



APTA STANDARDS DEVELOPMENT PROGRAM

RAIL STANDARD

American Public Transportation Association
1666 K Street, NW, Washington, DC, 20006-1215

APTA RT-VIM-S-023-12

First Published September 28, 2012

APTA Rail Transit Standards Vehicle
Inspection and Maintenance Working
Group

Emergency Egress/Access for Rail Transit Vehicles

Abstract: This standard specifies the design requirements for emergency egress and access systems for new rail transit vehicles.

Keywords: emergency egress/access, emergency response, emergency systems, hazard analysis, self-evacuation

Summary: This standard was developed to establish minimum design requirements for emergency egress/access systems intended to provide emergency exit capability for passengers and crew and emergency access capability for emergency response personnel in a life-threatening situation as a result of an accident, incident or environmental situation involving the vehicle or right-of-way.

Scope and purpose: This standard applies to rail transit systems that are in the process of procuring new vehicles. This standard specifies minimum criteria for emergency access and egress provisions for rail transit vehicles. Other complementary emergency systems provide lighting, signage and path markings to locate, operate and reach emergency exits and are covered in separate APTA standards.

This *Rail Standard* represents a common viewpoint of those parties concerned with its provisions, namely, transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any standards, practices or guidelines contained herein is voluntary. In some cases, federal and/or state regulations govern portions of a transit system's operations. In those cases, the government regulations take precedence over this standard. APTA recognizes that for certain applications, the standards or practices, as implemented by individual transit agencies, may be either more or less restrictive than those given in this document.

© 2012 American Public Transportation Association. No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the American Public Transportation Association.



Participants

The American Public Transportation Association greatly appreciates the contributions of David Barber, who provided the primary effort in the drafting of this standard.

At the time this standard was completed, the Vehicle Inspection and Maintenance Committee included the following members:

Jayendra Shah, *Chair*
Kenneth Morford, *Vice Chair*
Vicki Porter, *Secretary*

Juan Aristizabal	Joseph Krempasky
Dave Barber	Brian Ley
Damian Barnhart	John McEwen
Sherif Bastawros	Phil Olekszyk
Tom Berg	Ken Raghunandan
Richard Berk	Steve Rumsey
Steve Bethel	John Sadorra
Jerry Blackman	Richard Seaton
Stephen Bonina	James Skaggs
Lisa Cobb	George Shaffer
John Condrasky	John Shea Jr.
Richard Curtis	Melissa Shurland
Paul Denison	Narayana Sundaram
Phil Eberl	Michele Swayzer
Bill Egan	Tom Tarantino
Marc Gagne	Clive Thornes
Mike Ghobrial	Brian Turner
Dan Gornstein	Wilson Wallace
Curt Grau	Michael Wetherael
John Green	Evalyn Williams
Scott Grogan	Brian Whately
Terry Heildebrandt	Daniel Wilson
Ben Holland	Cliff Woodbury
Antonio Huggins	Hannie Woodson
Paul Jamieson	Bob Young
Ronald Johnson	
Anthony Jones	
John Kesich	
Rick Kindig	
Henry Kolesar	
Paul Kovacs	
David Kowalski	

Project consultant
 Gordon Campbell
Interfleet Technology Inc.

Project team
 Charles Joseph
American Public Transportation Association

Contents

Introduction	iii
Note on alternate practices	iii
1. General system requirements.....	1
1.1 Operation of emergency access and exit equipment	1
1.2 Analysis of hazards associated with vehicle emergency exiting..	1
2. Design requirements for exterior emergency access.....	2
2.1 Number and location of emergency access points	2
2.2 Doors equipped for exterior emergency access.....	2
2.3 Door exterior emergency releases	2
2.4 Door emergency entry system interlock controls.....	3
2.5 Windows equipped for exterior emergency access	3
3. Design requirements for interior emergency exits	3
3.1 Number and location of emergency exit points.....	3
4. Doors equipped for emergency exiting.....	3
4.1 Door interior emergency releases.....	3
4.2 Door emergency exit system interlock controls	4
4.3 Windows equipped for interior emergency exit	4
5. Required emergency response strategy	4
6. Maintenance	5
6.1 Periodic inspections and tests.....	5
6.2 Defect reporting, repair and recordkeeping.....	5
7. References.....	5
8. Definitions.....	5
9. Abbreviations and acronyms.....	6
10. Summary of changes.....	6

Introduction

(This introduction is not a part of APTA RT-VIM-S-023-12, “Emergency Egress/Access for Rail Transit Vehicles.”)

APTA rail transit system members have expressed a commitment to increase the effectiveness of safety devices and features on rail transit vehicles, not only for passengers, but also for operators and emergency personnel. This standard describes the minimum requirements for emergency egress/access systems for rail transit vehicles.

APTA recommends the use of this standard by:

- individuals or organizations that maintain emergency egress/access systems for rail transit vehicles;
- individuals or organizations that contract with others for the maintenance of emergency egress/access systems for rail transit vehicles; and
- individuals or organizations that design, specify or approve emergency egress/access systems for rail transit vehicles.

This standard is intended to satisfy the following objectives:

- Incorporate safety considerations during the design and specification process when procuring new vehicles.
- Incorporate safety considerations when determining scope of work during the design and specification of major overhauls or retrofit campaigns.
- Identify those safety critical standards that provide a high level of passenger safety.
- Identify those safety critical standards that provide a high level of crew safety.
- An effective systems approach uses this standard, as well as APTA standards APTA RT-S-VIM-020-08, “Emergency Lighting System Design for Rail Transit Vehicles”, APTA RT-S-VIM-021-08, “Emergency Signage for Rail Transit Vehicles,” and APTA RT-S-VIM-022-08, “Low Location Emergency Path Marking for Rail Transit Vehicles,” to provide a means for passengers and rail transit vehicle operators to locate, reach and operate emergency exits to facilitate their safe evacuation in an emergency. Each rapid transit system and car builder should carefully consider the options available to meet emergency evacuation requirements presented in these standards. This standard is intended to address emergency exit/entry of rail transit vehicle passenger compartments. Emergency exit/entry specific to the operator cab is addressed in a separate standard yet to be published, APTA-RT-RP-VIM-025-12 “Operator Protection Features for Rail Transit Vehicles.”

Note on alternate practices

The purpose of an APTA *Rail Standard* is to ensure that each rail transit system achieves a high level of safety for passengers, employees and the public. APTA standards represent an industry consensus of acceptable safety practices that should be used by a rail transit system. However, APTA recognizes that some rail transit systems have unique aspects of their operating environment, that when combined levels of service that must be provided, may make strict compliance with every provision of an APTA *Rail Standard* impossible.

When a rail transit system is faced with this dilemma, that system may use its system safety program plan to specify an alternate means to achieve an equivalent level of safety as provided by the APTA standard. The system safety program plan should:

- identify the rail transit safety standard requirements that cannot be met;
- state why each of these requirements cannot be met;
- describe the alternate means to ensure equivalent safety is achieved; and
- 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).

Emergency Egress/Access for Rail Transit Vehicles

1. General system requirements

Emergency egress and access shall be provided for individual rail transit cars, allowing for the safe evacuation of passengers and entry by emergency responders in the event of life-threatening emergencies. Egress and access shall be provided by a combination of doors and windows sufficient in number to accommodate vehicle size, passenger capacity and alternative exit/entry locations. For passenger safety, operation of emergency exit/entry devices shall restrict vehicle motion with doors open.

1.1 Operation of emergency access and exit equipment

The provision and operation of emergency exit and entry devices for rail transit vehicles is intended to permit passengers to evacuate from an area of immediate danger to an area of greater safety, and to allow emergency responders to gain entry to a rail transit vehicle in an emergency. The intent of this standard is to provide uncontrolled emergency access and exit points on the vehicle without special tools or keys.

1.2 Analysis of hazards associated with vehicle emergency exiting

Passenger-activated emergency exits are intended to permit passengers to self-evacuate to an area of relative safety with or without assistance of transit or rescue personnel. Immediate passenger evacuation in certain emergency incidents may be the least hazardous course of action. However, unsupervised evacuations may result in passengers exiting to an area of greater danger.

Environmental and operating conditions differ considerably among individual transit systems. Some rail transit operating environments present hazards that may be equal to or greater than the hazards justifying immediate evacuation. Transit systems involved in the purchase of new rail vehicles shall conduct a hazard assessment to determine the safest means and strategies to respond to and evacuate passengers in the event of an emergency, taking into account the specific hazards and capabilities of that transit system's operating environment and emergency features. The following factors should be taken into account to ensure that hazards associated with the availability or limitation of emergency exit capabilities are addressed in a manner that will not result in a situation of increased danger to passengers:

- **Vehicle characteristics**, such as:
 - i. door threshold height affecting evacuation away from station platforms;
 - ii. proximity of operator or additional crew to passengers; and
 - iii. emergency communications and surveillance capabilities.

- **Right-of-way characteristics**, such as:
 - i. at grade, on street;
 - ii. tunnels, elevated structures;
 - iii. close clearances;
 - iv. availability of walkways, catwalks for high level doors;
 - v. protective railings on elevated structures;
 - vi. availability of emergency exits between stations;

- vii. visibility and tripping hazards; and
 - viii. proximity of high-voltage adjacent tracks or high-speed trains.
- Operational issues, such as:
 - i. Passenger-initiated train stopping for emergencies;
 - ii. stoppage of trains and removal of traction power in evacuation area;
 - iii. emergency response procedure and capability; and
 - iv. emergency response for passengers with disabilities.

Provision for passenger self-evacuation from vehicles must take this operating environment into account to ensure that self-evacuation does not put passengers in greater danger. The hazard assessment shall be used to determine the safest means to respond to and evacuate passengers in the event of an emergency.

Where rail transit vehicles are equipped for passenger-activated evacuation, the transit system must have established procedures for dispatching transit and rescue personnel to the scene as quickly as possible to supervise the evacuation. Procedures must also be established for the immediate control of train movements and removal of traction power proximate to the evacuation.

Where the hazard assessment determines that relative risk may be greater for passenger-initiated evacuation than delays due to evacuation initiated by employees/responders, the transit system may choose to restrict passenger access to interior emergency door releases. In so doing, the rail transit system must have a policy and procedure for identifying, locating and responding to emergencies to evacuate passengers without delay.

2. Design requirements for exterior emergency access

2.1 Number and location of emergency access points

A minimum of four emergency entry points (two per side) shall be provided for each passenger compartment 60 ft in length or less. Two additional emergency entry points (one per side) shall be provided for each additional 30 ft of passenger compartment length in excess of 60 ft. Vehicle side doors shall be used as emergency entry points. A doorway with two separate door panels is considered a single emergency entry point. If vehicle design does not provide a sufficient number of doors on each side, emergency windows may be used to achieve the required number of emergency entry points.

2.2 Doors equipped for exterior emergency access

All doors designated as exterior emergency entry points shall be designed to be opened manually without the use of a crew key or tool and without vehicle electrical or air power required for normal door operation. Doors designated as emergency entry points should be capable of being fully opened (all panels) to facilitate the ability of emergency responders to enter the vehicle in emergency situations. Doors designed for high platform boarding shall have external ladders to facilitate access. Vehicle design shall consider survivability of doors, door pockets and emergency releases to minimize damage that would prevent manual opening.

2.3 Door exterior emergency releases

Exterior emergency door releases shall be provided at all doors designated as emergency entry points. Emergency releases must be positioned on the vehicle so that they are easily accessible to emergency responders on roadbeds, station platforms and catwalks. Appropriate signage shall be provided to help responders locate and operate the door release mechanisms. Keys shall not be required to access the release mechanisms.

As a precaution against unauthorized use, door release mechanisms may be covered and covers may be equipped with audible and visual alarms that activate when the cover door is opened. Additional signage may be provided warning against unauthorized use.

2.4 Door emergency entry system interlock controls

Door system controls shall permit a door to be manually opened by the exterior emergency door release when the vehicle is stopped. Door system controls shall be designed to prevent movement of the vehicle when a door is manually opened after activation of an exterior door emergency release. A bypass switch may be used to allow train movement with doors open in emergency situations.

2.5 Windows equipped for exterior emergency access

When vehicle doors are insufficient to meet emergency entry point requirements, emergency access windows shall be provided. Emergency access windows shall be designed to permit rapid and easy external opening by emergency responders. Access windows shall be provided with exterior identification markings and instructions.

3. Design requirements for interior emergency exits

3.1 Number and location of emergency exit points

A minimum of four emergency exit points (two per side) shall be provided for each passenger compartment 60 ft in length or less. For vehicles between 60 and 90 feet, two additional emergency exit points (one per side) shall be provided. A doorway with two separate door panels is considered a single emergency exit point. If vehicle design does not provide a sufficient number of doors on each side, emergency windows may be used to achieve the required number of emergency exit points.

In the event the RTS can not comply after performing a hazard analysis for passenger egress / emergency responder access they may consider the use of end doors as emergency exits.

4. Doors equipped for emergency exiting

All doors designated as interior emergency exit points shall be designed to be opened manually without the use of a crew key or tool and without vehicle electrical or air power required for normal door operation. Doors designated as emergency exit points should be capable of being fully opened (all panels) to facilitate passenger evacuation in emergency situations. Doors designed for high platform boarding shall have external ladders positioned to facilitate evacuation. Vehicle design shall consider survivability of doors, door pockets and emergency releases to minimize damage that would prevent manual opening.

4.1 Door interior emergency releases

Interior emergency door releases accessible to passengers shall be provided at all doors designated as emergency exit points. Emergency releases must be positioned so that they are easily accessible to passengers near the exit point. Appropriate signage shall be provided to instruct passengers how to access and operate the mechanisms. Release mechanism access and operation shall not require keys or special tools. Release mechanisms shall be designed to permit manual door opening.

Additional emergency evacuation instruction signage should be provided at exit locations, informing passengers of emergency procedures to be followed. Signage should also warn passengers of any risks upon exiting, such as drop-offs to roadbed, high voltage, moving trains, and tripping or falling hazards.

As a precaution against unauthorized use, door release mechanisms may be covered and covers may be equipped with audible and visual alarms that activate when the cover door is opened. Alarm signals may also be transmitted to the operating cab or central control, alerting transit system personnel that an emergency exit has been activated. Additional signage may be provided warning against unauthorized use.

4.2 Door emergency exit system interlock controls

Door system controls shall permit a door to be manually opened by the interior emergency door release when the vehicle is stopped by any means, including normal, deadman, penalty or emergency braking; signal or automatic control; or an incident (derailment, collision) causing a vehicle to stop. Door system controls shall be designed to prevent movement of the vehicle when a door is manually opened after activation of an interior door emergency release. A bypass switch may be used to allow train movement with doors open in emergency situations.

Door system controls shall prevent a vehicle in motion from continuing in motion with a door opened by the interior emergency door release. The rail transit agency procuring new transit vehicles for operation on its system shall conduct a hazard assessment to assess risks based on its operating environment and potential incidents requiring emergency passenger evacuation. The results from the hazard assessment shall be used to determine an acceptable method for the design of the emergency door interlock system.

The following are examples of alternatives that have been acceptable designs:

1. Activation of an interior emergency door release shall apply full service braking, bringing the vehicle to a stop. The doors controlled by the activated release may be manually opened prior to the vehicle being completely stopped.
2. Activation of an interior emergency door release shall apply full service braking, bringing the vehicle to a stop. The doors controlled by the activated release may be manually opened after the vehicle is completely stopped (zero speed condition).
3. Activation of an interior emergency door release shall send a signal to the operator indicating the activation of the device. Activation of the interior emergency door release does not initiate vehicle braking or interrupt propulsion. After the operator brings the vehicle to a stop, the doors controlled by the activated release may be manually opened. This option allows the operator to determine a safe location for emergency stopping and evacuation.

NOTE: Capability for two-way communication between the operator and passengers should be provided to determine the nature of the emergency and need for evacuation.

4.3 Windows equipped for interior emergency exit

When vehicle doors are insufficient to meet emergency exit point requirements, emergency exit windows shall be provided. Emergency exit windows shall be designed to permit rapid and easy opening from the inside of the vehicle. Exit windows shall be provided with interior identification markings and instructions for passengers. Signage shall be provided warning against unauthorized opening of emergency exit windows.

As a precaution against unauthorized use, exit windows may be equipped with audible and visual alarms which activate when the window is opened. Alarm signals may also be transmitted to the operating cab or central control, alerting transit system personnel that an emergency window has been opened.

5. Required emergency response strategy

Each transit system shall develop an emergency response strategy consistent with vehicle capability for passenger-initiated emergency exiting. Transit system emergency response plans must be developed to halt

operations and dispatch personnel in the event of passenger-initiated evacuations. If the operating environment is not designed for self-evacuation, then the emergency response strategy must take this into account. If the transit system determines, through a hazard analysis, that the operating environment presents unacceptable hazards to self-evacuation, then an alternate methodology to self-evacuation must be developed to ensure rapid response by personnel in emergency situations in lieu of allowing passenger-initiated rail vehicle emergency exits.

6. Maintenance

6.1 Periodic inspections and tests

Rail transit systems shall conduct periodic inspections and tests to verify that all vehicle emergency access and egress components function as intended. These shall include release mechanisms, covers, alarms, signage, vehicle movement sensing and control, manual door opening, and window opening for all equipped doors and windows. Inspection and testing shall be incorporated into existing procedures for vehicle door, communication and control systems.

6.2 Defect reporting, repair and recordkeeping

Defects, such as broken, missing or non-operational components, shall be reported and repaired in accordance with established local transit system procedures and OEM recommendations.

7. References

American Public Transportation Association, *Rail Standards*:

APTA RT-S-VIM-020-10, “Emergency Lighting System Design for Rail Transit Vehicles”

APTA RT-S-VIM-021-10, “Emergency Signage for Rail Transit Vehicles”

APTA RT-S-VIM-022-10, “Low Location Emergency Path Marking for Rail Transit Vehicles”

Federal Railroad Administration, 49 CFR Part 238, Passenger Equipment Safety Standards.

8. Definitions

emergency entry points: Doors or windows that may be opened manually from the vehicle exterior by means of a release mechanism that does not require special tools or keys.

emergency exit points: Doors or windows that may be opened manually from the vehicle interior by means of a release mechanism that does not require special tools or keys.

passenger compartment: That portion of a rail transit vehicle designed for passenger occupancy, having vehicle end doors or interior doors, perpendicular to the vehicle sides, which separate that section of the vehicle from other vehicle sections, other passenger compartments or other vehicles. A vehicle may contain one or more passenger compartments. Open articulation sections do not separate passenger compartments but are considered a continuation of the passenger compartment.

9. Abbreviations and acronyms

APTA	American Public Transportation Association
CFR	Code of Federal Regulations
LVPS	low-voltage power supply
OEM	original equipment manufacturer
PRESS	Passenger Rail Equipment Safety Standards

10. Summary of changes

This is a new document, hence no changes shown.