

4. Standard for Approach Locking Testing

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Abstract: This standard provides procedures for testing rail transit approach locking.

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Introduction

(This introduction is not a part of APTA RT-SC-S-004-02, *Standard for Approach Locking 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 testing rail transit approach locking.

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 Approach Locking Testing

1. Overview

1.1 Scope

This document establishes standard requirements for testing rail transit approach locking.

1.2 Purpose

The purpose of this standard is to verify that approach locking systems are operating safely and as designed through periodic 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 approach locking: An electric locking that is effective when a train is on the approach within a specified distance to a signal displaying an aspect to proceed that is set to stop and that which prevents the operation of any interlocked or electrically locked switch in the route governed by the signal and prevents an aspect to proceed from being displayed for a conflicting route, until after a predetermined time interval has expired or occupied or if the signal is at stop with the approach unoccupied.

2.1.2 clear signal: A signal displaying a permissive aspect.

2.1.3 conflicting route: Two or more routes, opposing, converging, or intersecting, over which train movements can not be made simultaneously without possibility of collision.

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

2.1.5 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.**

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

2.1.7 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.

2.1.8 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.**

2.1.9 route: The course or way traveled. *See also:* **conflicting routes.**

2.1.10 shunt: A by-path in an electrical circuit.

2.1.11 signal: An appliance that conveys information governing train movement.

2.2 Acronyms

ASR	approach stick relay
OCC	operations control center
OEM	original equipment manufacturer
PPE	personal protective equipment
RTS	rail transit system

3. Test requirements

3.1 Test frequency

The testing procedures in this standard shall be performed when approach locking is placed in service, when it is modified, repaired, or disarranged, or as otherwise deemed necessary by the RTS.

The RTS shall determine the need for additional test frequencies for approach locking. A review of the following factors may be useful in making this assessment:

- OEM-recommended testing 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

No consumable materials are required for testing approach locking unless otherwise specified by the OEM and/or RTS.

3.4 Tools

The following tools are required for testing approach locking:

- Multi-meter*
- Test shunt
- Stop watch
- RTS-approved portable radio
- Standard tools carried by signals 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 testing.

3.6 Safety

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

3.7 Test procedure

Approach locking testing procedures may be modified for each rail transit system's requirements (see Section 1.3) but shall contain the steps listed in 3.7.1-3.7.9 as a minimum. When performing this test procedure, ensure that non-vital logic does not mask the proper operation of the vital logic.

- 3.7.1** Notify the operations control center (OCC) and/or other authorities of the test activities to be performed.
- 3.7.2** Clear the signal for the route to be tested.
- 3.7.3** Simulate track occupancy in an approach track circuit.
- 3.7.4** Cancel the route previously established.
- 3.7.5** Verify that the timing device is energized and that approach locking remains restrictive until the predetermined time interval has elapsed.
- 3.7.6** Verify that each switch in the route is locked during the period when approach locking is restrictive.

- 3.7.7** Verify that conflicting routes cannot be established during the period when approach locking is restrictive.
- 3.7.8** Repeat steps 3.7.2-3.7.7 for each track circuit within the approach section.
- 3.7.9** Notify the OCC and/or other authorities when testing is complete.

3.8 Correction of deficiencies

Deficiencies identified during approach locking testing shall be corrected and documented in accordance with OEM and/or RTS requirements.

3.9 Documentation

Testing activities shall be documented, reviewed, and filed in accordance with RTS procedures.

Annex A

(informative)

Bibliography

[B1] AREMA Communications and Signals Manual of Recommended Practices— Part 2.4.5, Section D: Approach Locking, 1996.

[B2] DOT FRA 236.377: Approach Locking, Rules and Regulations Governing Railroad and Train Control Systems Office of Safety, February 14, 2000.

[B3] NYCT Division of Signal Policy Instruction Std. 11.006.2-1987, Standard Test Instruction, Section 3.10: Approach Locking.

[B4] Original equipment manufacturer (OEM) specifications for approach locking testing.

[B5] Rail transit system (RTS) procedures for approach locking testing.