GRADE CROSSING SIGNAL SYSTEM SAFETY REGULATIONS

Part 212

§ 212.231 Highway-rail grade crossing inspector

State inspectors would be authorized to enforce grade crossing system safety regulations.

§ 212.233 Apprentice Highway - Rail Grade Crossing Inspector

Applicants must meet minimum requirements prior to being enrolled in the inspector training program.

PART 234

This rule prescribes standards for reporting failures. Railroads are permitted to impose more stringent requirements.

§ 234.1 Scope

Railroads must take specific and timely action to protect the public and railroad employees from malfunctioning highway rail-grade crossing warning systems by adhering to the maintenance, inspection, and testing standards proposed in these regulations.

§ 234.5 Definitions:

"Activation failure" means the failure of an active highway-rail grade crossing warning system to indicate the approach of a train at least 20 seconds prior to the train’s arrival at the crossing, or to indicate the presence of a train occupying the crossing, unless the crossing is provided with an alternative means of active warning to highway users of approaching trains. A grade crossing signal system does not indicate the approach of a train within the meaning of this paragraph if--more than 50% of the flashing lights (not gate arm lights) on any approach lane to the crossing are not functioning as intended, or in the case of an approach lane for which two or more pairs of flashing lights are provided, there is not at least one flashing light pair operating as intended. Back lights on the far side of the crossing are not considered in making these determinations.

" Appropriately equipped flagger" -- person other than a train crew member who is equipped with a vest, shirt or jacket of a color appropriate for daytime flagging, such as orange, yellow, strong yellow green, or fluorescent versions of these colors or other highly visible colors. For nighttime flagging, similar outside garments shall be retroreflective. Acceptable hand signaling devices for daytime are STOP/SLOW paddles or red flags. For nighttime flagging, a flashlight, lantern, or other
lighted signal shall be used. Requirements to be appropriately equipped do not apply to law enforcement officers and train crewmembers responding to an emergency situation.

"Credible report of system malfunction" -- specific information regarding a malfunction at an identified highway-rail grade crossing, supplied by an identified railroad employee, law enforcement officer, highway traffic official, or an employee of a public agency acting in an official capacity.

“Partial activation” means activation of a highway-rail grade crossing warning system indicating the approach of a train, however, the full intended warning is not provided due to one of the following conditions:

(1) at non-gated crossings equipped with one pair of lights designed to flash alternately, one of the two lights does not operate properly (and approaching motorists can not clearly see flashing back lights from the warning lights on the other side of the crossing);

(2) at gated crossings, the gate arm is not in a horizontal position; or

(3) at gated crossings, any portion of a gate arm is missing if that portion normally had a gate arm flashing light attached.

"Warning System Malfunction" -- an activation failure or a false activation of a highway-rail grade crossing warning system.

§ 234.6 Civil Penalties

Any person who willfully violates any requirement or causes the violation of any requirement is subject to a civil penalty of at least $500.00, but no more than $10,000. For gross negligence or a pattern of repeated violations, a penalty may be imposed up to $20,000 for each violation. The definition of "Person" includes a railroad, its employees, and manufacturers and lessors of railroad equipment and independent contractors. Appendix A to the rule sets out a schedule of penalties for each type of violation. It should be noted that FRA does not consider it a violation if the railroad, exercising due diligence, could not have prevented the condition because it was not within the railroad’s control.

§ 234.7 Accidents Involving Grade Crossing Signal Failure

Each railroad shall report to FRA every impact between on-track railroad equipment and any other moving vehicle involving activation failure. Notification shall be provided to the National Response Center within 24 hours of the occurrence. A complete accident report shall be filed thereafter with the FRA.

§ 234.9 Grade Crossing Signal System Failure Reports

Each railroad shall report to FRA within 15 days of each activation failure of a grade crossing warning system. A railroad shall also file a report for each false activation of a grade crossing warning system. The later requirement shall be submitted within 30
days after the false activation occurs. The requirement to file false activation reports expired on April 1, 1994.

SUBPART C. -- Response to Reports of Warning System Malfunction

§234.101 Employee Notification Rules

Each railroad shall issue rules requiring employees to report to a designated railroad person, by the quickest means available, any warning system malfunction.

§ 234.103 Timely Response to Report of Malfunction

Upon receipt of a credible report of a warning system malfunction, the railroad shall promptly investigate the report and determine the nature of the malfunction. Based upon the results of that investigation, the railroad is required to adjust, repair, or replace any faulty component without undue delay. Until this is completed, the railroad shall provide alternative means of warning highway traffic and railroad employees, as provided in §234.105-§234.107

A railroad may discontinue or dismantle the warning system if state law permits it.

§ 234.105 Activation Failure

A railroad must, upon receipt of a credible report of activation failure, promptly initiate efforts to warn highway users and railroad employees by doing the following:

(a) Prior to a train's approval at the crossing, the railroad must notify the train crew of the report of activation failure and notify any other railroads operating over the crossing.

(b) The railroad must notify the law enforcement authority having jurisdiction over the crossing, or the railroad police.

(c) Until an appropriately equipped flagger or law enforcement officer is stationed at the crossing to warn highway traffic of approaching trains, each train must stop before entering the crossing to permit a crew member to dismount to flag highway traffic to a stop.

If an appropriately equipped flagger provides warning for each direction of highway traffic, trains may proceed through the crossing at normal speed. Any ban on whistles by a local jurisdiction must be lifted during the period of malfunctioning. At least one uniformed law enforcement officer (including a railroad police officer) may provide the warning.

If there is not an appropriately equipped flagger or law enforcement officer stationed at the crossing, trains may proceed with caution through the crossing at a speed
not exceeding 15 miles per hour. Normal speed may be resumed after passing through the crossing.

If a warning system is manually activated, a train can proceed through the crossing at normal speed.

§ 234.106 Partial Activation

Where there is a partial activation which provides some warning of an approaching train, but at a level less than that designed for the system, the railroad shall promptly initiate efforts to warn highway users and railroad employees at the crossing in the same manner as required for false activation set out in § 234.107.

§ 234.107 False Activation

When there is a false activation, a railroad must take the same initial actions as it would take in case of activation failure. The only difference between this section and the previous one is that the railroad has the option of temporarily taking the warning system out of service until repairs are completed. The warning system may only be taken out of service if the railroad complies with the protection requirements for activation failure.

§ 234.109 Recordkeeping

Each railroad is required to keep the following information for each report of warning system malfunction: location of crossing; time and date of receipt of report of malfunction; actions taken by railroad prior to repair and reactivation of repaired system; and time and date of repair. The railroads must retain these records for at least one year and these records shall be made available to the FRA as provided in the Federal Railroad Safety Act.

SUBPART D --Maintenance, Inspection and Testing

This subpart D is not intended to apply to grade crossing warning systems on out-of-service track.

§ 234.201 Location of plans

Plans and other information required for the proper maintenance and testing of highway–rail grade crossing warning systems shall be available for use at each warning system location. Plans would be required to be legible and correct to protect against errors in circuitry connections.

§ 234.203 Design of control circuits on closed circuit principle

All control circuits that affect the safe operation of the grade crossing warning system shall be designed on a fail-safe principle.
§ 234.205  Operating characteristics of warning system apparatus

Operating characteristics of electromagnetic, electronic, or electrical apparatus of each crossing warning system should include: specifications setting forth pick-up values, release values, working values, and condemning limits of these values for all electromagnetic, electronic, or electrical devices used in highway-rail grade crossing warning systems.

§ 234.207  Adjustment, repair, or replacement of component

When any essential component of the warning system fails to perform its intended function, the cause shall be determined and the faulty component shall be required or replaced without undue delay. Until the repair is made, action under §234.105 or §234.107 should be taken.

§ 234.209  Interference with normal functioning of system

The normal functioning of any system shall not be interfered with when testing or otherwise, without first taking measures to provide for the safety of highway traffic.

§ 234.211  Locking or warning system apparatus

All external housings of warning system apparatus shall be kept locked, sealed, or secured.

§ 234.213  Grounds

Each circuit which affects the proper functioning of the warning system shall be kept free of any ground or combination of grounds which will permit a flow of current equal to or in excess of 75 percent of the release value of any relay or electromagnetic device in the circuit.

§ 234.215  Standby battery and indicator or alarm

A standby battery source of power is required to ensure the warning system continues to function during any period of primary power interruption.

§ 234.217  Flashing light units

Each flashing light unit must be positioned and aligned in accordance with installation plans. Each unit shall be maintained to prevent dust and moisture from entering the interior of the unit. All light units shall flash alternately and the number of flashes per minute for each light shall be a minimum of 35 and a maximum of 65.
§ 234.219 Gate arm lights and light cable

Each gate arm light must be visible to approaching highway users and that lights and light wire be secured to the gate arm.

§ 234.221 Lamp voltage

Lamp voltage shall be maintained at no less that 85% of its prescribed rating.

§ 234.223 Gate arm

Each gate arm, when in the downward position, must extend across each lane of approaching highway traffic and be maintained in a condition sufficient to be clearly viewed by approaching motorists. Each gate arm must start its downward motion not less than three seconds after flashing lights begin to operate and assume the horizontal position in a minimum of five seconds before the arrival of any train at the crossing. At 4-quadrant gate installations these time requirements apply only to the gates closest to oncoming traffic.

§ 234.225 Activation of warning system

At least a 20 second minimum warning time is required prior to the grade crossing being occupied by rail traffic. The 20 second warning time requirement applies to normal through train operations rather than switching movements or train operations that require stopping short of the grade crossing.

§ 234.227 Train detection apparatus

The detection of a train or car is required when any part of a train detection circuit is occupied. When the presence of sand, rust, dirt, grease or other foreign matter is known to prevent effective shunting, appropriate action under §234.105 "Activation failure" must be taken.

§ 234.229 Shunting sensitivity

Each train detection circuit that controls a highway-rail grade crossing warning system must detect the presence of a shunt of 0.06 ohm resistance when the shunt is connected across the track rails of the circuit, including fouling sections of turnouts.

§ 234.231 Fouling wires

Each set of fouling wires located in a highway-rail grade crossing warning system train detection circuit is required to consist of at least two discrete conductors, and it is also required that each conductor be of sufficient conductivity and maintained in such a condition that the train detection apparatus is in such condition to ensure proper operation of the train detection apparatus when the circuit is shunted. The installation of a signal
duplex wire with a single plug acting as fouling wires is prohibited, but may be continued in use until they require repair or replacement.

§ 234.233 Rail joints

Each rail joint located within the limits of a highway-rail grade crossing train detection circuit must be bonded to ensure electrical conductivity by a means other than joint bars, and the bonds shall be maintained to ensure electrical conductivity.

§ 234.235 Insulated rail joints

Each insulated rail joint used to separate train detection circuits of a highway-rail grade crossing must be maintained in a condition to prevent current from flowing between rails separated by the insulation in an amount sufficient to cause a failure of the train detection circuit.

§ 234.237 Switch equipped with circuit controller

When a switch equipped with a switch circuit controller connected to the point is interconnected with highway-rail grade crossing warning system circuitry, it shall be maintained so that the warning system can be cut out only when the point is within one-half inch of full reverse position.

§ 234.239 Tagging of wires and interference of wires or tags with signal apparatus.

Each wire must be tagged or otherwise marked so that it can be identified at each terminal in all housings, including switch circuit controllers and terminal or junction boxes. This section does not apply to flashing light units, gate arm light units and other auxiliary light units. Also, local wiring on a solid state crossing controller rack will not require tags if the wiring is an integral part of the solid state equipment.

§ 234.241 Protection of insulted wire; splice in underground wire

Insulated wire is to be protected from mechanical injury.

§ 234.243 Wire on pole line and aerial cable

Wire on a pole line must be securely tied in on an insulator and properly fastened to a crossarm or bracket supported by a pole or other support.

The wire shall not be interfered with. Aerial cable is required to be supported by messenger wire. Open-wire transmission line operating at 750 volts or more shall not be placed less than 4 feet above the nearest cross arm carrying active warning circuits.
§ 234.245 Signs

Each sign mounted on a highway-rail grade crossing signal post must be maintained in good condition and visible to the highway user.

Inspections and Tests

§ 234.247 Purpose of inspections and tests; removal from service of relay or device failing to meet test requirements.

Inspections and tests under §§234.249 through 234.271 shall be made to determine if the warning system is maintained. Any electronic device, relay, or other electromagnetic device that fails to meet the requirements shall be removed from service. A full inspection and tests of all required components must be successful completed before operations resume.

§ 234.249 Ground Tests

A test for grounds on each energy bus furnishing power to circuits that affect the safety of warning system operation shall be made when an energy bus is placed in service, and at least once a month thereafter.

§ 234.251 Battery Voltage

Standby power shall be tested at least once each month.

§ 234.253 Flashing light units and lamp voltage

Each flashing light unit must be tested when installed, and at least once every twelve months each flashing light unit is required to be inspected for alinement and frequency of flashes in accordance with installation specifications. At least once a month each flashing unit will be required to be inspected for dust and damage to roundels to ensure visibility of the light unit.

§ 234.255 Gate arm and gate mechanism

Each gate arm and gate mechanism must be inspected, and gate arm movement be observed for proper operation, at least once each month. Test of hold-clear devices shall be required at least once every twelve months.

§ 234.257 Warning system operation

A highway-rail grade crossing warning system must be tested for proper operation when the warning system is placed in service. Thereafter whenever modified or disarranged it should be tested at least once each month.
§ 234.259  **Warning Time**

A highway-rail grade crossing warning system must be tested for prescribed warning time at least once every year, and when the warning system is modified because of change in train speeds, electronic devices may be used for the testing.

§ 234.261  **Highway traffic signal preemption**

Highway traffic signal preemption interconnectors, for which a railroad has maintenance responsibility, shall be tested at least once each month.

§ 234.263  **Relays**

Each relay that affects the proper functioning of a crossing warning system shall be tested at least once every four years. Alternating current vane type relays, direct polar type relays, relays with soft iron magnetic structure shall be tested at least every 2 years. Alternating current centrifugal type relays shall be tested at least once every 12 months. Testing of relays requiring testing on four year intervals shall be completed in accordance with the following schedule:

1. Not less than 50% by the end of calendar year 1996;
2. Not less than a total of 75% by the end of calendar year 1997; and
3. One hundred percent by the end of calendar year 1998.

Testing of relays requiring testing on two year intervals shall be completed by the end of calendar year 1996.

§ 234.265  **Timing relays and timing devices**

Each timing relay and timing devices must be tested at least once every twelve months. The timing would be required to be maintained at not less than 90% nor 110% of the predetermined time interval, which shall be shown on the plans or marked on the timing relay or timing device. Internal timing devices associated with motion detectors, motion sensors, and grade crossing predictors are not subject to the requirements of this section.

§ 234.267  **Insulation resistance tests, wires in trunking and cables**

(a) Insulation resistance test shall be made when wires or cables are installed and at least once every ten years thereafter.

(b) Insulation resistance tests must be made between all conductors and ground between conductors in each multiple conductor cable, and between conductors in
trunking. These tests must be performed when wires, cables, and insulation are dry.

(c) When insulation resistance of wire or cable is found to be less than 500,000 ohms, prompt action is required to repair or replace the defective wire or cable.

(d) A circuit with a conductor having an insulation resistance of less than 200,000 ohms shall not be used.

(e) Required insulation resistance testing that does not conform the required testing schedule of this section shall be completed in accordance with the following schedule:

   (1) Not less than 50% by the end of the calendar year 1996;

   (2) Not less than a total of 75% by the end of calendar year 1997; and

   (3) One hundred percent by the end of calendar year 1998.

Section 234.269 Cut-out circuits

Each cut-out circuit shall be tested at least once every three months to determine that the circuit functions as intended. This type of circuit includes both switch cut-out circuits and devices which enables personnel to manually override the operation of automatic warning systems.

Section 234.271 Insulated rail joints, bond wires, and track connections

Each insulated rail joint, bond wire, and track connection located within the limits of a highway-rail grade crossing train detection circuit must be inspected at least once every three months.

Section 234.273 Results of tests and Inspections

Results of tests made in compliance with this part must be recorded on preprinted or computerized forms by the railroad, or by electronic means, approved by the Associate Administrator for Safety. The records shall be made available to FRA and be kept at least one year from the date of the test.

49 U.S.C. § 20134
49 C.F.R. Parts 212 and 234