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RECOMMENDED PRACTICE

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Signals and Communication Working Group

Wayside Signal dc Power System Inspection and Testing

Abstract: This recommended practice provides guidelines for inspecting and testing rail transit wayside signal dc power systems.

Keywords: communication, dc, inspection, maintenance, power, signals, test, testing, wayside signal, wayside signal power system

Summary: Wayside dc power system inspection and testing procedures may be modified for each rail transit agency's requirements but should contain the steps listed in this document as a minimum, with the intent of increasing reliability and reducing the risk of hazards and failures.

Foreword

The American Public Transportation Association is a standards development organization in North America. The process of developing standards is managed by the APTA Standards Program's Standards Development Oversight Council (SDOC). These activities are carried out through several standards policy and planning committees that have been established to address specific transportation modes, safety and security requirements, interoperability, and other topics.

APTA used a consensus-based process to develop this document and its continued maintenance, which is detailed in the manual for the APTA Standards Program. This document was drafted in accordance with the approval criteria and editorial policy as described. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

This document was prepared by the Signals and Communication Working Group as directed by the Rail Standards Policy and Planning Committee.

This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any recommended practices or guidelines contained herein is voluntary. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit agency's operations. In cases where there is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal adviser to determine which document takes precedence.

This document supersedes APTA RT-SC-RP-002-02, which has been revised. Below is a summary of changes from the previous document version:

- This document has been updated using the latest document template for the APTA Standards Program. This document was revised with new language describing the inspection and testing of wayside signal dc power systems.
- The acronym RTS has been replaced with rail transit system and/or rail transit agency throughout the document in addition to minor grammatical corrections.
- Section 1.4 Tool
    - Current clamp was added to depict an example of a current measuring device
    - It was also noted that any tools marked with an asterisk (*) should be calibrated in accordance with OEM and/or rail transit agency requirements
- Section 1.7.1 Inspection
    - The replacement of outdated drawings or instructions was added
    - Cleaning the cooling devices, removal of debris and replacement of malfunctioning fans was added.
- Section 1.72. Testing
    - Review of voltage levels within OEM specifications was added
    - Testing for proper operation of indicators and alarms was added
    - Testing instructions for "on systems with load sharing" and "on systems with battery backup" were updated.

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Participants

The American Public Transportation Association greatly appreciates the contributions of the **Signals and Communications Working Group**, which provided the primary effort in the drafting of this document.

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

Aderemi Omotayo, *LA Metro*, Chair
J. Jeff McCormack, *AECOM*, Vice Chair
Kurt Slesinger, *Greater Cleveland Regional Transit Authority*, Secretary

Salvatore Ambrosino, *MTA New York City Transit*
Jose Arriojas, *NJ Transit*
Charles Barlow, *EverGlow NA*
Ryan Becraft, *Denver Transit Operators*
Frank Beeck, *Rail IT*
Peter Bertozzi, *Patrick Engineering*
Stéphane Bois, *AECOM*
Mark Bressi, *Hitachi Rail Systems USA*
Randy Brundridge, *ALSTOM*
Michael Bunnell, *MTA Metro-North Railroad*
Anthony Candarini, *AECOM*
Andrew Clapham, *Network Rail Consulting Ltd.*
Benjamin Claus, *Port Authority of Allegheny County*
Nicholas Columbare, *ALSTOM*
David Coury, *Transit Systems Engineering*
Michael Crispo, *Hatch-LTK*
Ismail Dahel, *Icomera US*
Philip Dang, *LA Metro*
Nolan Dick, *MBTA*
Martin Dyess, *Dallas Area Rapid Transit*
Jack Ellsworth, *ALSTOM*
Stephen Farrell, *Transit Systems Engineering*
Bruce Fenlason, *Metro Transit–Hiawatha Light Rail*
John Frisoli, *SEPTA*
Johann Glansdorp, *WMATA*
Alex Goff, *AECOM*
Howard Goldberg, *Alstom Signaling*
Howard Gregson, *AECOM*
Pat Guest, *NICTD*
Daniel Hernandez, *Chicago Transit Authority*
Tru Hong, *Gannett Fleming*
Rameez Iftikhar, *TransLink*
Peter Koonce, *City of Portland*
Philip Lee, *WMATA*
Michael Lowder, *Vanasse Hangen Brustlin*
Scott Matonak, *Hitachi Rail STS*
William McClellan, *ACI*
Jerry McCormack, *Vomar Products*
Eric McGraw, *Chicago Transit Authority*
Douglas McLeod, *Network Rail Consulting*
Douglas Minto, *Siemens Mobility*
Jeannette Mitchell, *Chicago Transit Authority*
Javier Molina, *Dallas Area Rapid Transit*
Thomas Newey, *Network Rail Consulting*
Ojo Nwabara, *Hitachi Rail STS*
William Palko, *Mott MacDonald*
Stephen Ranck, *Alstom*
Daniel Reitz, *Port Authority Trans-Hudson Corp.*
Louis Sanders, *Ayers Electronic Systems*
Tim Shoppa, *WMATA*
Phil Wellman, *Metro* Transit
James Winter, *Siemens Mobility*

Project team

Eugene Reed, *American Public Transportation Association*

Introduction

This introduction is not part of APTA RT-SC-RP-002-02, "Wayside Signal dc Power System Inspection and Testing."

APTA recommends the use of this document by:

- individuals or organizations that operate rail transit agencies;
- individuals or organizations that contract with others for the operation of rail transit agencies; and
- individuals or organizations that influence how rail transit agencies are operated (including but not limited to consultants, designers and contractors).

Scope and purpose

This document establishes recommended guidelines for inspecting and testing rail transit wayside signal dc power systems. The purpose of this recommended practice is to verify that wayside signal dc systems and equipment are operating safely and as designed through periodic inspection and testing.

Wayside Signal dc Power System Inspection and Testing

1. Inspection and testing provisions

1.1 Inspection and testing frequency

The inspection and testing procedures in this recommended practice should be performed when wayside signal dc power systems are placed in service; when they are modified, repaired or disarranged; or as otherwise deemed necessary by the rail transit agency.

The rail transit agency should determine the need for additional inspection and testing frequencies for wayside signal dc power systems. A review of the following factors may be useful in making this assessment:

- OEM-recommended intervals
- industry experience
- operating environment/conditions
- historical data
- reliability-centered maintenance program development
- failure analysis
- rail transit agency testing and experience
- regulatory requirements

The frequency of tasks should comply with applicable federal, state and local regulations.

1.2 Training

The rail transit agency and/or its maintenance contractors should develop and execute training programs that provide employees with the knowledge and skills necessary to safely and effectively perform the tasks outlined in this recommended practice.

1.3 Materials

The following materials are recommended for inspecting and testing wayside signal dc power systems:

- materials as required by the OEM and/or rail transit agency

1.4 Tools

The following tools are recommended for inspecting and testing wayside signal dc power systems:

- meggering device*
- digital multimeter*
- VOM*
- current measuring device (e.g., current clamp)*

- rail transit agency–approved portable radio
- standard tools carried by signals personnel
- additional tools as recommended by the OEM and/or rail transit agency

NOTE: Tools marked with an asterisk (*) should be calibrated in accordance with OEM and/or rail transit agency requirements.

1.5 Personal protective equipment

Personal protective equipment, as required by the rail transit agency, should be worn at all times during inspection and testing.

1.6 Safety

Rail transit agency–established safety rules, procedures and practices should be followed at all times during inspection and testing.

1.7 Inspection and testing procedures

Wayside dc power system inspection and testing procedures may be modified for each rail transit agency's requirements but should contain the steps listed in sections 1.7.1 and 1.7.2 as a minimum.

1.7.1 Inspection

1. Notify the operations control center (OCC) and/or other authorities of the inspection activities to be performed.
2. Check associated wiring for defective insulation, broken connectors, loose connections, corrosion and breaks.
3. Check associated contactors, indicators and controls for signs of burned contacts, loose connections, signs of overheating, corrosion and damage. Check equipment for proper operation.
4. Check protection devices for loose connections, broken parts, corrosion and signs of damage. Check equipment for proper operation.
5. Check equipment cases for loose, rusted or broken latches, locks, hinges and covers; damaged weather seals; holes; leaks; and entrances that are exposed or not used.
6. Clean and remove any dust or debris from the enclosure interior.
7. Check terminal boards for loose connections, corrosion and damage.
8. Inspect any associated circuit drawings stored in the equipment enclosure. Replace any damaged, deteriorated or outdated drawings or instructions.
9. Remove any debris or paper from the equipment enclosure prior to testing.
10. Check equipment cooling devices for proper operation. Clean the cooling devices. For example, fans, heatsinks and fan grilles should be free of debris. Malfunctioning or noisy fans should be repaired or replaced.
11. Check equipment and investigate any unusual sounds or odors.
12. Notify the OCC and/or other authorities when inspection is complete.

1.7.2 Testing

1. Notify the OCC and/or other authorities of the testing activities to be performed.
2. Check any coils or transformers for unusual noise.
3. Check that system voltages are within OEM specifications using DMM/VOM.
4. Check system current draw using current measuring device for the purpose of finding unusually high current draw.
5. Test for proper operation of indications and alarms.
6. Test system for grounds.

7. On systems with ground fault detection equipment, verify that no faults are detected, test the operation of the ground fault detector and reset the system.
8. On systems with battery banks, check electrolyte levels and specific gravity (if applicable), and check voltages of each individual cell (under load conditions if possible).
9. On systems with load sharing redundant supplies, perform the following:
    a. Disconnect the normal power source and verify transition to redundant power source.
    b. Reconnect the normal power source and verify transition back to the load sharing state. Investigate any unusual disruptions or noises.
    c. Disconnect the redundant power source and verify transition to normal power source.
    d. Reconnect the redundant power source and verify transition back to the load sharing state. Investigate any unusual disruptions or noises, and verify system timing if applicable.
    e. Perform additional testing as deemed necessary by the rail transit agency to verify proper and safe system operation.
10. On systems with battery backup, perform the following:
    a. Disconnect battery charger and verify transition to batteries. Investigate any unusual disruptions or noises, and verify system timing, if applicable (for example, length of time batteries are able to power their intended load without system disruption).
    b. Perform additional testing as deemed necessary by the rail transit agency to verify proper and safe system operation.
11. Notify the OCC and/or other authorities when testing is complete.

1.8 Correction of deficiencies

Deficiencies identified during wayside signal dc power system inspection and testing should be corrected and documented in accordance with OEM and/or rail transit agency requirements.

1.9 Documentation

Inspection and testing activities should be documented, reviewed and filed in accordance with rail transit agency procedures.

References

This document should be used in conjunction with OEM specifications and rail transit agency procedures for wayside signal dc power equipment inspection and testing.

Definitions

hazard: Any real or potential condition that can cause injury, death or damage, or loss of equipment or property.

operations control center (OCC): One or more locations designed, equipped and staffed for the purposes of monitoring and controlling rail transit agency activities from one or more central locations. Also called *rail control center*, *rail operations center*, *rail service control center*.

original equipment manufacturer (OEM): The enterprise that initially designs and builds a piece of equipment.

personal protective equipment: All clothing and other work accessories designed to create a barrier against workplace hazards. Examples include safety goggles, blast shields, hard hats, hearing protectors, gloves, respirators, aprons and work boots.

rail transit agency: The organization or portion of an organization that operates rail transit service and related activities. Also called *operating agency*, *operating authority*, *transit agency*, *transit authority*, *transit system*.

wayside signal dc power systems: The system that provides dc power to rail transit signal systems, typically including dc power supplies, dc-to-dc converters and charging equipment.

Abbreviations and acronyms

dc direct current
DMM digital multimeter
OCC operations control center
OEM original equipment manufacturer
VOM volt ohm meter

Document history

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