

3. APTA PR-PS-S-003-98

Standard for Emergency Evacuation Units for Passenger Rail Cars

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Abstract: This standard contains the minimum requirements for an emergency egress system for new and remanufactured passenger rail cars using a combination of doors and emergency window exits suitably equipped for use in an emergency.

Keywords: EEU, egress, emergency exit, emergency window, evacuation

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1666 K Street, N. W.
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Introduction

(This introduction is not a part of APTA PR-PS-S-003.98, Standard for Emergency Evacuation Units for Passenger Rail Cars.)

The ability of passengers to evacuate a passenger car immediately following a derailment or other emergency condition is determined by the number of usable exits and alternate means of egress. Predicting the number of usable exits requires a selection of emergency scenarios to ascertain what is likely to occur and what steps passengers with minimal orientation and on-scene guidance can be expected to take to reduce their exposure to danger. The 1993 Mobile, 1996 Silver Spring and 1996 Secaucus rail accidents focused attention on the need to improve the passengers' ability to protect themselves in times of peril when train crew members are either not able or are not surviving to organize a rescue effort. Prescriptive solutions in the past have simply imposed a set number of emergency exits without regard to car configuration or seat capacity. Likewise, there are a multitude of car designs for which a prescriptive approach neither improves emergency egress nor satisfactorily addresses some likely scenarios, even though they are "compliant."

The Federal Railroad Administration (FRA) regulations contained in 49 CFR, Part 238 requires that each passenger rail car is equipped with at least 2 exterior, side doors that are at least 30 in width. In addition, the FRA requires that at least 4 emergency window exits with a minimum size of 24 inches by 26 inches be provided on each main level of the rail car.

This standard establishes a performance driven emergency egress protocol that allows the passenger railroad operator and car builder to effectively combine various types of exiting in a car that is related to the seating capacity, using the emergency evacuation unit (EEU) to determine quantity.

Participants

The American Public Transit Association (APTA) greatly appreciates the contributions of the following individual(s), who provided the primary effort in the drafting of the *Standard for Emergency Evacuation Units for Passenger Rail Cars*:

James Michel

At the time that this standard was completed, the Passenger Rail Equipment Safety Standards (PRESS) Passenger Systems Committee included the following members:

Bill Lydon, Chair

Dave Brooks
Ralph Dolinger
Robert Gagne
Jim Gourley
Doug Karan
John Kopke
Eric Kosty
Billy Lopez
Susan Madigan

Stephanie Markos
James Michel
Brenda Moscoso
Scott Ornstein
J. K. Pollard
Al Pucci
Jack Reidy
Dan Taylor

Contents

1. Overview	3.4
1.1 Scope.....	3.4
1.2 Purpose.....	3.4
2. References	3.4
3. Definitions, abbreviations, and acronyms	3.5
3.1 Definitions.....	3.5
3.2 Abbreviations and acronyms.....	3.6
4. Design Requirements.....	3.6

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1. Overview

As a result of derailments, on-board fires, or other emergency incidents that require passengers to exit a passenger rail car without the intervention of a member of the train crew, each car must have sufficient exit paths that remain usable after an incident. In the most likely derailment and fire scenarios, one side and one end of a rail car will not be suitable for emergency egress, requiring sufficient alternative means to exit the car on the remaining usable paths.

Due to the great number of car configurations, the passenger railroad operator and the car designer shall determine the combination of exit doors and emergency exit windows required in order to establish an emergency egress system, as expressed in emergency evacuation units (EEU).

1.1 Scope

This standard shall apply to new and remanufactured passenger rail cars.

A combination of doors and emergency exit windows providing no less than the minimum number of EEUs per car constitutes the emergency egress system for a specific car design.

EEU calculations apply only to passenger car occupants exiting the vehicle and not to emergency responders trying to gain access from the exterior.

1.2 Purpose

This standard is intended to ensure passenger rail car occupants have usable emergency exit paths.

2. References

This standard shall be used in conjunction with the following publications:

49 CFR, Part 223, Glazing

49 CFR, Part 238, Passenger Equipment Safety Standards.

49 CFR, Part 239, Passenger Train Emergency Preparedness

APTA-PR-PS-S-002-99, Rev. 2, Standard for Emergency Signage for Egress/Access of Passenger Rail Equipment

APTA-PR-PS-S-004-98, Rev. 1, Standard for Low-Level Exit Path Marking

Urban Mass Transportation Administration (UMTA) Bay Area Rapid Transit (BART) C Car. Report no. UMTA-MA-06-0178-87-1, September, 1987

3. Definitions, abbreviations, and acronyms

3.1 Definitions

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

3.1.1 car end door: A door exiting from the passenger compartment or vestibule to the exterior, located between the truck center and the end of the rail car.

3.1.2 car level: A horizontal surface with permanently installed seating that is separated by at least four (4) feet (1.22 m) vertically from another seating area.

3.1.3 capacity exit factor (CFX): A value equal to the seating capacity of the car divided by 17 rounded up to the next whole number.

3.1.4 emergency evacuation unit (EEU): A numerical value assigned to an egress element that correlates to the speed and ease of exiting by a rail passenger.

3.1.5 emergency window exit: A window equipped with interior fittings to permit a passenger to easily remove the glazing, complying with *49 CFR, Part 238.113, Emergency Window Exits¹*, has an EEU value of 1.0.

3.1.6 exit door: A door intended to be used as part of an emergency exit path and complying with *49 CFR, Section 238.235, Doors*, has an EEU value of 2.0 per door leaf. On multi-level cars, car end exit doors with a door threshold higher than five (5) feet (1.52 m) above top of rail shall not be considered to be an EEU..

3.1.7 manually operated door: A door that can be operated by a passenger without tools or keys using only body strength to overcome the door closer, friction, and gravity.

3.1.8 power operated door: A door equipped with a power operator which in an emergency, shall be capable of manual operation with an override device in accordance with *49 CFR, Part 238.235 Doors*.

3.1.9 private accommodation: An enclosed room with a door within the passenger car equipped with seating or bedding where a person(s) may occupy the space exclusively.

3.1.10 reasonable exit rate: Per Bay Area Rapid Transit (BART) C Car September, 1987 report, a reasonable exit rate for a door is 35 persons per minute. (Using the criterion, one EEU is provided for each group of 17 passenger seats.)

¹ References in Italics correspond to those found in Section 2

3.1.11 usable exit path value (UXP): The number of emergency windows and exit doors that can be used by passengers after an incident that requires emergency egress from the vehicle. This value shall be the sum of EEUs for one side of the car less 50% of car end doors as defined in Section 3.1.1.

3.2 Abbreviations and acronyms

APTA	American Public Transportation Association
BART	Bay Area Rapid Transit
CFR	Code of Federal Regulations
CXF	capacity exit factor
EEU	emergency evacuation units
PRESS	Passenger Rail Equipment Safety Standards
UMTA	Urban Mass Transportation Administration (now Federal Transit Administration)
UXP	usable exit path

4. Design Requirements

Each passenger rail car shall have a combination of door exits and emergency window exits to achieve an EEU value equal to the larger of the capacity exit factor (CXF) or the usable exit path (UXP).

Bi-parting exit doors may be considered to be an EEU, provided each door leaf is at least 30 inches (76 cm) in width.

In addition to the EEU requirements for the general circulation spaces of the rail car, each private accommodation shall have one emergency window exit EEU. rail car. Only 25% of private accommodation EEUs may be included in the calculation of UXP.

Each passenger rail car shall have a minimum of two emergency window exits per car level, per car side.

Emergency window exits shall be distributed throughout passenger car body to reduce interior travel distance.

Exit doors and emergency window exits shall be manually operable without special tools.

Exit doors and window exits shall be marked in accordance with *49 CFR Parts 223² and 239, APTA PR-PS-S-002-98 Rev 2, Standard for Emergency Signage Egress/Access of Passenger Rail Equipment*, and *APTA PR-PS-S-004-99, Rev. 1, Standard for Low Level Exit Path Marking*.

² For references in Italics, see Section 2.