

# 1. Recommended Practice for Wayside Signal Ac Power System Inspection and Testing

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

**Keywords:** ac, communication, inspection, maintenance, power, test, testing, transfer switch signal, wayside signal, wayside signal power system

## Introduction

(This introduction is not a part of APTA RT-SC-RP-001-02, *Recommended Practice for Wayside Signal Ac Power System Inspection and Testing*.)

APTA rail transit safety standards and recommended practices represent an industry consensus on 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 recommended practice provides guidelines for inspecting and testing rail transit wayside ac power systems.

APTA recommends this practice 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)

The application of any 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 recommends.

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## Contents

1. Overview .....	1.1
1.1 Scope.....	1.1
1.2 Purpose.....	1.1
2. Definitions and acronyms .....	1.1
2.1 Definitions .....	1.1
2.2 Acronyms.....	1.2
3. Inspection and testing recommendations .....	1.2
3.1 Inspection and testing frequency .....	1.2
3.2 Training.....	1.2
3.3 Materials .....	1.3
3.4 Tools .....	1.3
3.5 Personal protective equipment.....	1.3
3.6 Safety .....	1.3
3.7 Inspection and testing procedures.....	1.3
3.8 Correction of deficiencies.....	1.5
3.9 Documentation.....	1.5
Annex A (informative) Bibliography.....	1.6

# Recommended Practice for Wayside Signal Ac Power System Inspection and Testing

## 1. Overview

### 1.1 Scope

This document establishes recommended guidelines for inspecting and testing rail transit wayside signal ac power systems.

### 1.2 Purpose

The purpose of this recommended practice is to verify that wayside signal ac systems and equipment are operating safely and as designed through periodic inspection and testing, thereby increasing reliability and reducing the risk of hazards and failures.

## 2. Definitions and acronyms

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

### 2.1 Definitions

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

**2.1.2 operations control center (OCC):** A location or locations designed, equipped, and staffed for the purposes of monitoring and controlling RTS activities from a central location or locations. *Syn:* **rail control center, rail operations center, rail service control center.**

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

**2.1.4 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.

**2.1.5 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.**

**2.1.6 wayside signal ac power system:** The system that provides ac power to rail transit signal systems typically including input transformer, inverters, converters, transfer, switches, UPS systems, fault protection equipment, breakers and fuses.

## 2.2 Acronyms

<b>DMM</b>	digital multi-meter
<b>OCC</b>	operations control center
<b>OEM</b>	original equipment manufacturer
<b>PPE</b>	personal protective equipment
<b>RTS</b>	rail transit system

## 3. Inspection and testing recommendations

### 3.1 Inspection and testing frequency

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

The RTS should determine the need for additional inspection and testing frequencies for wayside signal ac 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
- RTS testing and experience
- Regulatory requirements

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

### 3.2 Training

The RTS and/or their 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.

### 3.3 Materials

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

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

### 3.4 Tools

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

- Meggering device\*
- Multi-meter\*
- RTS-approved portable radio
- Standard tools carried by maintenance personnel
- Additional tools as recommended 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, should be worn at all times during inspection and testing.

### 3.6 Safety

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

### 3.7 Inspection and testing procedures

Wayside ac power system inspection and testing procedures may be modified for each rail transit system's requirements but should contain the steps listed in Sections 3.7.1-3.7.2 as a minimum.

#### 3.7.1 Inspection

- 3.7.1.1** Notify the operations control center (OCC) and/or other authorities of the inspection activities to be performed.
- 3.7.1.2** Check associated wiring for defective insulation, broken connectors, loose connections, corrossions and breaks.

- 3.7.1.3** Check all associated contactors, switch gears, indicators and controls for signs of burned contacts, loose connections, signs of overheating, corrosion and damage. Check equipment for proper operation
- 3.7.1.4** Check all protection devices for loose connections, broken parts, corrosion and signs of damage. Check equipment for proper operation.
- 3.7.1.5** Check all equipment cases for loose connections, broken parts, corrosion and signs of damage. Check equipment for proper operation
- 3.7.1.6** Clean and remove any dust or debris from enclosure interior
- 3.7.1.7** Check all terminal boards for loose connections, corrosion and damage.
- 3.7.1.8** Inspect any associated circuit drawings stored in equipment enclosure, replace any damaged or deteriorated drawings or instructions.
- 3.7.1.9** Remove any debris or paper from the equipment enclosure prior to testing.
- 3.7.1.10** Check all electrolyte levels if applicable.
- 3.7.1.11** Check all equipment cooling devices for proper operation.
- 3.7.1.12** Check equipment and investigate any unusual sounds or odors.
- 3.7.1.13** Notify the OCC and/or other authorities when inspection is complete.

### **3.7.2 Testing**

- 3.7.2.1** Notify the OCC and/or other authorities of the testing activities to be performed.
- 3.7.2.2** On systems equipped with transfer switches initiate a transfer to the back-up power source (emergency or reserve) for the system being tested and investigate any unusual disruptions or noises.
- 3.7.2.3** On systems equipped with transfer switches initiate a transfer back to the normal power source, verify transition to normal state, investigate any unusual disruptions or noises, verify system timing if applicable.
- 3.7.2.4** Check any coils or transformers for unusual noises.
- 3.7.2.5** Check and note system voltages.
- 3.7.2.6** Test system for shorts, grounds and proper operation.
- 3.7.2.7** On systems with ground fault detection equipment, verify no faults are detected, test the operations of the ground fault detection and reset the system.



**3.7.2.8** On systems with battery banks, check specific gravity (if applicable) and check voltages of each individual cell (under load conditions if possible)

**3.7.2.9** Perform additional testing as deemed necessary by the RTS to verify proper and safe system operation

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

### **3.8 Correction of deficiencies**

Deficiencies identified during wayside signal ac system inspection and testing should be corrected and documented in accordance with OEM and/or RTS requirements.

### **3.9 Documentation**

Inspection and testing activities should be documented, reviewed, and filed in accordance with RTS procedures.

## **Annex A**

(informative)

### **Bibliography**

- [B1] Original equipment manufacturer (OEM) specifications for wayside signal ac power equipment inspection and testing.
- [B2] Rail transit system (RTS) procedures for wayside ac signal power equipment inspection and testing.