29. Standard for Wayside Inductive Loop Inspection and Testing

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Abstract: This standard provides procedures for inspecting and testing rail transit wayside inductive loops.

Keywords: wayside inductive loop, inductive loop, inspection, signal, test, testing
Introduction

(This introduction is not a part of APTA RT-SC-S-029-03, Standard for Wayside Inductive Loop Inspection and Testing.)

APTA rail transit safety standards represent an industry consensus on safety practices for rail transit systems to help achieve a high level of safety for passengers, employees, and the general public. This document was created by and for those parties concerned with its provisions; namely, rail transit systems (operating agencies), manufacturers, consultants, engineers, and general interest groups. This standard provides procedures for inspecting and testing rail transit wayside inductive loops.

APTA recommends this standard for:

- Individuals or organizations that inspect, maintain, and/or operate rail transit systems
- Individuals or organizations that contract with others for the inspection, maintenance, and/or operation of rail transit systems
- Individuals or organizations that influence how rail transit systems are inspected, maintained, and/or operated (including but not limited to consultants, designers, and contractors)

This standard intends to meet the following objectives:

- To ensure special life/safety equipment is operational and reliable
- To help rail transit systems incorporate safety considerations during the inspection and maintenance process
- To identify inspection criteria and maintenance standards that provide a high level of passenger and personnel safety

The application of any standards, practices, or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of how a rail transit system operates. In such cases, the government regulations override any conflicting practices this document requires or recommends.
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Standard for Wayside Inductive Loop Inspection and Testing

1. Overview

1.1 Scope

This document establishes standard requirements for inspecting and testing rail transit wayside inductive loops.

1.2 Purpose

The purpose of this standard is to verify that wayside inductive loop systems are operating safely and as designed through periodic inspection and testing, thereby increasing reliability and reducing the risk of hazards and failures.

1.3 Alternate practices

Individual rail transit systems may modify the practices in this standard to accommodate their specific equipment and mode of operation. APTA recognizes that some rail transit systems may have unique operating environments that make strict compliance with every provision of this standard impossible. As a result, certain rail transit systems may need to implement the standards and practices herein in ways that are more or less restrictive than this document prescribes. A rail transit system (RTS) may develop alternates to the APTA standards so long as the alternates are based on a safe operating history and are described and documented in the system’s safety program plan (or another document that is referenced in the system safety program plan).

Documentation of alternate practices shall:

a) Identify the specific APTA rail transit safety standard requirements that cannot be met

b) State why each of these requirements cannot be met

c) Describe the alternate methods used

d) Describe and substantiate how the alternate methods do not compromise safety and provide a level of safety equivalent to the practices in the APTA safety standard (operating histories or hazard analysis findings may be used to substantiate this claim).
2. Definitions and acronyms

For the purposes of this standard, the following definitions and acronyms apply:

2.1 Definitions

2.1.1 coupling transformer: An electrical device used for impedance matching.

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

2.1.3 junction box: An enclosure which contains electrical connections and/or hardware.

2.1.4 loop cable conduit: Conduit made of polyvinyl chloride (PVC), plastic, rubber, fiberglass or other material used to house the coils of cables from which loops are made and to mount the loop to the rail. See also: wayside inductive loop.

2.1.5 loop layout: The complete track assembly that includes the loop, mounting brackets, clamps, loop cable, shorting bar, running rails and other related components.

2.1.6 loop shorting bar: The center tapped, rail to rail, 1000 kcmil cable shunt just inside the insulated joints at an Interlocking signal, which provides rail to rail balance for the negative return current entering and exiting the Interlocking and provides an additional length of inductive coupling for loop audio frequencies.

2.1.7 operations control center (OCC): That facility from which train control, train dispatching, and/or train supervision takes place for the entire RTS or for specific segments of a system if there is more than one control center. Syn: rail control center, rail operations center, rail service control center, train command center.

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

2.1.9 personal protective equipment (PPE): 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.

2.1.10 rail transit system (RTS): The organization or portion of an organization that operates rail transit service and related activities. Syn: operating agency, operating authority, transit agency, transit authority, transit system.

2.1.11 wayside inductive loop: A device constructed of one or more turns of conductors in a loop cable conduit for inductively coupling and/or transmitting track and cab signals into the running rails or to receiving devices for train reception. See also: loop cable conduit.
2.2 Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
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<tbody>
<tr>
<td>OCC</td>
<td>operations control center</td>
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<tr>
<td>OEM</td>
<td>original equipment manufacturer</td>
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<tr>
<td>PPE</td>
<td>personal protective equipment</td>
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<tr>
<td>PVC</td>
<td>polyvinyl chloride</td>
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<tr>
<td>RTS</td>
<td>rail transit system</td>
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3. Inspection and testing requirements

3.1 Inspection and testing frequency of conduct

The inspection and testing procedures in this standard shall be performed when wayside inductive loops are placed in service, when they are modified, repaired, or disarranged, or as otherwise deemed necessary by the RTS.

The RTS shall determine the need for additional inspection and testing frequencies for wayside inductive loops. 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
- RTS testing and experience
- Regulatory requirements.

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

3.2 Training

The RTS and/or their maintenance contractors shall develop and execute training programs that provide employees with the knowledge and skills necessary to safely and effectively perform the tasks outlined in this standard.
3.3 Materials

The following materials are required for inspecting and testing wayside inductive loops:

- RTS-approved lubricants
- Additional materials as required by the OEM and/or RTS

3.4 Tools

The following tools are required for inspecting and testing wayside inductive loops:

- Multi-meter*
- RTS-approved portable radio
- Standard tools carried by maintenance personnel
- Additional tools as required by the OEM and/or RTS

* Calibrate in accordance with OEM and/or RTS requirements.

3.5 Personal protective equipment

Personal protective equipment, as required by the RTS, shall be worn at all times during inspection and testing.

3.6 Safety

RTS established safety rules, procedures, and practices shall be followed at all times during inspection and testing.

3.7 Inspection and testing procedures

Wayside inductive loop inspection and testing procedures may be modified for each rail transit system’s requirements (see Section 1.3) but shall contain the steps listed in Sections 3.7.1-3.7.2 as a minimum.

3.7.1 Inspection

3.7.1.1 Notify operations control center (OCC) and/or other authorities of inspection activities to be performed.

3.7.1.2 Inspect loop layout components and mounting hardware for damage, rust, corrosion and missing or loose components and hardware.
3.7.3 Inspect loop shorting bar components and mounting hardware for damage, rust, corrosion and missing or loose components and hardware.

3.7.4 Inspect PVC, fiberglass, rubber and other loop cable conduit material for damage, cracks, breaks, loose conduit connections, missing or loose components and hardware.

3.7.5 Inspect associated loop junction boxes and other enclosures for rust, corrosion, damage, cracks, breaks, defective latches, locks, hinges, covers, weather seals, gaskets, loose conduit connections, missing or loose components and hardware. Holes and unused entrances shall be sealed.

3.7.6 Inspect associated loop cables and wiring for defective insulation, loose, corroded, rusted, damaged or missing connectors and terminals.

3.7.7 Inspect associated junction boxes and enclosures for the presence and condition of stored circuit drawings, terminal lists, wire tags and instructions.

3.7.8 Inspect associated coupling transformer units and connections for defective wire insulation, corroded, rusted, damaged, loose, or missing components and hardware.

3.7.9 Notify the OCC and/or other authorities when inspection is complete.

3.7.2 Resistance test

3.7.2.1 Notify OCC and/or other authorities of the test activities to be performed.

3.7.2.2 De-energize the appropriate operating power source and/or disable the appropriate track circuit modules for the loops under test.

3.7.2.3 Perform loop resistance test in accordance with RTS procedures.

3.7.2.4 Restore loop connections, power sources, and/or track circuit modules.

3.7.2.5 Verify proper operation of loop and associated track circuits.

3.7.2.6 Notify the OCC and/or other authorities when testing is complete.

3.8 Correction of deficiencies

Deficiencies identified during wayside inductive loop inspection and testing shall be corrected and documented in accordance with OEM and/or RTS requirements.

3.9 Documentation

Inspection and testing activities shall be documented, reviewed, and filed in accordance with RTS procedures.
Annex A

(informative)

Bibliography

[B1] Original equipment manufacturer (OEM) specifications for wayside inductive loop inspection and testing.

[B2] Rail transit system (RTS) procedures for wayside inductive loop inspection and testing.