

Federal Railroad Administration, DOT

§ 232.0

APPENDIX A TO PART 231—SCHEDULE OF CIVIL PENALTIES¹—Continued

FRA safety appliance defect code section ²	Violation	Willful violation
146.A Notice or Stencil not Posted on Caboosees with Running Boards Removed	500	1,000
146.B Safe Means not Provided to Clean or Maintain Windows of Caboose	1,000	2,000

¹ A penalty may be assessed against an individual only for a willful violation. The Administrator reserves the right to assess a penalty of up to \$22,000 for any violation where circumstances warrant. See 49 CFR part 209, appendix A.

² This schedule uses section numbers from FRA's Safety Appliance Defect Code, a restatement of the CFR text in a re-organized format. For convenience, and as an exception to FRA's general policy, penalty citations will cite the defect code rather than the CFR. FRA reserves the right, should litigation become necessary, to substitute in its complaint the CFR and/or statutory citation in place of the defect code section cited in the penalty demand letter.

[53 FR 52933, Dec. 29, 1988, as amended at 63 FR 11623, Mar. 10, 1998]

PART 232—RAILROAD POWER BRAKES AND DRAWBARS

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APPENDIX A TO PART 232—SCHEDULE OF CIVIL PENALTIES

APPENDIX B TO PART 232—SPECIFICATIONS AND REQUIREMENTS FOR POWER BRAKES AND APPLIANCES FOR OPERATING POWER-BRAKE SYSTEMS FOR FREIGHT SERVICE

AUTHORITY: 49 U.S.C. 20102-03, 20133, 20141, 20301-03, 20306, 21301-02, 21304; 49 CFR 1.49 (c), (m).

SOURCE: 33 FR 19679, Dec. 25, 1968, unless otherwise noted.

§ 232.0 Applicability and penalties.

(a) Except as provided in paragraphs (b) and (c) of this section, this part applies to all standard gage railroads.

(b) This part 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) Except for §§ 232.2 and 232.21 through 232.25, this part does not apply to a "passenger train" or "passenger equipment" as defined in § 238.5 of this chapter that is subject to the inspection and testing requirements contained in part 238 of this chapter.

(d) As used in this part, *carrier* means "railroad," as that term is defined below.

(e) *Railroad* means all forms of non-highway ground transportation that run on rails or electromagnetic guideways, including (1) commuter or other short-haul rail passenger service in a metropolitan or suburban area, and (2) high speed ground transportation systems that connect metropolitan areas, without regard to whether they use new technologies not associated with traditional railroads. Such term does not include rapid transit operations within an urban area that are not connected to the general railroad system of transportation.

(f) Any person (an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor) who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least

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\$500 and not more than \$11,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$22,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense.

[54 FR 33230, Aug. 14, 1989, as amended at 63 FR 11623, Mar. 10, 1998; 64 FR 25660, May 12, 1999]

§ 232.1 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.

§ 232.2 Drawbars; standard height.

Except on cars specified in the proviso in section 6 of the Safety Appliance Act of March 2, 1893 (sec. 6, 27 Stat. 532, 45 U.S.C. 6) as the same was amended April 1, 1896 (29 Stat. 85; 45 U.S.C. 6) the standard height of drawbars heretofore designated in compliance with law is hereby modified and changed in the manner hereinafter prescribed, to wit: The maximum height of drawbars for freight cars measured perpendicularly from the level of the tops of rails to the centers of drawbars for standard-gauge railroads in the United States subject to said act shall be 34½ inches, and the minimum height of drawbars for freight cars on such standard-gauge railroads measured in the same manner shall be 31½ inches, and on narrow-gauge railroads in the United States subject to said act the maximum height of drawbars for freight cars measured from the level of the tops of rails to the centers of drawbars shall be 26 inches, and the minimum height of drawbars for freight

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cars on such narrow-gauge railroads measured in the same manner shall be 23 inches, and on 2-foot-gauge railroads in the United States subject to said act the maximum height of drawbars for freight cars measured from the level of the tops of rails to the centers of drawbars shall be 17½ inches, and the minimum height of drawbars for freight cars on such 2-foot-gauge railroads measured in the same manner shall be 14½ inches.

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

(a) The specifications and requirement for power brakes and appliances for operating power-brake systems for freight service set forth in the appendix to the report on further hearing, of May 30, 1945, are hereby adopted and prescribed. (See appendix to this part for order in Docket 13528.)

(b) [Reserved]

RULES FOR INSPECTION, TESTING AND MAINTENANCE OF AIR BRAKE EQUIPMENT

§ 232.10 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 stencilled 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
Steam locomotives:	
Cam type of driving wheel brake	3½
Other types of driving wheel brakes	6
Engine truck brake	8
Engine trailer truck brake	8
Tender brake (truck mounted and tender bed mounted)	8
Tender brake (body mounted)	9
Locomotives other than steam:	
Driving wheel brake	6
Swivel type truck brake with brakes on more than one truck operated by one brake cylinder	7
Swivel type truck brake equipped with one brake cylinder	8
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

pipng 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:

Locomotives	Pounds
(1) Minimum brake pipe air pressure:	
Road Service	70
Switch Service	60

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Locomotives	Pounds
(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 El, 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 air signal	40-60
(10) Reducing valve for high-speed brake (minimum)	50
Cars	Pounds
(11) Reducing valve for high-speed brake	58-62
(12) Safety valve for PS, LN, UC, AML, AMU and AB-1-B air brakes	58-62
(13) Safety valve for HSC air brake	58-77
(14) Governor valve for water raising system	60
(15) Reducing valve for water raising system	20-30

§ 232.11 Train air brake system tests.

(a) Supervisors are jointly responsible with inspectors, enginemen and trainmen for condition of 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 10½ inches, the air brake 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.

[33 FR 19679, Dec. 25, 1968, as amended at 47 FR 36794, Aug. 23, 1982]

§ 232.12 Initial terminal road train air-brake 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 the train;

(B) Changing motive power;

(C) Removing or changing the ca-boose; or

(D) Any combination of the changes listed in (A), (B), and (C) of this subparagraph.

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 § 232.13 of this part.

(Approved by the Office of Management and Budget under OMB control number 2130-0008)

(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 electropneumatic 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 electropneumatic 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 electropneumatic 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 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 a suitable test device must be used to provide increase and reduction of brake pipe air pressure or electropneumatic 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 electropneumatic brake operation, this test must also be made in electropneumatic 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

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train is to be operated in electropneumatic 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.

(49 CFR 1.49(c))

[37 FR 12236, June 21, 1972, as amended at 47 FR 36795, Aug. 23, 1982; 47 FR 40807, Sept. 16, 1982]

§ 232.13 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 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. After this test is completed, it must be determined that the brakes on each of these cars and on the rear car of the train apply and release. 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 § 232.12 (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 § 232.13 (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 § 232.12 (c) through (j) are added to a train, such cars may either be given inspection and tests in accordance with § 232.12 (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 § 232.12 (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 § 232.12 (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 § 232.19.

(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 pounds.

[33 FR 19679, Dec. 25, 1968, as amended at 37 FR 12237, June 21, 1972; 51 FR 17303, May 9, 1986]

§ 232.14 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, 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.

§ 232.15 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.

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(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.

§ 232.16 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.

§ 232.17 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 the currently effective AAR Code of Rules for cars in interchange. Brake equipment shall then be tested by use of a single car testing device as prescribed by the currently effective AAR Code of Tests.

(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 currently effective AAR Code of Tests.

(ii) All freight cars on shop or repair tracks shall be tested to determine

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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 is 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 currently effective AAR Code of Tests. 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)(1) Brake equipment on cars other than passenger cars must be cleaned, repaired, lubricated and tested as often as required to maintain it in a safe and suitable condition for service but not less frequently than as required by currently effective AAR Code of Rules for cars in interchange.

(2) Brake equipment on passenger cars must be clean, repaired, lubricated and tested 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-045 in the Manual of Standards and Recommended Practices of the AAR.

(3) Copies of the materials referred to in this section can be obtained from the Association of American Railroads,

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1920 L Street, NW., Washington, DC 20036.

(72 Stat. 86 (45 U.S.C. 9); sec. 6 (e), (f), 80 Stat. 939 (49 U.S.C. 1655); and sec. 1.49(c) of the regulations of the Office of the Secretary of Transportation, 49 CFR 1.49(c))

[47 FR 36795, Aug. 23, 1982, as amended at 49 FR 1988, Jan. 17, 1984]

§ 232.19 Design standards for one-way end-of-train devices.

(a) 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 rear car brake pipe pressure and transmitting that information to the front unit for display to the locomotive engineer. The rear unit shall be—

(1) Capable of measuring the rear car brake pipe pressure with an accuracy of ± 3 psig and brake pipe pressure variations of ± 1 psig;

(2) Equipped with a “bleeder valve” that permits the release of any air under pressure from the rear of train unit or the associated air hoses prior to detaching the rear unit from the brake pipe;

(3) Designed so that an internal failure will not cause an undesired emergency brake application;

(4) Equipped with either an air gauge or a means of visually displaying the rear unit’s brake pipe pressure measurement; and

(5) Equipped with a pressure relief safety valve to prevent explosion from a high pressure air leak inside the rear unit.

(c) *Reporting rate.* Multiple data transmissions from the rear unit shall occur immediately after a variation in the rear car brake pipe pressure of ± 2 psig and at intervals of not greater than 70 seconds when the rear car brake pipe pressure variation over the 70-second interval is less than ± 2 psig.

(d) *Operating environment.* The rear unit shall be designed to meet the performance requirements of paragraphs (b) and (c) of this section under the following environmental conditions:

(1) At temperatures from -40° C to 60° C;

(2) At a relative humidity of 95% non-condensing at 50° 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 0.1 second in any axis.

(e) *Unique code.* Each rear unit shall have a unique and permanent identification code that is transmitted along with the pressure message to the front-of-train unit. A code obtained from the Association of American Railroads, 50 F Street, NW., Washington, DC 20036 shall be deemed to be a unique code for purposes of this section. A unique code also may be obtained from the Office of Safety Enforcement (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 not more than one-pound increments.

(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 232.19(d) (2), (3), (4), and (5). It shall also be designed to meet the performance requirements in this paragraph—

(i) At temperatures from 0° C to 60° C;

(ii) During a vertical or lateral shock of 2 g. peak for 0.1 second; and

(iii) During a longitudinal shock of 5 g. peak for 0.1 second.

(g) *Radio equipment.* (1) The radio transmitter in the rear unit and the radio receiver in the front unit shall comply with the applicable regulatory requirements of the FCC and use of a

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transmission format acceptable to the FCC.

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

[51 FR 17303, May 9, 1986, as amended at 62 FR 294, Jan. 2, 1997]

§ 232.21 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 §232.19, except those included in §232.19(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 and hose shall have a minimum diameter of 3/4 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. The switch shall be labeled "Emergency" and shall be protected so that there will exist no possibility of accidental activation.

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

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

(h) Means shall be provided to arm the front and rear units to ensure the

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rear unit responds to an emergency command only from a properly associated front unit.

[62 FR 294, Jan. 2, 1997]

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

(a) 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) 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 §232.21 or a device using an alternative technology to perform the same function.

(c) Each newly manufactured end-of-train device purchased by a railroad

after (one year from date of publication) shall be a two-way end-of-train device meeting the design and performance requirements contained in §232.21 or a device using an alternative technology to perform the same function.

(d) Each two-way end-of-train device purchased by any person prior to promulgation of these regulations shall be deemed to meet the design and performance requirements contained in §232.21.

(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 capable of making an emergency brake application, through a command effected by telemetry or by a crew member in radio contact with the lead (controlling) locomotive, located in the rear third of the train length;

(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, 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) Passenger trains in which all of the cars in the train are equipped with an emergency brake valve readily accessible to a crew member;

(10) 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

(11) Passenger trains that have twenty-four (24) or fewer cars (not including locomotives) in the consist and that are equipped and operated in accordance with the following train-configuration and operating requirements:

(i) If the total number of cars in a passenger train consist is twelve (12) or fewer, a car located no less than halfway through the consist (counting from the first car in the train) must be equipped with an emergency brake valve readily accessible to a crew member;

(ii) If the total number of cars in a passenger train consist is thirteen (13) to twenty-four (24), a car located no less than two-thirds (2/3) of the way through the consist (counting from the first car in the train) must be equipped with an emergency brake valve readily accessible to a crew member;

(iii) Prior to descending a section of track with an average grade of two percent or greater over a distance of two continuous miles, the engineer of the train shall communicate with the conductor, to ensure that a member of the crew with a working two-way radio is stationed in the car with the rearmost readily accessible emergency brake valve on the train when the train begins its descent; and

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

(f) 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 a train departs from the point where the device is installed until the train reaches its destination.

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

(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 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 any 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 will be considered an en route failure only if the loss of communication is for a period greater than 16 minutes and 30 seconds.

(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 over 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 will 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 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, if this can be done safely.

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

(2) [Reserved]

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

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

(i) A member of the train crew shall be immediately positioned in the car which contains the rearmost readily accessible emergency brake valve on the train and shall be equipped with an

operable two-way radio that communicates with the locomotive engineer; and

(ii) The locomotive engineer shall periodically make running tests of the train's air brakes until the failure is corrected; and

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

[62 FR 294, Jan. 2, 1997, as amended at 63 FR 24134, May 1, 1998]

§ 232.25 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-of-train unit.

(b) After each installation of either the front or rear unit of an end-of-train device, or both, the functional capability of the device shall be determined, after charging the train, by comparing the quantitative value displayed on the front unit with the quantitative value displayed on the rear unit or on a properly calibrated air gauge. The end-of-train device shall not be used if the difference between the two readings exceeds three pounds per square inch.

(c) A two-way end-of-train device shall be tested at the initial terminal or other point of installation to ensure that the device is capable of initiating an emergency power brake application from the rear of the train. If this test is conducted by a person other than a member of the train crew, the locomotive engineer shall be informed that the test was performed.

(d) The telemetry equipment shall be calibrated for accuracy according to the manufacturer's specifications at least every 365 days. The date of the last calibration, the location where the calibration was made, and the name of the person doing the calibration shall be legibly displayed on a weather-resistant sticker or other marking device

affixed to the outside of both the front unit and the rear unit.

[62 FR 295, Jan. 2, 1997]

APPENDIX A TO PART 232—SCHEDULE OF CIVIL PENALTIES¹

Section	Violation	Willful violation
232.1 Power brakes, minimum percentage	\$5,000	\$7,000
232.2 Drawbars; standard height	2,500	5,000
232.3 Power brakes and appliances for operating power brake systems	2,500	5,000
Rules for Inspection, Testing and Maintenance of Air Brake Equipment:		
232.10 General rules—locomotives:		
(b) Air brake equipment not inspected or tested to assure it is in a safe and suitable condition	2,500	5,000
(c) Compressor not tested for capacity	2,500	5,000
(d) Main reservoir not tested	2,500	5,000
(e) Air gauges not tested; if inaccurate not repaired or replaced	2,500	5,000
(f)(1) Operating portion of air brake equipment, dirt collectors, and filters not cleaned, repaired, and tested	2,500	5,000
(2) Hand brakes, parts and connections not inspected or suitably stenciled	1,000	2,000
(g) Date of testing or cleaning of air brake equipment not displayed in the cab	1,000	2,000
(h)(1) Minimum brake cylinder piston travel insufficient	2,500	5,000
(2) Maximum brake cylinder piston travel excessive ...	2,500	5,000
(i)(1) Foundation brake rigging, safety supports and brake shoes	2,500	5,000
(2) Foundation brake rigging or safety supports have improper clearance to the rails	2,500	5,000
(j)(1) Main reservoir leakage	2,500	5,000
(2) Brake pipe leakage	2,500	5,000
(3) Brake cylinder leakage	2,500	5,000
(4) Main reservoir safety valve	2,500	5,000
(5) Governor	2,500	5,000
(6) Compressor governor when used in connection with automatic air brake system	2,500	5,000
(k) Communicating signal system on locomotive	1,000	2,000
(l) Enginemen taking charge of locomotive	2,500	5,000

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APPENDIX A TO PART 232—SCHEDULE OF CIVIL PENALTIES ¹—Continued

APPENDIX A TO PART 232—SCHEDULE OF CIVIL PENALTIES ¹—Continued

Section	Violation	Willful violation
(m) Drain cocks on air compressors of steam locomotives	2,500	5,000
(n) Air pressure regulating devices	2,500	5,000
232.11 Train air brake system tests:		
(b) Communicating signal system on passenger train	2,500	5,000
(c) Effective and operative air brakes	2,500	5,000
(d) Condensation from yard line or motive power	2,500	5,000
232.12 Initial terminal road train air brake tests:		
(a) Total failure to perform initial terminal test	10,000	(1)
(b) 1,000 mile inspection not performed	5,000	10,000
(c)-(j) partial failure to perform initial terminal test ..	2,500	5,000
232.13 Road train and intermediate terminal train air brake tests:		
(a) Passenger trains: locomotive is detached	5,000	7,500
(b) Freight trains: locomotive is detached	5,000	7,500
(c)(1) Locomotive or caboose is changed, or one or more cars are cut off from the rear end or head end	5,000	7,500
(2) Brake pipe pressure restored	5,000	7,500
(3) Electropneumatic application and release test ...	5,000	7,500
(d)(1) Cars are added at a point other than a terminal	5,000	7,500
(2)(i) Cars added at a terminal and have not been charged and tested	5,000	7,500
(ii) Cars added at a terminal and have not been charged and tested	5,000	7,500
(3) Brake pipe pressure restored at the rear of freight train	5,000	7,500
(e)(1) Transfer train and yard train movements	2,500	5,000
(2) Transfer train and yard train movements exceeding 20 miles	5,000	7,500
(f) Locomotives, cars or train standing on a yard	5,000	7,500
(h) Device is used to comply with test requirement	2,500	5,000
232.14 Inbound brake equipment inspection:		
(a) Inspection of trains upon arrival at terminals	1,000	2,000
(b) Special instructions provide for immediate brake inspection and repairs	1,000	2,000

Section	Violation	Willful violation
232.15 Double heading and helper service:		
(a) Engineman of the leading locomotive shall operate the brakes	5,000	7,500
(b) Electropneumatic brake valve	5,000	7,500
232.16 Running tests	2,500	5,000
232.17 Freight and passenger train car brakes:		
(a) Testing and repairing brakes on cars while in shop or on repair track:		
(1) Periodic attention on freight car air brake equipment while car is on repair track	5,000	7,500
(2)(i) Single car testing of freight cars	2,500	5,000
(ii) Repair track tests of freight cars	2,500	5,000
(iii) Single car testing of freight cars	2,500	5,000
(iv) Car is released from a shop or repair track	2,500	5,000
(b)(1) Brake equipment on cars other than passenger cars	2,500	5,000
(2) Brake equipment on passenger cars ...	4,000	6,000
232.19 End of train device:		
(a) Location of front unit and rear unit	2,500	5,000
(b) Rear unit	2,500	5,000
(c) Reporting rate	2,500	5,000
(d) Operating environment	2,500	5,000
(e) Unique code	2,500	5,000
(f) Front unit	2,500	5,000
(g) Radio equipment	2,500	5,000
232.21 Two-way EOTs:		
(a)-(h) Design Standards ...	2,500	5,000
232.23 Operating standards:		
(b) Failure to equip	5,000	7,500
(c) Purchases	2,500	5,000
(f)(1) Device not armed or operable	5,000	7,500
(2) Insufficient battery charge	2,500	5,000
(g) En route failure, freight or other non-passenger ..	5,000	7,500
(h) En route failure, passenger	5,000	7,500
232.25 Inspection and Testing:		
(a) Unique code	2,500	5,000
(b) Comparing values	2,500	5,000
(c) Test of emergency capability	5,000	7,500
(d) Calibration	2,500	5,000

¹ A penalty may be assessed against an individual only for a willful violation. The Administrator reserves the right to assess a penalty of up to \$22,000 for any violation where circumstances warrant. See 49 CFR part 209, appendix A.

[53 FR 52934, Dec. 29, 1988, as amended at 62 FR 295, Jan. 2, 1997; 63 FR 11623, Mar. 10, 1998; 63 FR 24135, May 1, 1998]

APPENDIX B TO PART 232—SPECIFICATIONS AND REQUIREMENTS FOR POWER BRAKES AND APPLIANCES FOR OPERATING POWER-BRAKE SYSTEMS FOR FREIGHT SERVICE

PURPOSE

The purpose of this specification is to define and prescribe requirements for power brakes and appliances for operating powerbrake systems.

DEFINITIONS

For purposes of this specification, terms used herein are defined as follows:

1. *Power brake.* A combination of parts operated by compressed air and controlled manually, pneumatically or electrically, by means of which the motion of a car or locomotive is retarded or arrested.

2. *Power-brake system.* The power brakes on locomotives and cars of a train so interconnected that they can be operated together and by means of which the motion of the train is retarded or arrested.

3. *Brake valve.* The valve of the locomotive equipment by means of which operation of the power-brake system is controlled.

4. *Equalizing reservoir.* The small reservoir connected to the brake valve only, the pressure of which is reduced by the engineer for making service applications.

5. *Brake pipe.* The line of pipe and hose extending throughout the length of the train by means of which compressed air is supplied to the brake devices on the several cars and the pressures so controlled as to effect the application and release of the brakes.

6. *Operating valve.* Device on each car, the operation of which result in (a) admission of air to brake cylinder, (b) release of air from brake cylinder, and (c) charging of one or more reservoirs.

7. *Service reduction.* A decrease in brake-pipe pressure, usually of from 5 to 25 pounds, at a rate sufficiently rapid to move the operating valve to service position, but at a rate not rapid enough to operate the valve to emergency position. Quick service is that feature of the operating valve which provides for local reduction of brake-pipe pressure.

8. *Service application.* A brake application which results from one or more service reductions.

9. *Full service reduction.* A service reduction sufficient in amount to cause equalization of pressure in brake cylinder with pressure in the reservoir from which compressed air is supplied to brake cylinder.

10. *Full service application.* A brake application which results from one or more brake-pipe reductions sufficient in amount to cause a full service reduction.

11. *Emergency reduction.* A depletion of brake-pipe pressure at a rate sufficiently

rapid to move the operating valve to emergency position.

12. *Emergency application.* A brake application which results from an emergency reduction.

13. *Emergency brake-cylinder pressure.* The force per square inch exerted upon piston in brake cylinder by compressed air which is admitted to brake cylinder as a result of an emergency reduction. Effective emergency brake-cylinder pressure is a pressure not less than 15 percent nor more than 20 percent greater than the brake-cylinder pressure obtained from a full service reduction on the same car and from the same initial pressures.

SPECIFICATIONS

General Requirements

14. The design of the operating valve shall be such as will insure efficient and reliable operation, both in its application and release functions and when intermingled with other types of power brakes. It shall be so constructed that the rate of brake-cylinder pressure development may be adjusted to meet such changes in train operating conditions as may develop in the future.

15. The design of the service and emergency valves shall be such as to permit their removal for cleaning and repair without disturbing pipe joints.

16. The portions of the car brake which control the brake application and release, and also the brake cylinder, shall be adequately protected against the entrance of foreign matter.

17. The apparatus conforming to the requirements of these specifications shall be so constructed, installed and maintained as to be safe and suitable for service.

Service Requirements

The apparatus shall be so designed and constructed that: (based upon 70 pounds brake-pipe pressure and train length of 150 cars)

18. With a service reduction of 5 pounds in the equalizing reservoir at the brake valve all brakes will apply.

19. An initial 5-pound equalizing-reservoir reduction at the brake valve will produce substantially 10 pounds brake-cylinder pressure throughout the train, including brakes having piston travel in excess of 8 inches.

20. With an equalizing-reservoir reduction of 10 pounds, the difference in time of obtaining substantially 10 pounds pressure in the brake cylinder of the first and one hundred and fiftieth brakes will be nominally 20 seconds or less.

21. A brake-pipe reduction of 10 pounds will result in pressure in each brake cylinder of not less than 15 pounds nor more than 25 pounds.

22. A total brake-pipe reduction of 25 pounds will result in equalization of brake-cylinder pressure with pressure in the reservoir from which compressed air is supplied to the brake cylinder, and brake-cylinder pressure of not less than 48 pounds nor more than 52 pounds will be obtained.

23. Quick service activity of the train brakes will cease when the initial quick service action has been completed.

24. The quick service feature of the brake will produce substantially uniform time of quick service transmission regardless of the unavoidable variations in frictional resistance of the parts.

25. The brake will so function as to prevent a degree of wave action in brake-pipe pressure sufficient to cause undesired release of any brake while the brakes are being applied.

26. The degree of stability will be sufficient to prevent undesired service application occurring as a result of unavoidable minor fluctuations of brake-pipe pressure.

27. The brake-cylinder pressure increase resulting from quick service operation will be less when the brake is reapplied with pressure retained in the brake cylinder than with applications made when the brake-cylinder pressure is zero.

28. Undesired quick action will not result with any rate of change in brake-pipe pressure which may occur during service application or release of the brake.

29. In the normal release of train brakes, individual car brake will not start recharging from the brake pipe until brake-pipe pressure has increased sufficiently to have accomplished the release of adjacent valves.

30. The recharge of auxiliary reservoirs in the forward portion of the train will be automatically retarded while full release position of the brake valve is being used to initiate the release of train brakes.

31. After a 15-pound service reduction has been made and brake-valve exhaust has closed, in a release operation in which brake valve is moved to release position and after 15 seconds is moved to running position, air operating valves will move to release position within 40 seconds after brake valve is placed in release position.

32. After a 15-pound service reduction has been made and brake-valve exhaust has closed, in a release operation in which brake valve is moved to release position and after 15 seconds is moved to running position, brake-pipe pressure at car 150 will be increased 5 pounds within 1½ minutes after brake valve is placed in release position.

33. The rate of release of pressure from the brake cylinder will be nominally 23 seconds from 50 pounds to 5 pounds.

Emergency Requirements

The apparatus shall be so designed and constructed that: (based on 70 pounds brake-pipe pressure and train length of 150 cars).

34. Emergency application operation will always be available irrespective of the existing state or stage or brake application or release.

35. Emergency application initiated during a release of previous brake application will produce a material increase in brake-cylinder pressure over that which would result from a full service application made under the same conditions.

36. When operating valve acts in emergency it will so function as to develop nominally 15 pounds brake-cylinder pressure in not more than 1½ seconds and maximum pressure in nominally 10 seconds.

37. With an emergency reduction of brake-pipe pressure all brakes, including the one hundred and fiftieth, will start to apply within 8.2 seconds and develop not less than 15 percent nor more than 20 percent in excess of 50 pounds brake-cylinder pressure within 18.2 seconds from the movement of the brake valve to emergency position.

38. The operating valve will so function that, when an emergency application is made subsequent to a service application which has produced not less than 30 pounds brake-cylinder pressure, the maximum brake-cylinder pressure will be attained in nominally 4 seconds from the beginning of the emergency action of the valve.

39. Emergency application will produce from a charged system between 15 and 20 percent increase in brake-cylinder pressure over that which results from a full service application and irrespective of any degree of prior service application.

40. With any group of three consecutive brakes cut out, an emergency reduction made with the brake valve will cause the remainder of the brakes to operate in emergency and produce normal emergency pressures in the same time as when all brakes are cut in.

41. The brake will so function as to accomplish the release of an emergency application with the same degree of certainty secured in the release of service applications.

42. When releasing brakes following an emergency application, each brake will so function as to decrease the auxiliary-reservoir pressure prior to the actual release.

43. Both service and emergency brake applications will be released when the brake-pipe pressure is increased to not more than 1¼ pounds above that of the auxiliary reservoir and irrespective of the increased frictional resistance to release movement of the piston and slide valves after a period of operation in train service.

NOTE: Order 13528, as amended, 17 FR 8653, Sept. 30, 1952, provides as follows: That said

order of September 21, 1945, as amended, be, and it is hereby, further amended so as to require that all said non-interchange cars that may be used in transporting revenue freight and all cabooses shall be so equipped on or before December 31, 1953, and that all other said non-interchange cars shall be so equipped on or before December 31, 1954.

Order 13528 was further amended, 17 FR 8957, Oct. 7, 1952, as follows: That the order heretofore entered herein on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in freight service be, and it is hereby, further amended so as not to require the installation of such brakes and appliances on cars that are used exclusively in switching operations and are not used in train movements within the meaning of the Safety Appliance Acts (45 U. S. C., secs. 1 to 16, inclusive).

Order 13528 was further amended, 17 FR 10738, Nov. 26, 1952, as follows: That the order heretofore entered on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in interchange freight service on or before December 31, 1952, be, and it is hereby, further amended so as—

To require that all such interchange cars be so equipped on or before June 30, 1953, except as indicated hereinafter:

To prohibit the movement by any respondent after June 30, 1953, of any car interchange service, other than tank cars (including the cars of private carline companies), not so equipped except that such cars may be so moved prior to October 1, 1953, if routed to owner; and

To prohibit the movement by respondents after October 1, 1953, of any tank car in interchange service (including the tank cars of private car-line companies) not so equipped except that such tank cars may be so moved prior to January 1, 1954, if routed to owner.

That the term *interchange service* means the movement of any car that is engaged in freight service, irrespective of ownership, that is interchanged between or among two or more respondent railroads.

Order 13528 was further amended, 18 FR 6942, Nov. 3, 1953, as follows: That the order heretofore entered herein on September 21, 1945, as amended, requiring respondents to install power brakes and appliances on their cars used in freight service be, and it is hereby, further amended so as not to require the installation of such brakes and appliances on

a. Locomotives;

b. Scale test weight cars;

c. Locomotive cranes, steam shovels, pile drivers and similar construction and maintenance machines built prior to September 21, 1945;

d. Export, industrial, and other than railroad owned cars which are not to be used in service by respondents, except for movement as shipments on their own wheels to given destinations, provided that any such car so moved shall be properly identified by a card attached to each side of car, signed by shipper, stating that such movement is being made under authority of this order; and

e. Industrial and other than railroad owned cars which are not to be used in service by respondents except for movement within the limits of a single switching district.

And, that the effective date of said order of September 21, 1945, as amended, be, and it is hereby, extended until further order of the FRA, insofar as it applies to:

f. Narrow-gauge cars, and

g. Cars being returned from Canada or Mexico to owners in the United States, provided each such car being returned is routed directly to owner and is properly identified by a card attached to each side of car, signed by shipper, stating that the movement is being made under authority of this order.

[33 FR 19679, Dec. 25, 1968, as amended at 53 FR 28602, July 28, 1988]

PART 233—SIGNAL SYSTEMS REPORTING REQUIREMENTS

Sec.

233.1 Scope.

233.3 Application.

233.5 Accidents resulting from signal failure.

233.7 Signal failure reports.

233.9 Reports.

233.11 Civil penalties.

233.13 Criminal penalty.

APPENDIX A TO PART 233—SCHEDULE OF CIVIL PENALTIES

AUTHORITY: 49 U.S.C. 20103, 20107 and 49 CFR 1.49.

SOURCE: 49 FR 3379, Jan. 26, 1984, unless otherwise noted.

§ 233.1 Scope.

This part prescribed reporting requirements with respect to methods of train operation, block signal systems, interlockings, traffic control systems, automatic train stop, train control, and cab signal systems, or other similar appliances, methods, and systems.

§ 233.3 Application.

(a) Except as provided in paragraph (b) of this section, this part applies to railroads that operate on standard gage track which is part of the general railroad system of transportation.