

Railroad Locomotive Safety Standards

Part 229

Railroad Locomotive Safety Standards

- Subpart A General (Sections 229.1 - 229.19)
- Subpart B Inspections and Tests (Sections 229.21 - 229.33)
- Subpart C Safety Requirements (Sections 229.41 - 229.135)
- Subpart D Design Requirements (Section 229.141)
- 229 App A Appendix A to Part 229
- 229 App B Appendix B to Part 229

Authority: Authority: 49 U.S.C. 20102-03, 20133, 20137-38, 20143, 20701-03, 21301-02, 21304; 49 CFR 1.49(c),(m).

Source: 45 FR 21109, Mar. 31, 1980, unless otherwise noted.

Part 229 Subpart A

General

- 229.1 Scope.
- 229.3 Applicability.
- 229.4 Information collection.
- 229.5 Definitions.
- 229.7 Prohibited acts.
- 229.9 Movement of non-complying locomotives.
- 229.11 Locomotive identification.
- 229.13 Control of locomotives.
- 229.14 Non-MU control cab locomotives.
- 229.17 Accident reports.
- 229.19 Prior waivers.

229.1

Scope.

This part prescribes minimum Federal safety standards for all locomotives except those propelled by steam power.

Applicability.

(a) Except as provided in paragraphs (b) through (e) 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) Paragraphs (a) and (b) of § 229.125 do not apply to Tier II passenger equipment as defined in § 238.5 of this chapter (i.e., passenger equipment operating at speeds exceeding 125 mph but not exceeding 150 mph).

(d) On or after November 8, 1999, paragraphs (a)(1) and (b)(1) of § 229.141 do not apply to "passenger equipment" as defined in § 238.5 of this chapter, unless such equipment is excluded from the requirements of §§ 238.203 through 238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

(e) Paragraphs (a)(2) through (a)(4), and (b)(2) through (b)(4) of § 229.141 do not apply to "passenger equipment" as defined in § 238.5 of this chapter that is placed in service for the first time on or after September 8, 2000, unless such equipment is excluded from the requirements of §§ 238.203 through 238.219, and § 238.223 of this chapter by operation of § 238.201(a)(2) of this chapter.

[54 FR 33229, Aug. 14, 1989; 64 FR 25540, May 12, 1999]

229.4

Information collection.

(a) The information collection requirements in this part have been reviewed by the Office of Management and Budget pursuant to the Paperwork Reduction Act of 1980, Public Law 96-511, and have been assigned OMB control number 2130-0004.

(b) The information collection requirements are found in the following sections:

(1) Section 229.9.

(2) Section 229.17.

(3) Section 229.21.

(4) Section 229.23.

(5) Section 229.25.

(6) Section 229.27.

(7) Section 229.29.

(8) Section 229.31.

(9) Section 229.33.

(10) Section 229.55.

(11) Section 229.103.

(12) Section 229.105.

(13) Section 229.113.

(14) Section 229.135.

[50 FR 6953, Feb. 19, 1985, as amended at 58 FR 36613, July 8, 1993]

229.5

Definitions.

As used in this part-

Break means a fracture resulting in complete separation into parts.

Cab means that portion of the superstructure designed to be occupied by the crew operating the locomotive.

Carrier means railroad, as that term is defined below.

Commuter service means the type of railroad service described under the heading "Commuter Operations" in 49 CFR part 209, Appendix A.

Commuter work train is a non-revenue service train used in the administration and upkeep service of the commuter railroad.

Control cab locomotive means a locomotive without propelling motors but with one or more

control stands.

Crack means a fracture without complete separation into parts, except that castings with shrinkage cracks or hot tears that do not significantly diminish the strength of the member are not considered to be cracked.

Dead locomotive means-

A locomotive other than a control cab locomotive that does not have any traction device supplying tractive power; or

A control cab locomotive that has a locked and unoccupied cab.

Electronic air brake means a brake system controlled by a computer which provides the means for control of the locomotive brakes or train brakes or both.

Event recorder means a device, designed to resist tampering, that monitors and records data on train speed, direction of motion, time, distance, throttle position, brake applications and operations (including train brake, independent brake, and, if so equipped, dynamic brake applications and operations) and, where the locomotive is so equipped, cab signal aspect(s), over the most recent 48 hours of operation of the electrical system of the locomotive on which it is installed. A device, designed to resist tampering, that monitors and records the specified data only when the locomotive is in motion shall be deemed to meet this definition provided the device was installed prior to [insert the effective date of the rule] and records the specified data for the last eight hours the locomotive was in motion.

High voltage means an electrical potential of more than 150 volts.

In-service event recorder means an event recorder that was successfully tested as prescribed in §229.25(e) and whose subsequent failure to operate as intended, if any, is not actually known by the railroad operating the locomotive on which it is installed.

Lite locomotive means a locomotive or a consist of locomotives not attached to any piece of equipment or attached only to a caboose.

Locomotive means a piece of on-track equipment other than hi-rail, specialized maintenance, or other similar equipment-

With one or more propelling motors designed for moving other equipment;

With one or more propelling motors designed to carry freight or passenger traffic or both; or

Without propelling motors but with one or more control stands.

Modesty lock means a latch that can be operated in the normal manner only from within the sanitary compartment that is designed to prevent entry of another person when the sanitary

compartment is in use. A modesty lock may be designed to allow deliberate forced entry in the event of an emergency.

MU locomotive means a multiple operated electric locomotive described in paragraph (i)(2) or (3) of this section.

Other short-haul passenger service means the type of railroad service described under the heading "Other short-haul passenger service" in 49 CFR part 209, Appendix A.

Potable water means water that meets the requirements of 40 CFR part 141, the Environmental Protection Agency's Primary Drinking Water Regulations, or water that has been approved for drinking and washing purposes by the pertinent state or local authority having jurisdiction. For purposes of this section, commercially available, bottled drinking water is deemed potable water.

Powered axle is an axle equipped with a traction device.

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.

Sanitary means lacking any condition in which any significant amount of filth, trash, or human waste is present in such a manner that a reasonable person would believe that the condition might constitute a health hazard; or of strong, persistent, chemical or human waste odors sufficient to deter use of the facility, or give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove the waste; visible human waste residue on the floor or toilet seat that is present due to a toilet facility that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong, persistent chemical or human waste odors in the compartment.

Sanitation compartment means an enclosed compartment on a railroad locomotive that contains a toilet facility for employee use.

Serious injury means an injury that results in the amputation of any appendage, the loss of sight in an eye, the fracture of a bone, or the confinement in a hospital for a period of more than 24 consecutive hours.

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

movement.

Toilet facility means a system that automatically or on command of the user removes human waste to a place where it is treated, eliminated, or retained such that no solid or non-treated liquid waste is thereafter permitted to be released into the bowl, urinal, or room and that prevents harmful discharges of gases or persistent offensive odors.

Transfer service means a freight train that travels between a point of origin and a point of final destination not exceeding 20 miles and that is not performing switching service.

Unsanitary means having any condition in which any significant amount of filth, trash, or human waste is present in such a manner that a reasonable person would believe that the condition might constitute a health hazard; or strong, persistent, chemical or human waste odors sufficient to deter use of the facility or to give rise to a reasonable concern with respect to exposure to hazardous fumes. Such conditions include, but are not limited to, a toilet bowl filled with human waste, soiled toilet paper, or other products used in the toilet compartment, that are present due to a defective toilet facility that will not flush or otherwise remove the waste; visible human waste residue on the floor or toilet seat that is present due to a toilet facility that overflowed; an accumulation of soiled paper towels or soiled toilet paper on the floor, toilet facility, or sink; an accumulation of visible dirt or human waste on the floor, toilet facility, or sink; and strong persistent chemical or human waste odors in the compartment.

Washing system means a system for use by railroad employees to maintain personal cleanliness that includes a secured sink or basin, water, antibacterial soap, and paper towels; or antibacterial waterless soap and paper towels; or antibacterial moist towelettes and paper towels; or any other combination of suitable antibacterial cleansing agents

[45 FR 21109, Mar. 31, 1980, as amended at 54 FR 33229, Aug. 14, 1989; 58 FR 36613, July 8, 1993; 60 FR 27905, May 26, 1995; 66 FR 4104, January 17, 2001; 67 FR 16032, April 04, 2002]

229.7

Prohibited acts.

(a) The Locomotive Inspection Act (45 U.S.C. 22-34) makes it unlawful for any carrier to use or permit to be used on its line any locomotive unless the entire locomotive and its appurtenances-

- (1) Are in proper condition and safe to operate in the service to which they are put, without unnecessary peril to life or limb; and
- (2) Have been inspected and tested as required by this part.

(b) 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 of the Locomotive Inspection Act or causes the violation of any such requirement is subject to a civil penalty of at least \$500 and not more than \$11,000 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$22,000 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See appendix B to this part for a statement of agency civil penalty policy.

[45 FR 21109, Mar. 31, 1980, as amended at 53 FR 28601, July 28, 1988; 53 FR 52931, Dec. 29, 1988; 63 FR 11618, March 10, 1998]

229.9

Movement of non-complying locomotives.

(a) Except as provided in paragraphs (b), (c) and 229.125(h), a locomotive with one or more conditions not in compliance with this part may be moved only as a lite locomotive or a dead locomotive after the carrier has complied with the following:

(1) A qualified person shall determine-

(i) That it is safe to move the locomotive; and

(ii) The maximum speed and other restrictions necessary for safely conducting the movement;

(2) --

(i) The engineer in charge of the movement of the locomotive shall be notified in writing and inform all other crew members in the cab of the presence of the non-complying locomotive and the maximum speed and other restrictions determined under paragraph (a)(1)(ii) of this section.

(ii) A copy of the tag described in paragraph (a)(3) of this section may be used to provide the notification required by paragraph (a)(2)(i) of this section.

(3) A tag bearing the words "non-complying locomotive" and containing the following information, shall be securely attached to the control stand on each MU or control cab locomotive and to the isolation switch or near the engine start switch on every other type of locomotive-

(i) The locomotive number;

(ii) The name of the inspecting carrier;

(iii) The inspection location and date;

(iv) The nature of each defect;

(v) Movement restrictions, if any;

(vi) The destination; and

(vii) The signature of the person making the determinations required by this paragraph.

(b) A locomotive that develops a non-complying condition enroute may continue to utilize its propelling motors, if the requirements of paragraph (a) are otherwise fully met, until the earlier of-

(1) The next calendar day inspection, or

(2) The nearest forward point where the repairs necessary to bring it into compliance can be made.

(c) A non-complying locomotive may be moved live or dead within a yard, at speeds not in excess of 10 miles per hour, without meeting the requirements of paragraph (a) of this section if the movement is solely for the purpose of repair. The carrier is responsible to insure that the movement may be safely made.

(d) A dead locomotive may not continue in use following a calendar day inspection as a controlling locomotive or at the head of a train or locomotive consist.

(e) A locomotive does not cease to be a locomotive because its propelling motor or motors are inoperative or because its control jumper cables are not connected.

(f) Nothing in this section authorizes the movement of a locomotive subject to a Special Notice for Repair unless the movement is made in accordance with the restrictions contained in the Special Notice.

(g) Paragraphs (a), (b), and (c) of this section shall not apply to sanitation conditions covered by §§ 229.137 and 229.139. Sections 229.137 and 229.139 set forth specific requirements for the movement and repair of locomotives with defective sanitation compartments.

[61 FR 8881, Mar. 06, 1996; 67 FR 16032, April 04, 2002]

229.11

Locomotive identification.

(a) The letter "F" shall be legibly shown on each side of every locomotive near the end which for identification purposes will be known as the front end.

(b) The locomotive number shall be displayed in clearly legible numbers on each side of each locomotive.

229.13

Control of locomotives.

Except when a locomotive is moved in accordance with §229.9, whenever two or more locomotives are coupled in remote or multiple control, the propulsion system, the sanders, and the power brake system of each locomotive shall respond to control from the cab of the controlling locomotive. If a dynamic brake or regenerative brake system is in use, that portion of the system in use shall respond to control from the cab of the controlling locomotive.

229.14

Non-MU control cab locomotives.

On each non-MU control cab locomotive, only those components added to the passenger car that enable it to serve as a lead locomotive, control the locomotive actually providing tractive power, and otherwise control the movement of the train, are subject to this part.

229.17

Accident reports.

(a) In the case of an accident due to a failure from any cause of a locomotive or any part or appurtenance of a locomotive, or a person coming in contact with an electrically energized part or appurtenance, that results in serious injury or death of one or more persons, the carrier operating the locomotive shall immediately report the accident by toll free telephone, Area Code 800-424-0201. The report shall state the nature of the accident, number of persons killed or seriously injured, the place at which it occurred, the location at which the locomotive or the affected parts may be inspected by the FRA, and the name, title and phone number of the person making the call. The locomotive or the part or parts affected by the accident shall be preserved intact by the carrier until after the FRA inspection.

(b) Written confirmation of the oral report required by paragraph (a) of this section shall be immediately mailed to the Federal Railroad Administration, RRS-25, Washington, DC 20590, and contain a detailed description of the accident, including to the extent known, the causes and the number of persons killed and injured. The written report required by this paragraph is in

addition to the reporting requirements of 49 CFR part 225.

229.19

Prior waivers.

All waivers of every form and type from any requirement of any order or regulation implementing the Locomotive Inspection Act, applicable to one or more locomotives except those propelled by steam power, shall lapse on August 31, 1980, unless a copy of the grant of waiver is filed prior to that date with the Office of Safety (RRS-23), Federal Railroad Administration, Washington, DC 20590.

Part 229 Subpart B

Inspections and Tests

229.21 Daily inspection.

229.23 Periodic inspection: General.

229.25 Tests: Every periodic inspection.

229.27 Annual tests.

229.29 Biennial tests.

229.31 Main reservoir tests.

229.33 Out-of-use credit.

229.21

Daily inspection.

(a) Except for MU locomotives, each locomotive in use shall be inspected at least once during each calendar day. A written report of the inspection shall be made. This report shall contain the name of the carrier; the initials and number of the locomotive; the place, date and time of the inspection; a description of the non-complying conditions disclosed by the inspection; and the signature of the employee making the inspection. Except as provided in §§ 229.9, 229.137, and 229.139, any conditions that constitute non-compliance with any requirement of this part shall be repaired before the locomotive is used. Except with respect to conditions that do not comply with § 229.137 or § 229.139, a notation shall be made on the report indicating the nature of the repairs that have been made. Repairs made for conditions that do not comply with § 229.137 or § 229.139 may be noted on the report, or in electronic form. The person making the repairs shall sign the report. The report shall be filed and retained for at least 92 days in the office of the carrier at the terminal at which the locomotive is cared for. A record shall be maintained on each locomotive showing the place, date and time of the previous inspection.

(b) Each MU locomotive in use shall be inspected at least once during each calendar day and a written report of the inspection shall be made. This report may be part of a single master report

covering an entire group of MU's. If any non-complying conditions are found, a separate, individual report shall be made containing the name of the carrier; the initials and number of the locomotive; the place, date, and time of the inspection; the non-complying conditions found; and the signature of the inspector. Except as provided in §§ 229.9, 229.137, and 229.139, any conditions that constitute non-compliance with any requirement of this part shall be repaired before the locomotive is used. Except with respect to conditions that do not comply with § 229.137 or § 229.139, a notation shall be made on the report indicating the nature of the repairs that have been made. Repairs made for conditions that do not comply with § 229.137 or § 229.139 may be noted on the report, or in electronic form. A notation shall be made on the report indicating the nature of the repairs that have been made. The person making the repairs shall sign the report. The report shall be filed in the office of the carrier at the place where the inspection is made or at one central location and retained for at least 92 days.

(c) Each carrier shall designate qualified persons to make the inspections required by this section.

[45 FR 21109, Mar. 31, 1980, as amended at 50 FR 6953, Feb. 19, 1985; 67 FR 16032, April 04, 2002]

229.23

Periodic inspection: General.

(a) Each locomotive and steam generator shall be inspected at each periodic inspection to determine whether it complies with this part. Except as provided in §229.9, all non-complying conditions shall be repaired before the locomotive or the steam generator is used. Except as provided in §229.33, the interval between any two periodic inspections may not exceed 92 days. Periodic inspections shall only be made where adequate facilities are available. At each periodic inspection, a locomotive shall be positioned so that a person may safely inspect the entire underneath portion of the locomotive.

(b) The periodic inspection of the steam generator may be postponed indefinitely if the water suction pipe to the water pump and the leads to the main switch (steam generator switch) are disconnected, and the train line shut-off-valve is wired closed or a blind gasket applied. However, the steam generator shall be so inspected before it is returned to use.

(c) After April 30, 1980, each new locomotive shall receive an initial periodic inspection before it is used. Except as provided in §229.33, each locomotive in use on or before April 30, 1980, shall receive an initial periodic inspection within 92 days of the last 30-day inspection performed under the prior rules (49 CFR 230.331 and 230.451). At the initial periodic inspection, the date and place of the last tests performed that are the equivalent of the tests required by §§229.27, 229.29, and 229.31 shall be entered on Form FRA F 6180-49A. These dates shall determine when the tests first become due under §§229.27, 229.29, and 229.31. Out of use credit may be

carried over from Form FRA F 6180-49 and entered on Form FRA F 6180-49A.

(d) Each periodic inspection shall be recorded on Form FRA F 6180-49A. The form shall be signed by the person conducting the inspection and certified by that person's supervisor that the work was done. The form shall be displayed under a transparent cover in a conspicuous place in the cab of each locomotive.

(e) At the first periodic inspection in each calendar year the carrier shall remove from each locomotive Form FRA F 6180-49A covering the previous calendar year. If a locomotive does not receive its first periodic inspection in a calendar year before April 2 because it is out of use, the form shall be promptly replaced. The Form FRA F 6180-49A covering the preceding year for each locomotive, in or out of use, shall be signed by the railroad official responsible for the locomotive and filed as required in §229.23(f). The date and place of the last periodic inspection and the date and place of the last test performed under §§229.27, 229.29, and 229.31 shall be transferred to the replacement Form FRA F 6180-49A.

(f) The mechanical officer of each railroad who is in charge of a locomotive shall maintain in his office a secondary record of the information reported on Form FRA F 6180-49A under this part. The secondary record shall be retained until Form FRA F 6180-49A has been removed from the locomotive and filed in the railroad office of the mechanical officer in charge of the locomotive. If the Form FRA F 6180-49A removed from the locomotive is not clearly legible, the secondary record shall be retained until the Form FRA F 6180-49A for the succeeding year is filed. The Form F 6180-49A removed from a locomotive shall be retained until the Form FRA F 6180-49A for the succeeding year is filed.

[45 FR 21109, Mar. 31, 1980, as amended at 45 FR 39852, June 12, 1980; 50 FR 6953, Feb. 19, 1985]

229.25

Tests: Every periodic inspection.

Each periodic inspection shall include the following:

(a) All mechanical gauges used by the engineer to aid in the control or braking of the train or locomotive, except load meters used in conjunction with an auxiliary brake system, shall be tested by comparison with a dead-weight tester or a test gauge designed for this purpose.

(b) All electrical devices and visible insulation shall be inspected.

(c) All cable connections between locomotives and jumpers that are designed to carry 600 volts or more shall be thoroughly cleaned, inspected, and tested for continuity.

(d) Each steam generator that is not isolated as prescribed in §229.23(b) shall be inspected and tested as follows:

- (1) All automatic controls, alarms and protective devices shall be inspected and tested.
- (2) Steam pressure gauges shall be tested by comparison with a dead-weight tester or a test gauge designed for this purpose. The siphons to the steam gauges shall be removed and their connections examined to determine that they are open.
- (3) Safety valves shall be set and tested under steam after the steam pressure gauge is tested.
- (e) The event recorder, if installed, shall be inspected, maintained, and tested in accordance with the instructions of the manufacturer, supplier, or owner thereof and in accordance with the following criteria:

(1) A written copy of the instructions in use shall be kept at the point where the work is performed.

(2) The event recorder shall be tested prior to performing any maintenance work on it. At a minimum, the event recorder test shall include cycling all required recording parameters and determining the full range of each parameter by reading out recorded data. A micro-processor based event recorder, equipped to perform self-tests, has passed the pre-maintenance inspection requirement if it has not indicated a failure.

(3) If this test does not reveal that the device is recording all the specified data and that all recordings are within the designed recording parameters, this fact shall be noted on the data verification result required to be maintained by this section and maintenance and testing shall be performed as necessary until a subsequent test is successful.

(4) When a successful test is accomplished, a copy of those data verification results shall be maintained with the locomotive's maintenance records until the next one is filed.

(5) A railroad's event recorder periodic maintenance shall be considered effective if ninety percent (90%) of the recorders inbound in any given month for periodic inspection are still fully functional; maintenance practices and test intervals shall be adjusted as necessary to yield effective periodic maintenance.

[45 FR 21109, Mar. 31, 1980, as amended at 58 FR 36614, July 8, 1993; 60 FR 27905, May 26, 1995; 66 FR 4104, January 17, 2001]

229.27

Annual tests

(a) Each locomotive shall be subjected to the tests and inspections included in paragraphs (b) and (c) of this section, and each non-MU locomotive shall also be subjected to the tests and inspections included in paragraph (a) of this section, at intervals that do not exceed 368 calendar

days:

(1) The filtering devices or dirt collectors located in the main reservoir supply line to the air brake system shall be cleaned, repaired, or replaced.

(2) Brake cylinder relay valve portions, main reservoir safety valves, brake pipe vent valve portions, feed and reducing valve portions in the air brake system (including related dirt collectors and filters) shall be cleaned, repaired, and tested.

(3) The date and place of the cleaning, repairing, and testing shall be recorded on Form FRA F 6180-49A and the person performing the work and that person's supervisor shall sign the form. A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in the carrier's files or in the cab of the locomotive.

(4) At its option, a carrier may fragment the work required by this paragraph. In that event, a separate air record shall be maintained under a transparent cover in the cab. The air record shall include the locomotive number, a list of the air brake components, and the date and place of the last inspection and test of each component. The signature of the person performing the work and the signature of that person's supervisor shall be included for each component. A duplicate record shall be maintained in the carrier's files.

(b) The load meter shall be tested. Each device used by the engineer to aid in the control or braking of the train or locomotive that provides an indication of air pressure electronically shall be tested by comparison with a test gauge or self-test designed for this purpose. An error of greater than five percent or three pounds per square inch shall be corrected. The date and place of the test shall be recorded on Form FRA F 6180-49A, and the person conducting the test and that person's supervisor shall sign the form.

(c) Each steam generator that is not isolated as prescribed in §229.23(b), shall be subjected to a hydrostatic pressure at least 25 percent above the working pressure and the visual return water-flow indicator shall be removed and inspected.

[66 FR 4104, January 17, 2001]

229.29

Biennial tests.

(a) Except for the valves and valve portions on non-MU locomotives that are cleaned, repaired, and tested as prescribed in §229.27(a), all valves, valve portions, MU locomotive brake cylinders and electric-pneumatic master controllers in the air brake system (including related dirt collectors and filters) shall be cleaned, repaired, and tested at intervals that do not exceed 736 calendar days. The date and place of the cleaning, repairing, and testing shall be recorded on Form FRA F 6180-49A, and the person performing the work and that person's supervisor shall sign the form. A record of the parts of the air brake system that are cleaned, repaired, and tested shall be kept in

the carrier's files or in the cab of the locomotive.

(b) At its option, a carrier may fragment the work required by this section. In that event, a separate air record shall be maintained under a transparent cover in the cab. The air record shall include the locomotive number, a list of the air brake components, and the date and place of the inspection and test of each component. The signature of the person performing the work and the signature of that person's supervisor shall be included for each component. A duplicate record shall be maintained in the carrier's files.

229.31

Main reservoir tests.

229.31(a)

(a) Except as provided in paragraph (c) of this section, before it is put in service and at intervals that do not exceed 736 calendar days, each main reservoir other than an aluminum reservoir shall be subjected to a hydrostatic pressure of at least 25 percent more than the maximum working pressure fixed by the chief mechanical officer. The test date, place, and pressure shall be recorded on Form FRA F 6180-49A, and the person performing the test and that person's supervisor shall sign the form.

(b) Except as provided in paragraph (c) of this section, each main reservoir other than an aluminum reservoir shall be hammer tested over its entire surface while the reservoir is empty at intervals that do not exceed 736 calendar days. The test date and place shall be recorded on Form FRA F 6180-49A, and the person performing the test and that person's supervisor shall sign the form.

(c) Each welded main reservoir originally constructed to withstand at least five times the maximum working pressure fixed by the chief mechanical officer may be drilled over its entire surface with telltale holes that are three-sixteenths of an inch in diameter. The holes shall be spaced not more than 12 inches apart, measured both longitudinally and circumferentially, and drilled from the outer surface to an extreme depth determined by the formula-

where:

D=extreme depth of telltale holes in inches but in no case less than one-sixteenth inch;

P=certified working pressure in pounds per square inch;

S=one-fifth of the minimum specified tensile strength of the material in pounds per square inch;
and

R=inside radius of the reservoir in inches.

One row of holes shall be drilled lengthwise of the reservoir on a line intersecting the drain opening. A reservoir so drilled does not have to meet the requirements of paragraphs (a) and (b) of this section, except the requirement for a hydrostatic test before it is placed in use. Whenever any such telltale hole shall have penetrated the interior of any reservoir, the reservoir shall be permanently withdrawn from service. A reservoir now in use may be drilled in lieu of the tests provided for by paragraphs (a) and (b) of this section, but it shall receive a hydrostatic test before

it is returned to use.

(d) Each aluminum main reservoir before being placed in use and at intervals that do not exceed 736 calendar days thereafter, shall be-

(1) Cleaned and given a thorough visual inspection of all internal and external surfaces for evidence of defects or deterioration; and

(2) Subjected to a hydrostatic pressure at least twice the maximum working pressure fixed by the chief mechanical officer, but not less than 250 p.s.i. The test date, place, and pressure shall be recorded on Form FRA F 6180-49A, and the person conducting the test and that person's supervisor shall sign the form.

229.33

Out-of-use credit

When a locomotive is out of use for 30 or more consecutive days or is out of use when it is due for any test or inspection required by §229.23, 229.25, 229.27, 229.29, or 229.31, an out-of-use notation showing the number of out-of-use days shall be made on an inspection line on Form FRA F 6180-49A. A supervisory employee of the carrier who is responsible for the locomotive shall attest to the notation. If the locomotive is out of use for one or more periods of at least 30 consecutive days each, the interval prescribed for any test or inspection under this part may be extended by the number of days in each period the locomotive is out of use since the last test or inspection in question. A movement made in accordance with §229.9 is not a use for purposes of determining the period of the out-of-use credit.

Part 229 Subpart C

Safety Requirements

General Requirements

229.41 Protection against personal injury.

229.43 Exhaust and battery gases.

229.45 General condition.

Brake System

229.46 Brakes: General.

229.47 Emergency brake value.

229.49 Main reservoir system.

229.51 Aluminum main reservoirs.

229.53 Brake gauges.

229.55 Piston travel.

229.57 Foundation brake gear.

229.59 Leakage.
 Draft System
 229.61 Draft system.
 Suspension System
 229.63 Lateral motion.
 229.64 Plain bearings.
 229.65 Spring rigging.
 229.67 Trucks.
 229.69 Side bearings.
 229.71 Clearance above top of rail.
 229.73 Wheel sets.
 229.75 Wheels and tire defects.
 Electrical System
 229.77 Current collectors.
 229.79 Third rail shoes.
 229.81 Emergency pole; shoe insulation.
 229.83 Insulation or grounding of metal parts.
 229.85 Doors and cover plates marked "Danger".
 229.87 Hand-operated switches.
 229.89 Jumpers; cable connections.
 229.91 Motors and generators.
 Internal Combustion Equipment
 229.93 Safety cut-off device.
 229.95 Venting.
 229.97 Grounding fuel tanks.
 229.99 Safety hangers.
 229.101 Engines.
 Steam Generators
 229.103 Safe working pressure; factor of safety.
 229.105 Steam generator number.
 229.107 Pressure gauge.
 229.109 Safety valves.
 229.111 Water-flow indicator.
 229.113 Warning notice.
 Cabs and Cab Equipment
 229.115 Slip/slide alarms.
 229.117 Speed indicators.
 229.119 Cabs, floors, and passageways.
 229.121 Locomotive cab noise.
 229.123 Pilots, snowplows, end plates.
 229.125 Headlights and auxiliary lights.
 229.127 Cab lights.
 229.129 Audible warning device.
 229.131 Sanders.

- 229.133 Interim locomotive conspicuity measures-auxiliary external lights.
- 229.135 Event recorders.
- 229.137 Sanitation, general requirements.
- 229.139 Sanitation, servicing requirements.

229.103

Safe working pressure; factor of safety.

The safe working pressure for each steam generator shall be fixed by the chief mechanical officer of the carrier. The minimum factor of safety shall be four. The fixed safe working pressure shall be indicated on FRA Form F 6180-49A.

229.105

Steam generator number.

An identification number shall be marked on the steam generator's separator and that number entered on FRA Form F 6180-49A.

229.135

Event recorders.

(a) *Duty to equip and record.* Except as provided in paragraphs (c) and (d) of this section, a train operated faster than 30 miles per hour shall have an in-service event recorder, of the type described in paragraph (b) of this section, in the lead locomotive. The presence of the event recorder shall be noted on Form FRA F6180-49A (by writing the make and model of event recorder with which the locomotive is equipped) under the REMARKS section, except that an event recorder designed to allow the locomotive to assume the lead position only if the recorder is properly functioning is not required to have its presence noted on Form FRA F6180-49A. For the purpose of this section, "train" includes a locomotive or group of locomotives with or without cars. The duty to equip the lead locomotive may be met with an event recorder located elsewhere than the lead locomotive provided that such event recorder monitors and records the required data as though it were located in the lead locomotive. The event recorder shall record the most recent 48 hours of operation of the electrical system of the locomotive on which it is installed.

(b) *Equipment requirements.* Event recorders shall monitor and record data elements required by this paragraph with at least the accuracy required of the indicators displaying any of the required elements to the engineer.

(1) A lead locomotive originally ordered before October 1, 2006, and placed in service before October 1, 2009, including a controlling remote distributed power locomotive, a lead manned helper locomotive, a DMU locomotive, and an MU locomotive, except as provided in paragraphs

(c) and (d) of this section, shall have an in-service event recorder that records the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

(v) Throttle position;

(vi) Applications and operations of the train automatic air brake;

(vii) Applications and operations of the independent brake;

(viii) Applications and operations of the dynamic brake, if so equipped; and

(ix) Cab signal aspect(s), if so equipped and in use.

(2) A locomotive originally manufactured before October 1, 2006, and equipped with an event recorder that uses magnetic tape as its recording medium shall have the recorder removed from service on or before October 1, 2009 and replaced with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part and that records at least the same number of data elements as the recorder it replaces.

(3) A lead locomotive, a lead manned helper locomotive, and a controlling remotely distributed power locomotive, other than a DMU or MU locomotive, originally ordered on or after October 1, 2006 or placed in service on or after October 1, 2009, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind and below the top of the collision posts and above the platform level is deemed to be mounted "for its maximum protection.") The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

- (v) Throttle position;
- (vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;
- (vii) Applications and operations of the independent brake;
- (viii) Applications and operations of the dynamic brake, if so equipped;
- (ix) Cab signal aspect(s), if so equipped and in use;
- (x) End-of-train (EOT) device loss of communication front to rear and rear to front;
- (xi) Electronic controlled pneumatic braking (ECP) message (and loss of such message), if so
- (xii) EOT armed, emergency brake command, emergency brake application;
- (xiii) Indication of EOT valve failure;
- (xiv) EOT brake pipe pressure (EOT and ECP devices);
- (xv) EOT marker light on/off;
- (xvi) EOT "low battery" status;
- (xvii) Position of on/off switch for headlights on lead locomotive;
- (xviii) Position of on/off switch for auxiliary lights on lead locomotive;
- (xix) Horn control handle activation;
- (xx) Locomotive number;
- (xxi) Locomotive automatic brake valve cut in;
- (xxii) 135 Locomotive position in consist (lead or trail);
- (xxiii) Tractive effort;

(xxiv) Cruise control on/off, if so equipped and in use; and

(xxv) Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.

(4) A DMU locomotive and an MU locomotive originally ordered on or after October 1, 2006 or placed in service on or after October 1, 2009, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D of this part. The certified event recorder memory module shall be mounted for its maximum protection. (Although other mounting standards may meet this standard, an event recorder memory module mounted behind the collision posts and above the platform level is deemed to be mounted "for its maximum protection.") The event recorder shall record, and the certified crashworthy event recorder memory module shall retain, the following data elements:

(i) Train speed;

(ii) Selected direction of motion;

(iii) Time;

(iv) Distance;

(v) Throttle position;

(vi) Applications and operations of the train automatic air brake, including emergency applications. The system shall record, or provide a means of determining, that a brake application or release resulted from manipulation of brake controls at the position normally occupied by the locomotive engineer. In the case of a brake application or release that is responsive to a command originating from or executed by an on-board computer (e.g., electronic braking system controller, locomotive electronic control system, or train control computer), the system shall record, or provide a means of determining, the involvement of any such computer;

(vii) Applications and operations of the independent brake, if so equipped;

(viii) Applications and operations of the dynamic brake, if so equipped;

(ix) Cab signal aspect(s), if so equipped and in use;

- (x) Emergency brake application(s);
 - (xi) Wheel slip/slide alarm activation (with a property-specific minimum duration);
 - (xii) Lead locomotive headlight activation switch on/off;
 - (xiii) Lead locomotive auxiliary lights activation switch on/off;
 - (xiv) Horn control handle activation;
 - (xv) Locomotive number;
 - (xvi) Locomotive position in consist (lead or trail);
 - (xvii) Tractive effort;
 - (xviii) Brakes apply summary train line;
 - (xix) Brakes released summary train line;
 - (xx) Cruise control on/off, if so equipped and used; and
 - (xxi) Safety-critical train control data routed to the locomotive engineer's display with which the engineer is required to comply, specifically including text messages conveying mandatory directives, and maximum authorized speed. The format, content, and proposed duration for retention of such data shall be specified in the product safety plan submitted for the train control system under subpart H of part 236 of this chapter, subject to FRA approval under this paragraph. If it can be calibrated against other data required by this part, such train control data may, at the election of the railroad, be retained in a separate certified crashworthy memory module.
- (5) A locomotive equipped with an event recorder that is remanufactured, as defined in this part, on or after October 1, 2007, shall be equipped with an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and is capable of recording, at a minimum, the same data as the recorder that was on the locomotive before it was remanufactured.
- (6) An event recorder originally manufactured after January 1, 2010, that is installed on any locomotive identified in paragraph (b)(1) of this section shall be an event recorder with a certified crashworthy event recorder memory module that meets the requirements of Appendix D to this part and that is capable of recording, at a minimum, the same data as the event recorder that was previously on the locomotive.
- (c) Removal from service. Notwithstanding the duty established in paragraph (a) of this section

to equip certain locomotives with an in-service event recorder, a railroad may remove an event recorder from service and, if a railroad knows that an event recorder is not monitoring or recording required data, shall remove the event recorder from service. When a railroad removes an event recorder from service, a qualified person shall record the date that the device was removed from service on Form FRA F6180-49A, under the REMARKS section, unless the event recorder is designed to allow the locomotive to assume the lead position only if the recorder is properly functioning.

(d) Response to defective equipment. Notwithstanding the duty established in paragraph (a) of this section to equip certain locomotives with an in-service event recorder, a locomotive on which the event recorder has been taken out of service as provided in paragraph (c) of this section may remain as the lead locomotive only until the next calendar-day inspection. A locomotive with an inoperative event recorder is not deemed to be in improper condition, unsafe to operate, or a non-complying locomotive under §§ 229.7 and 229.9, and, other than the requirements of Appendix D of this part, the inspection, maintenance, and testing of event recorders are limited to the requirements set forth in §§ 229.25(e) and 229.27(d).

(e) *Preserving accident data.* If any locomotive equipped with an event recorder, or any other locomotive-mounted recording device or devices designed to record information concerning the functioning of a locomotive or train, is involved in an accident/incident that is required to be reported to FRA under part 225 of this chapter, the railroad that was using the locomotive at the time of the accident shall, to the extent possible, and to the extent consistent with the safety of life and property, preserve the data recorded by each such device for analysis by FRA. This preservation requirement permits the railroad to extract and analyze such data, provided the original downloaded data file, or an unanalyzed exact copy of it, shall be retained in secure custody and shall not be utilized for analysis or any other purpose except by direction of FRA or the National Transportation Safety Board. This preservation requirement shall expire one (1) year after the date of the accident unless FRA or the Board notifies the railroad in writing that the data are desired for analysis.

(f) Relationship to other laws. Nothing in this section is intended to alter the legal authority of law enforcement officials investigating potential violation(s) of State criminal law(s), and nothing in this chapter is intended to alter in any way the priority of National Transportation Safety Board investigations under 49 U.S.C. 1131 and 1134, nor the authority of the Secretary of Transportation to investigate railroad accidents under 49 U.S.C. 5121, 5122, 20107, 20111, 20112, 20505, 20702, 20703, and 20902.

(g) Disabling event recorders. Except as provided in paragraph (c) of this section, any individual who willfully disables an event recorder is subject to civil penalty and to disqualification from performing safety-sensitive functions on a railroad as provided in § 218.55 of this chapter, and any individual who tampers with or alters the data recorded by such a device is subject to a civil penalty as provided in appendix B of part 218 of this chapter and to disqualification from performing safety-sensitive functions on a railroad if found unfit for such duties under the procedures in part 209 of this chapter.

[58 FR 36614, July 8, 1993, as amended at 60 FR 27905, May 26, 1995; 70 FR 37920, June 30, 2005]

Appendix D to Part 229—Criteria for Certification of Crashworthy Event Recorder Memory Module

Section 229.135(b) requires that certain locomotives be equipped with an event recorder that includes a certified crashworthy event recorder memory module. This appendix prescribes the requirements for certifying an event recorder memory module (ERMM) as crashworthy, including the performance criteria and test sequence for establishing the crashworthiness of the ERMM as well as the marking of the event recorder containing the crashworthy ERMM.

A. General Requirements

1. Each manufacturer that represents its ERMM as crashworthy shall, by marking it as specified in Section B of this appendix, certify that the ERMM meets the performance criteria contained in this appendix and that test verification data are available to a railroad or to FRA upon request.
2. The test verification data shall contain, at a minimum, all pertinent original data logs and documentation that the test sample preparation, test set up, test measuring devices and test procedures were performed by designated, qualified personnel using recognized and acceptable practices. Test verification data shall be retained by the manufacturer or its successor as long as the specific model of ERMM remains in service on any locomotive.
3. A crashworthy ERMM shall be marked by its manufacturer as specified in Section B of this appendix.

B. Marking Requirements

1. The outer surface of the event recorder containing a certified crashworthy ERMM shall be colored international orange. In addition, the outer surface shall be inscribed, on the surface allowing the most visible area, in black letters on an international orange background, using the largest type size that can be accommodated, with the words CERTIFIED DOT CRASHWORTHY, followed by the ERMM model number (or other such designation), and the name of the manufacturer of the event recorder. This information may be displayed as follows:

CERTIFIED DOT CRASHWORTHY

Event Recorder Memory

Module Model Number

Manufacturer's Name

Marking "CERTIFIED DOT CRASHWORTHY" on an event recorder designed for installation in a railroad locomotive is the certification that all performance criteria contained in this appendix have been met and all functions performed by, or on behalf of, the manufacturer whose

name appears as part of the marking, conform to the requirements specified in this appendix.
 2. Retro-reflective material shall be applied to the edges of each visible external surface of an event recorder containing a certified crashworthy ERMM.

C. Performance Criteria for the ERMM

An ERMM is crashworthy if it has been successfully tested for survival under conditions of fire, impact shock, static crush, fluid immersion, and hydro-static pressure contained in one of the two tables shown in this section of Appendix D. (See Tables 1 and 2.) Each ERMM must meet the individual performance criteria in the sequence established in Section D of this appendix. A performance criterion is deemed to be met if, after undergoing a test established in this Appendix D for that criterion, the ERMM has preserved all of the data stored in it. The data set stored in the ERMM to be tested shall include all the recording elements required by § 229.135(b). The following tables describe alternative performance criteria that may be used when testing an ERMM's crashworthiness. A manufacturer may utilize either table during its testing but may not combine the criteria contained in the two tables.

Table 1.-Acceptable Performance Criteria-Option A

Parameter	Value	Duration	Remarks
Fire, High Temperature	750 °C (1400 °F)	60 minutes	Heat source: Oven.
Fire, Low Temperature	260 °C (500 °F)	10 hours	
Impact Shock	55g	100 ms	½ sine crash pulse.
Static Crush	110kN (25,000 lbf)	5 minutes.	
Fluid Immersion	#1 Diesel, #2 Diesel, Water, Salt Water, Lube Oil	Any single fluid, 48 hours.	
Fire Fighting Fluid		10 minutes, following immersion above	Immersion followed by 48 hours in a dry location without further disturbance.
Hydrostatic Pressure	Depth equivalent = 15 m. (50 ft.)	48 hours at nominal temperature of 25 °C (77 °F)	

Table 2.-Acceptable Performance Criteria-Option B

Parameter	Value	Duration	Remarks
Fire, High	1000 °C	60 minutes	Heat source: Open

Temperature	(1832 °F)		flame.
Fire, Low	260 °C	10 hours	Heat source: Oven.
Temperature	(500 °F)		
Impact	23gs	250 ms	
Shock			
-Option 1			
Impact	55gs	100 ms	½ sine crash pulse.
Shock			
-Option 2			
Static Crush	111.2kN	5 minutes.	
	(25,000 lbf)		
	44.5kN (10,000	(single	Applied to 25% of
	lbf)	"squeeze")	surface of largest
		face.	
Fluid	#1 Diesel, #2	48 hours each.	
Immersion	Diesel, Water,		
	Salt Water,		
	Lube Oil, Fire		
	Fighting Fluid		
Hydrostatic	46.62 psig (=	48 hours at	
Pressure	30.5 m. or 100	nominal	
	ft.)	temperature of	
		25 °C (77	
		°F)	

D. Testing Sequence

In order to reasonably duplicate the conditions an event recorder may encounter, the ERMM shall meet the various performance criteria, described in Section C of this appendix, in a set sequence. (See Figure 1). If all tests are done in the set sequence (single branch testing), the same ERMM must be utilized throughout. If a manufacturer opts for split branch testing, each branch of the test must be conducted using an ERMM of the same design type as used for the other branch. Both alternatives are deemed equivalent, and the choice of single branch testing or split branch testing may be determined by the party representing that the ERMM meets the standard.

E. Testing Exception

If a new model ERMM represents an evolution or upgrade from an older model ERMM that was previously tested and certified as meeting the performance criteria contained in Section C of this appendix, the new model ERMM need only be tested for compliance with those performance criteria contained in Section C of this appendix that are potentially affected by the upgrade or modification. FRA will consider a performance criterion not to be potentially affected if a preliminary engineering analysis or other pertinent data establishes that the modification or upgrade will not change the performance of the older model ERMM against the performance criterion in question. The manufacturer shall retain and make available to FRA upon request any

analysis or data relied upon to satisfy the requirements of this paragraph to sustain an exception from testing.

[70 FR 37920, June 30, 2005]