA or railroad employees, or fails to adequately track and monitor the equipment. FRA will record such a determination in writing, include a statement of the basis for such action, and will provide a copy of the document to the affected railroads.

2. [Reserved.]

§ 232.305 -- Repair track air brake tests.

(a) Repair track brake tests shall be performed by a qualified person in accordance with either Section 3.0, "Procedures for Repair Track Test for Air Brake Equipment," of the Association of American Railroads Standard S-486-99, "Code of Air Brake System Tests for Freight Equipment," contained in the AAR Manual of Standards and Recommended Practices, Section E (April 1, 1999) or an alternative procedure approved by FRA pursuant to § 232.17. The incorporation by reference of this AAR 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 Association of American Railroads, 50 F Street, NW., Washington, DC 20001. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1120 Vermont Avenue, NW., Suite 7000, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(b) Except as provided in § 232.303(e), a railroad shall perform a repair track brake test on a car when:

1. A car has its brakes cut-out or inoperative when removed from a train or when placed on a shop or repair track;
(2) A car is on a repair or shop track, as defined in § 232.303(a), for any reason and has not received a repair track brake test within the previous 12 month period;

(3) A car is found with missing or incomplete repair track brake test information;

(4) One or more of the following conventional air brake equipment items is removed, repaired, or replaced:
   (i) Brake reservoir;
   (ii) Control valve mounting gasket; or
   (iii) Pipe bracket stud.

(5) A car is found with one or more of the following wheel defects:
   (i) Built-up tread, unless known to be caused by hand brake left applied;
   (ii) Slid flat wheel, unless known to be caused by hand brake left applied;
   or
   (iii) Thermal cracks.

(c) Except as provided in paragraph (d) of this section, each car shall receive a repair track brake test no less than every 5 years.

(d) Each car shall receive a repair track brake test no less than 8 years from the date the car was built or rebuilt.

§ 232.307 -- Single car tests.

(a) Single car tests shall be performed by a qualified person in accordance with either Section 4.0, "Tests-Standard Single Capacity Freight Brake Equipment (Single Car Test)," of the Association of American Railroads Standard S-486-99, "Code of Air Brake System Tests for Freight Equipment," contained in the AAR Manual of Standards and Recommended Practices, Section E (April 1, 1999) or an alternative procedure approved by FRA pursuant to § 232.17. The incorporation by reference of this AAR 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 Association of American Railroads, 50 F Street, NW., Washington, DC 20001. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1120 Vermont Avenue, NW., Suite 7000, Washington, DC or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC.

(b) Except as provided in § 232.303(e), a railroad shall perform a single car test on a car when one or more of the following conventional air brake equipment items is removed, repaired or replaced:
   (1) Service portion;
   (2) Emergency portion; or
   (3) Pipe bracket.

(c) A single car test pursuant to paragraph (a) of this section shall be performed on a new or rebuilt car prior to placing or using the car in revenue service.

§ 232.309 -- Repair track air brake test and single car test equipment and devices.

(a) Test equipment and devices used to perform repair track air brake tests or single car tests shall be tested for correct operation at least once each calendar day of use.

(b) Except for single car test devices, mechanical test devices such as pressure gauges, flow meters, orifices, etc. shall be calibrated once every 92 days.

(c) Electronic test devices shall be calibrated at least once every 365 days.
(d) Test equipment and single car test devices placed in service shall be tagged or labeled with the date its next calibration is due.
(e) Each single car test device shall be tested not less frequently than every 92 days after being placed in service and may not continue in service if more than one year has passed since its last 92-day test.
(f) Each single car test device shall be disassembled and cleaned not less frequently than every 365 days after being placed in service.

Subpart E--End-of-Train Devices

§ 232.401 -- Scope.
This subpart contains the requirements related to the performance, operation, and testing of end-of-train devices. Unless expressly excepted in this subpart, the requirements of this subpart apply to all trains operating on track which is part of the general railroad system of transportation.

§ 232.403 -- Design standards for one-way end-of-train devices.
(a) General. A one-way end-of-train device shall be comprised of a rear-of-train unit (rear unit) located on the last car of a train and a front-of-train unit (front unit) located in the cab of the locomotive controlling the train.
(b) Rear unit. The rear unit shall be capable of determining the brake pipe pressure on the rear car and transmitting that information to the front unit for display to the locomotive engineer. The rear unit shall be-
   (1) Capable of measuring the brake pipe pressure on the rear car with an accuracy of #3 pounds per square inch (psig) and brake pipe pressure variations of #1 psig;
   (2) Equipped with a "bleeder valve" that permits the release of any air under pressure from the rear of train unit or the associated air hoses prior to detaching the rear unit from the brake pipe;
   (3) Designed so that an internal failure will not cause an undesired emergency brake application;
   (4) Equipped with either an air gauge or a means of visually displaying the rear unit's brake pipe pressure measurement; and
   (5) Equipped with a pressure relief safety valve to prevent explosion from a high pressure air leak inside the rear unit.
(c) Reporting rate. Multiple data transmissions from the rear unit shall occur immediately after a variation in the rear car brake pipe pressure of #2 psig and at intervals of not greater than 70 seconds when the variation in the rear car brake pipe pressure over the 70-second interval is less than #2 psig.
(d) Operating environment. The rear unit shall be designed to meet the performance requirements of paragraphs (b) and (c) of this section under the following environmental conditions:
   (1) At temperatures from 40 [degrees] C to 60 [degrees] C;
   (2) At a relative humidity of 95% noncondensing at 50 [degrees] C;
   (3) At altitudes of zero to 12,000 feet mean sea level;
   (4) During vertical and lateral vibrations of 1 to 15 Hz., with 0.5 g. peak to peak, and 15 to 500 Hz., with 5 g. peak to peak;
During the longitudinal vibrations of 1 to 15 Hz., with 3 g. peak to peak, and
15 to 500 Hz., with 5 g. peak to peak; and
During a shock of 10 g. peak for 0.1 second in any axis.

(e) **Unique code.** Each rear unit shall have a unique and permanent identification
code that is transmitted along with the pressure message to the front-of-train unit. A code
obtained from the Association of American Railroads, 50 F Street, NW., Washington, DC
20036 shall be deemed to be a unique code for purposes of this section. A unique code
also may be obtained from the Office of Safety Assurance and Compliance (RRS-10),
Federal Railroad Administration, Washington, DC 20590.

(f) **Front unit.**

(1) The front unit shall be designed to receive data messages from the rear unit
and shall be capable of displaying the rear car brake pipe pressure in increments not to
exceed one pound.

(2) The display shall be clearly visible and legible in daylight and darkness from
the engineer's normal operating position.

(3) The front device shall have a means for entry of the unique identification code
of the rear unit being used. The front unit shall be designed so that it will display a
message only from the rear unit with the same code as entered into the front unit.

(4) The front unit shall be designed to meet the requirements of paragraphs (d)(2),
(3), (4), and (5) of this section. It shall also be designed to meet the performance
requirements in this paragraph under the following environmental conditions:
   (i) At temperatures from 0 [degrees] C to 60 [degrees] C;
   (ii) During a vertical or lateral shock of 2 g. peak for 0.1 second; and
   (iii) During a longitudinal shock of 5 g. peak for 0.1 second.

(g) **Radio equipment.**

(1) The radio transmitter in the rear unit and the radio receiver in the front unit
shall comply with the applicable regulatory requirements of the Federal Communications
Commission (FCC) and use of a transmission format acceptable to the FCC.

(2) If power is supplied by one or more batteries, the operating life shall be a
minimum of 36 hours at 0 [degrees] C.

§ 232.405 -- Design and performance standards for two-way end-of-train devices.

Two-way end-of-train devices shall be designed and perform with the features
applicable to one-way end-of-train devices described in § 232.403, except those included
in § 232.403(b)(3). In addition, a two-way end-of-train device shall be designed and
perform with the following features:

(a) An emergency brake application command from the front unit of the device shall
activate the emergency air valve at the rear of the train within one second.

(b) The rear unit of the device shall send an acknowledgment message to the front
unit immediately upon receipt of an emergency brake application command. The front
unit shall listen for this acknowledgment and repeat the brake application command if the
acknowledgment is not correctly received.

(c) The rear unit, on receipt of a properly coded command, shall open a valve in the
brake line and hold it open for a minimum of 15 seconds. This opening of the valve shall
cause the brake line to vent to the exterior.
(d) The valve opening shall have a minimum diameter of 3/4 inch and the internal diameter of the hose shall be 5/8 inch to effect an emergency brake application.

(e) The front unit shall have a manually operated switch which, when activated, shall initiate an emergency brake transmission command to the rear unit or the locomotive shall be equipped with a manually operated switch on the engineer control stand designed to perform the equivalent function. The switch shall be labeled "Emergency" and shall be protected so that there will exist no possibility of accidental activation.

(f) All locomotives ordered on or after August 1, 2001, or placed in service for the first time on or after August 1, 2003, shall be designed to automatically activate the two-way end-of-train device to effectuate an emergency brake application whenever it becomes necessary for the locomotive engineer to place the train air brakes in emergency.

(g) The availability of the front-to-rear communications link shall be checked automatically at least every 10 minutes.

(h) Means shall be provided to confirm the availability and proper functioning of the emergency valve.

(i) Means shall be provided to arm the front and rear units to ensure the rear unit responds to an emergency command only from a properly associated front unit.


(a) Definitions. The following definitions are intended solely for the purpose of identifying those operations subject to the requirements for the use of two-way end-of-train devices.

(1) Heavy grade means:

(i) For a train operating with 4,000 trailing tons or less, a section of track with an average grade of two percent or greater over a distance of two continuous miles; and

(ii) For a train operating with greater than 4,000 trailing tons, a section of track with an average grade of one percent or greater over a distance of three continuous miles.

(2) Train means one or more locomotives coupled with one or more rail cars, except during switching operations or where the operation is that of classifying cars within a railroad yard for the purpose of making or breaking up trains.

(3) Local train means a train assigned to perform switching en route which operates with 4,000 trailing tons or less and travels between a point of origin and a point of final destination, for a distance that is no greater than that which can normally be operated by a single crew in a single tour of duty.

(4) Work train means a non-revenue service train of 4,000 trailing tons or less used for the administration and upkeep service of the railroad.

(5) Trailing tons means the sum of the gross weights-expressed in tons-of the cars and the locomotives in a train that are not providing propelling power to the train.

(b) General. All trains not specifically excepted in paragraph (e) of this section shall be equipped with and shall use either a two-way end-of-train device meeting the design and performance requirements contained in § 232.405 or a device using an alternative technology to perform the same function.
(c) **New devices.** Each newly manufactured end-of-train device purchased by a railroad after January 2, 1998 shall be a two-way end-of-train device meeting the design and performance requirements contained in § 232.405 or a device using an alternative technology to perform the same function.

(d) **Grandfathering.** Each two-way end-of-train device purchased by any person prior to July 1, 1997 shall be deemed to meet the design and performance requirements contained in § 232.405.

(e) **Exceptions.** The following types of trains are excepted from the requirement for the use of a two-way end-of-train device:

1. Trains with a locomotive or locomotive consist located at the rear of the train that is capable of making an emergency brake application, through a command effectuated by telemetry or by a crew member in radio contact with the controlling locomotive;
2. Trains operating in the push mode with the ability to effectuate an emergency brake application from the rear of the train;
3. Trains with an operational caboose placed at the rear of the train, carrying one or more crew members in radio contact with the controlling locomotive, that is equipped with an emergency brake valve;
4. Trains operating with a secondary, fully independent braking system capable of safely stopping the train in the event of failure of the primary system;
5. Trains that do not operate over heavy grades and do not exceed 30 mph;
6. Local trains, as defined in paragraph (a)(3) of this section, that do not operate over heavy grades;
7. Work trains, as defined in paragraph (a)(4) of this section, that do not operate over heavy grades;
8. Trains that operate exclusively on track that is not part of the general railroad system;
9. Trains that must be divided into two sections in order to traverse a grade (e.g., doubling a hill). This exception applies only to the extent necessary to traverse the grade and only while the train is divided in two for such purpose;
10. Passenger trains in which all of the cars in the train are equipped with an emergency brake valve readily accessible to a crew member;
11. Passenger trains that have a car at the rear of the train, readily accessible to one or more crew members in radio contact with the engineer, that is equipped with an emergency brake valve readily accessible to such a crew member; and
12. Passenger trains that have twenty-four (24) or fewer cars (not including locomotives) in the consist and that are equipped and operated in accordance with the following train-configuration and operating requirements:
   (i) If the total number of cars in a passenger train consist is twelve (12) or fewer, a car located no less than halfway through the consist (counting from the first car in the train) must be equipped with an emergency brake valve readily accessible to a crew member;
   (ii) If the total number of cars in a passenger train consist is thirteen (13) to twenty-four (24), a car located no less than two-thirds (2/3) of the way through the consist (counting from the first car in the train) must be equipped with an emergency brake valve readily accessible to a crew member;
(iii) Prior to descending a section of track with an average grade of two percent or greater over a distance of two continuous miles, the engineer of the train shall communicate with the conductor, to ensure that a member of the crew with a working two-way radio is stationed in the car with the rearmost readily accessible emergency brake valve on the train when the train begins its descent; and

(iv) While the train is descending a section of track with an average grade of two percent or greater over a distance of two continuous miles, a member of the train crew shall occupy the car that contains the rearmost readily accessible emergency brake valve on the train and be in constant radio communication with the locomotive engineer. The crew member shall remain in this car until the train has completely traversed the heavy grade.

(f) Specific requirements for use. If a train is required to use a two-way end-of-train device:

1. That device shall be armed and operable from the time the train departs from the point where the device is installed until the train reaches its destination. If a loss of communication occurs at the location where the device is installed, the train may depart the location at restricted speed for a distance of no more than one mile in order to establish communication. When communication is established, the quantitative values of the head and rear unit shall be compared pursuant to § 232.409(b) and the device tested pursuant to § 232.409(c), unless the test was performed prior to installation.

2. The rear unit batteries shall be sufficiently charged at the initial terminal or other point where the device is installed and throughout the train's trip to ensure that the end-of-train device will remain operative until the train reaches its destination.

3. The device shall be activated to effectuate an emergency brake application either by using the manual toggle switch or through automatic activation, whenever it becomes necessary for the locomotive engineer to initiate an emergency application of the air brakes using either the automatic brake valve or the conductor's emergency brake valve.

(g) En route failure of device on a freight or other non-passenger train. Except on passenger trains required to be equipped with a two-way end-of-train device (which are provided for in paragraph (h) of this section), en route failures of a two-way end-of-train device shall be handled in accordance with this paragraph. If a two-way end-of-train device or equivalent device fails en route (i.e., is unable to initiate an emergency brake application from the rear of the train due to certain losses of communication (front to rear) or due to other reasons, the speed of the train on which it is installed shall be limited to 30 mph until the ability of the device to initiate an emergency brake application from the rear of the train is restored. This limitation shall apply to a train using a device that uses an alternative technology to serve the purpose of a two-way end-of-train device. With regard to two-way end-of-train devices, a loss of communication between the front and rear units is an en route failure only if the loss of communication is for a period greater than 16 minutes and 30 seconds. Based on the existing design of the devices, the display to an engineer of a message that there is a communication failure indicates that communication has been lost for 16 minutes and 30 seconds or more.

1. If a two-way end-of-train device fails en route, the train on which it is installed, in addition to observing the 30-mph speed limitation, shall not operate over a
section of track with an average grade of two percent or greater for a distance of two continuous miles, unless one of the following alternative measures is provided:

(i) Use of an occupied helper locomotive at the end of the train. This alternative may be used only if the following requirements are met:

(A) The helper locomotive engineer shall initiate and maintain two-way voice radio communication with the engineer on the head end of the train; this contact shall be verified just prior to passing the crest of the grade.

(B) If there is a loss of communication prior to passing the crest of the grade, the helper locomotive engineer and the head-end engineer shall act immediately to stop the train until voice communication is resumed, in accordance with the railroad's operating rules.

(C) If there is a loss of communication once the descent has begun, the helper locomotive engineer and the head-end engineer shall act to stop the train, in accordance with the railroad's operating rules, if the train has reached a predetermined rate of speed that indicates the need for emergency braking.

(D) The brake pipe of the helper locomotive shall be connected and cut into the train line and tested to ensure operation.

(ii) Use of an occupied caboose at the end of the train with a tested, functioning brake valve capable of initiating an emergency brake application from the caboose. This alternative may be used only if the train service employee in the caboose and the engineer on the head end of the train establish and maintain two-way voice radio communication and respond appropriately to the loss of such communication in the same manner as prescribed for helper locomotives in paragraph (g)(1)(i) of this section.

(iii) Use of a radio-controlled locomotive at the rear of the train under continuous control of the engineer in the head end by means of telemetry, but only if such radio-controlled locomotive is capable of initiating an emergency application on command from the lead (controlling) locomotive.

(2) [Reserved.]

(h) **En route failure of device on a passenger train.**

(1) A passenger train required to be equipped with a two-way end-of-train device that develops an en route failure of the device (as explained in paragraph (g) of this section) shall not operate over a section of track with an average grade of two percent or greater over a distance of two continuous miles until an operable two-way end-of-train device is installed on the train or an alternative method of initiating an emergency brake application from the rear of the train is achieved.

(2) Except as provided in paragraph (h)(1) of this section, a passenger train required to be equipped with a two-way end-of-train device that develops an en route failure of the device (as explained in paragraph (g) of this section) shall be operated in accordance with the following:

(i) A member of the train crew shall be immediately positioned in the car which contains the rearmost readily accessible emergency brake valve on the train and shall be equipped with an operable two-way radio that communicates with the locomotive engineer; and
(ii) The locomotive engineer shall periodically make running tests of the train's air brakes until the failure is corrected; and

(3) Each en route failure shall be corrected at the next location where the necessary repairs can be conducted or at the next location where a required brake test is to be performed, whichever is reached first.

§ 232.409 -- Inspection and testing of end-of-train devices.
(a) After each installation of either the front or rear unit of an end-of-train device, or both, on a train and before the train departs, the railroad shall determine that the identification code entered into the front unit is identical to the unique identification code on the rear unit.
(b) After each installation of either the front or rear unit of an end-of-train device, or both, on a train and before the train departs, the functional capability of the device shall be determined, after charging the train, by comparing the quantitative value of the air pressure displayed on the front unit with the quantitative value of the air pressure displayed on the rear unit or on a properly calibrated air gauge. The end-of-train device shall not be used if the difference between the two readings exceeds three pounds per square inch.
(c) A two-way end-of-train device shall be tested at the initial terminal or other point of installation to ensure that the device is capable of initiating an emergency power brake application from the rear of the train. If this test is conducted by a person other than a member of the train crew, the locomotive engineer shall be notified that a successful test was performed. The notification required by this paragraph may be provided to the locomotive engineer by any means determined appropriate by the railroad; however, a written or electronic record of the notification shall be maintained in the cab of the controlling locomotive and shall include the date and time of the test, the location where the test was performed, and the name of person conducting the test.
(d) The telemetry equipment shall be tested for accuracy and calibrated if necessary according to the manufacturer's specifications and procedures at least every 365 days. This shall include testing radio frequencies and modulation of the device. The date and location of the last calibration or test as well as the name of the person performing the calibration or test shall be legibly displayed on a weather-resistant sticker or other marking device affixed to the outside of both the front unit and the rear unit; however, if the front unit is an integral part of the locomotive or is inaccessible, then the information may be recorded on Form FRA F6180-49A instead, provided the serial number of the unit is recorded.
Subpart F--Introduction of New Brake System Technology

§ 232.501 -- Scope.
This subpart contains general requirements for introducing new brake system technologies. This subpart is intended to facilitate the introduction of new complete brake system technologies or major upgrades to existing systems which the current regulations do not adequately address (i.e., electronic brake systems). This subpart is not intended for use in the introduction of a new brake component or material.

§ 232.503 -- Process to introduce new brake system technology.
(a) Pursuant to the procedures contained in § 232.17, each railroad shall obtain special approval from the FRA Associate Administrator for Safety of a pre-revenue service acceptance testing plan, developed pursuant to § 232.505, for the new brake system technology, prior to implementing the plan.
(b) Each railroad shall complete a pre-revenue service demonstration of the new brake system technology in accordance with the approved plan, shall fulfill all of the other requirements prescribed in § 232.505, and shall obtain special approval from the FRA Associate Administrator for Safety under the procedures of § 232.17 prior to using such brake system technology in revenue service.

§ 232.505 -- Pre-revenue service acceptance testing plan.
(a) General; submission of plan. Except as provided in paragraph (f) of this section, before using a new brake system technology for the first time on its system the operating railroad or railroads shall submit a pre-revenue service acceptance testing plan containing the information required by paragraph (e) of this section and obtain the approval of the FRA Associate Administrator for Safety, under the procedures specified in § 232.17.
(b) Compliance with plan. After receiving FRA approval of the pre-revenue service testing plan and before introducing the new brake system technology into revenue service, the operating railroad or railroads shall:
   (1) Adopt and comply with such FRA-approved plan, including fully executing the tests required by the plan;
   (2) Report to the FRA Associate Administrator for Safety the results of the pre-revenue service acceptance tests;
   (3) Correct any safety deficiencies identified by FRA in the design of the equipment or in the inspection, testing, and maintenance procedures or, if safety deficiencies cannot be corrected by design or procedural changes, agree to comply with any operational limitations that may be imposed by the Associate Administrator for Safety on the revenue service operation of the equipment; and
   (4) Obtain FRA approval to place the new brake system technology in revenue service.
(c) Compliance with limitations. The operating railroad shall comply with each operational limitation, if any, imposed by the Associate Administrator for Safety.
(d) Availability of plan. The plan shall be made available to FRA for inspection and copying upon request.
(e) Elements of plan. The plan shall include all of the following elements:
(1) An identification of each waiver, if any, of FRA or other Federal safety regulations required for the tests or for revenue service operation of the equipment.

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

(3) A planned schedule for conducting the tests.

(4) A description of the railroad property or facilities to be used to conduct the tests.

(5) A detailed description of how the tests are to be conducted. This description shall include:

   (i) An identification of the equipment to be tested;
   (ii) The method by which the equipment is to be tested;
   (iii) The criteria to be used to evaluate the equipment's performance; and
   (iv) The means by which the test results are to be reported to FRA.

(6) A description of any special instrumentation to be used during the tests.

(7) A description of the information or data to be obtained.

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

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

(10) 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.

(11) A description of any special safety precautions to be observed during the testing.

(12) A written set of standard operating procedures to be used to ensure that the testing is done safely.

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

(14) Criteria to be used for the revenue service operation of the equipment.

(15) A description of all testing of the equipment that has previously been performed, if any.

(f) Exception. For brake system technologies that have previously been used in revenue service in the United States, the railroad shall test the equipment on its system, prior to placing it in revenue service, to ensure the compatibility of the equipment with the operating system (track, signals, etc.) of the railroad. A description of such testing shall be retained by the railroad and made available to FRA for inspection and copying upon request.

Appendix A --Schedule of Penalties