APTA STANDARDS DEVELOPMENT PROGRAM

STANDARD

American Public Transportation Association
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PRESS Mechanical Working Group

ECP Cable-Based and Passenger Emulation Braking System—Approval Procedure

Abstract: This standard identifies the document submittals and testing that must be conducted to gain approval of the ECP brake equipment as applied to passenger cars and locomotives.

Keywords: approval, brake, ECP, passenger car, rail car

Summary: This safety standard contains the requirements to obtain approval for new electronically controlled pneumatic (ECP) braking systems that meet the requirements contained in the latest revision of APTA PR-M-S-020-17, "Passenger Electronic 26C Emulation Braking System—Performance Requirements," and the latest revision of APTA PR-M-S-021-17, "ECP Passenger Cable-Based Braking System—Performance Requirements."

Scope and purpose: The objectives of this standard are to ensure that the APTA-approved ECP brake equipment from different manufacturers will be interoperable, function consistently and that APTA-approved ECP systems meet a high standard for safety and reliability.

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Introduction

This introduction is not part of APTA PR-M-S-025-19, "ECP Cable-Based and Passenger Emulation Braking System—Approval Procedure."

This standard applies to all:

1. Railroads that operate intercity or commuter passenger train service on the general railroad system of transportation; and
2. Railroads that provide commuter or other short-haul rail passenger train service in a metropolitan or suburban area, including public authorities operating passenger train service.

This standard does not apply to:

1. Rapid transit operations in an urban area that are not connected to the general railroad system of transportation;
2. Tourist, scenic, historic, or excursion operations, whether on or off the general railroad system of transportation;
3. Operation of private cars, including business/office cars and circus trains; or
4. Railroads that operate only on track inside an installation that is not part of the general railroad system of transportation.

ECP Cable-Based and Passenger Emulation Braking System—Approval Procedure

1. Acceptance procedure

1.1 Manufacturer will make application for consideration of any new, non-accepted passenger ECP brake equipment to the American Public Transportation Association PRESS Mechanical ECP Sub-Working Group hereby defined as the Test Committee. The application shall include a test plan/procedure, including a requirements verification matrix. The initial application shall include sufficient narrative description of the passenger ECP brake equipment, together with preliminary drawings and/or documents.

1.2 Following review and approval of initial application data and test plan by the Test Committee, the steps in paragraph 1.3 must be taken to obtain conditional approval of the ECP brake equipment.

1.3 It is the manufacturer's obligation to establish that the passenger ECP brake equipment will comply with, and satisfactorily function in accordance with, the following applicable specifications, as witnessed by representatives of Test Committee:

- **APTA PR-M-S-020-17, Rev. 1,** "Passenger Electronic 26C Emulation Brake Systems—Performance Requirements"
- **APTA PR-M-S-021-17, Rev. 1,** "ECP Passenger Cable-Based Brake Systems—Performance Requirements"
- **APTA PR-M-S-023-19,** "ECP Passenger Cable-Based Brake DC Power Supply—Performance Specification"
- **APTA PR-M-S-024-19,** "Intratrain Communication Requirements for ECP Cable-Based Passenger Train Control Systems"

1.3.1 Demonstration shall include the following:

1.3.1.1 Testing shall be conducted on an-approved 24-car test rack with a system configuration as described in paragraph 1.3.1.2. The HEUs, TPSs and EOTs shall be selected from production lots of four of each. All ECP car control devices shall be selected and witnessed by a representative of the Test Committee.

1.3.1.2 The 24-car test rack shall be configured as follows:

- A minimum of 100 ft of brake pipe with angle cocks and 22 in. end hoses on each car
- A minimum of 100 ft of AAR-approved ECP cable per car or locomotive, with no segment exceeding 250 ft
- Cable junction boxes at each end of car and locomotive
- AAR-approved ECP connectors at each junction box
- Total cable and connector length shall be 2400 ft minimum
- One CCD and car ID module per car
- Two HEUs, two locomotive ID modules, two TPSs and two HETs

- One EOT node (as defined in APTA Standard PR-M-S-021-17, "ECP Passenger Cable-Based Braking System—Performance Requirements")

1.3.2 Results of all required tests shall be provided by the manufacturer and furnished free of charge to APTA for evaluation. These results shall include requirements traceability and compliance matrix for each applicable APTA passenger ECP standard, as specified in paragraph 1.3. These matrices shall list the APTA specification requirement by specification number and a corresponding manufacturer test report section number that demonstrates compliance with that requirement. The manufacturer shall also include all the necessary test reports.

1.3.3 Once the tests outlined in paragraph 1.3.2 have been successfully accomplished, interoperability testing shall be conducted in accordance with APTA PR-M-S-026-17, "ECP Passenger Cable-Based Braking System—Interoperability Procedure." The testing shall be between new ECP brake equipment and APTA-approved passenger ECP brake equipment.

1.4 Upon satisfactory completion of the laboratory tests listed in paragraph 1.3.1.1, Test Committee shall consider conditional approval of the passenger ECP brake equipment. For passenger ECP car equipment, the passenger ECP car control devices shall be placed in service within 24 months. For passenger ECP locomotive equipment, a minimum of one locomotive equipped with passenger ECP equipment must be placed in service. For passenger ECP end-of-train devices, a minimum of one must be placed in service within 24 months of test approval.

2. In-service testing requirements

2.1 In-service tests must be conducted within 24 months of the date of conditional approval.

2.2 Train length is to be approved by Test Committee.

2.3 Full Test Committee approval shall be given for the passenger ECP brake equipment under the following conditions:

2.3.1 Service reports shall be furnished to Test Committee within 30 days after each six-month period of in-service testing.

2.3.2 In-service testing shall be conducted for a period of two years unless otherwise specified by Test Committee.

2.3.3 During the two-year service test period, the manufacturer must keep accurate records of any malfunctions of the passenger ECP brake equipment and report these to Test Committee.

2.3.4 Manufacturers shall make available repair material for the test passenger ECP brake equipment. Any repairs required or modifications made are to be included in the manufacturer's six-month report to Test Committee.

2.3.5 APTA and/or Test Committee reserves the right to withdraw conditional test approval if safety is impaired, if reliability degrades or if incompatibility of passenger ECP brake operation develops.

2.3.6 APTA and/or Test Committee reserves the right to require additional testing or performance evaluation as deemed necessary.

3. Other requirements

3.1 If a manufacturer desires to make any change in the passenger ECP brake equipment that is under APTA approval, the manufacturer shall advise APTA, furnishing full information as to the nature of the proposed change and the objects expected to be accomplished thereby. This provision covers only changes effecting interoperability and failure mode, effects and criticality analysis (FMECA). The Test Committee shall decide in each case what action is to be taken on these changes.

3.2 The manufacturer shall be responsible for all travel and reasonable and customary expenses associated with the approval tests.

Related APTA standards

The following standards are the complete set of Passenger ECP standards:

APTA PR-M-S-020-17, "Passenger Electronic 26C Emulation Braking System—Performance Requirements"
APTA PR-M-S-021-17, "ECP Passenger Cable-Based Braking System—Performance Requirements"
APTA PR-M-S-022-19, "ECP Passenger Cable-Based Brake System Cable, Connectors and Junction Boxes—Performance Requirements"
APTA PR-M-S-023-19, "ECP Passenger Cable-Based Brake DC Power Supply—Performance Requirements"
APTA PR-M-S-024-19, "Intratrain Communication Requirements for ECP Cable-Based Passenger Train Control Systems"
APTA PR-M-S-025-19, "ECP Passenger Cable-Based and Passenger Emulation Braking System—Approval Procedure"
APTA PR-M-S-026-19, "ECP Passenger Cable-Based Braking System—Interoperability Procedure"
APTA PR-M-S-027-19, "ECP Passenger Cable-Based Braking System—Configuration Management"

Definitions

electronically controlled pneumatics (ECP): A train power braking system actuated by compressed air and controlled by electronic signals originated at the locomotive/cab car for service and emergency applications. An ECP brake system is composed of ECP locomotive/cab car equipment, ECP car equipment and an ECP end-of-train (EOT) device. ECP locomotive/cab car equipment includes a head end unit (HEU), locomotive ID module and trainline power supply (TPS). ECP car equipment includes a car control device (CCD) and a car ID module.

Abbreviations and acronyms

AAR Association of American Railroads
CCD car control device
ECP electronically controlled pneumatics
EOT end-of-train
FMECA failure mode, effects and criticality analysis
HEU head end unit
ID identification
LCD locomotive control module
NATSA North American Transportation Services Association
PRESS Passenger Rail Equipment Safety Standards
TPS trainline power supply

Summary of document changes

- This is the first publication of this document.

Document history

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