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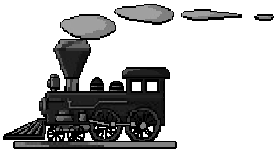

Brake System Safety Standards for Freight

Subpart B – General Requirements

Module 2

Module Objectives

- Apply FRA Brake System Safety Standards when inspecting freight equipment
- Identify deviations from the standards
- Determine if a monitoring plan for yard air sources is in compliance with Federal regulations based on a given case study

Subpart B

- Scope – 232.101
- General requirements for all train brake systems – 232.103
- General requirements for locomotives 232.105
- Air source requirements and cold weather operations – 232.107
- Dynamic brake requirements – 232.109
- Train handling information – 232.111

General requirements brake systems

- Primary brake system capabilities.
- 100 percent operative brakes at initial terminal.
- Never less than 85 percent operative brakes.
- Emergency application capabilities.
- Railroad establishes max. MR working pressure.
- Max. BP pressure no greater than 15 psi less than air compressor governor loading pressure.

General requirements brake systems New requirements

- Piston travel ranges as indicated on badge plate, sticker, decal or stencil.
- New equipment ordered on or after 8/1/02 or placed in service after 4/1/04 shall have brake system designed to facilitate inspection of PT or PT indicator from safe position.
- Freight and other non-passenger equipment brake systems shall meet at a minimum AAR-Standard S-469-47, “Performance Specification for Freight Brakes”
- If air flow exceeds 60 CFM on trains qualified by AFM and pointer does not return within reasonable time, train shall stop at next available location and its brake system inspected for leaks.

General requirements brake systems Unattended equipment – Standing trains

Unattended equipment shall be secured in accordance with the following requirements:

- A sufficient number of hand brakes shall be applied to hold the equipment. Railroads shall develop and implement a process or procedure to verify that applied hand brakes will sufficiently hold the equipment with the air brakes released.
- Except for equipment connected to a source of compressed air (e.g., locomotive or ground air source), prior to leaving equipment unattended, the brake pipe shall be reduced to zero at a rate that is no less than a service rate reduction, and the brake pipe vented to atmosphere by leaving the angle cock in the open position on the first unit of the equipment left unattended.

General requirements brake systems
Unattended equipment – additional requirements

Any hand brakes applied to hold unattended equipment shall not be released until it is known that the air brake system is properly charged.

General requirements brake systems
Unattended locomotives

Except for distributed power units, the following requirements apply to unattended locomotives:

- All hand brakes shall be fully applied on all locomotives in the lead consist of an unattended train.
- All hand brakes shall be fully applied on all locomotives in an unattended locomotive consist outside of yard limits.
- At a minimum, the hand brake shall be fully applied on the lead locomotive in an unattended locomotive consist within yard limits.

Railroads shall develop, adopt, and comply with procedures for securing any unattended locomotive required to have a hand brake applied as stated in the three bullets above when the locomotive is not equipped with an operative hand brake.

General requirements brake systems
Unattended locomotives – additional requirements

A railroad shall adopt and comply with a process, procedures and instructions to verify and/or address:

- The applied hand brakes will sufficiently hold an unattended locomotive consist.
- Throttle position.
- Position of the generator field switch.
- Status of the independent brakes and reverser lever.
- Position of the isolation switch and automatic brake valve on all unattended locomotives.

The procedures and instruction shall also take into account winter weather conditions as they relate to throttle position and reverser handle.

General requirements brake systems
Air pressures

See chart §232.103, carried over locomotive section from previous rule, but eliminated car section

Added two new entries specifying BP of 90 psi for road service and 60 psi for switch service

General requirements for locomotives Hand brakes

Locomotives ordered on or after 8/1/02 or placed in service for the first time on or after 4/1/04 shall be equipped with a hand or parking brake that is:

- Capable of application or activation by hand.
- Capable of release by hand.
- Capable of holding the unit on a three percent grade.
- An inspection shall be made of parts, connections, etc. as often as necessary but not less frequently than every 368 days. Inspection date shall be entered on 49A or stencil date on HB.

General requirements for locomotives Leakage

- Equalizing leakage shall be zero, unless the system is capable of maintaining the set pressure at any service application with the brakes control valve in the freight position.
- Equalizing leakage detected on trains en route may proceed to nearest forward location where the equalizing-reservoir leakage can be corrected.

General requirements for locomotives Miscellaneous

- Feed valve braking is prohibited.
- The passenger position brake control stand shall be used only if the trailing equipment is designed for graduated brake release or if equalizing reservoir leakage occurs en route and its use is necessary to safely control the movement of the train until it reaches the next forward location where the reservoir leakage can be corrected.
- When taking charge of a locomotive or locomotive consist, an engineer must know that brakes are in operative condition.

Air source requirements Monitoring plans for yard air sources

Railroad shall adopt and comply with a written plan to monitor all yard air sources, other than locomotives, to determine that:

- They operate as intended.
- Do not introduce contaminants into the brake system of freight equipment.

Air source requirements
Plan details

The plan shall include requirements to:

- Inspect each yard air source at least two times per calendar year, no less than five months apart, to determine it operates as intended and does not introduce contaminants into the brake system of the equipment it services.
- Identify yard air sources found not to be operating as intended or found introducing contaminants into the brake system of the equipment it services.
- Repair or take other remedial action regarding any defective yard air source

Air source requirements
Plan records

Railroads shall maintain records of the information and actions required by the previous slide. These records shall be maintained for a period of at least one year from the date of creation and may be maintained either electronically or in writing.

Air source requirements
Additional requirements and/or prohibitions

- Condensation shall be blown out from source, (yard air or locomotives), before connecting to train.
- Damaging chemicals shall not be introduced into the brake pipe or brake system.
- Yard air reservoirs in use shall be drained daily (automatic drains ok provided they operate).

Cold weather requirements

Railroads shall adopt and comply with detailed written operating procedures tailored to the equipment and territory of that railroad to cover safe train operations during cold weather.

Dynamic brake requirements
Notification & information

- The locomotive engineer shall be informed of the operational status of the dynamic brakes on all locomotive units in the consist at the initial terminal for a train and at other locations where a locomotive engineer first begins operation of a train.
- The information required may be provided to the locomotive engineer by any means determined to be appropriate by the railroad; however, a written or electronic record of the information shall be maintained in the cab of the controlling locomotive.
- The information above not required if lead locomotive consist is equipped with self test and status feature (see slide 23).

Dynamic brake requirements
Remedial action

- Inoperative dynamic brakes shall be repaired within 30 calendar days of becoming inoperative or at the locomotive's next periodic inspection, whichever occurs first.
- If a locomotive consist is intended to have its dynamic brakes used while in transit, a locomotive with inoperative or deactivated dynamic brakes or a locomotive not equipped with dynamic brakes shall not be placed in the controlling (lead) position of a consist unless the locomotive has the capability of:
  - Controlling the dynamic braking effort in trailing locomotives in the consist that are so equipped.
  - Displaying to the locomotive engineer the deceleration rate of the train or the total train dynamic brake retarding force.

Dynamic brake requirements
Tagging defective equipment

Locomotive with inoperative dynamic brakes shall have a tag bearing the words "inoperative dynamic brake" securely attached and displayed in a conspicuous location in the cab of the locomotive.

The tag shall contain the following information:

- The locomotive number.
- The name of the discovering railroad.
- The location and date where condition was discovered.
- The signature of the person discovering the condition.

An electronic or written record of repairs made to a locomotive's dynamic brakes shall be retained for 92 days.

Dynamic brake requirements
Deactivation

A railroad may elect to declare the dynamic brakes on a locomotive deactivated without removing the dynamic brake components from the locomotive, only if all of the following conditions are met:

- The locomotive is clearly marked with the words "dynamic brake deactivated" in a conspicuous location in the cab of the locomotive.
- The railroad has taken appropriate action to ensure the deactivated locomotive is incapable of utilizing dynamic brake effort to retard or control train speed.

Dynamic brake requirements New locomotives

All locomotives equipped with dynamic brakes and ordered on or after April 1, 2006, or placed in service for the first time on or after 10/01/07, shall be designed to:

- Conduct an electrical integrity test of the dynamic brake to determine if electrical current is being received at the grids on the system.
- Display in real-time in the cab of the controlling locomotive the total train dynamic brake retarding force available in the train.

Dynamic brake requirements Rebuilt locomotives

Rebuilt locomotives equipped with dynamic brakes and placed in service on or after 4/1/04, shall be designed to:

- Conduct an electrical integrity test of the dynamic brake to determine if electrical current is being received at the grids on the system.
- Display either the train deceleration rate or in real-time in the cab of the controlling locomotive the total train dynamic brake retarding force available in the train.

Dynamic brake requirements
Operating procedures

The railroad operating a train with a brake system that includes dynamic brakes shall adopt and comply with written operating rules governing safe train handling procedures using these dynamic brakes under all operating conditions, which shall be tailored to the specific equipment and territory of the railroad.

Dynamic brake requirements
Operating procedure details

The railroad's operating rules shall:

- Ensure that the friction brakes are sufficient by themselves, without the aid of dynamic brakes, to stop the train safely under all operating conditions.
- Include a "miles-per-hour-overspeed-stop" rule. At a minimum, this rule shall require that any train when descending a section of track with an average grade of one percent or greater over a distance of three continuous miles shall be immediately brought to a stop, by an emergency brake application if necessary, when the train's speed exceeds the maximum authorized speed for that train by more than 5 miles per hour. A railroad shall reduce the 5-miles-per-hour-overspeed-stop restriction if validated research indicates the need for such a reduction. A railroad may increase the 5-miles-per-hour-overspeed restriction only with approval of FRA and based upon verifiable data and research.

Dynamic brake requirements Part 240 implications

Railroads operating a train with a brake system that includes dynamic brakes shall adopt and comply with specific knowledge, skill, and ability criteria to ensure that its locomotive engineers are fully trained in the operating rules referred to in the previous two slides. The railroad shall incorporate such criteria into its locomotive engineer certification program pursuant to Part 240 of this chapter.

Train handling information

Railroads shall adopt and comply with written procedures to ensure that a train crew employed by the railroad is given accurate information on the condition of the train brake system and train factors affecting brake system performance and testing when the crew takes over responsibility for the train. The information required by this paragraph may be provided to the locomotive engineer by any means determined appropriate by the railroad; however, a written or electronic record of the information shall be maintained in the cab of the controlling locomotive.

Train handling information Consists & train profile

Each train crew taking charge of a train be informed of:

- The total weight and length of the train, based on the best information available to the railroad.
- Any special weight distribution that would require special train handling procedures.
- The number and location of cars with cut-out or otherwise inoperative brakes and the location where they will be repaired.
- If a Class I or Class IA brake test is required prior to the next crew change point, the location at which that test shall be performed.
- Any train brake system problems encountered by the previous crew of the train.

End of Module 2