

### **§ 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.

### **§ 229.23 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]

### **§ 229.41 Protection against personal injury.**

Fan openings, exposed gears and pinions, exposed moving parts of mechanisms, pipes carrying hot gases and high-voltage equipment, switches, circuit breakers, contactors, relays, grid resistors, and fuses shall be in non-hazardous locations or equipped with guards to prevent personal injury

### **§ 229.43 Exhaust and battery gases.**

(a) Products of combustion shall be released entirely outside the cab and other compartments. Exhaust stacks shall be of sufficient height or other means provided to prevent entry of products of combustion into the cab or other compartments under usual operating conditions.

(b) Battery containers shall be vented and batteries kept from gassing excessively.

### **§ 229.45 General condition.**

All systems and components on a locomotive shall be free of conditions that endanger the safety of the crew, locomotive or train. These conditions include: insecure attachment of components, including third rail shoes or beams, traction motors and motor gear cases, and fuel tanks; fuel, oil, water, steam, and other leaks and accumulations of oil on electrical equipment that create a personal injury hazard; improper functioning of components, including slack adjusters, pantograph operating cylinders, circuit breakers,

contactors, relays, switches, and fuses; and cracks, breaks, excessive wear and other structural infirmities of components, including quill drives, axles, gears, pinions, pantograph shoes and horns, third rail beams, traction motor gear cases, and fuel tanks.

### **§ 229.46 Brakes: General.**

The carrier shall know before each trip that the locomotive brakes and devices for regulating all pressures, including but not limited to the automatic and independent brake valves, operate as intended and that the water and oil have been drained from the air brake system.

### **§ 229.47 Emergency brake valve.**

(a) Except for locomotives with cabs designed for occupancy by only one person, each road locomotive shall be equipped with a brake pipe valve that is accessible to a member of the crew, other than the engineer, from that crew member's position in the cab. On car body type locomotives, a brake pipe valve shall be attached to the wall adjacent to each end exit door. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each brake pipe valve or shall be shown on an adjacent badge plate.

(b) DMU, MU, and control cab locomotives operated in road service shall be equipped with an emergency brake valve that is accessible to another crew member in the passenger compartment or vestibule. The words "Emergency Brake Valve" shall be legibly stenciled or marked near each valve or shall be shown on an adjacent badge plate.

[45 FR 21109, Mar. 31, 1980, as amended at 71 FR 61857, Oct. 19, 2006]

### **§ 229.49 Main reservoir system.**

(a)(1) The main reservoir system of each locomotive shall be equipped with at least one safety valve that shall prevent an accumulation of pressure of more than 15 pounds per square inch above the maximum working air pressure fixed by the chief mechanical officer of the carrier operating the locomotive.

(2) Except for non-equipped MU locomotives built prior to January 1, 1981, each locomotive that has a pneumatically actuated system of power controls shall be equipped with a separate reservoir of air under pressure to be used for operating those power controls. The reservoir shall be provided with means to automatically prevent the loss of pressure in the event of a failure of main air pressure, have storage capacity for not less than three complete operating cycles of control equipment and be located where it is not exposed to damage.

(b) A governor shall be provided that stops and starts or unloads and loads the air compressor within 5 pounds per square inch above or below the maximum working air pressure fixed by the carrier.

(c) Each compressor governor used in connection with the automatic air brake system shall be adjusted so that the compressor will start when the main reservoir pressure is not less than 15 pounds per square inch above the maximum brake pipe pressure fixed by the carrier and will not stop the compressor until the reservoir pressure has increased at least 10 pounds.

### **§ 229.53 Brake gauges.**

All mechanical gauges and all devices providing indication of air pressure electronically that are used by the engineer to aid in the control or braking of the train or locomotive shall be located so that they may be conveniently read from the engineer's usual position during operation of the locomotive. A gauge or device shall not be more than five percent or three pounds per square inch in error, whichever is less.

[66 FR 4192, Jan. 17, 2001]

### **§ 229.55 Piston travel.**

(a) Brake cylinder piston travel shall be sufficient to provide brake shoe clearance when the brakes are released.

(b) When the brakes are applied on a standing locomotive, the brake cylinder piston travel may not exceed 1 1/2 inches less than the total possible piston travel. The total possible piston travel for each locomotive shall be entered on Form FRA F 6180-49A.

(c) The minimum brake cylinder pressure shall be 30 pounds per square inch.

### **§ 229.57 Foundation brake gear.**

A lever, rod, brake beam, hanger, or pin may not be worn through more than 30 percent of its cross-sectional area, cracked, broken, or missing. All pins shall be secured in place with cotters, split keys, or nuts. Brake shoes shall be fastened with a brake shoe key and aligned in relation to the wheel to prevent localized thermal stress in the edge of the rim or the flange.

### § 229.59 Leakage.

- (a) Leakage from the main air reservoir and related piping may not exceed an average of 3 pounds per square inch per minute for 3 minutes after the pressure has been reduced to 60 percent of the maximum pressure.
- (b) Brake pipe leakage may not exceed 5 pounds per square inch per minute.
- (c) With a full service application at maximum brake pipe pressure and with communication to the brake cylinders closed, the brakes shall remain applied at least 5 minutes.
- (d) Leakage from control air reservoir, related piping, and pneumatically operated controls may not exceed an average of 3 pounds per square inch per minute for 3 minutes.

### § 229.61 Draft system.

(a) A coupler may not have any of the following conditions:

- (1) A distance between the guard arm and the knuckle nose of more than 5 1/8 inches on standard type couplers (MCB contour 1904) or more than 5 5/16 inches on D&E couplers.
- (2) A crack or break in the side wall or pin bearing bosses outside of the shaded areas shown in Figure 1 or in the pulling face of the knuckle.

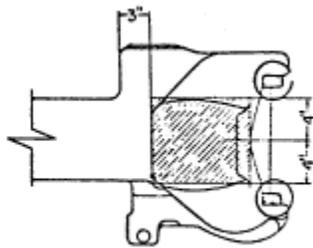


Figure 1

[View or download PDF](#)

- (3) A coupler assembly without anti-creep protection.
  - (4) Free slack in the coupler or drawbar not absorbed by friction devices or draft gears that exceeds one-half inches.
  - (5) A broken or cracked coupler carrier.
  - (6) A broken or cracked yoke.
  - (7) A broken draft gear.
- (b) A device shall be provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

### § 229.64 Plain bearings.

A plain bearing box shall contain visible free oil and may not be cracked to the extent that it will leak oil.

### § 229.65 Spring rigging.

- (a) Protective construction or safety hangers shall be provided to prevent spring planks, spring seats or bolsters from dropping to track structure in event of a hanger or spring failure.

(b) An elliptical spring may not have its top (long) leaf broken or any other three leaves broken, except when that spring is part of a nest of three or more springs and none of the other springs in the nest has its top leaf or any other three leaves broken. An outer coil spring or saddle may not be broken. An equalizer, hanger, bolt, gib, or pin may not be cracked or broken. A coil spring may not be fully compressed when the locomotive is at rest.

(c) A shock absorber may not be broken or leaking clearly formed droplets of oil or other fluid.

### **§ 229.67 Trucks.**

(a) The male center plate shall extend into the female center plate at least 3/4 inch. On trucks constructed to transmit tractive effort through the center plate or center pin, the male center plate shall extend into the female center plate at least 1 1/2 inches. Maximum lost motion in a center plate assemblage may not exceed 1/2 inch.

(b) Each locomotive shall have a device or securing arrangement to prevent the truck and locomotive body from separating in case of derailment.

(c) A truck may not have a loose tie bar or a cracked or broken center casting, motor suspension lug, equalizer, hanger, gib or pin. A truck frame may not be broken or have a crack in a stress area that may affect its structural integrity.

### **§ 229.69 Side bearings.**

(a) Friction side bearings with springs designed to carry weight may not have more than 25 percent of the springs in any one nest broken.

(b) Friction side bearings may not be run in contact unless designed to carry weight. Maximum clearance of side bearings may not exceed one-fourth inch on each side or a total of one-half inch on both sides, except where more than two side bearings are used under the same rigid superstructure. The clearance on one pair of side bearings under the same rigid superstructure shall not exceed one-fourth inch on each side or a total of one-half inch on both sides; the other side bearings under the same rigid superstructure may have one-half inch clearance on each side or a total of 1 inch on both sides. These clearances apply where the spread of the side bearings is 50 inches or less; where the spread is greater, the side bearing clearance may only be increased proportionately.

### **§ 229.71 Clearance above top of rail.**

No part or appliance of a locomotive except the wheels, flexible nonmetallic sand pipe extension tips, and trip cock arms may be less than 2 1/2 inches above the top of rail.

### **§ 229.75 Wheels and tire defects.**

Wheels and tires may not have any of the following conditions:

(a) A single flat spot that is 2 1/2 inches or more in length, or two adjoining spots that are each two or more inches in length.

(b) A gouge or chip in the flange that is more than 1 1/2 inches in length and 1/2 inch in width.

(c) A broken rim, if the tread, measured from the flange at a point five-eighths inch above the tread, is less than 3 3/4 inches in width.

(d) A shelled-out spot 2 1/2 inches or more in length, or two adjoining spots that are each two or more inches in length.

(e) A seam running lengthwise that is within 3 3/4 inches of the flange.

(f) A flange worn to a 7/8 inch thickness or less, gauged at a point 3/8 inch above the tread.

(g) A tread worn hollow 5/16 inch or more on a locomotive in road service or 3/8 inch or more on a locomotive in switching service.

(h) A flange height of 1 1/2 inches or more measured from tread to the top of the flange.

(i) Tires less than 1 1/2 inches thick.

(j) Rims less than 1 inch thick on a locomotive in road service or less than 3/4 inch on a locomotive in yard service.

(k) A crack or break in the flange, tread, rim, plate, or hub.

(l) A loose wheel or tire.

(m) Fusion welding may not be used on tires or steel wheels of locomotives, except for the repair of flat spots and worn flanges on locomotives used exclusively in yard service. A wheel that has been welded is a welded wheel for the life of the wheel.

### **§ 229.89 Jumpers; cable connections.**

(a) Jumpers and cable connections between locomotives shall be so located and guarded to provide sufficient vertical clearance. They may not hang with one end free.

(b) Cable and jumper connections between locomotive may not have any of the following conditions:

(1) Broken or badly chafed insulation.

(2) Broken plugs, receptacles or terminals.

(3) Broken or protruding strands of wire.

### **§ 229.91 Motors and generators.**

A motor or a generator may not have any of the following conditions:

(a) Be shorted or grounded.

(b) Throw solder excessively.

(c) Show evidence of coming apart.

(d) Have an overheated support bearing.

(e) Have an excessive accumulation of oil.

### **§ 229.101 Engines.**

(a) The temperature and pressure alarms, controls and related switches of internal combustion engines shall function properly.

(b) Whenever an engine has been shut down due to mechanical or other problems, a distinctive warning notice giving reason for the shut-down shall be conspicuously attached near the engine starting control until repairs have been made.

(c) Wheel slip/slide protection shall be provided on a locomotive with an engine displaying a warning notice whenever required by §229.115(b).

### **§ 229.117 Speed indicators.**

(a) After December 31, 1980, each locomotive used as a controlling locomotive at speeds in excess of 20 miles per hour shall be equipped with a speed indicator which is—

(1) Accurate within  $\pm 3$  miles per hour of actual speed at speeds of 10 to 30 miles per hour and accurate within  $\pm 5$  miles per hour at speeds above 30 miles per hour; and

(2) Clearly readable from the engineer's normal position under all light conditions.

(b) Each speed indicator required shall be tested as soon as possible after departure by means of speed test sections or equivalent procedures.

### **§ 229.119 Cabs, floors, and passageways.**

(a) Cab seats shall be securely mounted and braced. Cab doors shall be equipped with a secure and operable latching device.

(b) Cab windows of the lead locomotive shall provide an undistorted view of the right-of-way for the crew from their normal position in the cab. (See also, Safety Glazing Standards, 49 CFR part 223, 44 FR 77348, Dec. 31, 1979.)

(c) Floors of cabs, passageways, and compartments shall be kept free from oil, water, waste or any obstruction that creates a slipping, tripping or fire hazard. Floors shall be properly treated to provide secure footing.

(d) The cab shall be provided with proper ventilation and with a heating arrangement that maintains a temperature of at least 50 degrees Fahrenheit 6 inches above the center of each seat in the cab.

(e) Similar locomotives with open end platforms coupled in multiple control and used in road service shall have a means of safe passage between them; no passageway is required through the nose of car body locomotives. There shall be a continuous barrier across the full width of the end of a locomotive or a continuous barrier between locomotives.

(f) Containers shall be provided for carrying fusees and torpedoes. A single container may be used if it has a partition to separate fusees from torpedoes. Torpedoes shall be kept in a closed metal container.

### **§ 229.123 Pilots, snowplows, end plates.**

After January 1, 1981, each lead locomotive shall be equipped with an end plate that extends across both rails, a pilot, or a snowplow. The minimum clearance above the rail of the pilot, snowplow or end plate shall be 3 inches, and the maximum clearance 6 inches.

### **§ 229.125 Headlights and auxiliary lights.**

(a) Each lead locomotive used in road service shall have a headlight that produces a peak intensity of at least 200,000 candela. If a locomotive or locomotive consist in road service is regularly required to run backward for any portion of its trip other than to pick up a detached portion of its train or to make terminal movements, it shall also have on its rear a headlight that produces at least 200,000 candela. Each headlight shall be arranged to illuminate a person at least 800 feet ahead and in front of the headlight. For purposes of this section, a headlight shall be comprised of either one or two lamps.

(1) If a locomotive is equipped with a single-lamp headlight, the single lamp shall produce a peak intensity of at least 200,000 candela. The following lamps meet the standard set forth in this paragraph (a)(1): a single operative PAR-56, 200-watt, 30-volt lamp; or an operative lamp of equivalent design and intensity.

(2) If a locomotive is equipped with a dual-lamp headlight, a peak intensity of at least 200,000 candela shall be produced by the headlight based either on a single lamp capable of individually producing the required peak intensity or on the candela produced by the headlight with both lamps illuminated. If both lamps are needed to produce the required peak intensity, then both lamps in the headlight shall be operational. The following lamps meet the standard set forth in this paragraph (a)(2): a single operative PAR-56, 200-watt, 30-volt lamp; two operative PAR-56, 350-watt, 75-volt lamps; or operative lamp(s) of equivalent design and intensity.

(b) Each locomotive or locomotive consist used in yard service shall have two headlights, one located on the front of the locomotive or locomotive consist and one on its rear. Each headlight shall produce at least 60,000 candela and shall be arranged to illuminate a person at least 300 feet ahead and in front of the headlight.

(c) Headlights shall be provided with a device to dim the light.

(d) Effective December 31, 1997, each lead locomotive operated at a speed greater than 20 miles per hour over one or more public highway-rail crossings shall be equipped with operative auxiliary lights, in addition to the headlight required by paragraph (a) or (b) of this section. A locomotive equipped on March 6, 1996 with auxiliary lights in conformance with §229.133 shall be deemed to conform to this section until March 6, 2000. All locomotives in compliance with §229.133(c) shall be deemed to conform to this section. Auxiliary lights shall be composed as follows:

(1) Two white auxiliary lights shall be placed at the front of the locomotive to form a triangle with the headlight.

(i) The auxiliary lights shall be at least 36 inches above the top of the rail, except on MU locomotives and control cab locomotives where such placement would compromise the integrity of the car body or be otherwise impractical. Auxiliary lights on such MU locomotives and control cab locomotives shall be at least 24 inches above the top of the rail.

(ii) The auxiliary lights shall be spaced at least 36 inches apart if the vertical distance from the headlight to the horizontal axis of the auxiliary lights is 60 inches or more.

(iii) The auxiliary lights shall be spaced at least 60 inches apart if the vertical distance from the headlight to the horizontal axis of the auxiliary lights is less than 60 inches.

(2) Each auxiliary light shall produce a peak intensity of at least 200,000 candela or shall produce at least 3,000 candela at an angle of 7.5 degrees and at least 400 candela at an angle of 20 degrees from the centerline of the locomotive when the light is aimed

parallel to the tracks. Any of the following lamps meet the standard set forth in this paragraph (d)(2): an operative PAR-56, 200-watt, 30-volt lamp; an operative PAR-56, 350-watt, 75-volt lamp; or an operative lamp of equivalent design and intensity.

(3) The auxiliary lights shall be focused horizontally within 15 degrees of the longitudinal centerline of the locomotive.

(e) Auxiliary lights required by paragraph (d) of this section may be arranged

(1) to burn steadily or

(2) flash on approach to a crossing.

If the auxiliary lights are arranged to flash;

(i) they shall flash alternately at a rate of at least 40 flashes per minute and at most 180 flashes per minute,

(ii) the railroad's operating rules shall set a standard procedure for use of flashing lights at public highway-rail grade crossings, and

(iii) the flashing feature may be activated automatically, but shall be capable of manual activation and deactivation by the locomotive engineer.

(f) Auxiliary lights required by paragraph (d) of this section shall be continuously illuminated immediately prior to and during movement of the locomotive, except as provided by railroad operating rules, timetable or special instructions, unless such exception is disapproved by FRA. A railroad may except use of auxiliary lights at a specific public highway-rail grade crossing by designating that exception in the railroad's operating rules, timetable, or a special order. Any exception from use of auxiliary lights at a specific public grade crossing can be disapproved for a stated cause by FRA's Associate Administrator for Safety or any one of FRA's Regional Administrators, after investigation by FRA and opportunity for response from the railroad.

(g) Movement of locomotives with defective auxiliary lights.

(1) A lead locomotive with only one failed auxiliary light must be repaired or switched to a trailing position before departure from the place where an initial terminal inspection is required for that train.

(2) A locomotive with only one auxiliary light that has failed after departure from an initial terminal, must be repaired not later than the next calendar inspection required by §229.21.

(3) A lead locomotive with two failed auxiliary lights may only proceed to the next place where repairs can be made. This movement must be consistent with §229.9.

(h) Any locomotive subject to Part 229, that was built before December 31, 1948, and that is not used regularly in commuter or intercity passenger service, shall be considered historic equipment and excepted from the requirements of paragraphs (d) through (h) of this section.

[45 FR 21109, Mar. 31, 1980, as amended at 61 FR 8887, Mar. 6, 1996; 68 FR 49717, Aug. 19, 2003; 69 FR 12537, Mar. 16, 2004]

## **§ 229.129 Locomotive horn.**

(a) Each lead locomotive shall be equipped with a locomotive horn that produces a minimum sound level of 96 dB(A) and a maximum sound level of 110 dB(A) at 100 feet forward of the locomotive in its direction of travel. The locomotive horn shall be arranged so that it can be conveniently operated from the engineer's usual position during operation of the locomotive.

(b)(1) Each locomotive built on or after September 18, 2006 shall be tested in accordance with this section to ensure that the horn installed on such locomotive is in compliance with paragraph (a) of this section. Locomotives built on or after September 18, 2006 may, however, be tested in accordance with an acceptance sampling scheme such that there is a probability of .05 or less of rejecting a lot with a proportion of defectives equal to an AQL of 1% or less, as set forth in 7 CFR part 43.

(2) Each locomotive built before September 18, 2006 shall be tested in accordance with this section before June 24, 2010 to ensure that the horn installed on such locomotive is in compliance with paragraph (a) of this section.

(3) Each remanufactured locomotive, as determined pursuant to §229.5 of this part, shall be tested in accordance with this section to ensure that the horn installed on such locomotive is in compliance with paragraph (a).

(4)(i) Except as provided in paragraph (b)(4)(ii) of this section, each locomotive equipped with a replacement locomotive horn shall be tested, in accordance with paragraph (c) of this section, before the next two annual tests required by §229.27 of this part are completed.

(ii) Locomotives that have already been tested individually or through acceptance sampling, in accordance with paragraphs (b)(1), (b)(2), or (b)(3) of this section, shall not be required to undergo sound level testing when equipped with a replacement locomotive horn, provided the replacement locomotive horn is of the same model as the locomotive horn that was replaced and the mounting location and type of mounting are the same.

(c) Testing of the locomotive horn sound level shall be in accordance with the following requirements:

(1) A properly calibrated sound level meter shall be used that, at a minimum, complies with the requirements of International Electrotechnical Commission (IEC) Standard 61672-1 (2002-05) for a Class 2 instrument.

(2) An acoustic calibrator shall be used that, at a minimum, complies with the requirements of IEC standard 60942 (1997-11) for a Class 2 instrument.

(3) The manufacturer's instructions pertaining to mounting and orienting the microphone; positioning of the observer; and periodic factory recalibration shall be followed.

(4) A microphone windscreen shall be used and tripods or similar microphone mountings shall be used that minimize interference with the sound being measured.

(5) The test site shall be free of large reflective structures, such as barriers, hills, billboards, tractor trailers or other large vehicles, locomotives or rail cars on adjacent tracks, bridges or buildings, within 200 feet to the front and sides of the locomotive. The locomotive shall be positioned on straight, level track.

(6) Measurements shall be taken only when ambient air temperature is between 32 degrees and 104 degrees Fahrenheit inclusively; relative humidity is between 20 percent and 95 percent inclusively; wind velocity is not more than 12 miles per hour and there is no precipitation.

(7) With the exception of cab-mounted or low-mounted horns, the microphone shall be located 100 feet forward of the front knuckle of the locomotive, 15 feet above the top of the rail, at an angle no greater than 20 degrees from the center line of the track, and oriented with respect to the sound source according to the manufacturer's recommendations. For cab-mounted and low-mounted horns, the microphone shall be located 100 feet forward of the front knuckle of the locomotive, four feet above the top of the rail, at an angle no greater than 20 degrees from the center line of the track, and oriented with respect to the sound source according to the manufacturer's recommendations. The observer shall not stand between the microphone and the horn.

(8) Background noise shall be minimal: the sound level at the test site immediately before and after each horn sounding event shall be at least 10 dB(A) below the level measured during the horn sounding.

(9) *Measurement procedures.* The sound level meter shall be set for A-weighting with slow exponential response and shall be calibrated with the acoustic calibrator immediately before and after compliance tests. Any change in the before and after calibration levels shall be less than 0.5 dB. After the output from the locomotive horn system has reached a stable level, the A-weighted equivalent sound level (slow response) for a 10-second duration (LAeq, 10s) shall be obtained either directly using an integrating-averaging sound level meter, or recorded once per second and calculated indirectly. The arithmetic-average of a series of at least six such 10-second duration readings shall be used to determine compliance. The standard deviation of the readings shall be less than 1.5 dB.

(10) Written reports of locomotive horn testing required by this part shall be made and shall reflect horn type; the date, place, and manner of testing; and sound level measurements. These reports, which shall be signed by the person who performs the test, shall be retained by the railroad, at a location of its choice, until a subsequent locomotive horn test is completed and shall be made available, upon request, to FRA as provided by 49 U.S.C. 20107.

(d) This section does not apply to locomotives of rapid transit operations which are otherwise subject to this part.

[71 FR 47666, Aug. 17, 2006]

### **§ 229.131 Sanders.**

Except for MU locomotives, each locomotive shall be equipped with operable sanders that deposit sand on each rail in front of the first power operated wheel set in the direction of movement.

### **§ 229.133 Interim locomotive conspicuity measures—auxiliary external lights.**

(a) A locomotive at the head of a train or other movement is authorized to be equipped with auxiliary external lights, additional to the headlight required by §229.125, for the purpose of improved conspicuity. A locomotive that is equipped with auxiliary external lights in conformance with the specifications or performance standards set forth in paragraph (b) of this section on the date of issuance of a final rule that requires additional or other external lights on locomotives for improved conspicuity, as required by section 202(u) of

the Federal Railroad Safety Act of 1970, shall be deemed to conform to the requirements of the final rule for four years following the date of issuance of that final rule.

(b) Each qualifying arrangement of auxiliary external lights shall conform to one of the following descriptions:

(1) *Ditch lights.* (i) Ditch lights shall consist of two white lights, each producing a steady beam of at least 200,000 candela, placed at the front of the locomotive, at least 36 inches above the top of the rail.

(ii) Ditch lights shall be spaced at least 36 inches apart if the vertical distance from the headlight to the horizontal axis of the ditch lights is 60 inches or more.

(iii) Ditch lights shall be spaced at least 60 inches apart if the vertical distance from the headlight to the horizontal axis of the ditch lights is less than 60 inches.

(iv) Ditch lights shall be focused horizontally within 45 degrees of the longitudinal centerline of the locomotive.

(2) *Strobe lights.* (i) Strobe lights shall consist of two white stroboscopic lights, each with "effective intensity," as defined by the Illuminating Engineering Society's Guide for Calculating the Effective Intensity of Flashing Signal Lights (November 1964), of at least 500 candela.

(ii) The flash rate of strobe lights shall be at least 40 flashes per minute and at most 180 flashes per minute.

(iii) Strobe lights shall be placed at the front of the locomotive, at least 48 inches apart, and at least 36 inches above the top of the rail.

(3) *Crossing lights.* (i) Crossing lights shall consist of two white lights, placed at the front of the locomotive, at least 36 inches above the top of the rail.

(ii) Crossing lights shall be spaced at least 36 inches apart if the vertical distance from the headlight to the horizontal axis of the ditch lights is 60 inches or more.

(iii) Crossing lights shall be spaced at least 60 inches apart if the vertical distance from the headlight to the horizontal axis of the ditch lights is less than 60 inches.

(iv) Each crossing light shall produce at least 200,000 candela, either steadily burning or alternately flashing.

(v) The flash rate of crossing lights shall be at least 40 flashes per minute and at most 180 flashes per minute.

(vi) Crossing lights shall be focused horizontally within 15 degrees of the longitudinal centerline of the locomotive.

(4) *Oscillating light.* (i) An oscillating light shall consist of:

(A) One steadily burning white light producing at least 200,000 candela in a moving beam that depicts a circle or a horizontal figure "8" to the front, about the longitudinal centerline of the locomotive; or

(B) Two or more white lights producing at least 200,000 candela each, at one location on the front of the locomotive, that flash alternately with beams within five degrees horizontally to either side of the longitudinal centerline of the locomotive.

(ii) An oscillating light may incorporate a device that automatically extinguishes the white light if display of a light of another color is required to protect the safety of railroad operations.

(c)(1) Any lead locomotive equipped with oscillating lights as described in paragraph (b)(4) that were ordered for installation on that locomotive prior to January 1, 1996, is considered in compliance with §229.125(d) (1) through (3).

(2) Any lead locomotive equipped with strobe lights as described in paragraph (b)(2) and operated at speeds no greater than 40 miles per hour, is considered in compliance with §229.125(d) (1) through (3) until the locomotive is retired or rebuilt, whichever comes first.

(3) Any lead locomotive equipped with two white auxiliary lights spaced at least 44 inches apart on at least one axis which was equipped with these auxiliary lights before May 30, 1994, will be considered in compliance with §229.125(d) (1) through (3) until the locomotive is retired or rebuilt, whichever comes first.

## § 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 equipped;
- (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) 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.