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APTA Rail Transit Signal & Communications Working Group

Visual Inspection of Wayside Signal Equipment

Abstract: This document provides requirements for inspecting rail transit signal system wayside equipment.

Keywords: inspection, signal, wayside signal equipment

Summary: This recommended practice is designed to aid rail transit systems in identifying visual defects or other potentially hazardous conditions related to wayside signal equipment through preventative periodic inspection, thereby increasing reliability and reducing the risk of hazards and failures.

Scope and purpose: The inspection procedure in this document encompasses visual inspections of wayside electrical and mechanical components of the signal system. This document is intended to satisfy the following objectives:

- to ensure that life/safety signal system equipment is operational and free from excessive wear, defects and conditions that put the signal system at risk
- to identify those inspection criteria that provide a high level of passenger and personnel safety

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Introduction

This introduction is not part of APTA RT-SC-RP-033-03, Rev. 1 "Visual Inspection of Wayside Signal Equipment."

APTA recommends the use of this document by:

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

Visual Inspection of Wayside Signal Equipment

1. Inspection requirements

1.1 Inspection frequency

The rail transit system shall determine the inspection frequency for wayside equipment. 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 system testing and experience
- regulatory requirements
- applicable federal, state and local regulations

In addition to the above, wayside equipment should be inspected at the following times:

- after track maintenance/renewal/construction
- prior to restoration of service after unplanned service interruptions
- after any abnormal event (accident, seismic, weather, flood, etc.)

1.2 Materials and data

The following materials are required for inspecting wayside signal equipment:

- signal material location plans
- additional materials as required by the rail transit system and/or OEM

1.3 Tools

Test and inspection tools and apparatus shall be as required by the rail transit system and/or OEM.

1.4 Personnel

These inspections shall be performed by qualified personnel as defined by the rail transit system.

1.5 Personal protective equipment

Personal protective equipment shall be worn as required by the rail transit system.

1.6 Safety

Rail transit system safety rules, procedures and practices shall be followed at all times during inspection. No work of any type shall be performed until train movements and personnel performing the inspections have been protected. The normal functioning of any device shall not be interfered with, in testing or otherwise, without first taking measures to provide for the safety of train operation, which depends on the normal functioning of such device.

2. Inspection procedure

The inspection procedures in this document may be modified for each rail transit system's requirements (see "Note on alternate practices") but shall contain steps 1 through 3 as a minimum. Inspections represented herein may be combined with other inspections/tests for efficiency or ease of execution.

1. Notify the Operations Control Center and/or other authorities of the inspection activities to be performed.
2. Inspect the wayside signal equipment, including but not limited to items listed in **Table 1** for the observed conditions, and note identified deficiencies. To aid in determining the urgency of corrective action, deficiencies can be categorized per Section 3 below.
3. Notify the OCC and/or other authorities when inspection is complete.

TABLE 1
Conditions to Inspect

Type of Equipment or System	Observed Condition(s) for Corrective Action
General inspection	• Trash or debris
Drainage	• Blocked wayside drains • Flooding
Wayside signal equipment: • Impedance bonds • Marker coils • Train-to-wayside communications equipment and loops • Signals • Switch machines • Wayside junction boxes • Bridging receiver units • Terminating receiver units • Signs • Inductive and long-wire loops • Train stops • Axle counters • Route selection boxes • Foundations • Structures, poles, signal masts • Snow melting equipment	• Water damage from condensation, standing water, tunnel leaks/seepage or retention • Corrosion, damage, cracks and breaks • Defective latches, lenses, hoods, hinges, padlocks • Missing or loose components and hardware including degraded structural mounting elements • Missing/damaged covers, weather seals or gaskets • Deteriorated or damaged conduit connections • Unused holes and entrances not required for ventilation • Cracked or damaged housings • Interference from stray ballast or debris • Proper location and visibility of signs and signals • Damaged/loose equipment connectors • Any condition that may interfere with operation of subject equipment • Signal not plumb or visibly sways when train passes

TABLE 1
Conditions to Inspect

Type of Equipment or System	Observed Condition(s) for Corrective Action
Cables, terminations and raceways: • Track circuit connections • Bonds and clamps • Pin bonds • Welded and mechanical conductor rail terminations • Cables • Conduits • Cable mounts and brackets • Signal and negative return bonds • Traction power return and cross-bond cable connections • Transposition and shunt cables	• Defective cable insulation • Damage, corrosion, cracks or breaks • Cable chaffing, rubbing, etc. • Loose conduit connections • Missing or loose components and hardware • Evidence of heat/burning • Loose or broken connections • Rodent damage • Disarrangement of cab loops, cab jumpers and TWC loops
Track components: • Insulated rail joints • Gauge plates • Tie rods • Switch machine rods • Switch points • Stock and guard rails	• Broken or deteriorated insulation • Metal shavings • Excessive wear, bends, or loose or missing hardware • Proper closure or binding of switch points and heels • Proper electrical isolation of running rails and other conductors
Documentation: • Train control room/relay room/bungalow/ wayside case	Up-to-date documents are required to be present: • circuit drawings • terminal lists • wire tags • instructions

3. Correction of deficiencies

The need for corrective action is based on three categories of observed condition severity or as otherwise stated by the rail transit system:

- **Imminent:** The condition is hazardous and should be corrected immediately.
- **Degraded:** The condition could cause a hazard and should be corrected within the next inspection interval.
- **Deteriorated:** The condition is causing the equipment to deteriorate and needs to be noted and monitored at each inspection interval.

4. Documentation

Inspections shall be documented, reviewed and filed in accordance with rail transit system procedures.

Related APTA standards

APTA STD-ADMIN-GL-002-22, "Definitions for Signal & Communications Terms"
APTA RT-S-SC-021-03, "Electric Train Stop Mechanism Inspection and Maintenance"
APTA RT-S-SC-036-03, "Wayside Signal Inspection and Testing"
APTA RT-S-SC-042-03, "Electro-Pneumatic Train Stop Mechanism Inspection and Maintenance"
APTA RT-S-SC-049-03, "Impedance Bond Inspection and Maintenance"

References

This document shall be used in conjunction with the most recent edition of OEM specifications/manuals for wayside signal equipment inspection.

Abbreviations and acronyms

OCC operations control center
OEM original equipment manufacturer
TWC train-to-wayside communications

Summary of document changes

- Document formatted to the new APTA standard format.
- Revisions made to the boilerplate sections for consistency among documents.
- Applied revisions addressing agreed-to comments from the March 10, 2016; June 8, 2016; Oct. 4, 2016; and Jan. 17, 2017, committee meetings.
- Applied revisions to personal protective equipment and inspection procedures.

Document history

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