

# 17. APTA PR-IM-S-017-02

## Standard for Third Rail Current Collection Equipment Periodic Inspection and Maintenance

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**APTA Passenger Rail Equipment Safety Standards Task Force**

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**APTA Commuter Rail Executive Committee**

**Abstract:** This standard covers basic procedures for periodic inspection and maintenance of third rail current collection equipment on locomotives/multiple unit (MU) cars, with emphasis on maintenance of high voltage current collection devices.

**Key words:** contact shoe, periodic inspection and maintenance, third rail current collection equipment, third rail shoe

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## **Introduction**

(This introduction is not part of APTA PS-IM-S-017-02, Standard for Third Rail Current Collection Equipment Periodic Inspection and Maintenance)

This standard describes the basic inspection and maintenance requirements for third rail current collection equipment on rail passenger vehicles. APTA recommends the use of this standard by:

- a) Individuals or organizations that maintain third rail current collection equipment on locomotives/multiple unit (MU) cars;
- b) Individuals or organizations that contract with others for the maintenance of third rail current collection equipment on locomotives/multiple unit (MU) cars ; and
- c) Individuals or organizations that influence how third rail current collection equipment is maintained on locomotives/multiple unit (MU) cars.

This standard is intended to satisfy the following objectives:

- Incorporate safety considerations during the periodic inspection and maintenance process.
- Identify those inspection criteria and maintenance standards that provide a high level of passenger safety; and
- Identify those inspection criteria and maintenance standards that provide a high level of workplace safety.

## Participants

The American Public Transportation Association greatly appreciates the contributions of the following individual(s), who provided the primary effort in the drafting of *the Standard for Third Rail Current Collection Equipment Periodic Inspection and Maintenance*:

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## Standard for Third Rail Current Collection Equipment Periodic Inspection and Maintenance

### 1. Overview

This document establishes a standard for the inspection and maintenance of third rail current collection equipment. Individual railroads should tailor these standards to accommodate their specific equipment and mode of operation.

#### 1.1 Scope

This standard includes all essential periodic inspection and maintenance requirements for third rail current collection equipment used on rail passenger locomotives/multiple unit (MU) cars.

#### 1.2 Purpose

This standard is intended for use by rail equipment maintenance organizations. It establishes procedures for periodic inspection and maintenance of third rail current collection equipment used on rail passenger locomotives/MU cars.

### 2. References

This standard shall be used with the following publications. If the following publications are superseded by an approved revision, the revision shall apply.

CFR 49 Part 229, Railroad Locomotive Safety Standards, October 2000.

CFR 49 Part 238, Passenger Rail Equipment Safety Standards, October 2000.

APTA SS-I&M-014-99, Standard for Modification Methodology for the Periodic Inspection and Maintenance of Passenger Coaches.

Applicable state and local regulations.

Railroad procedures for blue signal protection of workers.

Original Equipment Manufacturers' (OEM) third rail current collection equipment manuals.

### 3. Definitions, abbreviations, and acronyms

For the purposes of this safety standard, the following terms and definitions apply.

#### 3.1 Definitions

**3.1.1 third rail:** An electrical conductor located alongside the track designed to carry

energy for the propulsion and auxiliary systems of trains.

**3.1.2 third rail current collection assembly:** A mechanical assembly commonly mounted to a locomotive/multiple unit (MU) car truck frame. Usually multiple assemblies per locomotive/MU car and bussed together. Its design provides a continuous pressure applied sliding shoe connection to the third rail for the purpose of transferring power from the third rail to the locomotive/MU car.

**3.1.3 calendar day inspection--**An inspection performed each calendar day as prescribed by *CFR Title 49 parts 229 and 238<sup>1</sup>*.

**3.1.4 periodic maintenance--**The performance of selected inspection and maintenance actions on systems or sub-systems. The frequency of these actions may be set by regulatory agencies, or the railroad. The frequency may be expressed as a function of time (i.e. days, weeks, or months) or in mileage or cycles.

**3.2 Abbreviations and acronyms**

- OEM        original equipment manufacturer
- CFR        Code of Federal Regulations
- MU Car    locomotive or locomotive MU as defined in 49 CFR Section 238.5

**4. Frequency of conduct**

Maintenance tasks on the third rail current collection equipment should be performed on a regular schedule to insure proper operation of the equipment. The sections listed in Table 1 provide a guide of detailed procedures for each identified maintenance task.

**TABLE 1**

INSPECTIONS AND MAINTENANCE	RECOMMENDED PERIODIC INSPECTION INTERVALS (Not to Exceed)	REFERENCE SECTION
Daily third rail current collection equipment inspection	Daily	CFR Part 229.45
Visual	Not to exceed 92 Days	5.5.1
Mechanical	Not to exceed 92 Days	5.5.2
Electrical	Not to exceed 92 Days	5.5.3
Cleaning	Not to exceed 92 Days	5.5.4

The frequency of tasks in Table 1 shall comply with all applicable federal, state, and local regulations. As a part of a railroad’s periodic inspection and maintenance program, frequencies for individual tasks may be established based on a number of additional

<sup>1</sup> For references in Italics, see Section 2.

factors, including but not limited to:

- OEM – recommended intervals
- Industry Experience
- Operating Environment/Conditions
- Historical Data
- Performance Requirements
- Failure Analysis
- Railroad’s testing and experience
- Reliability centered maintenance programs

## 5. Requirements and specific tasks

**WARNING: SAFETY HAZARD**

The following inspection and maintenance procedures other than purely visual inspections must be carried out in an area that is third rail voltage free or where no third rail is present.

**WARNING: SAFETY HAZARD**

Follow proper lock-out/tag-out and Blue Signal Protection of Workers procedures as required by the railroad and in accordance with federal regulations.

**WARNING: SAFETY HAZARD**

Follow all railroad safety practices for working on high voltage equipment.

**WARNING: SAFETY HAZARD**

Ensure the vehicle is secured against uncontrolled movement in accordance with local railroad rules before commencing inspection and maintenance procedures.

### 5.1 Materials

- a) Approved non-conducting cleaning solvents.
- b) Approved lubricants as required by the OEM.
- c) Additional materials as required by OEM.

## 5.2 Tools

- a) 1000 Vdc Megohm-meter (commonly referred to as a megger)\*
- b) Multi-meter\*
- c) Force gauge ( spring scale or digital )\*
- d) Torque wrench\*
- e) Third rail shoe height gauge
- f) Standard tools carried by the maintenance personnel

\* Tools shall be calibrated in accordance with OEM and Railroad's procedures

## 5.3 Safety /personal protective equipment

Personal protective equipment, as required by the railroad, shall be worn at all times in the performance of the inspection and maintenance tasks.

## 5.4 Training requirements

Railroads and/or their maintenance contractors shall develop and execute training programs in compliance with *49 CFR Section 238.1<sup>2</sup>09* that provide employees with the knowledge and the skills necessary to safely and effectively perform the tasks outlined in this standard.

## 5.5 Inspections and maintenance

### 5.5.1 Visual

- a) Electrical – Frayed, burnt, broken, cut, or otherwise defective shunt straps or electrical cables shall be replaced. Make sure that cables are not lying over objects that will cause them to chafe. When replacing shunts, make sure contact surfaces are clean, free of dust and/or corrosion.
- b) Mechanical – Missing or damaged cotter pins, bolts, nuts, lock washers, support brackets, electrical terminals shall be replaced. Inspect for the alignment of torque stripes on the associated hardware if applicable. Loose hardware shall be torqued to OEM's specification. Inspect all shunts and cables for loose connections; tighten as required. Make sure cable routing does not result in rubbing.

**Note--**Elastic lock nuts and chemical locking compounds are not to be used to secure current carrying components.

- c) Wear Indicator – Current collector shoes shall be replaced if:

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<sup>2</sup> For references in Italics, see Section 2.



- Shoe is damaged
  - Pad wear indicator mark is exposed
  - Shoe is worn down to the condemning limit.
- d) Shoe Contact – Inspect the current collector shoe pad for correct contact to the third rail. Excessive burning of pad contact area or uneven wear generally indicates improper shoe height, alignment, or improper spring tension. If required, adjust or replace components in accordance with railroad procedures.
- e) Collector Free Height – Inspect the current collector shoe height from top of running rail using the railroad’s approved height gauge. Adjust as required.
- f) Fuse Condition – Inspect all ribbon or braided type fuses for burnt, separated or otherwise damaged elements and replace as required. Inspect the trip button on the cartridge-type fuses for activation. If the button was activated, attempt to reset, if applicable. If unable to reset, replace fuse.
- g) Warning Labels – Inspect the “Danger High Voltage” warning labels. Ensure they are clean, legible and located as prescribed by CFR, OEM and the railroad.
- h) Emergency Shoe Insulation – (CFR Title 49 part 229.81) Ensure that each locomotive/MU car equipped with third rail collection shoes has, in good condition and sufficient supply, a device to isolate/insulate the current collection equipment from third rail.

### **5.5.2 Mechanical**

- a) Inspection – Inspect the current collector shoe spring, insulators, brushings, and shoe bracket assembly for damage. All defective components shall be replaced.
- b) Assembly Function – If applicable, test for correct current collector shoe spring tension. Adjust as required.
- c) Shoe shaft – Inspect shaft for free rotation and wear. All defective components shall be replaced.

### **5.5.3 Electrical**

- a) Perform an insulation test using a meg-ohm meter set at 1000 Vdc. Ensure that the knife switch or main breaker is in the open position. Connect the megger negative lead to carbody ground and the positive lead to the line side of the main knife switch or circuit breaker. A minimum of five (5) megohms is required.
- b) Fuse condition – Perform circuit continuity test and/or observe fuse condition indicator on all fuses and replace all fuses that exhibit an “open” condition.

#### **5.5.4 Cleaning**

- a) Fuse assembly – Clean fuse holder/box thoroughly with an approved non-conductive grease dissolving solvent and inspect for evidence of structural deterioration, damage, electrical tracking, or flashover.
- b) Collector mounting beam/bracket assembly - Clean surface thoroughly and inspect for evidence of structural deterioration, delaminating, cracks, electrical tracking, or flashover.

#### **5.5.5 Lubrication**

Generally, none is required for this type of assembly. Refer to the OEM for all required lubrication applications.