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**Title 49 —Transportation**

**Subtitle B —Other Regulations Relating to Transportation**

**Chapter II —Federal Railroad Administration, Department of Transportation**

**Part 232** Brake System Safety Standards for Freight and Other Non-Passenger  
Trains and Equipment; End-of-Train Devices

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## **PART 232—BRAKE SYSTEM SAFETY STANDARDS FOR FREIGHT AND OTHER NON-PASSENGER TRAINS AND EQUIPMENT; END-OF-TRAIN DEVICES**

**Authority:** 49 U.S.C. 20102-20103, 20107, 20133, 20141, 20301-20303, 20306, 21301-20302, 21304; 28 U.S.C. 2461, note; and 49 CFR 1.89.

Source: 66 FR 4193, Jan. 17, 2001, unless otherwise noted.

## 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 must comply with all the requirements contained in this part.
- (c) Except for operations identified in § 232.3(c)(1), (4), and (6) through (8), all railroads part of the general railroad system of transportation must operate pursuant to the requirements in subpart H of this part (which contains the requirements in this part 232 as they existed on May 31, 2001), until they are either required to operate pursuant to the requirements contained in subparts A through G of this part or the requirements contained in part 238 of this chapter.

[66 FR 4193, Jan. 17, 2001, as amended at 66 FR 9906, Feb. 12, 2001; 85 FR 80570, Dec. 11, 2020]

### § 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(c) 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).

[66 FR 4193, Jan. 17, 2001, as amended at 85 FR 80570, Dec. 11, 2020]

## § 232.5 Definitions.

The definitions in this section are intended to clarify the meaning of terms used in 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 method indicator, AFM** means a calibrated air flow measuring device used as required by the air flow method (AFM) of qualifying train air brakes and with information clearly and legibly displayed in analog or digital format and visible in daylight and darkness from the engineer's normal operating position. Each AFM indicator includes:

- (1) Markings from 10 to 80 cubic feet per minute (CFM), in increments of 10 CFM or less; and
- (2) Numerals indicating 20, 40, 60, and 80 CFM for continuous monitoring of air flow.

**Air repeater unit, ARU** means a car, container, or similar device that provides an additional brake pipe air source by responding to air control instructions from a controlling locomotive using a communication system such as a distributed power system.

**APTA** means the American Public Transportation Association.

**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 nominally designed retarding force on the train. A car's air brake is not considered effective if it is not capable of producing its nominally designed retarding force or if its piston travel exceeds:

- (1) 10<sup>1</sup>/<sub>2</sub> inches for cars equipped with nominal 12-inch stroke brake cylinders; or
- (2) The piston travel limit 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.

**Car control device (CCD)** means an electronic control device that replaces the function of the conventional pneumatic service and emergency portions of a car's air brake control valve during electronic braking and provides for electronically controlled service and emergency brake applications.

**Dual mode ECP brake system** means an ECP brake system that is equipped with either an emulator CCD or an overlay ECP brake system on each car which can be operated in either ECP brake mode or conventional pneumatic brake mode.

**ECP** means "electronically controlled pneumatic" when applied to a brake or brakes.

**ECP brake mode** means operating a car or an entire train using an ECP brake system.

**ECP brake system** means a train power braking system actuated by compressed air and controlled by electronic signals from the locomotive or an ECP-EOT to the cars in the consist for service and emergency applications in which the brake pipe is used to provide a constant supply of compressed air to the reservoirs on each car but does not convey braking signals to the car. ECP brake systems include dual mode and stand-alone ECP brake systems.

**ECP-EOT device** means an end-of-train device for an ECP brake system that is physically the last network node in the train, pneumatically and electrically connected at the end of the train to the train line cable operating with an ECP brake system.

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

**Emulator CCD** means a CCD that is capable of optionally emulating the function of the pneumatic control valve while in a conventionally braked train.

**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.

**Gradient, brake pipe** means the difference in brake pipe pressure, usually measured in pounds per square inch (psi), between each air supply source (e.g., locomotive, distributed power unit, or ARU) or between an air supply source and the rear car of the train when the brake system is fully charged under existing leakage and temperature conditions.

**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.

**Mechanical securement device** means a device, other than the air brake, that provides at least the equivalent securement that a sufficient number of hand brakes would provide in the same situation. Current examples include skates, retarders, and inert retarders.

**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.



**Overlay ECP brake system** means a brake system that has both conventional pneumatic brake valves and ECP brake components, making it capable of operating as either a conventional pneumatic brake system or an ECP brake system. This brake system can operate in either a conventionally braked train using the conventional pneumatic control valve or in an ECP braked train using the ECP brake system's CCD.

**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:

- (1) 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

- (2) 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 coupled together and added to or removed from a train as a single unit.

**Stand-alone CCD** means a CCD that can operate properly only in a train operating in ECP brake mode and cannot operate in a conventional pneumatically braked train.

**Stand-alone ECP brake system** means a brake system equipped with a CCD that can only operate the brakes on the car in ECP brake mode.

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

**Switch Mode** means a mode of operation of the ECP brake system that allows operation of that train at 20 miles per hour or less when the train's ECP-EOT device is not communicating with the lead locomotive's HEU, the train is separated during road switching operations, or the ECP brake system has stopped the train because the percentage of operative brakes fell below 85%. Many of the ECP brake system's fault detection/response procedures are suspended during Switch Mode.

**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 line cable** is a two-conductor electric wire spanning the train and carrying both electrical power to operate all CCDs and ECP-EOT devices and communications network signals.

**Train, unit or train, cycle** means a train that, except for the changing of locomotive power or for the removal or replacement of defective equipment, remains coupled as a consist and operates in a continuous loop or continuous loops without destination.

**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.

**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.

**Yard** means a system of tracks, not including main tracks and sidings, used for classifying cars, making-up and inspecting trains, or storing cars and equipment.

**Yard air** means a source of compressed air other than from a locomotive.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17580, Apr. 10, 2002; 73 FR 61552, Oct. 16, 2008; 80 FR 47834, Aug. 6, 2015; 85 FR 80570, Dec. 11, 2020]

## § 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 the minimum civil monetary penalty and not more than the ordinary maximum civil monetary penalty 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 individuals, or has caused death or injury, a penalty not to exceed the aggravated maximum civil monetary penalty per violation may be assessed. See 49 CFR part 209, appendix A. Each day a violation continues shall constitute a separate offense. FRA's website at <https://railroads.dot.gov/> contains a schedule of civil penalty amounts used in connection with this part.
- (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.

[66 FR 4193, Jan. 17, 2001, as amended at 69 FR 30594, May 28, 2004; 72 FR 51197, Sept. 6, 2007; 73 FR 79703, Dec. 30, 2008; 77 FR 24421, Apr. 24, 2012; 81 FR 43111, July 1, 2016; 82 FR 16134, Apr. 3, 2017; 83 FR 60748, Nov. 27, 2018; 84 FR 23736, May 23, 2019; 84 FR 37074, July 31, 2019; 85 FR 80570, Dec. 11, 2020]

**Editorial Note:** At 86 FR 1759, Jan. 11, 2021, § 232.11 was amended; however, the amendment could not be incorporated due to inaccurate amendatory instruction.

**§ 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. Nothing in this paragraph shall be construed to preempt an action under State law seeking damages for personal injury, death, or property damage alleging that a party has failed to comply with the Federal standard of care established by this part, has failed to comply with its own plan, rule, or standard that it created pursuant to this part, or has failed to comply with a State law, regulation, or order that is not incompatible with the first sentence of this paragraph.
- (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.

[66 FR 4193, Jan. 17, 2001, as amended at 73 FR 61552, Oct. 16, 2008]

**§ 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, except that defective locomotives may have the tag or card placed in the cab of the locomotive. In lieu of a tag or card, an automated tracking system approved for use by FRA shall be provided. The tag, card, or automated tracking system shall contain 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 where the equipment 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) **Designation of repair locations.** Based on the guidance detailed in paragraph (f) of this section and consistent with other requirements contained in this part, a railroad may submit a detailed petition, pursuant to the special approval procedures contained in § 232.17, containing a plan designating locations where brake system repairs will be performed. Approval of such plans shall be made accordance with the procedures contained in § 232.17, and shall be subject to any modifications determined by FRA to be necessary to ensure consistency with the requirements and guidance contained in this part.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17580, Apr. 10, 2002]

## § 232.17 Special approval procedure.

(a) **General.** The following procedures govern consideration and action upon requests for special approval of a plan under § 232.15(g); an alternative standard under § 232.305 or § 232.603; an alternative technology under § 232.407(b) or (c); or a single car test procedure under § 232.611; and pre-revenue service acceptance testing plans under subpart F of this part.

(b) **Petitions for special approval of an alternative standard or test procedure.** Each petition for special approval of a plan under § 232.15(g); an alternative standard under § 232.305 or § 232.603; an alternative technology under § 232.407(b) or (c); or a single car test procedure under § 232.611 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 plan, alternative standard, alternative technology, or test procedure proposed, in detail, to be submitted for or to meet the particular requirement of this part;



- (3) Appropriate data or analysis, or both, for FRA to consider in determining whether the plan, alternative standard, alternative technology, or test procedure, will be consistent with the guidance under § 232.15(f), if applicable, and will provide at least an equivalent level of safety or otherwise meet the requirements contained in this part; and
  - (4) A statement affirming that the railroad has served a copy of the petition on designated representatives of its employees, together with a list of the names and addresses of the persons served.
- (c) ***Petitions for special approval of 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.
- (d) ***Service.***
  - (1) Each petition for special approval under paragraph (b) or (c) of this section shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590.
  - (2) Service of each petition for special approval of a plan or an alternative standard submitted under paragraph (b) of this section shall be made on the following:
    - (i) Designated representatives of the employees of the railroad submitting a plan pursuant to § 232.15(g) or designated representatives of the employees 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.
- (e) ***Federal Register notice.*** FRA will publish a notice in the FEDERAL REGISTER concerning each petition under paragraph (b) of this section.
- (f) ***Comment.*** Not later than 30 days from the date of publication of the notice in the FEDERAL REGISTER concerning a petition under 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 to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue, SE., 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 plan under § 232.15(g), the alternative standard, or the 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 proposed plan under § 232.15(g), the alternative standard, or the 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17580, Apr. 10, 2002; 73 FR 61552, Oct. 16, 2008; 74 FR 25174, May 27, 2009; 85 FR 80570, Dec. 11, 2020]

### § 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.
- (b) The information collection requirements are found in the following sections: §§ 229.27, 231.31, 232.1, 232.3, 232.7, 232.11, 232.15, 232.17, 232.103, 232.105, 232.107, 232.109, 232.111, 232.203, 232.205, 232.207, 232.209, 232.211, 232.213, 232.303, 232.307, 232.309, 232.403, 232.405, 232.407, 232.409, 232.503, 232.505.

## 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 and 232.609. 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<sup>1</sup>/<sub>2</sub> 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<sup>1</sup>/<sub>2</sub> 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 must, at a minimum, meet the Association of American Railroads (AAR) Standard S-469, "Freight Brakes-Performance Specification," Revised 2006 (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment), also referred to as AAR Standard S-469-01. The Director of the FEDERAL REGISTER approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy from the Association of American Railroads, 425 Third Street SW, Washington, DC 20024, telephone: (202) 639-2345, email: [publications@aar.com](mailto:publications@aar.com), website: <https://aarpublishings.com>. You may inspect a copy of the document at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue SE, Washington, DC 20590 (telephone: (855) 368-4200) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html).
- (m) An en route train shall be stopped at the next available location, inspected for leaks in the brake system, and provided with corrective action, if the train experiences:

- (1) A brake pipe gradient of greater than 15 psi; or
- (2) A brake pipe air flow of greater than that permitted by this part, when the air flow has been qualified by the Air Flow Method as provided for in subpart C of this part and the indication does not return to within the limits in a reasonable time.

(n) **Securement of unattended equipment.** Unattended equipment shall be secured in accordance with the following requirements:

- (1) A sufficient number of hand brakes, to be not fewer than one, shall be applied to hold the equipment unless an acceptable alternative method of securement is provided pursuant to paragraph (n)(11)(i) of this section. 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) Except for equipment connected to a source of compressed air (e.g., locomotive or ground air source), or as provided under paragraph (n)(11)(ii) of this section, prior to leaving equipment unattended, the brake pipe shall be reduced to zero at a rate that is no less than a service rate reduction, and the brake pipe vented to atmosphere by leaving the angle cock in the open position on the first unit of the equipment left unattended. A train's air brake shall not be depended upon to hold equipment standing unattended (including a locomotive, a car, or a train whether or not locomotive is attached).
- (3) Except for distributed power units, the following requirements apply to 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 a yard.
  - (iii) At a minimum, the hand brake shall be fully applied on the lead locomotive in an unattended locomotive consist within a yard.
  - (iv) A railroad shall develop, adopt, and comply with procedures for securing any unattended locomotive required to have a hand brake applied pursuant to paragraph (n)(3)(i) through (iii) of this section when the locomotive is not equipped with an operative hand brake.
- (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.
- (6)
  - (i) The requirements in paragraph (n)(7) through (8) of this section apply to any freight train or standing freight car or cars that contain:

- (A) Any loaded tank car containing a material poisonous by inhalation as defined in § 171.8 of this title, including anhydrous ammonia (UN 1005) and ammonia solutions (UN 3318); or
    - (B) Twenty (20) or more loaded tank cars or loaded intermodal portable tanks of any one or any combination of a hazardous material listed in paragraph (n)(6)(i)(A) of this section, or any Division 2.1 (flammable gas), Class 3 (flammable or combustible liquid), Division 1.1 or 1.2 (explosive), or a hazardous substance listed at § 173.31(f)(2) of this title.
  - (ii) For the purposes of this paragraph, a tank car containing a residue of a hazardous material as defined in § 171.8 of this title is not considered a loaded car.
- (7)
- (i) No equipment described in paragraph (n)(6) of this section shall be left unattended on a main track or siding (except when that main track or siding runs through, or is directly adjacent to a yard) until the railroad has adopted and is complying with a plan identifying specific locations or circumstances when the equipment may be left unattended. The plan shall contain sufficient safety justification for determining when equipment may be left unattended. The railroad must notify FRA when the railroad develops and has in place a plan, or modifies an existing plan, under this provision prior to operating pursuant to the plan. The plan shall be made available to FRA upon request. FRA reserves the right to require modifications to any plan should it determine the plan is not sufficient.
  - (ii) Except as provided in paragraph (n)(8)(iii) of this section, any freight train described in paragraph (n)(6) of this section that is left unattended on a main track or siding that runs through, or is directly adjacent to, a yard shall comply with the requirements contained in paragraphs (n)(8)(i) and (n)(8)(ii) of this section.
- (8)
- (i) Where a freight train or standing freight car or cars as described in paragraph (n)(6) of this section is left unattended on a main track or siding outside of a yard, and not directly adjacent to a yard, an employee responsible for securing the equipment shall verify with another person qualified to make the determination that the equipment is secured in accordance with the railroad's processes and procedures.
  - (ii) The controlling locomotive cab of a freight train described in paragraph (n)(6) of this section shall be locked on locomotives capable of being locked. If the controlling cab is not capable of being locked, the reverser on the controlling locomotive shall be removed from the control stand and placed in a secured location.
  - (iii) A locomotive that is left unattended on a main track or siding that runs through, or is directly adjacent to, a yard is excepted from the requirements in (n)(8)(ii) of this section where the locomotive is not equipped with an operative lock and the locomotive has a reverser that cannot be removed from its control stand or has a reverser that is necessary for cold weather operations.
- (9) Each railroad shall implement operating rules and practices requiring the job briefing of securement for any activity that will impact or require the securement of any unattended equipment in the course of the work being performed.

- (10) Each railroad shall adopt and comply with procedures to ensure that, as soon as safely practicable, a qualified employee verifies the proper securement of any unattended equipment when the railroad has knowledge that a non-railroad emergency responder has been on, under, or between the equipment.
- (11) A railroad may adopt and then must comply with alternative securement procedures to do the following:
- (i) In lieu of applying hand brakes as required under paragraph (n) of this section, properly maintain and use mechanical securement devices, within their design criteria and as intended within a classification yard or on a repair track.
  - (ii) In lieu of compliance with the associated requirement in paragraph (n)(2) of this section—and in lieu of applying hand brakes as required under paragraph (n) of this section— isolate the brake pipe of standing equipment from atmosphere if it:
    - (A) Initiates an emergency brake application on the equipment;
    - (B) Closes the angle cock; and
    - (C) Operates the locomotive or otherwise proceeds directly to the opposite end of the equipment for the sole purpose to either open the angle cock to vent to atmosphere or provide an air source.
  - (iii) Upon completion of the procedure described in paragraph (n)(11)(ii) of this section, the securement requirements of paragraph (n) of this section shall apply.
- (o) Air pressure regulating devices shall be adjusted for the following pressures:

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

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17581, Apr. 10, 2002; 73 FR 61553, Oct. 16, 2008; 74 FR 25174, May 27, 2009; 80 FR 47834, Aug. 6, 2015; 85 FR 80571, Dec. 11, 2020]

**§ 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.
- (h)
  - (1) After March 1, 2017, each locomotive left unattended outside of a yard, but not on a track directly adjacent to the yard, shall be equipped with an operative exterior locking mechanism.
  - (2) The railroad shall inspect and, where necessary, repair the locking mechanism during a locomotive's periodic inspection required in § 229.23 of this chapter.
  - (3) In the event that a locking mechanism becomes inoperative during the time interval between periodic inspections, the railroad must repair the locking mechanism within 30 days of finding the inoperative lock.
  - (4) A railroad may continue the use of a locomotive without an operative locking mechanism; however, if the controlling locomotive of a train meeting the requirements of § 232.103(n)(6)(i) does not have an operative locking mechanism for the locomotive, the train must not be left unattended on main track or a siding unless the reverser is removed from the control stand as required in § 232.103(n)(8)(ii) or the locomotive otherwise meets one of the exceptions described in § 232.103(n)(8)(iii).

[66 FR 4193, Jan. 17, 2001, as amended at 80 FR 47835, Aug. 6, 2015]

**§ 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 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 to be 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 April 1, 2006, or placed in service for the first time on or after October 1, 2007, shall be designed to:
  - (1) Conduct an electrical integrity test of the dynamic brake to determine if electrical current is being received at the grids on the system; and
  - (2) Display in real-time in the cab of the controlling (lead) locomotive the total train dynamic brake retarding force available in the train.
- (h) All rebuilt locomotives equipped with dynamic brakes and placed in service on or after April 1, 2004, shall be designed to:
  - (1) Conduct an electrical integrity test of the dynamic brake to determine if electrical current is being received at the grids on the system; and
  - (2) Display either the train deceleration rate or in real-time in the cab of the controlling (lead) locomotive the total train dynamic brake retarding force available in the train.
- (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 section of track with an average grade of one percent or greater over a distance of three continuous miles 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-miles-per-hour-overspeed-stop restriction if validated research indicates the need for such a reduction. A railroad may increase the 5-miles-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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17581, Apr. 10, 2002]

## § 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) An employee hired or working prior to June 1, 2001, for a railroad or contractor covered by this part will be considered to have met the requirements, or a portion of the requirements, contained in paragraphs (b)(3) through (b)(5) of this section if the employee receives training and testing on the specific Federal regulatory requirements contained in this part related to the performance of the tasks which the employee will be responsible for performing; and if:
    - (i) The training or testing, including efficiency testing, previously received by the employee is determined by the railroad or contractor to meet the requirements, or a portion of the requirements, contained in paragraphs (b)(3) through (b)(5) of this section and such training or testing can be documented as required in paragraphs (e)(1) through (e)(4) of this section;
    - (ii) The employee passes an oral, written, or practical, “hands-on” test developed or adopted by the railroad or contractor which is determined by the railroad or contractor to ensure that the employee possesses the skills and knowledge, or a portion of the skills or knowledge, required in paragraphs (b)(3) through (b)(5) of this section and the test is documented as required in paragraph (e) of this section; or

- (iii) The railroad or contractor certifies that a group or segment of its employees has previously received training or testing determined by the railroad or contractor to meet the requirements, or a portion of the requirements, contained in paragraphs (b)(3) through (b)(5) of this section and complete records of such training are not available, provided the following conditions are satisfied:
  - (A) The certification is placed in the employee's training records required in paragraph (e) of this section;
  - (B) The certification contains a brief description of the training provided and the approximate date(s) on which the training was provided; and
  - (C) Any employee determined to be trained pursuant to this paragraph is given a diagnostic oral, written, or "hands-on" test covering that training for which this paragraph is relied upon at the time the employee receives his or her first periodic refresher training under paragraph (b)(8) of this section.
- (iv) Any combination of the training or testing contained in paragraphs (b)(6)(i) through (b)(6)(iii) of this section and paragraphs (b)(3) through (b)(5) of this section may be used to satisfy the training and testing requirements for an employee in accordance with this paragraph.

- (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; except that employees that have completed their initial training under paragraphs (b)(3) through (b)(6) of this part prior to April 1, 2004, shall not be required to complete their first periodic refresher training until four years after the completion of their initial training, and every three years thereafter. Observation and evaluation of actual performance of duties may be used to meet the "hands-on" portion of this requirement, provided that 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 that specifically addresses:

- (1) 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; and
- (2) For operating employees the limitations and proper use of the emergency application signal and the loss of communication indication between front-of-train and rear-of-train 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) The tasks required to be performed under this part which the employee is deemed qualified to perform;
  - (7) 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)(6) of this section; and
  - (8) The date that the employee's status as qualified to perform the tasks identified in paragraph (e)(6) 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17581, Apr. 10, 2002; 79 FR 66501, Nov. 7, 2014; 85 FR 80571, Dec. 11, 2020]

### § 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 (c) 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, except as provided in paragraph (b)(2) of this section;
    - (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 24 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) Except as provided in § 232.209, each car and each solid block of cars added to a train shall receive a Class I brake test as described in paragraph (c) of this section at the location where it is added to a train unless:
  - (1) The solid block of cars is comprised of cars from a single previous train, the cars of which have previously received a Class I brake test and have 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 and have not been off-air for more than 24 hours; or
  - (2) The solid block of cars is comprised of cars from a single previous train, the cars of which were required to be separated into multiple solid blocks of cars due to space or trackage constraints at a particular location when removed from the previous train, provided the cars have previously received a Class I brake test, have not been off-air more than 24 hours, and the cars in each of the multiple blocks of cars have remained continuously and consecutively coupled together with the train line remaining connected, except for the removal of defective equipment. Furthermore, these multiple solid blocks of cars shall be added to a train in the same relative order (no reclassification) as when removed from the previous train, except for the removal of defective equipment.
- (c) 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) Use a calibrated AFM indicator to measure air flow. A train equipped with at least one distributed power unit or an air repeater unit providing a source of brake pipe control air from two or more locations must not exceed a combined flow of 90 cubic feet per minute (CFM). Otherwise, the air flow must not exceed 60 CFM. Railroads must develop and implement operating rules to ensure compliant operation of a train if air flow exceeds these parameters after the Class I brake test is completed.
- (iii) The AFM indicator must be calibrated for accuracy at periodic intervals not to exceed 92 days. The AFM indicator and all test orifices must be calibrated at temperatures of not less than 20 °F. AFM indicators must be accurate to within  $\pm 3$  standard cubic feet per minute (CFM) at 60 CFM air flow.
- (iv) For each AFM indicator, its last date of calibration must be recorded and certified on Form F6180-49A.
- (v) An AFM indicator not in compliance with this part must:
- (A) Not be used, including in the performance of a leakage test or to aid in the control or braking of the train;
  - (B) Be tagged in accordance with § 232.15(b) and include text that it is "inoperative" or "overdue"; and
  - (C) Be placed with its tag in a conspicuous location of the controlling locomotive cab.
- (2) The inspector(s) shall take a position 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 an air pressure that is within 15 psi of the air pressure at which the train will be operated. The retest may be conducted from either the controlling locomotive, the head-end of the consist, or with a suitable test device, as described in § 232.217(a), positioned at one end of the car(s) being retested, and the brakes shall 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<sup>1</sup>/<sub>2</sub>-inch or 10-inch diameter brake cylinders, piston travel shall be within 6 to 9 inches. If piston travel is found to be less than 6 inches or more than 9 inches, it must be adjusted to nominally 7<sup>1</sup>/<sub>2</sub> inches. For cars not equipped with 8<sup>1</sup>/<sub>2</sub>-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.
- (9) Although an air repeater unit is not a locomotive or appurtenance under part 229, an air repeater unit operated in accordance with this part must:
  - (i) Receive an inspection in accordance with § 229.21 where and when an inspection is required in accordance with § 232.205(a)(1); and
  - (ii) Otherwise comply with part 229 as applicable to those parts that provide compressed air, modulate the brake pipe, and otherwise control the movement of the train. All remaining parts are subject to the inspection requirements of parts 215 and 232.
- (d) 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.



- (e) A railroad must notify the locomotive engineer that the Class I brake test was satisfactorily performed, whether the equipment to be hauled in his train has been off-air for a period of more than 24 hours, 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 must be retained in the cab of the controlling locomotive until the train reaches its destination. The written or electronic record must 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.
- (f) 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17582, Apr. 10, 2002; 73 FR 61553, Oct. 16, 2008; 85 FR 80571, Dec. 11, 2020]

### § 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(c)(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(c)(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 within 24 hours after the designation has been changed and the reason for that change.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17582, Apr. 10, 2002; 85 FR 80572, Dec. 11, 2020]

### § 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 must 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 24 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) Except as provided in paragraph (a)(4) of this section, each solid block of cars that is comprised of cars from only one previous train, the cars of which have not remained continuously and consecutively coupled together with the train line remaining connected since being removed from the previous train. A solid block of cars is considered to have remained continuously and consecutively coupled together with the train line remaining connected since being removed from the previous train if it has been changed only by removing defective equipment.
  - (4) Each solid block of cars that is comprised of cars from a single previous train, the cars of which were required to be separated into multiple solid blocks of cars due to space or trackage constraints at a particular location when removed from the previous train, if they are not added in the same relative order as when removed from the previous train or if the cars in each of the multiple blocks of cars have not remained continuously and consecutively coupled together with the train line remaining connected, except for the removal of defective equipment.
- (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(c)(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(c)(4); otherwise, the defective equipment may only be moved pursuant to the provisions of § 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17583, Apr. 10, 2002; 85 FR 80572, Dec. 11, 2020]

### **§ 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:

- (i) 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
    - (ii) That has not been off-air for more than 24 hours is added to a train;
  - (4) At a point, other than the initial terminal for the train, where a solid block of cars that is comprised of cars from a single previous train is added to a train, provided:
    - (i) The solid block of cars was required to be separated into multiple solid blocks of cars due to space or trackage constraints at a particular location when removed from the previous train;
    - (ii) The cars have previously received a Class I brake test;
    - (iii) Have not been off-air more than 24 hours; and
    - (iv) The cars in each of the multiple blocks of cars have remained continuously and consecutively coupled together with the train line remaining connected, except for the removal of defective equipment. Furthermore, these multiple solid blocks of cars must be added to the train in the same relative order (no reclassification) as when removed from the previous train, except for the removal of defective equipment; or
  - (5) 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 24 hours, is added to a train.
- (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 not be less than 60 psi, 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.
- (d) Whenever the continuity of the brake pipe is broken or interrupted with the train consist otherwise remaining unchanged, it must be determined that the brake pipe pressure of the train is being restored as indicated by a rear car gauge or end-of-train device prior to proceeding. In the absence of an accurate rear car gauge or end-of-train telemetry device, it must be determined that the brakes on the rear car of the train apply and release in response to air pressure changes made in the controlling locomotive.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17583, Apr. 10, 2002; 85 FR 80572, Dec. 11, 2020]

### § 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 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 in the train.
  - (5) The train must 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. Cars added to the train en route must be inspected pursuant to the requirements contained in paragraphs (a)(2) through (5) of this section at the location where they are added to the train.
  - (6) 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 must be conducted pursuant to § 232.205 to ensure 100 percent effective and operative brakes.
    - (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 must meet all the requirements contained in paragraphs (a)(1) through (5) of this section. Such trains must 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 must either be repaired or removed from the train.
  - (7) FRA inspectors shall have physical access to visually observe all brake and freight car inspections and tests required by this section.

- (8) 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 an extended haul brake test is performed to a location not on the railroad's list of designated locations for performing extended haul brake tests, provided that the railroad notifies FRA's Associate Administrator for Safety within 24 hours after the designation has been changed and the reason for that change.
- (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 the statement of civil penalty policy on FRA's website at [www.fra.dot.gov](http://www.fra.dot.gov). 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17583, Apr. 10, 2002; 73 FR 61553, Oct. 16, 2008; 84 FR 23736, May 23, 2019; 85 FR 80572, Dec. 11, 2020]

### § 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(c)(4); otherwise, the defective equipment may be moved only 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17583, Apr. 10, 2002]

### § 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 yard air is used the train air brake system must be charged and tested as prescribed by § 232.205(c) 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 24 hours, the cars must be retested in accordance with § 232.205(c) through (f).
  - (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 80 psi, then a brake pipe 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(c)(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  $\pm 3$  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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17583, Apr. 10, 2002; 85 FR 80573, Dec. 11, 2020]

### § 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. Alternatively, the helper locomotive or the device shall be equipped with a means to automatically reset the device, provided that the automatic reset occurs within the period time permitted for manual reset of the device; and
  - (3) When helping trains equipped with distributed power or ECP brakes on the rear of the train, and utilizing a *Helper Link* device or a similar technology, a properly installed and tested end-of-train device may be utilized on the helper locomotive. Railroads must adopt and comply with an operating rule consistent with this chapter to ensure the safe use of this alternative procedure.

- (4) 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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17584, Apr. 10, 2002; 85 FR 80573, Dec. 11, 2020]

## 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 by a railroad as a track where minor repairs will be conducted or used by a railroad to regularly and consistently perform minor repairs during the period when the track is used to conduct major repairs; however, such trackage is considered a shop or repair track only for each car receiving major repairs on such trackage and not for a car receiving only minor repairs; 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 that normally would require greater than four person-hours to accomplish or would involve the use of specialized tools and equipment. Major repairs include such activities as coupler replacement, draft gear repair, and repairs requiring the use of an air jack but exclude changing wheels on intermodal loading ramps either with or without 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<sup>1</sup>/<sub>2</sub>-inch or 10-inch diameter brake cylinders, piston travel shall be within 6 to 9 inches. If piston travel is found to be less than 6 inches or more than 9 inches, it must be adjusted to nominally 7<sup>1</sup>/<sub>2</sub> inches. For cars not equipped with 8<sup>1</sup>/<sub>2</sub>-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 single car air brake test required by § 232.305 cannot be conducted at the point where repairs can be made to the car, the car may be moved after the repairs are made to the next forward location where the test can be performed. Inability to perform a single car air brake test does not constitute an inability to make 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 single car air brake 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, shall contain 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 single car air brake test;
    - (v) The location where the appropriate test is to be performed; and
    - (vi) 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 single car air brake test required by § 232.305 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 test required by § 232.305.
  - (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]

[66 FR 4193, Jan. 17, 2001, as amended at 66 FR 39687, Aug. 1, 2001; 67 FR 17584, Apr. 10, 2002; 73 FR 61553, Oct. 16, 2008]

### § 232.305 Single car air brake tests.

- (a) Single car air brake tests must be performed by a qualified person in accordance with either Section 3.0, "Tests-Standard Freight Brake Equipment," and Section 4.0, "Special Tests," AAR Standard S-486-18; Section 3.0, "Single-Car Test Requirements," Section 4.0, "Special Tests," and Section 13.0 "4-Pressure Single-Car Test Requirements," AAR Standard S-4027-18; an alternative procedure approved by FRA pursuant to § 232.17; or a modified procedure approved in accordance with the provisions contained in § 232.307.
- (b) Except as provided in § 232.303(e), a railroad shall perform a single car air 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, as defined in § 232.303(a);
  - (2) A car is on a shop or repair track, as defined in § 232.303(a), for any reason and has not received either:
    - (i) A manual single car air brake test (AAR Standard S-486) within the previous 12-month period;
    - (ii) An automated single car air brake test (AAR Standard S-4027 §§ 3.0 and 4.0) within the previous 24-month period;
    - (iii) Or a 4-pressure single car air brake test (AAR Standard S-4027 § 13.0) within the previous 48-month period;
  - (3) A car is found with missing or incomplete single car air 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;
    - (iii) Pipe bracket stud;
    - (iv) Service portion;

(v) Emergency portion; or

(vi) Pipe bracket.

(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 single car air brake test no less than every 5 years.

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

(e) A single car air brake test shall be performed on each new or rebuilt car prior to placing or using the car in revenue service.

(f) The Director of the Federal Register approves the incorporation by reference of the standards required in this section into this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy of the material at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue SE, Washington, DC 20590 (telephone: 855-368-4200). You may also inspect the material at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html). You may obtain the material from the following source(s):

(1) Association of American Railroads (AAR), 425 Third Street SW, Washington, DC 20024, telephone: (202) 639-2345, email: [publications@aar.com](mailto:publications@aar.com), website: <https://aarpublications.com>.

(i) AAR Standard S-486, "Code of Air Brake System Tests for Freight Equipment—Single Car Test," Revised 2018 (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment), also referred to as AAR Standard S-486-18.

(ii) AAR Standard S-4027, "Automated Single-Car Test Equipment, Conventional Brake Equipment—Design and Performance Requirements," Revised 2018 (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment), also referred to as AAR Standard S-4027-18.

(2) [Reserved]

[66 FR 39688, Aug. 1, 2001, as amended at 73 FR 61553, Oct. 16, 2008; 74 FR 25174, May 27, 2009; 85 FR 80573, Dec. 11, 2020]

## § 232.307 Modification of brake test procedures.

(a) **Request.** The AAR or other authorized representative of the railroad industry may seek modification of brake test procedures prescribed in this chapter. The request for modification shall be submitted to the Associate Administrator for Safety, Federal Railroad Administration, 1200 New Jersey Avenue SE, Washington, DC 20590 and shall contain:

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

- (2) The section and paragraph at issue, and the modification, in detail, to be substituted for a particular procedure prescribed in this chapter;
  - (3) Appropriate data or analysis, or both, for FRA to consider in determining whether the modification will provide at least an equivalent level of safety; and
  - (4) A statement affirming that the railroad industry has served a copy of the request on the designated representatives of the employees responsible for the equipment's operation, inspection, testing, and maintenance under this part, together with a list of the names and addresses of the persons served.
- (b) **Federal Register document.** Upon receipt of a request for modification, FRA will publish a document in the FEDERAL REGISTER containing the requested modification. The document will permit interested parties 60 days to comment on any requested modification.
- (c) **FRA review.** During the 60 days provided for public comment, FRA will review the petition. If FRA objects to the requested modification, written notification will be provided, within this 60-day period, to the party requesting the modification detailing FRA's objection.
- (d) **Disposition.**
- (1) If no comment objecting to the requested modification is received during the 60-day comment period, provided by paragraph (b) of this section, or if FRA does not issue a written objection to the requested modification, the modification will become effective 15 days after the close of the 60-day comment period.
  - (2) If an objection is raised by an interested party, during the 60-day comment period, or if FRA issues a written objection to the requested modification, the requested modification will be handled as follows:
    - (i) If FRA finds that the request complies with the requirements of this section and that the proposed modification is acceptable and justified, the request will be granted, normally within 90 days of its receipt. If the request for modification is neither granted nor denied within 90 days, the request remains pending for decision. FRA may attach special conditions to the approval of any request for modification. Following the approval of a request for modification, FRA may reopen consideration of the request for cause.
    - (ii) If FRA finds that the request does not comply with the requirements of this section and that the proposed modification is not acceptable or justified, the requested modification will be denied, normally within 90 days of its receipt.
    - (iii) When FRA grants or denies a request for modification, or reopens consideration of the request, written notice is sent to the requesting party and other interested parties.

[66 FR 39688, Aug. 1, 2001, as amended at 74 FR 25174, May 27, 2009; 85 FR 80573, Dec. 11, 2020]

### § 232.309 Equipment and devices used to perform single car air brake tests.

- (a) Equipment and devices used to perform single car air brake 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.

[66 FR 4193, Jan. 17, 2001, as amended at 66 FR 39689, Aug. 1, 2001]

## 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  $\pm 3$  pounds per square inch (psig) and brake pipe pressure variations of  $\pm 1$  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  $\pm 2$  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  $\pm 2$  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  $-40^{\circ}\text{C}$  to  $60^{\circ}\text{C}$ ;
  - (2) At a relative humidity of 95% noncondensing at  $50^{\circ}\text{C}$ ;
  - (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;
  - (5) 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
  - (6) During a shock of 10 g. peak for 0.01 seconds 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 °C to 60 °C;
    - (ii) During a shock of 10 g. peak for 0.01 seconds in any axis.
- (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 only, the operating life must be a minimum of 36 hours at 0 °C.
  - (3) If power is supplied by a generator—an air turbine or alternative technology—a backup battery or similar energy storage device is required with a minimum of 12 hours continuous power at 0 °C in the event the generator stops functioning as intended.

[66 FR 4193, Jan. 17, 2001, as amended at 85 FR 80574, Dec. 11, 2020]

## § 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  $\frac{3}{4}$  inch and the internal diameter of the hose shall be  $\frac{5}{8}$  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.

**§ 232.407 Operations requiring use of two-way end-of-train devices; prohibition on purchase of nonconforming devices.**

- (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 approved by FRA pursuant to § 232.17 to perform the same function.
- (c) **New devices.** Each newly manufactured end-of-train device purchased by a railroad 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 approved by FRA pursuant to § 232.17 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, locomotive consist, or air repeater unit located at the rear of the train that is capable of making an emergency brake application, through a command effected 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 ( $\frac{2}{3}$ ) 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 must 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. Air-powered generator equipped devices must be tested for a minimum charge at installation before initiating generator operation.
- (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) If a two-way end-of-train device fails en route while the train on which it is installed is operating over a section of track with an average grade of two percent or greater for a distance of two continuous miles, the train shall be brought safely to a stop at the first available location in accordance with the railroad's operating rule, except the train may continue in operation if the railroad provides one of the alternative measures detailed in paragraph (g)(1) of this section.

(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.

[66 FR 4193, Jan. 17, 2001, as amended at 67 FR 17584, Apr. 10, 2002; 85 FR 80574, Dec. 11, 2020]

### § 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 determine 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 the person conducting the test.
- (d) The telemetry equipment must be tested for accuracy and calibrated if necessary according to the manufacturer's specifications and procedures. If the manufacturer's specifications requires periodic calibration of the telemetry equipment, the date and location of the last calibration or test and the name or unique employee identifier of the person performing the calibration or test must be legibly displayed on

a weather-resistant sticker 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 that the serial number of the unit is recorded.

- (e) The air pressure sensor contained in the end-of-train device must be tested by the processes and frequency identified in § 229.27 or by manufacturer specifications approved under § 232.307. The date and location of the test and the name or unique employee identifier of the person performing the test must be legibly displayed on a weather-resistant marking device affixed to the outside of the unit.
- (f) Each manufacturer of telemetry transceiver equipment must either:
  - (1) Establish and communicate publicly to its customers a reasonable recommended calibration period; or
  - (2) Submit to FRA an annual report including:
    - (i) The total number of transceivers—itemized by model name, number, or type—sold to date;
    - (ii) The number of transceivers that have been reported as inoperative or otherwise malfunctioning or returned for servicing; and
    - (iii) The number of transceivers reported or returned for service with frequency modulation or transmit power outside of either manufacturer's specifications or FCC-approved specifications.

[66 FR 4193, Jan. 17, 2001, as amended at 66 FR 29502, May 31, 2001; 67 FR 17584, Apr. 10, 2002; 85 FR 80574, Dec. 11, 2020]

## 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.

## Subpart G—Electronically Controlled Pneumatic (ECP) Braking Systems

**Source:** 73 FR 61553, Oct. 16, 2008, unless otherwise noted.

### § 232.601 Scope.

This subpart contains specific requirements applicable to freight trains and freight cars equipped with ECP brake systems. This subpart also contains specific exceptions from various requirements contained in this part for freight trains and freight cars equipped with ECP brake systems.

### § 232.602 Applicability.

This subpart applies to all railroads that operate a freight car or freight train governed by this part and equipped with an ECP brake system. Unless specifically excepted or modified in this section, all of the other requirements contained in this part are applicable to a freight car or freight train equipped with an ECP brake system.

### § 232.603 Design, interoperability, and configuration management requirements.

- (a) **General.** A freight car or freight train equipped with an ECP brake system must, at a minimum, meet the Association of American Railroads (AAR) standards contained in the AAR Manual of Standards and Recommended Practices related to ECP brake systems listed in paragraph (g) of this section; an alternate standard approved by FRA pursuant to § 232.17; or a modified standard approved in accordance with the provisions contained in paragraph (g) of this section.
- (1) AAR S-4200, "Electronically Controlled Pneumatic (ECP) Cable-Based Brake Systems—Performance Requirements," (Adopted 1999; Revised: 2002, 2004, 2008);
  - (2) AAR S-4210, "ECP Cable-Based Brake System Cable, Connectors, and Junction Boxes—Performance Specifications," (Adopted: 1999; Revised 2002, 2007);
  - (3) AAR S-4220, "ECP Cable-Based Brake DC Power Supply—Performance Specification," Version 2.0 (Adopted: 1999; Revised: 2002);
  - (4) AAR S-4230, "Intratrain Communication (ITC) Specification for Cable-Based Freight Train Control System," Version 3.0 (Adopted: 1999; Revised: 2002, 2004);
  - (5) AAR S-4240, "ECP Brake Equipment—Approval Procedure" (Adopted: 2007);

- (6) AAR S-4250, "Performance Requirements for ITC Controlled Cable-Based Distributed Power Systems," Version 2.0 (Adopted: 2003; Revised: 2004);
  - (7) AAR S-4260, "ECP Brake and Wire Distributed Power Interoperability Test Procedures" (Adopted: 2007); and
  - (8) AAR S-4270, "ECP Brake System Configuration Management" (Adopted: 2008).
- (b) **Approval.** A freight train or freight car equipped with an ECP brake system and equipment covered by the AAR standards incorporated by reference in this section shall not be used without conditional or final approval by AAR in accordance with AAR Standard S-4240, "ECP Brake Equipment—Approval Procedures" (2007).
- (c) **Configuration management.** A railroad operating a freight train or freight car equipped with ECP brake systems shall adopt and comply with the configuration management plan developed in accordance with the AAR standards incorporated by reference in this section. FRA reserves the right to audit a manufacturer's configuration management plan at any time.
- (d) **Exceptions.**
- (1) A freight car or freight train equipped with a standalone ECP brake system is excepted from the requirement in § 232.103(l) referencing AAR Standard S-469-01, "Freight Brakes—Performance Specification."
- (e) **New technology.** Upon written request supported by suitable justification and submitted pursuant to the special approval procedures in § 232.17, the Associate Administrator may except from the requirements of subpart F of this part the testing of new ECP brake technology, demonstration of new ECP brake technology, or both, where testing or demonstration, or both, will be conducted pursuant to an FRA-recognized industry standard and FRA is invited to monitor the testing or demonstration, or both.
- (f) **Modification of standards.** The AAR or other authorized representative of the railroad industry may seek modification of the industry standards identified in or approved pursuant to paragraph (g) of this section. The request for modification will be handled and shall be submitted in accordance with the modification procedures contained in § 232.307.
- (g) **Incorporation by reference.** The Director of the Federal Register approves the incorporation by reference of the standards required in this section into this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy at the Federal Railroad Administration, 1200 New Jersey Avenue SE, Washington, DC, 202-493-6300 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html). You may obtain the material from the following source(s):
- (1) Association of American Railroads, 425 Third Street SW, Washington, DC 20024, telephone: (202) 639-2345, email: [publications@aar.com](mailto:publications@aar.com), website: <https://aarpublishings.com>.
    - (i) AAR S-4200, "Electronically Controlled Pneumatic (ECP) Cable-Based Brake Systems—Performance Requirements," Revised 2014, (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment).
    - (ii) AAR S-4210, "ECP Cable-Based Brake System Cable, Connectors, and Junction Boxes—Performance Specifications," Revised 2014, (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment).

- (iii) AAR S-4220, "ECP Cable-Based Brake DC Power Supply—Performance Specification," Version 2.0, Revised 2002, (contained in AAR Manual of Standards and Recommended Practices, Electronically Controlled Brake Systems).
- (iv) AAR S-4230, "Intratrain Communication Specification for Cable-Based Freight Train Control System," Version 4.1, Revised 2014, (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment).
- (v) AAR S-4240, "ECP Brake Equipment—Approval Procedure," Adopted 2007, (contained in AAR Manual of Standards and Recommended Practices, Electronically Controlled Brake Systems).
- (vi) AAR S-4250, "Performance Requirements for ITC Controlled Cable-Based Distributed Power Systems," Version 3.0, Revised 2014, (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment).
- (vii) AAR S-4260, "ECP Brake and Wire Distributed Power Interoperability Test Procedures," Revised 2008 (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment).
- (viii) AAR S-4270, "ECP Brake System Configuration Management," Adopted 2008, (contained in AAR Manual of Standards and Recommended Practices, Electronically Controlled Brake Systems).

(2) [Reserved]

[66 FR 4193, Jan. 17, 2001, as amended at 85 FR 80574, Dec. 11, 2020]

## § 232.605 Training requirements.

- (a) **Inspection, testing and maintenance.** A railroad that operates a freight car or freight train equipped with an ECP brake system and each contractor that performs inspection, testing, or maintenance on a freight car or freight train equipped with an ECP brake system shall adopt and comply with a training, qualification, and designation program for its employees that perform inspection, testing or maintenance of ECP brake systems. The training program required by this section shall meet the requirements in §§ 232.203(a), (b), (e), and (f).
- (b) **Operating rules.** A railroad operating a freight train or freight car equipped with an ECP brake system shall amend its operating rules to govern safe train handling procedures related to ECP brake systems and equipment under all operating conditions and shall tailor its operating rules to the specific equipment and territory of the railroad.
- (c) **Locomotive engineers.** A railroad operating a freight car or freight train equipped with an ECP brake system shall adopt and use in its training program under part 240 specific knowledge, skill, and ability criteria to ensure that its locomotive engineers are fully trained with the operating rules governing safe train handling procedures related to ECP brake systems and equipment under all operating conditions and tailored to the specific equipment and territory of the railroad.

## § 232.607 Inspection and testing requirements.

- (a) **Trains at initial terminal.** A freight train operating in ECP brake mode shall receive the following inspections at its point of origin (initial terminal):
  - (1) A Class I brake test as described in § 232.205(c) by a qualified mechanical inspector (QMI); and



- (2) A pre-departure inspection pursuant to part 215 of this chapter by an inspector designated under § 215.11 of this chapter.

(b) *Trains en route.*

- (1) Except for a unit or cycle train, a train operating in ECP brake mode shall not operate a distance that exceeds its destination or 3,500 miles, whichever is less, unless inspections meeting the requirements of paragraph (a) of this section are performed on the train.
- (2) A unit or cycle train operating in ECP brake mode shall receive the inspections required in paragraph (a) of this section at least every 3,500 miles.
- (3) The greatest distance that any car in a train has traveled since receiving a Class I brake test by a qualified mechanical inspector will determine the distance that the train has traveled.
- (4) A freight train operating in ECP brake mode shall receive a Class I brake test as described in § 232.205(c) by a qualified person at a location where the train is off air for a period of more than:
  - (i) 24 hours, or
  - (ii) 80 hours, if the train remains inaccessible to the railroad and in an extended-off-air facility. For the purpose of this section, an extended-off-air facility means a location controlled by a sole shipper or consignee which restricts access to the train and provides sufficient security to deter vandalism.

(c) *Cars added en route.*

- (1) Each freight car equipped with an ECP brake system that is added to a freight train operating in ECP brake mode shall receive a Class I brake test as described in § 232.205(c) by a qualified person, unless all of the following are met:
  - (i) The car has received a Class I brake test by a qualified mechanical inspector within the last 3,500 miles;
  - (ii) Information identified in § 232.205(e) relating to the performance of the previously received Class I brake test is provided to the train crew;
  - (iii) The car has not been off air for more than 24 hours or for more than 80 hours, if that train remains in an extended-off-air facility; and
  - (iv) A visual inspection of the car's brake systems is conducted to ensure that the brake equipment is intact and properly secured. This may be accomplished as part of the inspection required under § 215.13 of this chapter and may be conducted while the car is off air.
- (2) Each car and each solid block of cars not equipped with an ECP brake system that is added to a train operating in ECP brake mode shall receive a visual inspection to ensure it is properly placed in the train and safe to operate and shall be moved and tagged in accordance with the provisions contained in § 232.15.

(d) *Class III brake test*

- (1) A Class III brake test shall be performed on a freight train operating in ECP brake mode by a qualified person, as defined in § 232.5, to test the train's brake system whenever the continuity of the brake pipe or electrical connection is broken or interrupted.

- (2) In lieu of observing the brake pipe changes at the rear of a freight train with the end-of-train telemetry device referred to in §§ 232.211(c) and (d), the operator shall verify that the brakes applied and released on the rear car of the freight train by observing the ECP brake system's display in the locomotive cab.

(e) **Initialization.**

- (1) A freight train operating in ECP brake mode shall be initialized as described in paragraph (e)(2) whenever the following occurs:
  - (i) Class I brake test.
  - (ii) Class III brake test.
  - (iii) Whenever the ECP brake system is powered on.
- (2) Initialization shall, at a minimum:
  - (i) initialize the ECP brake system pursuant to AAR Series Standard S-4200; and
  - (ii) be performed in the sequential order of the vehicles in the train.
- (3) Whenever an ECP brake system is initialized pursuant to this paragraph, the train crew must ensure that the total number of cars indicated by the ECP brake system is the same as the total number of cars indicated on the train consist.

(f) **Modifications to existing brake inspections.**

- (1) In lieu of the specific brake pipe service reductions and increases required in this part, an electronic signal that provides an equivalent application and release of the brakes shall be utilized when conducting any required inspection or test on a freight car or freight train equipped with an ECP brake system and operating in ECP brake mode.
- (2) In lieu of the specific piston travel ranges contained in this part, the piston travel on freight cars equipped with ECP brake systems shall be within the piston travel limits stenciled or marked on the car or badge plate consistent with the manufacturers recommended limits, if so stenciled or marked.

(g) **ECP brake system train line cable.** Each ECP brake system train line cable shall:

- (1) Be located and guarded to provide sufficient vertical clearance;
- (2) Not cause any tripping hazards;
- (3) Not hang with one end free whenever the equipment is used in a train movement;
- (4) Not be positioned to interfere with the use of any safety appliance; or
- (5) Not have any of the following conditions:
  - (i) Badly chafed or broken insulation.
  - (ii) Broken plugs, receptacles or terminals.
  - (iii) Broken or protruding strands of wire.

(h) **Exceptions.** A freight car or a freight train shall be exempt from the requirements contained in §§ 232.205(a) and (b), 232.207, 232.209, and 232.211(a) when it is equipped with an ECP brake system and operating in ECP brake mode.

**§ 232.609 Handling of defective equipment with ECP brake systems.**

- (a) Ninety-five percent of the cars in a train operating in ECP brake mode shall have effective and operative brakes prior to use or departure from the train's initial terminal or any location where a Class I brake test is required to be performed on the entire train by a qualified mechanical inspector pursuant to § 232.607.
- (b) A freight car equipped with an ECP brake system that is known to have arrived with ineffective or inoperative brakes at initial terminal of the next train which the car is to be included or at a location where a Class I brake test is required under §§ 232.607(b)(1) through (b)(3) shall not depart that location with ineffective or inoperative brakes in a train operating in ECP brake mode unless:
  - (1) The location does not have the ability to conduct the necessary repairs;
  - (2) The car is hauled only for the purpose of repair to the nearest forward location where the necessary repairs can be performed consistent with the guidance contained in § 232.15(f);
  - (3) The car is not being placed for loading or unloading while being moved for repair unless unloading is necessary for the safe repair of the car; and
  - (4) The car is properly tagged in accordance with § 232.15(b).
- (c) A freight car equipped with only conventional pneumatic brakes shall not move in a freight train operating in ECP brake mode unless it would otherwise have effective and operative brakes if it were part of a conventional pneumatic brake-equipped train or could be moved from the location in defective condition under the provisions contained in, and tagged in accordance with, § 232.15.
- (d) A freight train operating in ECP brake mode shall not move if less than 85 percent of the cars in the train have operative and effective brakes. However, after experiencing a penalty stop for having less than 85 percent operative and effective brakes, a freight train operating in ECP brake mode may be moved if all of the following are met:
  - (1) The train is visually inspected;
  - (2) Appropriate measures are taken to ensure that the train is safely operated to the location where necessary repairs or changes to the consist can be made;
  - (3) A qualified person determines that it is safe to move the train; and
  - (4) The train is moved in ECP brake Switch Mode to the nearest or nearest forward location where necessary repairs or changes to the consist can be made.
- (e) A freight car or locomotive equipped with an ECP brake system that is found with inoperative or ineffective brakes for the first time during the performance of a Class I brake test or while en route may be used or hauled without civil penalty liability under this part to its destination, not to exceed 3,500 miles; provided, all applicable provisions of this section are met and the defective car or locomotive is hauled in a train operating in ECP brake mode.
- (f) A freight car equipped with an ECP brake system that is part of a train operating in ECP brake mode:
  - (1) That is found with a defective non-brake safety appliance may be used or hauled without civil penalty under this part to the nearest or nearest forward location where the necessary repairs can be performed consistent with the guidelines contained in § 232.15(f).
  - (2) That is found with an ineffective or inoperative brake shall be hauled in accordance with the following:

- (i) § 232.15(e)(1).
  - (ii) No more than two freight cars with brakes pneumatically cut out or five freight cars or five units in a multi-unit articulated piece of equipment with brakes electronically cut out shall be consecutively placed in the same train.
- (g) A train operating with conventional pneumatic brakes shall not operate with freight cars equipped with stand-alone ECP brake systems unless:
- (1) The train has at least the minimum percentage of operative brakes required by paragraph (h) of this section when at an initial terminal or paragraph (d) of this section when en route; and
  - (2) The stand-alone ECP brake-equipped cars are:
    - (i) Moved for the purpose of delivery to a railroad receiving the equipment or to a location for placement in a train operating in ECP brake mode or being moved for repair to the nearest available location where the necessary repairs can be made in accordance with §§ 232.15(a)(7) and (f);
    - (ii) Tagged in accordance with § 232.15(b); and
    - (iii) Placed in the train in accordance with § 232.15(e).
- (h) A train equipped and operated with conventional pneumatic brakes may depart an initial terminal with freight cars that are equipped with stand-alone ECP brake systems provided all of the following are met:
- (1) The train has 100 percent effective and operative brakes on all cars equipped with conventional pneumatic brake systems;
  - (2) The train has at least 95 percent effective and operative brakes when including the freight cars equipped with stand-alone ECP brake systems; and
  - (3) The requirements contained in paragraph (g) of this section are met.
- (i) **Tagging of defective equipment.** A freight car equipped with an ECP brake system that is found with ineffective or inoperative brakes will be considered electronically tagged under § 232.15(b)(1) and (b)(5) if the car is used or hauled in a train operating in ECP brake mode and the ECP brake system meets the following:
- (1) The ECP brake system is able to display information in the cab of the lead locomotive regarding the location and identification of the car with defective brakes;
  - (2) The information is stored or downloaded and is accessible to FRA and appropriate operating and inspection personnel; and
  - (3) An electronic or written record of the stored or downloaded information is retained and maintained in accordance with § 232.15(b)(3).
- (j) **Procedures for handling ECP brake system repairs and designation of repair locations.**
- (1) Each railroad operating freight cars equipped with ECP brake systems shall adopt and comply with specific procedures developed in accordance with the requirements related to the movement of defective equipment contained in this subpart. These procedures shall be made available to FRA upon request.

(2) Each railroad operating freight trains in ECP brake mode shall submit to FRA's Associate Administrator for Safety a list of locations on its system where ECP brake system repairs will be performed. A railroad shall notify FRA's Associate Administrator for Safety in writing 30 days prior to any change in the locations designated for such repairs. A sufficient number of locations shall be identified to ensure compliance with the requirements related to the handling of defective equipment contained in this part.

(k) **Exceptions:** All freight cars and trains that are specifically identified, operated, and handled in accordance with this section are excepted from the movement of defective equipment requirements contained in § 232.15(a)(2), (a)(5) through (a)(8), and 232.103(d) and (e).

### § 232.611 Periodic maintenance.

(a) In addition to the maintenance requirements contained in § 232.303(b) through (d), a freight car equipped with an ECP brake system shall be inspected and repaired before being released from a shop or repair track to ensure the proper and safe condition of the following:

- (1) ECP brake system wiring and brackets;
- (2) ECP brake system electrical connections; and
- (3) Car mounted ECP brake system components.

(b) **Single car air brake test procedures.** Prior to placing a freight car equipped with an ECP brake system into revenue service, a railroad or a duly authorized representative of the railroad industry shall submit a procedure for conducting periodic single car air brake tests to FRA for its approval pursuant to § 232.17.

(c) Except as provided in § 232.303(e), a single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on a freight car equipped with an ECP brake system whenever any of the events identified in § 232.305 occur, except for those paragraphs identified in paragraph (f) of this section.

(d) A single car air brake test conducted in accordance with the procedure submitted and approved in accordance with paragraph (b) of this section shall be performed by a qualified person on each freight car retrofitted with a newly installed ECP brake system prior to placing or using the car in revenue service.

(e) **Modification of single car test standard.** A railroad or a duly authorized representative of the railroad industry may seek modification of the single car test standard approved in accordance with paragraph (b) of this section. The request for modification will be handled and shall be submitted in accordance with the modification procedures contained in § 232.307.

(f) **Exceptions.** A freight car equipped with a stand-alone or dual mode ECP brake system is excepted from the single car air brake test procedures contained in § 232.305(a). A freight car equipped with a stand-alone ECP brake system is excepted from the single car test requirements contained in § 232.305(b)(2).

(g) For purposes of paragraphs (c) and (d) of this section, if a single car air brake test is conducted on a car prior to June 15, 2009, pursuant to the then existing AAR standards, it shall be considered the last single car air brake test for that car, if necessary.

### § 232.613 End-of-train devices.

(a) An ECP-EOT device shall, at a minimum, serve as the final node on the ECP brake circuit, provide a cable terminal circuit, and monitor, confirm, and report train, brake pipe, and train line cable continuity, cable voltage, brake pipe pressure, and the status of the ECP-EOT device battery charge. The ECP-EOT device

shall transmit a status message (EOT Beacon) at least once per second, contain a means of communicating with the HEU, and be equipped with a brake pipe pressure transducer and a battery that charges from the train line cable.

- (b) A railroad shall not move or use a freight train equipped with an ECP brake system unless that train is equipped with a functioning ECP-EOT device designed and operated in accordance with this subpart. The ECP-EOT device must be properly connected to the network and to the train line cable at the rear of the train.
- (c) A locomotive equipped with ECP brakes can be used in lieu of an ECP-EOT device, provided it is capable of performing all of the functions of a functioning ECP-EOT device.
- (d) **Exception.** A freight train operating in ECP brake mode is excepted from the end-of-train device requirements contained in subpart E of this part, provided that it is equipped with an ECP-EOT device complying with this section.

## Subpart H—Tourist, Scenic, Historic, and Excursion Operations Braking Systems

**Source:** 85 FR 80575, Dec. 11, 2020, unless otherwise noted.

### § 232.700 Applicability.

- (a) Except as provided in paragraph (b) of this section, this subpart applies to standard gage railroads.
- (b) This subpart does not apply to:
  - (1) A railroad that operates only on track inside an installation which is not part of the general railroad system of transportation; or
  - (2) Rapid transit operations in an urban area that are not connected with the general railroad system of transportation.
- (c) As used in this subpart, carrier means “railroad,” as that term is defined by 49 CFR 232.5

### § 232.701 Power brakes; minimum percentage.

On and after September 1, 1910, on all railroads used in interstate commerce, whenever, as required by the Safety Appliance Act as amended March 2, 1903, any train is operated with power or train brakes, not less than 85 percent of the cars of such train shall have their brakes used and operated by the engineer of the locomotive drawing such train, and all power-brake cars in every such train which are associated together with the 85 percent shall have their brakes so used and operated.

### § 232.702 Drawbars; standard height.

Not included in this subpart. Moved to 49 CFR part 231.

### § 232.703 Power brakes and appliances for operating power-brake systems.

Requirements are contained in 49 CFR 232.103(l).

**§ 232.710 General rules; locomotives.**

- (a) Air brake and hand brake equipment on locomotives including tender must be inspected and maintained in accordance with the requirements of the Locomotive Inspection and United States Safety Appliance Acts and related orders and regulations of the Federal Railroad Administrator (FRA).
- (b) It must be known that air brake equipment on locomotives is in a safe and suitable condition for service.
- (c) Compressor or compressors must be tested for capacity by orifice test as often as conditions require but not less frequently than required by law and orders of the FRA.
- (d) Main reservoirs shall be subjected to tests periodically as required by law and orders of the FRA.
- (e) Air gauges must be tested periodically as required by law and orders of the FRA, and whenever any irregularity is reported. They shall be compared with an accurate deadweight tester, or test gauge. Gauges found inaccurate or defective must be repaired or replaced.
- (f)
  - (1) All operating portions of air brake equipment together with dirt collectors and filters must be cleaned, repaired and tested as often as conditions require to maintain them in a safe and suitable condition for service, and not less frequently than required by law and orders of the FRA.
  - (2) On locomotives so equipped, hand brakes, parts, and connections must be inspected, and necessary repairs made as often as the service requires, with date being suitably stenciled or tagged.
- (g) The date of testing or cleaning of air brake equipment and the initials of the shop or station at which the work was done shall be placed on a card displayed under transparent covering in the cab of each locomotive unit.
- (h)
  - (1) Minimum brake cylinder piston travel must be sufficient to provide proper brake shoe clearance when brakes are released.
  - (2) Maximum brake cylinder piston travel when locomotive is standing must not exceed the following:

	Inches
(i) Steam locomotives:	
(A) Cam type of driving wheel brake	3 1/2
(B) Other types of driving wheel brakes	6
(C) Engine truck brake	8
(D) Engine trailer truck brake	8
(E) Tender brake (truck mounted and tender bed mounted)	8
(F) Tender brake (body mounted)	9
(ii) Locomotives other than steam:	
(A) Driving wheel brake	6
(B) Swivel type truck brake with brakes on more than one truck operated by one brake cylinder	7

	Inches
(C) Swivel type truck brake equipped with one brake cylinder	8
(D) Swivel type truck brake equipped with two or more brake cylinders	6

(i)

- (1) Foundation brake rigging, and safety supports, where used, must be maintained in a safe and suitable condition for service. Levers, rods, brake beams, hangars and pins must be of ample strength and must not bind or foul in any way that will affect proper operation of brakes. All pins must be properly applied and secured in place with suitable locking devices. Brake shoes must be properly applied and kept approximately in line with treads of wheels or other braking surfaces.
- (2) No part of the foundation brake rigging and safety supports shall be closer to the rails than specified by law and orders of the FRA.

(j)

- (1) Main reservoir leakage: Leakage from main air reservoir and related piping shall not exceed an average of 3 pounds per minute in a test of three minutes' duration, made after the pressure has been reduced 40 percent below maximum pressure.
  - (2) Brake pipe leakage: Brake pipe leakage must not exceed 5 pounds per minute after a reduction of 10 pounds has been made from brake pipe air pressure of not less than 70 pounds.
  - (3) Brake cylinder leakage: With a full service application of brakes, and with communication to the brake cylinders closed, brakes must remain applied not less than five minutes.
  - (4) The main reservoir system of each unit shall be equipped with at least one safety valve, the capacity of which shall be sufficient to prevent an accumulation of pressure of more than 10 pounds per square inch above the maximum setting of the compressor governor fixed by the chief mechanical officer of the carrier operating the locomotive.
  - (5) A suitable governor shall be provided that will stop and start the air compressor within 5 pounds above or below the pressures fixed.
  - (6) Compressor governor when used in connection with the automatic air brake system shall be so adjusted that the compressor will start when the main reservoir pressure is not less than 15 pounds above the maximum brake-pipe pressure fixed by the rules of the carrier and will not stop the compressor until the reservoir pressure has increased not less than 10 pounds.
- (k) The communicating signal system on locomotives when used in passenger service must be tested and known to be in a safe and suitable condition for service before each trip.
- (l) Enginemen when taking charge of locomotives must know that the brakes are in operative condition.
- (m) In freezing weather drain cocks on air compressors of steam locomotives must be left open while compressors are shut off.



- (n) Air pressure regulating devices must be adjusted for the following pressures:

	Pounds
(1) Locomotives:	
(i) Minimum brake pipe air pressure:	
(A) Road Service	70
(B) Switch Service	60
(ii) Minimum differential between brake pipe and main reservoir air pressures, with brake valve in running position	15
(iii) Safety valve for straight air brake	30-55 30-68
(iv) Safety valve for LT, ET, No. 8-EL, No. 14 EI, No. 6-DS, No. 6-BL and No. 6-SL equipment	30-75
(v) Safety valve for HSC and No. 24-RL equipment	30-50
(vi) Reducing valve for independent or straight air brake	50
(vii) Self-lapping portion for electro-pneumatic brake (minimum full application pressure)	30-50
(viii) Self-lapping portion for independent air brake (full application pressure)	40-60
(viii) Reducing valve for air signal	50
(x) Reducing valve for high-speed brake (minimum)	
(2) Cars:	
(i) Reducing valve for high-speed brake	58-62
(ii) Safety valve for PS, LN, UC, AML, AMU and AB-1-B air brakes	58-62
(iii) Safety valve for HSC air brake	58-77
(iv) Governor valve for water raising system	60
(v) Reducing valve for water raising system	20-30

### § 232.711 Train air brake system tests.

- (a) Supervisors are jointly responsible with inspectors, enginemen and trainmen for condition of train air brake and air signal equipment on motive power and cars to the extent that it is possible to detect defective equipment by required air tests.
- (b) Communicating signal system on passenger equipment trains must be tested and known to be in a suitable condition for service before leaving terminal.
- (c) Each train must have the air brakes in effective operating condition, and at no time shall the number and location of operative air brakes be less than permitted by Federal requirements. When piston travel is in excess of  $10^{1/2}$  inches, the air brakes cannot be considered in effective operating condition.
- (d) Condensation must be blown from the pipe from which air is taken before connecting yard line or motive power to train.

### § 232.712 Initial terminal road train airbrake tests.

- (a)

- (1) Each train must be inspected and tested as specified in this section by a qualified person at points—
  - (i) Where the train is originally made up (initial terminal);
  - (ii) Where train consist is changed, other than by adding or removing a solid block of cars, and the train brake system remains charged; and
  - (iii) Where the train is received in interchange if the train consist is changed other than by:
    - (A) Removing a solid block of cars from the head end or rear end of train;
    - (B) Changing motive power;
    - (C) Removing or changing the caboose; or
    - (D) Any combination of the changes listed in paragraphs (a)(1)(iii)(A), (B), and (C) of this section. Where a carman is to perform the inspection and test under existing or future collective bargaining agreement, in those circumstances a carman alone will be considered a qualified person.
- (2) A qualified person participating in the test and inspection or who has knowledge that it was made shall notify the engineer that the initial terminal road train air brake test has been satisfactorily performed. The qualified person shall provide the notification in writing if the road crew will report for duty after the qualified person goes off duty. The qualified person also shall provide the notification in writing if the train that has been inspected is to be moved in excess of 500 miles without being subjected to another test pursuant to either this section or § 232.713 of this part.
- (b) Each carrier shall designate additional inspection points not more than 1,000 miles apart where intermediate inspection will be made to determine that:
  - (1) Brake pipe pressure leakage does not exceed five pounds per minute;
  - (2) Brakes apply on each car in response to a 20-pound service brake pipe pressure reduction; and
  - (3) Brake rigging is properly secured and does not bind or foul.
- (c) Train airbrake system must be charged to required air pressure, angle cocks and cutout cocks must be properly positioned, air hose must be properly coupled and must be in condition for service. An examination must be made for leaks and necessary repairs made to reduce leakage to a minimum. Retaining valves and retaining valve pipes must be inspected and known to be in condition for service. If train is to be operated in electro-pneumatic brake operation, brake circuit cables must be properly connected.
- (d)
  - (1) After the airbrake system on a freight train is charged to within 15 pounds of the setting of the feed valve on the locomotive, but to not less than 60 pounds, as indicated by an accurate gauge at rear end of train, and on a passenger train when charged to not less than 70 pounds, and upon receiving the signal to apply brakes for test, a 15-pound brake pipe service reduction must be made in automatic brake operations, the brake valve lapped, and the number of pounds of brake pipe leakage per minute noted as indicated by brake pipe gauge, after which brake pipe reduction must be increased to full service. Inspection of the train brakes must be made to determine that angle cocks are properly positioned, that the brakes are applied on each car, that piston travel is correct, that

brake rigging does not bind or foul, and that all parts of the brake equipment are properly secured. When this inspection has been completed, the release signal must be given and brakes released and each brake inspected to see that all have released.

(2) When a passenger train is to be operated in electro-pneumatic brake operation and after completion of test of brakes as prescribed by paragraph (d)(1) of this section the brake system must be recharged to not less than 90 pounds air pressure, and upon receiving the signal to apply brakes for test, a minimum 20 pounds electro-pneumatic brake application must be made as indicated by the brake cylinder gage. Inspection of the train brakes must then be made to determine if brakes are applied on each car. When this inspection has been completed, the release signal must be given and brakes released and each brake inspected to see that all have released.

(3) When the locomotive used to haul the train is provided with means for maintaining brake pipe pressure at a constant level during service application of the train brakes, this feature must be cut out during train airbrake tests.

(e) Brake pipe leakage must not exceed 5 pounds per minute.

(f)

(1) At initial terminal piston travel of body-mounted brake cylinders which is less than 7 inches or more than 9 inches must be adjusted to nominally 7 inches.

(2) Minimum brake cylinder piston travel of truck-mounted brake cylinders must be sufficient to provide proper brake shoe clearance when brakes are released. Maximum piston travel must not exceed 6 inches.

(3) Piston travel of brake cylinders on freight cars equipped with other than standard single capacity brake, must be adjusted as indicated on badge plate or stenciling on car located in a conspicuous place near the brake cylinder.

(g) When test of airbrakes has been completed the engineman and conductor must be advised that train is in proper condition to proceed.

(h) During standing test, brakes must not be applied or released until proper signal is given.

(i)

(1) When train airbrake system is tested from a yard test plant, an engineer's brake valve or an appropriate test device shall be used to provide increase and reduction of brake pipe air pressure or electro-pneumatic brake application and release at the same or a slower rate as with engineer's brake valve and yard test plant must be connected to the end which will be nearest to the hauling road locomotive.

(2) When yard test plant is used, the train airbrakes system must be charged and tested as prescribed by paragraphs (c) to (g) of this section inclusive, and when practicable should be kept charged until road motive power is coupled to train, after which, an automatic brake application and release test of airbrakes on rear car must be made. If train is to be operated in electro-pneumatic brake operation, this test must also be made in electro-pneumatic brake operation before proceeding.

(3) If after testing the brakes as prescribed in paragraph (i)(2) of this section the train is not kept charged until road motive power is attached, the brakes must be tested as prescribed by paragraph (d)(1) of this section and if train is to be operated in electro-pneumatic brake operation as prescribed by paragraph (d)(2) of this section.

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

### § 232.713 Road train and intermediate terminal train air brake tests.

- (a) **Passenger trains.** Before motive power is detached or angle cocks are closed on a passenger train operated in either automatic or electro-pneumatic brake operation, except when closing angle cocks for cutting off one or more cars from the rear end of train, automatic air brake must be applied. After recoupling, brake system must be recharged to required air pressure and before proceeding and upon receipt of proper request or signal, application and release tests of brakes on rear car must be made from locomotive in automatic brake operation. If train is to be operated in electro-pneumatic brake operation, this test must also be made in electro-pneumatic brake operation before proceeding. Inspector or trainman must determine if brakes on rear car of train properly apply and release.
- (b) **Freight trains.** Before motive power is detached or angle cocks are closed on a freight train, brakes must be applied with not less than a 20-pound brake pipe reduction. After recoupling, and after angle cocks are opened, it must be known that brake pipe air pressure is being restored as indicated by a rear car gauge or device. In the absence of a rear car gauge or device, an air brake test must be made to determine that the brakes on the rear car apply and release.
- (c)
  - (1) At a point other than an initial terminal where a locomotive or caboose is changed, or where one or more consecutive cars are cut off from the rear end or head end of a train with the consist otherwise remaining intact, after the train brake system is charged to within 15 pounds of the feed valve setting on the locomotive, but not less than 60 pounds as indicated at the rear of a freight train and 70 pounds on a passenger train, a 20-pound brake pipe reduction must be made and it must be determined that the brakes on the rear car apply and release. As an alternative to the rear car brake application and release test, it shall be determined that brake pipe pressure of the train is being reduced as indicated by a rear car gauge or device and then that brake pipe pressure of the train is being restored as indicated by a rear car gauge or device.
  - (2) Before proceeding it must be known that brake pipe pressure as indicated at rear of freight train is being restored.
  - (3) On trains operating with electro-pneumatic brakes, with brake system charged to not less than 70 pounds, test must be made to determine that rear brakes apply and release properly from a minimum 20 pounds electro-pneumatic brake application as indicated by brake cylinder gauge.
- (d)
  - (1) At a point other than a terminal where one or more cars are added to a train, after the train brake system is charged to not less than 60 pounds as indicated by a gauge or device at the rear of a freight train and 70 pounds on a passenger train. A brake test must be made by a designated person as described in § 232.712(a)(1) to determine that brake pipe leakage does not exceed five (5) pounds per minute as indicated by the brake pipe gauge after a 20-pound brake pipe reduction has been made. After the test is completed, it must be determined that piston travel is correct, and the train airbrakes of these cars and on the rear car of the train apply and remain applied, until the release signal is given. As an alternative to the rear car brake application and release portion of the test, it shall be determined that brake pipe pressure of the train is being reduced as indicated by a rear car gauge or device and then that brake pipe pressure of the train is being restored as indicated

by a rear car gauge or device. Cars added to a train that have not been inspected in accordance with § 232.712 (c) through (j) must be so inspected and tested at the next terminal where facilities are available for such attention.

(2)

(i) At a terminal where a solid block of cars, which has been previously charged and tested as prescribed by § 232.712 (c) through (j), is added to a train, it must be determined that the brakes on the rear car of the train apply and release. As an alternative to the rear car application and release test, it shall be determined that brake pipe pressure of the train is being reduced as indicated by a rear car gauge or device and then that brake pipe pressure of the train is being restored as indicated by a rear car gauge or device.

(ii) When cars which have not been previously charged and tested as prescribed by § 232.712 (c) through (j) are added to a train, such cars may either be given inspection and tests in accordance with § 232.712 (c) through (j), or tested as prescribed by paragraph (d)(1) of this section prior to departure in which case these cars must be inspected and tested in accordance with § 232.712 (c) through (j) at next terminal.

(3) Before proceeding it must be known that the brake pipe pressure at the rear of freight train is being restored.

(e)

(1) Transfer train and yard train movements not exceeding 20 miles, must have the air brake hose coupled between all cars, and after the brake system is charged to not less than 60 pounds, a 15-pound service brake pipe reduction must be made to determine that the brakes are applied on each car before releasing and proceeding.

(2) Transfer train and yard train movements exceeding 20 miles must have brake inspection in accordance with § 232.712 (c)-(j).

(f) The automatic air brake must not be depended upon to hold a locomotive, cars or train, when standing on a grade, whether locomotive is attached or detached from cars or train. When required, a sufficient number of hand brakes must be applied to hold train, before air brakes are released. When ready to start, hand brakes must not be released until it is known that the air brake system is properly charged.

(g) As used in this section, device means a system of components designed and inspected in accordance with § 232.719.

(h) When a device is used to comply with any test requirement in this section, the phrase brake pipe pressure of the train is being reduced means a pressure reduction of at least five pounds and the phrase brake pipe pressure of the train is being restored means a pressure increase of at least five (5) pounds.

### **§ 232.714 Inbound brake equipment inspection.**

(a) At points where inspectors are employed to make a general inspection of trains upon arrival at terminals, visual inspection must be made of retaining valves and retaining valve pipes, release valves and rods, brake rigging, safety supports, hand brakes, hose and position of angle cocks and make necessary repairs or mark for repair tracks any cars to which yard repairs cannot be promptly made.

- (b) Freight trains arriving at terminals where facilities are available and at which special instructions provide for immediate brake inspection and repairs, trains shall be left with air brakes applied by a service brake pipe reduction of 20 pounds so that inspectors can obtain a proper check of the piston travel. Trainmen will not close any angle cock or cut the locomotive off until the 20-pound service reduction has been made. Inspection of the brakes and needed repairs should be made as soon thereafter as practicable.

### § 232.715 Double heading and helper service.

- (a) When more than one locomotive is attached to a train, the engineman of the leading locomotive shall operate the brakes. On all other motive power units in the train the brake pipe cutout cock to the brake valve must be closed, the maximum main reservoir pressure maintained and brake valve handles kept in the prescribed position. In case it becomes necessary for the leading locomotive to give up control of the train short of the destination of the train, a test of the brakes must be made to see that the brakes are operative from the automatic brake valve of the locomotive taking control of the train.
- (b) The electro-pneumatic brake valve on all motive power units other than that which is handling the train must be cut out, handle of brake valve kept in the prescribed position, and air compressors kept running if practicable.

### § 232.716 Running tests.

When motive power, engine crew or train crew has been changed, angle cocks have been closed except for cutting off one or more cars from the rear end of train or electro-pneumatic brake circuit cables between power units and/or cars have been disconnected, running test of train air brakes on passenger train must be made, as soon as speed of train permits, by use of automatic brake if operating in automatic brake operation or by use of electro-pneumatic brake if operating in electro-pneumatic brake operation. Steam or power must not be shut off unless required and running test must be made by applying train air brakes with sufficient force to ascertain whether or not brakes are operating properly. If air brakes do not properly operate, train must be stopped, cause of failure ascertained and corrected and running test repeated.

### § 232.717 Freight and passenger train car brakes.

- (a) *Testing and repairing brakes on cars while on shop or repair tracks.*
  - (1) When a freight car having brake equipment due for periodic attention is on shop or repair tracks where facilities are available for making air brake repairs, brake equipment must be given attention in accordance with the requirements of Rules 3 and 4 of the 2020 Field Manual of the AAR Interchange Rules (AAR Field Manual); or an alternative procedure approved by FRA under paragraph (d) of this section. Brake equipment shall then be tested by use of a single car testing device as prescribed by § 232.305.
  - (2)
    - (i) When a freight car having an air brake defect is on a shop or repair track, brake equipment must be tested by use of a single car testing device as prescribed by § 232.305.
    - (ii) All freight cars on shop or repair tracks shall be tested to determine that the air brakes apply and release. Piston travel on a standard body mounted brake cylinder which is less than 7 inches or more than 9 inches must be adjusted to nominally 7 inches. Piston travel of brake cylinders on all freight cars equipped with other than standard single capacity brake, must be

adjusted as indicated on badge plate or stenciling on car located in a conspicuous place near brake cylinder. After piston travel has been adjusted and with brakes released, sufficient brake shoe clearance must be provided.

(iii) When a car equipped for use in passenger train service not due for periodical air brake repairs, as indicated by stenciled or recorded cleaning dates, is on shop or repair tracks, brake equipment must be tested by use of single car testing device as prescribed by the applicable standards referenced in § 232.305 or by the American Public Transportation Association (APTA) standard referenced in § 238.311(a) of this chapter. Piston travel of brake cylinders must be adjusted if required, to the standard travel for that type of brake cylinder. After piston travel has been adjusted and with brakes released, sufficient brake shoe clearance must be provided.

(iv) Before a car is released from a shop or repair track, it must be known that brake pipe is securely clamped, angle cocks in proper position with suitable clearance, valves, reservoirs and cylinders tight on supports and supports securely attached to car.

(b) **Clean, repair, lubricate and test (COT&S).**

(1) Brake equipment on cars other than passenger cars must be cleaned, repaired, lubricated and tested ("COT&S") as often as required to maintain it in a safe and suitable condition for service but not less frequently than as required by Rules 3 and 4 of the AAR Field Manual.

(2) Brake equipment on passenger cars must be cleaned, repaired, lubricated and tested ("COT&S") as often as necessary to maintain it in a safe and suitable condition for service but not less frequently than as required in Standard S-4045-13 in the Manual of Standards and Recommended Practices of the AAR or an alternative procedure approved by FRA pursuant to § 232.717(d).

(c) **Discontinued brake systems.** For a brake system once, but no longer, included in AAR's current Code of Rules or Code of Tests (presently known as the Field Manual of the AAR Interchange Rules or the Manual of Standards and Recommended Practices), the brake system must be maintained in a safe and suitable condition for service according to a railroad's written maintenance plan. The maintenance plan, including its COT&S component and a periodic attention schedule, must be based upon a standard appropriate to the equipment. The railroad must comply with and make its written maintenance plan available to FRA upon request.

(d) **Modification of standards.** The AAR or other authorized representative of the railroad industry may seek modification of the industry standards identified in or approved pursuant to paragraph (a) of this section. The request for modification will be handled and must be submitted in accordance with the modification procedures contained in § 232.307 of this part.

(e) **Incorporation by Reference.** The Director of the Federal Register approves the incorporation by reference of the standards required in this section into this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may inspect a copy of the material at the Federal Railroad Administration, Docket Clerk, 1200 New Jersey Avenue SE, Washington, DC 20590 (telephone: 855-368-4200). You may also inspect the material at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email [fedreg.legal@nara.gov](mailto:fedreg.legal@nara.gov), or go to: [www.archives.gov/federal-register/cfr/ibr-locations.html](http://www.archives.gov/federal-register/cfr/ibr-locations.html). You may obtain the material from the following source(s):

(1) Association of American Railroads (AAR), 425 Third Street SW, Washington, DC 20024, telephone: (202) 639-2345, email: [publications@aar.com](mailto:publications@aar.com), website: <https://aarpublications.com>.

- (i) 2020 Field Manual of the AAR Interchange Rules, Rule 3—Testing of Air Brakes and Rule 4—Air Brake Valves and Parts, effective January 1, 2020.
- (ii) AAR Standard S-4045, “Passenger Equipment Maintenance Requirements,” Revised 2013 (contained in AAR Manual of Standards and Recommended Practices, Brakes and Brake Equipment), also referred to as AAR Standard S-4045-13.

(2) [Reserved]

### **§ 232.719 End-of-train devices.**

Requirements are contained in subpart E of this part.