



APTA STANDARDS DEVELOPMENT PROGRAM

STANDARD

American Public Transportation Association
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PRESS Inspection & Maintenance
Working Group

Third Rail Current Collection Equipment Periodic Inspection and Maintenance

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.

Keywords: contact shoe, periodic inspection and maintenance, third rail current collection equipment, third rail shoe

Summary: 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.

Scope and purpose: This standard includes all essential periodic inspection and maintenance requirements for third rail current collection equipment used on rail passenger locomotives/MU cars. It is intended for use by rail equipment maintenance organizations.

This document represents a common viewpoint of those parties concerned with its provisions, namely operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, recommended practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a transit system's operations. In those cases, the government regulations take precedence over this standard. The North American Transit Service Association and its parent organization APTA recognize that for certain applications, the standards or practices, as implemented by individual agencies, may be either more or less restrictive than those given in this document.

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Table of Contents

Participants.....	iii
Introduction.....	iii
1. Frequency of conduct.....	1
2. Requirements and specific tasks	1
2.1 Materials	2
2.2 Tools	2
2.3 Safety/personal protective equipment.....	2
2.4 Training requirements	2
2.5 Inspections and maintenance	2
Related APTA standards.....	4
References.....	4
Definitions.....	4
Abbreviations and acronyms.....	4
Summary of document changes	4
Document history.....	5

List of Figures and Tables

Table 1 Inspection Intervals.....	1
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Participants

The American Public Transportation Association greatly appreciates the contributions of the **Passenger Rail Equipment Safety Standards (PRESS) Vehicle Inspection & Maintenance Working Group**, who provided the primary effort in the drafting of the revision of this document.

At the time this standard was revised, the working group included the following members:

Paul Kovacs, Chair

Lea+Elliott

Dave Elliott, Vice Chair

LTK Engineering Services

Stephen Bonina, *WSP*

Gordon Campbell, *Interfleet Technology Inc.*

John Condrasky, *WABCO Transit Division*

Joshua Coran, *Talgo, Inc.*

Richard Curtis, *Curtis Engineering Consulting*

Ever Diaz, *Keolis commuter Services*

Marc Gagné, *TDG Transit Design Group*

Ben Holland, *Bay Area Rapid Transit District*

Tony Jones, *Voith Turbo Scharfenberg*

Lloyd Mack, *LTK Engineering Services*

Mike Porter, *LTK Engineering Services*

Martin Schroeder, *CH2M*

Sherman Shreves, *SEPTA*

Richard Seaton, *TDG Transit Design Group*

James Skaggs, *International Electronic Machines*

Jeff Thompson, *SEPTA*

Dan Wilson, *Miami-Dade Transit*

Cliff Woodbury, *LTK Engineering Services*

Project team

Nathan Leventon, *American Public Transportation Association*

Charles Joseph, *American Public Transportation Association*

Introduction

This introduction is not part of APTA PR-IM-S-017-02, Rev. 2, "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:

- individuals or organizations that maintain third-rail current collection equipment on locomotives/multiple unit (MU) cars;
- individuals or organizations that contract with others for the maintenance of third rail current collection equipment on locomotives/MU cars; and
- individuals or organizations that influence how third rail current collection equipment is maintained on locomotives/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.
- Identify those inspection criteria and maintenance standards that provide a high level of workplace safety.

Third Rail Current Collection Equipment Periodic Inspection and Maintenance

1. Frequency of conduct

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

TABLE 1
Inspection Intervals

Inspections and Maintenance	Recommended Periodic Inspection Intervals	Reference Section of This Document (Unless Otherwise Noted)
Daily third rail current collection equipment inspection	Daily	CFR Part 229.45
Visual	Not to exceed 92 days	2.5.1
Mechanical	Not to exceed 92 days	2.5.2
Electrical	Not to exceed 92 days	2.5.3
Cleaning	Not to exceed 92 days	2.5.4

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 factors, including but not limited to the following:

- original equipment manufacturer (OEM)—recommended intervals
- industry experience
- operating environment/conditions
- historical data
- performance requirements
- failure analysis
- railroad’s testing and experience
- reliability-centered maintenance programs
- the railroad’s standard maintenance procedure (SMP)

2. Requirements and specific tasks

CAUTION: 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.

CAUTION: Follow proper lock-out/tag-out and blue flag protection of workers procedures as required by the railroad and in accordance with federal regulations.

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

APTA PR-IM-S-017-02, Rev. 2
Third Rail Current Collection Equipment Periodic Inspection and Maintenance

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

2.1 Materials

- approved non-conducting cleaning solvents
- approved lubricants as required by the OEM and the railroad SMP
- additional materials as required by the OEM and the railroad SMP

2.2 Tools

- 1000 VDC megohmmeter (commonly referred to as a megger)*
- multimeter*
- force gauge (spring scale or digital)*
- torque wrench*
- third rail shoe height gauge
- standard tools carried by the maintenance personnel
- third rail shoe thickness gauge*

NOTE: An asterisk (*) denotes tools that shall be calibrated in accordance with OEM and railroad procedures.

2.3 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.

2.4 Training requirements

Railroads and/or their maintenance contractors shall develop and execute training programs in compliance with 49 CFR, Section 238.109 (see References) that provide employees with the knowledge and the skills necessary to safely and effectively perform the tasks outlined in this standard.

2.5 Inspections and maintenance

2.5.1 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 that contact surfaces are clean and free of dust and/or corrosion.
- b) **Mechanical:** Missing or damaged cotter pins, bolts, nuts, lock washers, support brackets and 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 specifications and the railroad SMP. 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:
 - shoe is damaged;
 - pad wear indicator mark is exposed; or
 - shoe is worn down to the condemning limit.

Third Rail Current Collection Equipment Periodic Inspection and Maintenance

- 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 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, then attempt to reset, if applicable. If unable to reset, then replace the fuse.
- g) **Warning labels:** Inspect the “Danger High Voltage” warning labels. Ensure that they are clean, legible and located as prescribed by CFR, OEM and the railroad.
- h) **Emergency shoe insulation:** (CFR 49, Part 229.81) If applicable, 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 the third rail.

2.5.2 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:** If equipped, inspect shaft for free rotation and wear. All defective components shall be replaced.
- d) **Proximity sensor:** If equipped, inspect for damage and replace as required. Check and adjust for height and positioning if required in accordance with OEM’s and the railroad’s maintenance instructions.

2.5.3 Electrical

- a) **Insulation test:** Perform an insulation test using a megohmmeter 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 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.
- c) **Proximity sensor:** If equipped, check and verify operation in accordance with OEM’s and the railroad’s maintenance instructions.

2.5.4 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.
- c) **Proximity sensor:** If equipped, clean thoroughly with an approved grease-dissolving solvent, and inspect for damage.

2.5.5 Lubrication

Generally, no lubrication is required for this type of assembly. Refer to the OEM recommendations and the railroad SMP for all required lubrication applications.

Related APTA standards

APTA PR-IM-S-014-99, “Modification Methodology for the Periodic Inspection and Maintenance of Passenger Coaches” (previously numbered as APTA SS-I&M-014-99)

References

Code of Federal Regulations:

- 49 CFR, Part 229, “Railroad Locomotive Safety Standards,”
- 49 CFR, Part 238, “Passenger Equipment Safety Standards,”

This standard also shall be used in conjunction with the following publications (when the following standards are superseded by an approved revision the revision shall apply):

- OEM specifications for third rail current collection equipment inspection and maintenance
- local operating property procedures for third rail current collection equipment inspection and maintenance
- railroad procedures for providing blue flag protection of workers

Definitions

calendar-day inspection: An inspection performed each calendar day as prescribed by 49 CFR, parts 229 and 238.

Multiple unit (MU) car: A locomotive or locomotive MU as defined in 48 CFR, Section 238.5.

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.

third rail: An electrical conductor located alongside the track designed to carry energy for the propulsion and auxiliary systems of trains.

third rail current collection assembly: A mechanical assembly commonly mounted to a locomotive/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.

Abbreviations and acronyms

APTA	American Public Transportation Association
CFR	Code of Federal Regulations
MU	multiple unit
NATSA	North American Transportation Services Association
OEM	original equipment manufacturer
PRESS	Passenger Rail Equipment Safety Standards
SMP	standard maintenance procedure
VDC	voltage direct current

Summary of document changes

- Document formatted to the new APTA standard format.
- Sections have been moved and renumbered.

APTA PR-IM-S-017-02, Rev. 2
Third Rail Current Collection Equipment Periodic Inspection and Maintenance

- Scope and summary moved to the front page.
- Definitions and abbreviations and acronyms moved to the rear of the document.
- Two new sections added: “Summary of document changes” and “Document history.”
- Some global changes to section headings and numberings resulted when sections dealing with references and acronyms were moved to the end of the document, along with other cosmetic changes, such as capitalization, punctuation, spelling, grammar and general flow of text.
- Addition of proximity sensor to Sections 2.5.2 d), 2.5.3 c), and 2.5.4 c).
- References updated to reflect current (as of May 1st, 2017) information.
- Addition of APTA and PRESS to “Abbreviations and acronyms.”
- Participants list updated.

Document history

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