

**APTA RT-VIM-S-021-10, Rev. 2**

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APTA VIM Standards Working Group

Emergency Signage for Rail Transit Vehicles

Abstract: This standard specifies the minimum performance criteria for the design of the emergency signage for rail transit vehicles.

Keywords: emergency signage

Summary: This standard requires that each rail transit vehicle have interior and exterior emergency signage to assist passengers, train crew members and emergency responders in an emergency. Interior signage assists passengers and crew members in locating and operating emergency exits in order to safely evacuate from the equipment. Exterior signage assists emergency responders in locating and operating emergency access points.

APTA rail transit agency members have expressed a commitment to increase the effectiveness of safety devices and features present on rail transit vehicles, not only for the passengers but also for the operators and emergency personnel. This standard is intended to incorporate safety considerations during the design and specification process when procuring new vehicles; to incorporate safety considerations when determining scope of work during the design and specification of major overhauls or retrofit campaigns; to identify those safety-critical standards that provide a high level of passenger safety; and to identify those safety-critical standards that provide a high level of crew safety.



Foreword

The American Public Transportation Association is a standards development organization in North America. The process of developing standards is managed by the APTA Standards Program's Standards Development Oversight Council (SDOC). These activities are carried out through several standards policy and planning committees that have been established to address specific transportation modes, safety and security requirements, interoperability, and other topics.

APTA used a consensus-based process to develop this document and its continued maintenance, which is detailed in the [manual for the APTA Standards Program](#). This document was drafted in accordance with the approval criteria and editorial policy as described. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

This document was prepared by the VIM Standards Working Group as directed by the Rail Standards Policy and Planning Committee.

This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit system's operations. In cases where there is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal adviser to determine which document takes precedence.

This document supersedes APTA RT-VIM-S-021-10, Rev. 1, which has been revised. Below is a summary of the working group's changes from the previous document version:

- Implemented terminology changes.
- Added and removed language as needed to clarify standard requirements.
- Added appendixes containing acceptable examples of emergency signs/markings.
- Added provisions to include FTA and NTSB recommendations (e.g., hazard signage, standardized internationally recognized pictograms and symbols, nonemergency egress through end doors).
- Incorporated provisions applicable to rail transit from APTA PR-PS-S-006-23, "Emergency Egress/Access Signage" and "APTA PR-PS-S-004-99 Low-Location Exit Path Markings for Passenger Rail Equipment."
- Added, formalized and updated references.



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Introduction

This introduction is not part of APTA RT-VIM-S-021-10, Rev. 2, "Emergency Signage for Rail Transit Vehicles."

Rail transit agencies shall review the adequacy of emergency egress/access signs and markings as part of their Public Transportation Agency Safety Plan (PTASP) and Safety Management System (SMS).

Rail transit agencies and carbuilders should carefully consider the options available to meet emergency evacuation requirements.



APTA recommends the use of this document by:

- individuals or organizations that operate rail transit systems;
- individuals or organizations that contract with others for the operation of rail transit systems; and
- individuals or organizations that influence how rail transit systems are operated (including but not limited to consultants, designers and contractors).

This standard is an integral component of a systems approach to facilitate the ability of passengers and train crew members to locate, reach and operate emergency exits; for emergency responders to gain access into the car; and to promote safe evacuation from a rail transit car in the event of an emergency. The other required components of this systems approach are emergency lighting, low-location exit path marking (LLEPM) and situational awareness signage.

Additional information about LLEPM provisions is contained in APTA RT-VIM-S-022-10, “Low-Location Exit Path Marking for Rail Transit Vehicles.”

Scope and purpose

This standard applies to rail transit agencies that are procuring new vehicles, retrofitting existing vehicles or overhauling existing vehicles. This standard specifies minimum design and performance criteria for rail transit car emergency signage that not only functions under normal conditions but will also operate when normal and/or emergency lighting systems are unavailable.

This standard also requires tests to validate the design. Other complementary emergency systems provide lighting and path markings to locate, operate and reach emergency exits and are covered in separate APTA standards.

Rail transit agencies recognize that, in the majority of emergencies, the safest place for passengers and crew is on the rail transit vehicle. Should evacuation from a particular vehicle be required, the safest course of action for passengers and crew is normally to move into an adjacent car. This avoids or minimizes the hazards inherent with evacuating passengers onto the railroad right-of-way.

Note on 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 may develop alternates to 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:

- identify the specific APTA rail transit safety standard requirements that cannot be met;
- state why each of these requirements cannot be met;
- describe the alternate methods used; 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 Signage for Rail Transit Vehicles

1. General system requirements

Emergency signs/markings shall be designed to provide evacuation guidance for passengers and rail transit vehicle crew members, as well as rescue access guidance for emergency responders. All signs and instructions shall be visible and easily readable.

Acceptable examples of door signs/markings are included in the appendixes.

1.1 Visual identity and recognition

All emergency exit and rescue access signage/markings systems shall contain brief and quickly understandable information, with consideration for useful field of view (UFOV). That is, emergency exit signage/markings systems shall enable passengers and train crew members to make positive identification of emergency exits. Signs/markings and instructions shall utilize, to the extent practical, commonly recognized or standardized internationally used information symbols, icons, graphics and pictograms, as well as standardized color, contrast, content and placement.

Each interior emergency exit sign and emergency exit locator sign shall be conspicuous (i.e., clearly recognizable and distinguishable) or become conspicuous to passengers and train crew members immediately and automatically upon the loss of power for normal lighting, from a minimum distance of 5 ft (1.52 m). Each sign/markings shall remain conspicuous under the minimum general emergency light illumination levels as specified in APTA RT-VIM-S-020-10, “Emergency Lighting System Design for Rail Transit Vehicles,” as well as under total darkness should the emergency lighting systems fail. The signs/markings shall operate independently of the cars’ normal and emergency lighting systems for a minimum of 1.5 hours after loss of all power for normal lighting. An emergency exit locator sign shall be located in close proximity of each emergency exit and shall work in conjunction with the emergency exit sign. The location of the sign, directional arrow(s) or wording shall guide passengers and train crew members to the emergency exit route.

NOTE: High-performance photoluminescent (HPPL) signs/markings should not be installed in shadowed locations, to the extent practicable.

Each emergency rescue access sign/markings shall be conspicuous on the exterior of the car. Rescue access signage/markings systems shall enable emergency responders to make positive identification of rescue access points without undue hesitation, delay or confusion.

NOTE: Emergency rescue access signs/markings are typically fabricated using retroreflective material.

1.2 Multilingual signs

At a minimum, any words included in emergency exit/rescue access signage shall be in English. However, when system-specific determinations are made or as otherwise mandated by local, municipal, state or other regulations, signage/instructions shall be written in one or more designated languages in addition to English.

Standardized pictograms can be used to supplement mandatory signage written in English. In addition, the use of universal symbols for signage may serve as an alternative to signage written in other languages, enabling riders with diverse cultural and language backgrounds to interpret emergency signage.

1.3 Signage for warnings and hazards

Emergency signs/markings shall include the notification of hazards associated with emergency egress/evacuation. Signage should warn passengers of any risks at the exit locations of the vehicle, including but not limited to drop-offs, moving vehicles, unstable roadbed, falling or tripping hazards, and electric hazards such as high voltage or third rail.

Warnings shall provide information on (1) the nature of the hazard and (2) what to do if the hazard is encountered. Hazard signage shall have letters no less than $\frac{3}{8}$ in. in height. All instructional language shall have letters no less than $\frac{3}{16}$ in. in height.

Departures from letter size provision shall be in accordance with “Table 1 – Examples of word message letter heights and minimum safe viewing distance” in Section B3.3.13 of ANSI Z535.4-2011, “American National Standard for Product Safety Signs and Labels,” as agreed to between the transit authority and the manufacturer.

A safety alert symbol, as is referenced in ANSI Z535.4 and ISO 7010-2020, “Graphical symbols - Safety colors and signs,” shall also be affixed near the warning sign.

2. Design requirements, interior

Emergency exit and evacuation information placed within the interior of the car body shall, at a minimum, consist of the following signs/markings/instructions:

- door exit signs/markings and instructions
- door exit locator signs/markings, if necessary
- door exit control locator signs/markings
- emergency window exit locator signs/markings, if necessary
- emergency window exit signs/markings and instructions

2.1 Location

2.1.1 Door exits

2.1.1.1 Door signs/markings

Each vestibule door, end-frame door and side door leading to the exterior that is intended for emergency egress shall be identified by a sign/markings that contains the wording “EXIT,” “EMERGENCY EXIT” or other similar wording in capital letters. Standardized pictograms can be used to supplement mandatory signage written in English.

Each sign shall be located on the door or door glazing, or in the immediate proximity. The center of the sign shall be located on the upper half of the door/car and shall be conspicuous.

2.1.1.2 Door exit locators/markings

If a door exit is not within sight of any seat or standee location (e.g., visibly blocked by a bulkhead or divider), then a door locator sign shall be provided to enable passengers and train crew members in those areas to identify the location of such door exit.

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The locator sign(s) shall consist of brief text, graphic arrow(s) or standardized internationally recognized symbol(s) that are placed on bulkheads, dividers, seat frames/pockets, armrests, luggage racks, ceilings, etc., to direct passengers toward the nearest door that can be used for emergency egress.

2.1.1.3 Door exit emergency release locator signs/markings

Each door exit handle, latch or operating button shall be marked with HPPL material using one of the following methods:

- outline stripping that is no less than 1 in. (2.54 cm) wide to the extent practicable around the perimeter of the opening device; or
- area wide pad that is applied to the door or doorframe directly behind the handle or latch with no less than 16 sq in. (103 cm²).

In addition, each door equipped with a separate manual override device for a power-operated door intended for emergency egress shall be marked with a sign/markings containing the words “Emergency Door Release,” “Manual Door Release,” or other similar wording. These signs/markings shall be placed at the manual door control or at an appropriate location in its immediate proximity.

Rail transit agencies may use a standardized internationally recognized pictogram to serve as a supplemental identifier for doors equipped with manual door control for emergency egress.

If it is not obvious where the manual release device is located relative to the door handle, latch or operating button, then a door emergency release locator sign shall be posted. The manual door release locator signs/markings shall consist of brief text, graphic arrow(s) or standardized internationally recognized symbol(s) to direct passengers and crew members from the door control to the location of the manual door release.

2.1.1.4 Instructions

If the method for opening a door intended for exit is not obvious, then operating instructions shall be posted at that door’s control or in its immediate vicinity. Signage shall be visible and easily readable.

Operating instructions shall be posted at or near each manual release device for a door intended for emergency egress. Signage shall be visible and easily readable.

2.1.1.5 Routinely locked doors

When a door designated as an exit is locked (such as an end-frame door at the end of the train), additional measures shall be taken to provide emergency opening instructions for the door exit or to direct passengers to an alternative door exit and/or emergency window exit. These measures may include the following:

- PA announcements
- safety seatback cards
- permanent signage or markings

2.1.1.6 Nonemergency egress

Each rail transit vehicle with end doors shall be equipped with signage to deter nonemergency passenger egress through the end doors. For coupled equipment, additional signage should be provided to highlight the hazard associated with the gap between cars.

2.1.2 Emergency window exits

2.1.2.1 Exit locator signs/markings

Emergency exit locator signs/markings directing passengers and crew members to the nearest emergency window exit location(s) shall be provided. The signage/marking shall use the words “EMERGENCY EXIT” or similar wording. This signage/marking may take the form of:

- signage/marking on walls;
- signage/markings on light fixtures located above the emergency window exit; and/or
- signage/markings located on the ceiling, window or seat frames/armrests.

One sign/marking may serve more than one emergency window exit if the sign can readily identify each such exit. If all the side windows installed in the passenger compartment of the rail car can be used for emergency egress, then locator signs are not required.

An emergency window exit sign may serve as a locator sign if it meets the minimum requirements for a locator sign.

2.1.2.2 Exit locator signs/markings and instructions

Each interior emergency window exit shall be identified with a sign/marking located on or adjacent to each such window. In addition, instructions, including pictorial diagrams or other standardized internationally recognized symbols for exiting the window, shall be posted on or adjacent to each such window.

If so equipped, each emergency window exit equipped with a pull handle shall be identified with an “EMERGENCY EXIT PULL HANDLE” marking, either as an integral part of the handle marking, with instructions/illustrations applied as a decal in the immediate vicinity, or a combination of these.

Locations that are space-limited, such as the emergency window pull handle, as well as supplemental operating instructions, shall have the characters as large as feasible for the allotted space.

2.2 Letter/sign size

2.2.1 Letter size

The letter characters on emergency exit signs and markings and emergency exit locator signs intended to be read by the general public shall have a minimum character height using uppercase letters of:

- 1 in. (2.54 cm) on emergency window exit signs and locator signs; or
- 1.5 in. (3.81 cm) on door exit signs and locator signs.

In addition, the characters shall have the following characteristics:

- a width-to-height ratio between 3:5 and 1:1;
- a stroke-to-width ratio (i.e., the width of the lines that are combined to produce a letter) between 1:4 and 1:6; and
- spacing between letters of a minimum of one-sixteenth the height of the uppercase letters.

NOTE: These requirements do not apply to instructional signage/marking.

2.2.2 Sign size

A minimum sign area of 16 sq in. (103 cm²) is required for all end and side door exit signs.

2.3 Color and contrast

Lettering and pictograms utilized on interior emergency exit signage/markings shall be designed to achieve a luminance contrast ratio of not less than 0.7, as measured by a color-corrected photometer.

NOTE: The recommended color contrast choice for all new and replacement signage is either green or red lettering/graphics. In addition, existing signage should comply with the recommendation for either green or red lettering/graphics on a light photoluminescent background, preferably with a matte finish, except for those instances in which bold contrast with the background on which the sign is placed would not be attainable. Green or red may be used if the color scheme is consistently implemented throughout an agency.

A contrasting border around the outer edge of the sign will also enhance visibility.

The more of the HPPL surface that is visible (i.e., not covered with letters, symbols, etc.), the more conspicuous the resulting sign. Graphics or heavy text covering the HPPL material will reduce the light output of the sign letters, and thus the conspicuity and legibility of the signs as well, even though the HPPL material passes the tests required.

2.4 Illuminance/luminance criteria

2.4.1 Electrically powered systems

The light sources used to comply with the criteria required in this section shall be electrically powered (e.g., incandescent, fluorescent, electroluminescent [EL] or LED).

2.4.1.1 Illuminance/luminous intensity

For signs/markings with exposed LEDs that spell out “EXIT,” each LED shall have a minimum peak intensity of 35 mcd.

2.4.1.2 Luminance

The average luminance value of the electrically illuminated sign/markings shall be at least 1000 mcd/m², as measured on the surface marking or sign.

NOTE: Most electroluminescent signs have an initial luminance of more than 20,000 mcd/m², but they may show substantial luminance degradation (more than 80%) over their service lives. Service life estimates range from 30,000 to 100,000 hours (7 to 20 years) for stationary equipment.

NOTE: LED devices need to be designed to achieve the 1000 mcd/m² value by their end of life. For example, a 50,000-hour L70 rated LED system will need to have an initial luminance of at least 1429 mcd/m².

2.4.2 Passive systems

2.4.2.1 Materials

Signs/markings constructed of HPPL material shall provide a luminance value of at least 7.5 mcd/m² for 1.5 hours after loss of normal power.

2.4.2.2 Charging light

The illuminance levels required to provide sufficient charging vary according to the type of light source used. The minimum charging light values are as specified in **Table 1**.

TABLE 1
Minimum Illuminance Values for Charging HPPL Materials

HPPL Illuminance fc (lux)	Type of Luminaire (Charging Light)
0.8 (8.6)	Cool-white LED (6500 K)
0.9 (9.7)	Warm-white LED (4700 K)
1.0 (10.8)	Cool-white fluorescent (4000 to 4500 K)
1.5 (16.1)	Warm-white fluorescent (3000 to 3500 K)
3.5 (37.7)	Incandescent (2900 K)

These illuminance values shall be measured with a light meter with the sensor placed flat against the surface of the sign/markings in accordance with Section 4.1.2.

HPPL materials certified by an independent test laboratory to meet **Table 1** with the lower amount of charging light are permitted for use at that location as long as the specified amount of light is available.

HPPL signs/markings certified by an independent test laboratory to be capable of meeting the specifications for HPPL material that are located in partitioned vestibules/compartments/passageways that are no longer than 5 ft (1.5 m) longitudinally (including partially portioned vestibules) are not subject to the illuminance requirements in **Table 1**.

To ensure that the normal lighting system provides an adequate charge to the HPPL system, luminaires (light fixtures) shall be located in the proximity of each HPPL component and oriented to ensure that the HPPL material is adequately exposed to charging light.

Luminaires located in the proximity of each HPPL component shall be specified such that their light-dispersion patterns provide the above-listed minimum illuminance levels at the surface of the component.

2.4.3 Dual-mode systems

Dual-mode systems composed of active and passive components shall be designed so the HPPL material is adequately charged by an active light source in order to comply with the minimum luminance criterion of 7.5 mcd/m² for a duration of 1.5 hours after activation lighting has been removed or ceased operating.

2.5 Component materials

Interior emergency exit signs/markings complying with sections 2.2 and 2.3 shall be constructed of active electrically powered light sources, passive HPPL material, dual-mode systems or a combination, as specified in this section.

Sign/markings component illumination or luminance levels, as applicable, shall be initially verified in accordance with Section 4 and maintained in accordance with Section 7.

The difference between the physical characteristics of electrically powered light sources and HPPL materials has an impact on their visibility and thus the performance criteria and installation location within various rail car configurations.

2.5.1 Signs/markings

2.5.1.1 Vestibule, end-frame and side doors

Emergency exit signs/markings shall identify the location of all vestibule, end-frame and side doors leading to the exterior of the car and intended for emergency egress, using:

- HPPL material, including dual mode; or
- electrically powered fixtures with an independent power source that can power the signs/markings for a time frame defined by the rail transit agency in accordance with the typical emergency response time specific for its operation and after the power source for the emergency lighting has been exhausted.

For electrically powered illuminated signs that use an independent power source, a status indicator shall be readily observed during the daily inspection. The status indicator shall be designed with a health status feature.

Rail transit cars ordered on or after the adoption of this standard shall have HPPL material.

2.5.1.2 Requirements to mark side door exit locations without independently powered emergency lighting

Each side door opening intended for emergency egress leading to the exterior of the car shall be marked with a minimum of 144 sq in. (930 cm²) of HPPL material placed no higher than 18 in. (45.7 cm) off the floor, with its lowest point no higher than 6 in. (15.2 cm) off the floor. The marking may be composed of one or more panels placed either on the door and/or in its immediate vicinity.

NOTE: A door with two leaves that open for emergency egress is considered a single door opening. Therefore, 144 sq in. (930 cm²) of HPPL material is sufficient for that door opening.

To provide some illumination at the floor for passengers and crew members as they exit, to the extent practical, the material should not be placed on a door leaf/panel that is intended to open for emergency egress or on the part of a wall or partition that would be covered by a door leaf/panel in any position (e.g., sliding doors).

Signs and markings used to comply with the low-location exit path marking (LLEPM) requirements contained in APTA RT-VIM-S-022-10, “Low-Location Exit Path Marking,” may be counted toward this requirement to the extent that they meet the criteria noted above (e.g., HPPL door delineators required to meet the LLEPM requirements that are installed on the door 18 in. [45.7 cm] off the floor would count as 36 sq in. [232 cm²] of the 144 sq in. [930 cm²] required).

2.5.1.3 Door exit control locator signs/markings

Each door control locator sign/markings shall be constructed of HPPL material.

2.5.1.4 Emergency window exits

All emergency window exit markings shall be constructed of HPPL material.

3. Design requirements, exterior

Rescue access information for emergency responders placed on the exterior of the car body shall, at a minimum, consist of the following:

- external rescue access door signs/markings and instructions
- external rescue access door control locator signs/markings and instructions
- external rescue access window locator signs/markings and instructions
- external roof access locator signs/markings and instructions, if applicable

3.1 Location

3.1.1 Rescue access doors

3.1.1.1 Door signs/markings

Each door intended for use by emergency responders for rescue access shall be identified with emergency access signs, standardized internationally recognized symbols or other conspicuous markings consisting of retroreflective material that complies with sections 3.2 and 3.3.

3.1.1.2 Door control signs/markings and instructions

Each door intended for use by emergency responders for rescue access shall have operating instructions for opening the door from outside the car placed on or immediately adjacent to the door on the car body. If a powered door does not function with an integral release mechanism, the instructions shall indicate the location of the exterior manual door control.

Each powered door intended for use by emergency responders for rescue access that has a nonintegral release mechanism located away from the door shall have a door control sign/markings placed at the location of this control that provides instructions for emergency operation, either as part of the access sign/markings or as another sign/markings.

Each car equipped with manual doors shall have operating instructions for opening the door from the exterior, either as part of the access sign/markings or as another sign/markings.

3.1.2 Rescue access windows

On rail cars equipped with rescue access windows, each rescue access window shall be identified with a unique retroreflective and easily recognizable sign, symbol or other conspicuous marking that complies with sections 3.2 and 3.3.

Signs utilizing standardized internationally recognized symbols or markings shall be placed at the bottom of each such window, on each window or adjacent to each window, utilizing arrows where necessary to clearly designate rescue access window locations. Legible and understandable window access instructions, including any pictogram/instructions for removing the window, shall be posted at or near each rescue access window.

NOTE: An emergency exit window and rescue access window may utilize the same window as long as the window is marked according to Section 2.1.2.1 on the inner face of the window and Section 2.1.2.2 on the outer face of the window.

3.1.3 Emergency roof access

On rail cars equipped with an emergency roof access, the location of each emergency access point provided on the roof of the rail car shall be clearly marked with retroreflective material of contrasting color that

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complies with sections 3.2 and 3.3. Legible and understandable instructions shall be posted at or near each such location.

NOTE: The sign may include the notification of hazards associated with roof evacuation, including but not limited to electric hazards such as a live pantograph.

Signs at the access point shall have a total area of no less than 98 sq in. (632 cm²) and shall contain appropriate text and/or icons for the method of access. The wording and icons on the signs shall have the same orientation and shall be entirely within the confines of the retroreflective border identifying the access point.

NOTE: Concise wording and the use of icons where possible is recommended.

If emergency roof access is provided by means of a structural weak point:

- the retroreflective material shall clearly mark the line along which the roof skin shall be cut; and
- a sign plate with a retroreflective border shall also state:



“CAUTION—DO NOT USE FLAME CUTTING DEVICES”



“CAUTION—WARN PASSENGERS BEFORE CUTTING”



“CUT ALONG DASHED LINE TO GAIN ACCESS”



“ROOF CONSTRUCTION—[STATE RELEVANT DETAILS]”

If emergency roof access is provided by means of a hatch, then a sign with a retroreflective border, or that is entirely retroreflective, in either case of a contrasting color, shall be applied to the outside of each hatch. This sign shall, at a minimum, state:

- “EMERGENCY ACCESS,” or words to that effect
- in smaller letters, instructions for opening the hatch

3.2 Color and contrast

Exterior signs/markings shall provide a lettering-to-sign background and sign-to-substrate luminance contrast ratio of not less than 0.7, as measured by a color-corrected photometer.

Characters and their background shall have a nonglare finish. Characters shall contrast with their background, with either light characters on a dark background or dark characters on a light background.

NOTE: A contrasting border around the outer edge of the sign may also enhance visibility.

3.3 Materials

Exterior emergency rescue access locator signs/markings shall be constructed of retroreflective material that conforms to the specifications for Type I, as specified in ASTM D4956, “Standard Specification for Retroreflective Sheeting for Traffic Control.”

In order to maintain optimum retroreflective properties of the base material, any retroreflective markings that have ink or pigment applied shall utilize a translucent or semitranslucent ink, as per the manufacturer’s

instructions. This may include a UV clear coat to prevent fading. Signs utilizing protective coatings or other materials for the enhancement of sign durability shall meet the retroreflectivity requirements.

3.4 Letter size

All external primary identification markings (i.e., emergency door release) shall have letters no less than $\frac{3}{8}$ in. in height. All external instructional signs shall have letters no less than $\frac{3}{16}$ in. in height.

4. Evaluation measurements and tests

4.1 Interior signs/markings

To verify that emergency signage system component design complies with the requirements of Section 2.4, a qualification test shall be conducted on at least one representative passenger car/area of each signage system layout in accordance with this section.

For equipment ordered on or after the adoption of this standard, the first car to have the system installed may be tested, and this test shall be completed prior to the car's release for operation in revenue service.

Rail transit agencies shall confirm that emergency exit signage system components comply with the minimum required illumination or luminance criteria, as applicable, for the specified duration.

4.1.1 Electrically powered (active) systems

Test reports provided by the manufacturer/supplier with results certified by an independent laboratory shall show that electrically powered components have been photometrically tested as appropriate for the type of light source. These shall show:

- luminance for EL markings; and
- luminous intensity for point sources.

All results must comply with Section 2.4.1.

Rail transit agencies shall confirm that the power supply for electrically powered signage will maintain the operating voltages specified by the sign/markings manufacturer/supplier for at least 1.5 hours after loss of normal power.

To ensure compliance with Section 2.4.1, measurements of electrically illuminated signs/markings shall be conducted in accordance with sections 3.2, 3.3, 3.4.1 and 3.4.2, as well as Table 1 in Section 2.3 of APTA RT-S-VIM-020-10, "Emergency Lighting System Design for Rail Transit Vehicles."

4.1.2 Passive HPPL systems

4.1.2.1 Material luminance

Manufacturer/supplier-provided independent laboratory certified test result reports shall show that all tested samples of passive HPPL material, as used in the finished component configurations (including any cover or protective coating if used, but not including text or graphics) comply with the minimum luminance criterion of 7.5 mcd/m² after 1.5 hours when tested according to the provisions of ASTM E2073, "Standard Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings," with the following three modifications:

- **Section 8.3, Activation:** The HPPL material shall be activated with a fluorescent lamp of 40 W or less that provides no more than 1 fc of illumination as measured on the material surface.

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- **Section 8.4, Luminance:** The photopic luminance of all specimens of the HPPL material shall be measured with a luminance meter, as described in Section 5.2 of ASTM E2073, a minimum of 1.5 hours after activation has ceased.
- **Section 9.1.12, Luminance in mcd/m²:** The test report shall include a luminance measurement 1.5 hours after activation has ceased.

The manufacturer/supplier is required to have a minimum of one batch of material for signs/markings of a given type certified. Signs/markings of the same certified type of material can be sold to multiple customers, even with minor changes in text or typography.

4.1.3 Ambient light charge

To confirm that HPPL emergency sign/marking components are installed in locations that receive adequate charging light, illuminance measurements shall be taken in accordance with Section 2.4.2.2 of this standard. This requirement applies to each representative car/area tested.

The charging light shall consist only of that provided by the car's normal lighting system. All natural or other external light shall be excluded. Several methods can be used to eliminate ambient light for accurate data collection, including working at night with cars parked away from bright yard lights; locating cars in a dark windowless shop, paint booth or carwash; masking windows and vestibules with roofing paper, flooring paper or similar opaque materials; or draping cars with opaque tarpaulins.

To take the measurement readings, the sensor is placed on the area of the HPPL sign/marking surface location (or on the floor location as permitted in Section 2.5.1.2). The observer records the readings using a data collection form.

The sensor and the readout device of the illuminance meter should be held so they can be read without the observer's shadow affecting the readings.

If light diffusers are used on the light fixtures, then the measurements shall be made with the light diffusers in place.

4.1.4 Testing equipment

To ensure accurate illuminance measurements including measurements on vertical surfaces at which the angle of incident light is large, the light meter must be designed to take such measurements and possess all of the following:

- **Basic accuracy:** $\pm 3\%$ of reading ± 1 digit or better
- **Resolution:** 0.01 fc or better
- **Cosine error:** No more than 6%, measured at 50 deg.
- **Color correction:** Correction to CIE photopic curve

4.2 Exterior signs/markings

Rail transit agencies shall ensure that retroreflective material is certified by an independent test laboratory to be in conformance with ASTM E810, "Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry."

4.3 Recordkeeping

Rail transit agencies shall retain a copy of the car manufacturer/supplier-provided independent laboratory certified test report results showing that the illuminance or luminance measurements, as appropriate, on the

active area of the signage/markings component comply with the criteria specified in Section 2.4 of this standard. Such records shall be kept until all cars with those components are retired, transferred, leased or conveyed.

Rail transit agencies shall retain a copy of the certified independent laboratory test report results that certify that the retroreflective material complies with Type I materials per ASTM D4956 until all cars containing the retroreflective material are retired, transferred, leased or conveyed to another rail transit agency. A copy of such records shall be provided to the accepting rail transit agency, along with any cars that are transferred, leased or conveyed.

5. System reliability

All emergency signage systems shall be designed so the signs/markings remain conspicuous, notwithstanding the failure of any individual sign, material segment, single light fixture, or battery or other power source.

6. Operating conditions

All emergency signage shall be designed to operate without failure under the conditions typically found in rail transit vehicles, including expected mechanical vibrations, shock and electromagnetic interference.

For rail cars ordered on or after the adoption of this standard, emergency signs/markings shall continue to function after the standby power and any other stages of load shedding have terminated, independently of the main car battery, so that illumination at the minimum levels is maintained for at least 1.5 hours after loss of normal power.

7. Maintenance

7.1 Daily inspections

Rail transit agencies that conduct daily inspections shall visually inspect all emergency signage system components, except those for roof access, during those inspections to determine that sign/markings components are present and conspicuous, and that signs and instructions are legible.

7.2 Periodic inspections

Rail transit agencies shall conduct periodic inspections and tests to verify that all emergency signage components, including power sources, function as intended. Rail transit agencies shall test a representative sample of passenger rail cars considering the deployment of different batches of signs.

7.2.1 Electrically powered (active) systems

Rail transit agencies shall perform periodic tests to confirm that system components, including the emergency power source, function as intended and comply with sections 2.4.1.1 and 2.4.1.2. The first tests shall be upon installation of the system components. Subsequently, periodic tests should be conducted no less frequently than once every eight years.

The tests shall verify the minimum illumination/luminance level and duration of all system components.

Electrically powered components shall be photometrically tested as appropriate to the type of light source:

- illuminance for internally illuminated signs/markings/delineators
- luminance for EL signs/markings/delineators

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Independent power sources shall be certified by their manufacturers/suppliers to be capable of maintaining operation of the sign/markings components to which they are connected for at least 1.5 hours as required by Section 4.1.1 upon first installation of the system components.

For electrically powered illuminated interior door exit signs and components that use an independent power source and have an automatic self-diagnostic module, the module shall perform discharge tests.

7.3 HPPL (passive) systems

Rail transit agencies shall also conduct tests specified in this section to verify that all HPPL (passive) interior emergency signage system components receive sufficient illuminance from the charging light to provide the required luminance for the required duration (see Section 4.1.2). Charging light shall be photometrically tested as appropriate to the type of light source.

If the normal lighting system of a car type is reconfigured, then the illumination levels shall be retested on at least one example of all affected areas.

Rail transit agencies shall conduct periodic illuminance tests to confirm that HPPL components receive adequate charging light no less frequently than once every eight years, with the first test conducted no later than eight years after the car was placed in service for the first time, for only the following HPPL components:

- HPPL signs/markings/delineators placed in areas designed or maintained with normal light levels of less than 5 fc
- grandfathered HPPL materials, where the sign/markings/delineator is placed in an area designed or maintained with normal light levels of less than 10 fc

If the illuminance levels in the first two randomly selected representative sample cars exceed the minimum required to charge the HPPL components required by this standard by at least a factor of 2, then no further testing is required for the cars represented by the sample cars tested for the periodic test cycle.

7.4 Defect reporting, repair and recordkeeping

Illegible, broken, damaged, missing or nonfunctioning components of either the interior or the exterior emergency signage system shall be corrected and documented in accordance with established local transit system procedures and OEM recommendations.

Recordkeeping shall be in accordance with standard transit agency procedures.

Related APTA standards

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

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

References

ASTM International, ASTM D4956, “Standard Specification for Retroreflective Sheeting for Traffic Control.”

ASTM International, ASTM E810, “Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry.”

ASTM International, ASTM E2073, “Standard Test Method for Photopic Luminance of Photoluminescent (Phosphorescent) Markings.”

ISO 3864-1, Graphical symbols – Safety colors and safety signs – Part 1: Design principles for safety signs and safety markings

ISO 3864-3, Graphical symbols – Safety colors and safety signs – Part 3: Design principles for graphical symbols for use in safety signs

ISO 3864-4, Graphical symbols – Safety colors and safety signs – Part 4: Colorimetric and photometric properties of safety sign materials

ISO 7010, Graphical symbols – Safety colors and safety signs – Registered safety signs

ISO 17724, Graphical symbols – Vocabulary

ANSI Z535.4, American national standard for product safety signs and labels

ANSI/ASQC Z1.9, Sampling procedures and tables for inspection by variables for percent nonconforming

Definitions

auxiliary power system: An onboard source of electrical power (e.g., alternator/generator/car battery) typically used under normal operating conditions to supply such functions as lighting, air conditioning, etc.

candela: A unit of luminous intensity in both the SI and English measurement systems. 1 candela is 1 lumen per steradian (lm/sr). It is similar to the obsolete unit called the candle.

color temperature: A numerical descriptor of the hue of a light source. It is expressed in terms of degrees on the Kelvin scale and refers to the temperature of a black-body radiator that produces light of the same hue as the source specified. Low color temperatures correspond to reddish sources, such as candle flames or incandescent lamps, whereas higher color temperatures are associated with bluish (or cool) color sources.

emergency exit locator signs: Conspicuous emergency marking/signage used to identify and/or direct passengers to the nearest emergency exit location(s).

emergency signage: Textual and graphic messages designed to assist passengers and train crew members in locating and using rail car emergency exits and to assist emergency responders in gaining access to rail cars using doors and windows from the exterior.

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foot-candle: A unit of illuminance. 1 foot-candle is 1 lumen per square foot (lm/sq ft). In the international system (SI), the units of illuminance are lux (1 fc = 10.76 lux).

high-performance photoluminescent (HPPL) material: A photoluminescent material that is capable of emitting light at a very high rate and for an extended period of time. For this standard, the minimum luminance value for HPPL is 7.5 millicandela per square meter (mcd/m²), for 1.5 hours after removal of the charging light source. Unless otherwise permitted in this standard, the charging light source is specified as a fluorescent lamp with a color temperature of 4000 to 4500 K that provides an illuminance of no more than 1 fc on the test sample for a duration of no more than 1 hour.

icon: A sign or representation that stands for an object by virtue of a resemblance or analogy to it.

illuminance: The amount of light (luminous flux) falling on a specific unit surface area (e.g., 1 sq ft). English units are foot-candles (fc) or lumens per square foot (lm/sq ft). International units (SI) are lumens per square meter (lm/m²) or lux (lx). 1 fc equals 10.76 lux.

independent power source: A sealed battery or other energy storage device located within the car body designed to power one or more emergency light fixtures or other devices when the normal head-end power, main car battery, auxiliary power and/or wayside power are unavailable.

integral release mechanism: A mechanically actuated device that functions as a door release.

lighting, emergency: A lighting mode that is available whenever power for the normal lighting is unavailable. The main car battery or one or more independent power sources can be used to supply the power to operate the fixtures that provide emergency lighting.

lighting, normal: A lighting mode that is available when the car is in operation with the normal power system.

lumen: The international unit of luminous flux, or the rate of flow of light.

luminaire (light fixture): A device to produce, control and distribute light. A complete unit consists of one or more lamps, sockets to hold and protect the lamps, optical devices to direct the light, and circuitry to provide the required electrical power to the lamps.

luminance: The amount of light reflected from a unit area or surface, or the amount of light emitted from a surface, e.g., EL or LED material. English units are foot-lamberts (fl). International units (SI) are candela per square meter (cd/m²) (also called “nits”) and millicandela per square meter (mcd/m²). (1 fl = 3.426 cd/m² or 3426 mcd/m².)

luminance contrast: Refers to the relationship or difference between the object and its immediate background, defined by the following ratio:

$$\frac{L_1 - L_2}{L_1} \quad \text{Where: } L_1 = \text{luminance of background}$$
$$L_2 = \text{luminance of the object in question}$$

(e.g., lettering, pictogram, symbol)

luminescence: The emission of light other than incandescent, as in phosphorescence or fluorescence, by processes that derive energy from essentially nonthermal sources through excitation by radiation.

lux: The international unit of illuminance (1 lux = 0.0929 fc).

marking/delineator: A noticeable sign, symbol, line or trace.

passive illumination: Illumination that is generated without the use of direct electrical energy.

photoluminescent (PL) material: Material having the property of emitting light that continues for a length of time after excitation by visible or invisible light has been removed (i.e., self-illuminating).

pictogram/pictograph: A pictorial sign or symbol.

reflectance factor: The ratio of the luminous flux reflected by a surface to the luminous flux it receives.

representative car/area: A car/area that shares the relevant characteristics as the car(s)/area(s) it represents (i.e., same signage/markings layout, lighting system, and normal car lighting levels for passive systems or luminance/illuminance for electrically powered systems).

representative sample: A small quantity, part or subset of a larger set or entity that has the same properties as the population it represents.

retroreflective material: A material that is capable of reflecting light rays back to the light source.

sign: A display board, poster, placard or marking/delineator using text and/or graphics to convey information or direction.

spatial average: The average of all samples taken in the vicinity of a specific location. The area of a spatial average varies. For a stairway, it comprises only the area of the stair step(s). For an aisle, the entire length of the aisle is included.

symbol: A letter, figure, other character, arrow or mark, or any combination thereof, used for designating something else by association, resemblance or convention.

useful field of view (UFOV): The sensory, perceptual and attentional processes that address the ability to attend to one's surroundings, detect information and identify that which demands action. In terms of behavior, UFOV includes information that can be extracted from a glance.

Abbreviations and acronyms

ASTM	ASTM International (formerly the American Society for Testing and Materials)
EL	electroluminescent
fc	foot-candle
fl	foot-lambert
HPPL	high-performance photoluminescent
K	Kelvin
LED	light-emitting diode
LLEPM	low-location exit path marking
lm	lumen
mcd	millicandela
OEM	original equipment manufacturer
PA	public address
PL	photoluminescent
PTASP	Public Transportation Agency Safety Plan
SI	Système International d'unités

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SMS Safety Management System
sr steradian
UFOV useful field of view
UV ultraviolet
W watt

Document history

Document Version	Working Group Vote	Public Comment/ Technical Oversight	Rail CEO Approval	Policy & Planning Approval	Publish Date
First published	—	—	—	—	Dec. 6, 2017
First revision	—	—	—	—	—
Second revision	Oct. 20, 2023	March 31, 2024	April 21, 2024	June 3, 2024	July 9, 2024

Appendix A (informative): Working group emergency signage survey

A.1 Survey description

The survey below is intended to gather information on industry practices regarding emergency signage and markings.

A.2 Emergency signage example request

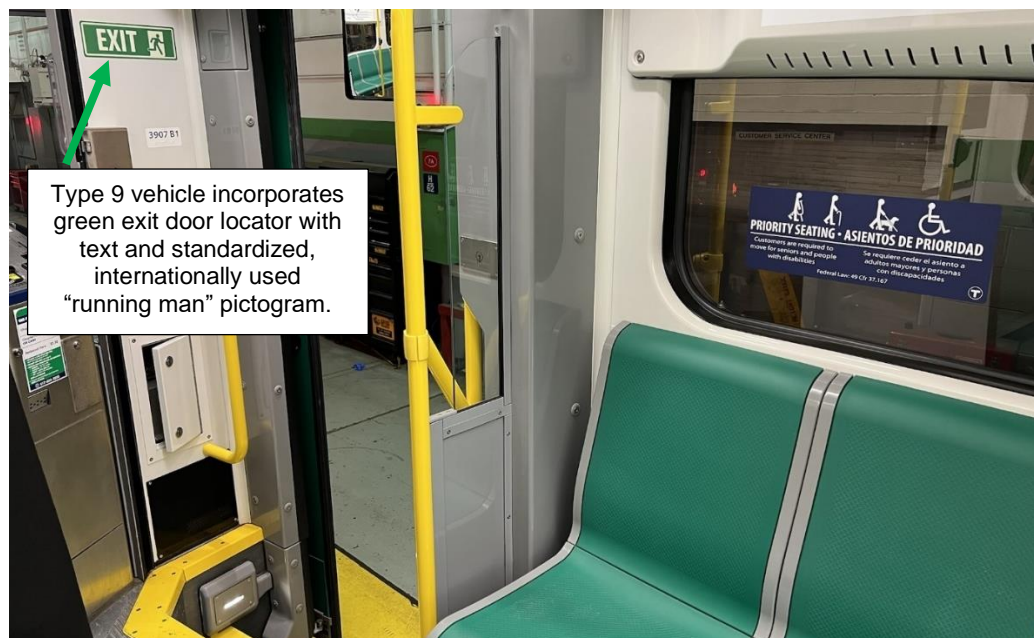
1. Please provide a set of layout drawings for the equipment operated by your rail transit authority. This information will be used to demarcate the locations where emergency signage is implemented for your equipment.
2. Please provide photographs of any emergency signage that is implemented within the interior and exterior of your equipment, including:
 - a. Emergency locator exit signs and marking instructions
 - b. Door or emergency window location signs
 - c. Low-location emergency exit path markings
 - d. Signage associated with emergency roof access
 - e. Per NTSB recommendation to FTA – Any signage associated with passage through end doors
 - f. Per FTA report – Any signage associated with ROW hazards (including but not limited to electrical hazards such as third rail shoes)
 - g. Any signage associated with emergency egress directives

Appendix B (informative): Photographic examples of interior signage

B.1 Exit locator signage

FIGURE B.1.1

Door Exit Locator (MBTA – Type 9 – CAF USA)



B.2 Emergency door exit signage

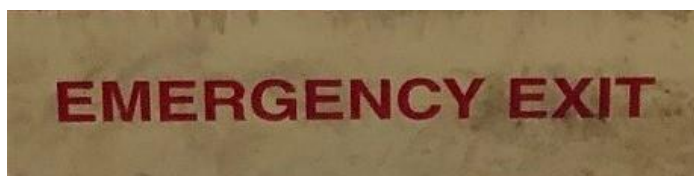
FIGURE B.2.1

Emergency Door Exit (NYCT – R-143 – Kawasaki)



FIGURE B.2.2

Emergency Door Exit (PATH – PA-5 – Kawasaki)



B.3 End door signage

The variation of signage used by rail transit agencies is apparent in the range of end door signage drawings and photographs provided by agencies. The signs feature different phrases, including “No Exit,” “Emergency

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Use Only,” “No Passing Through,” “Keep Door Closed,” and “Do Not Open.” The messaging for some signs discourages standing, riding or moving between cars.

FIGURE B.3.1

No Exit – Emergency Use Only Door Exit
(NYCT – R-160 – Alstom)

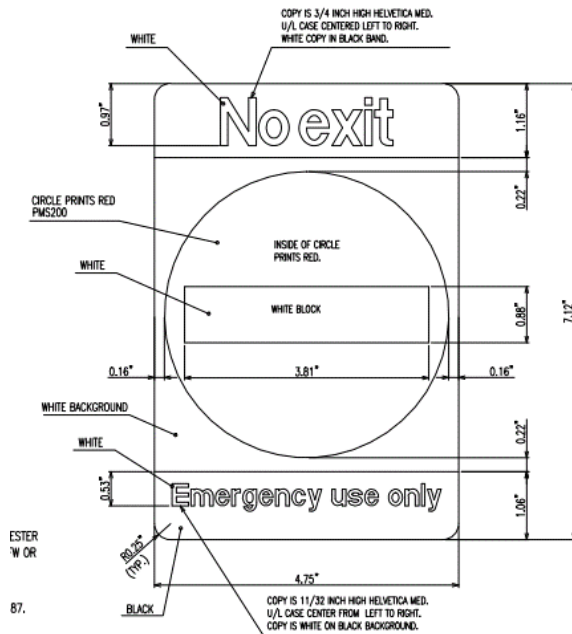


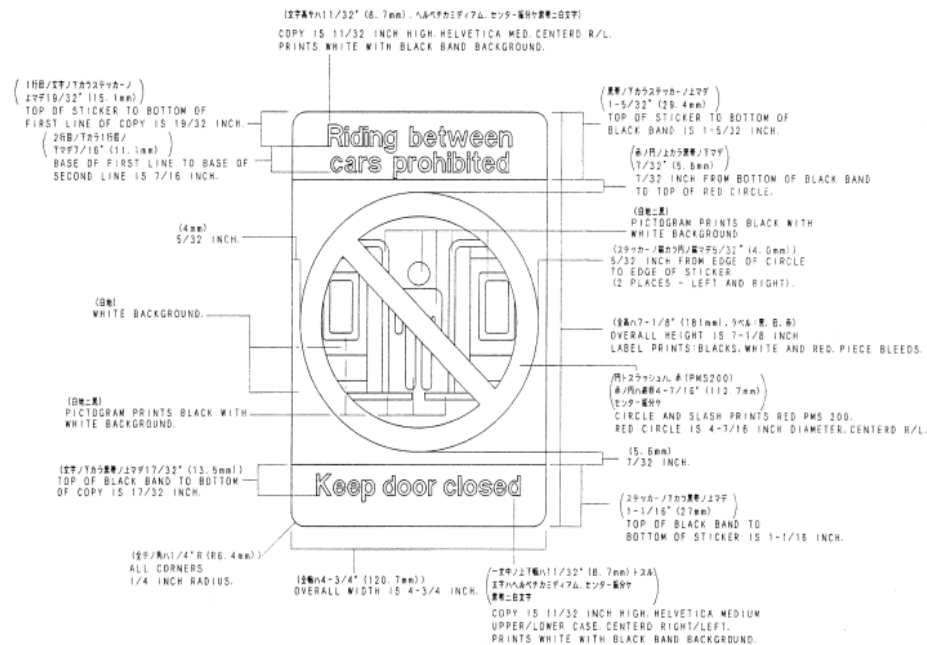
FIGURE B.3.2

Emergency Use Only Door Exit, No Passing Through
(NYCT – R-160 – Alstom)



FIGURE B.3.3

No Passing Through (NYCT – R-143 – Kawasaki)



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FIGURE B.3.4

Emergency Use Only Door Exit, No Passing Through (LACMTA – A650 – BREDA)



FIGURE B.3.5

Emergency Use Only Door Exit
(LACMTA – A650 – BREDA)



Black version of
"Running man"
pictogram used for
emergency exit
only signage.

FIGURE B.3.6

No Passing Through
(MBTA – 0600 – Hawker Siddeley Canada)



FIGURE B.3.7

Emergency Use Only Door Exit, No Passing Through
(CTA – 3200 – Morrison-Knudsen)



Pictograms and stop sign symbol
used with text to deter
nonemergency end door passage.

FIGURE B.3.8

No Passing Through
(CTA – 3200 – Morrison-Knudsen)



FIGURE B.3.9
No Passing Through
(SEPTA – B-IV – Kawasaki)



FIGURE B.3.10
No Passing Through
(SEPTA – M-4 – AdTranz)

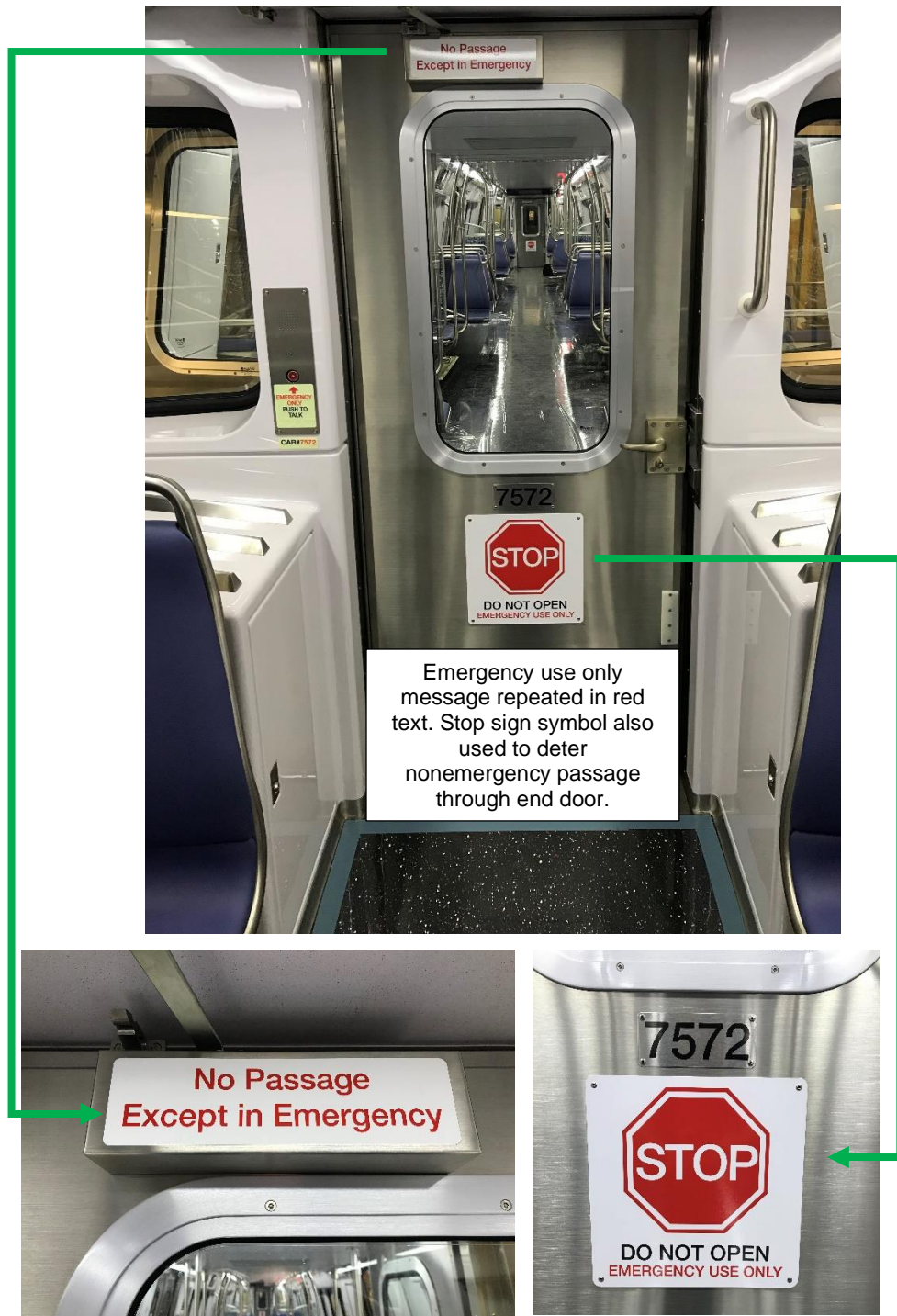


FIGURE B.3.11
Emergency Use Only Door Exit (GCRTA – Tokyu Car Corporation)



FIGURE B.3.12

Emergency Use Only Door Exit (WMATA – 7k – Kawasaki)



B.4 Exit window signage

FIGURE B.4.1

Emergency Window Exit Locator and Instructions (TTC – Flexity Outlook – Bombardier)

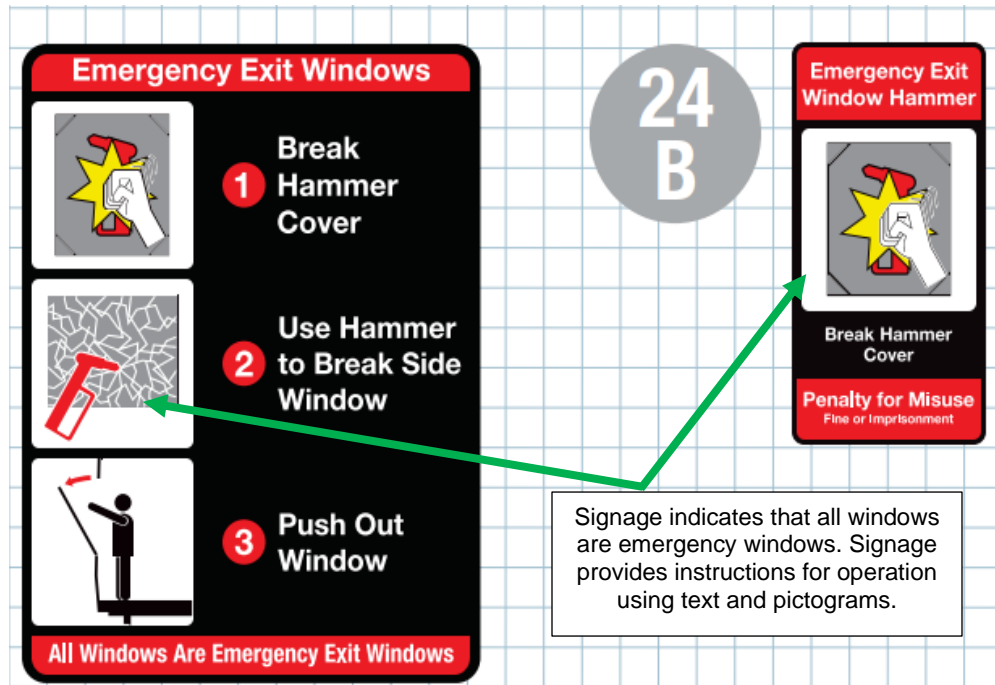
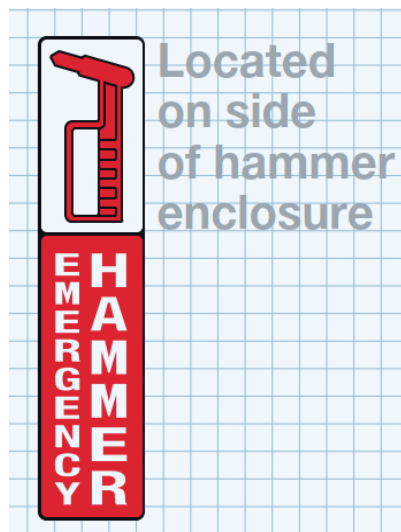


FIGURE B.4.2

Emergency Window Exit Equipment (TTC – Flexity Outlook – Bombardier)



B.5 Manual door release signage

The range of signage used by rail transit agencies is also apparent in the provided decal renderings and photographs. Some signs feature instructive text and pictograms, while others provide only text instructions or text used to locate the manual door release mechanism.

FIGURE B.5.1

Manual Door Release Locator and Instructions (with Standardized Internationally Recognized Pictogram)



FIGURE B.5.2

Manual Door Release Locator and Instructions
(TTC – Flexity Outlook – Bombardier)

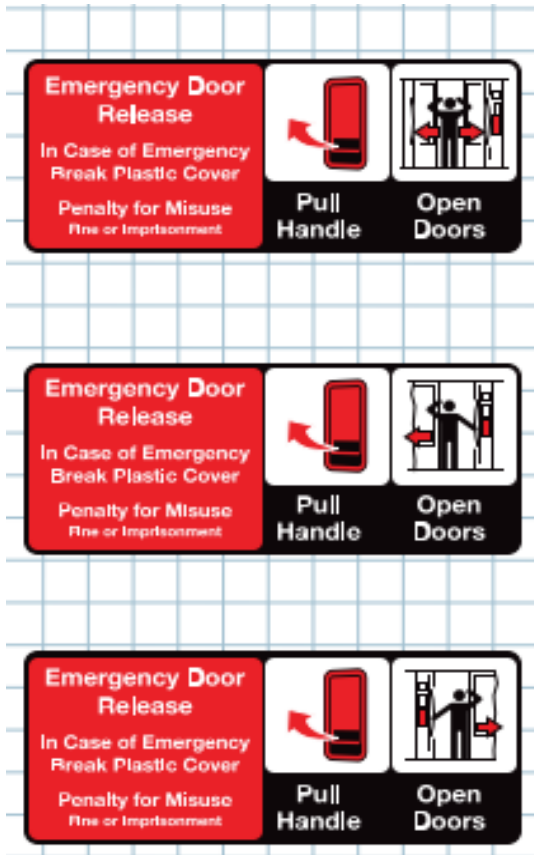


FIGURE B.5.3

Manual Door Release Locator and Instructions
(PAAC – SD-400 – Siemens)

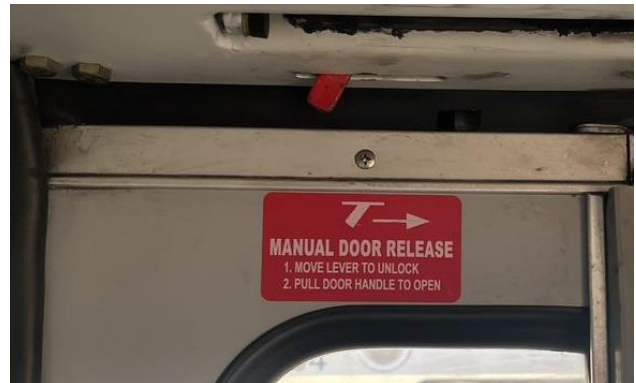


FIGURE B.5.4

Manual Door Release Locator
(PAAC – SD-400 – Siemens)



FIGURE B.5.5

Manual Door Release Locator and Instructions (MBTA – Type 9 – CAF USA)



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FIGURE B.5.6
Manual Door Release Locator
(CATS – S70 – Siemens)



FIGURE B.5.7
Manual Door Release Locator and Instructions
(VMR – Tempe Streetcar – Brookville)



FIGURE B.5.8
Manual Door Release Locator
(LACMTA – P3010 – Kinki Sharyo)



FIGURE B.5.9
Manual Door Release Locator
(LACMTA – A650 – BREDa)



VMR manual door release instructions and
LACMTA manual door release locator
signage feature bilingual text.

B.6 Passenger emergency intercom and assistance alarm signage

Again, some of the signage depicted in the decal renderings and photographs features instructive text and pictograms, while other signage examples provide only text instructions or text used to locate the passenger intercom.

FIGURE B.6.1

Passenger Emergency Intercom Locator and Instructions (MBTA – Type 9 – CAF USA)



FIGURE B.6.2

ADA Passenger Emergency Intercom Locator and Instructions (MBTA – Type 9 – CAF USA)



FIGURE B.6.3

Passenger Emergency Intercom Locator (TTC – Flexity Outlook – Bombardier)

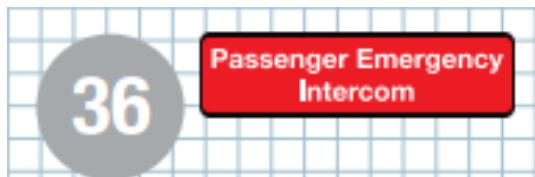


FIGURE B.6.5

Passenger Emergency Intercom Instructions (TTC – Flexity Outlook – Bombardier)



FIGURE B.6.4

Passenger Emergency Intercom Instructions (TTC – Flexity Outlook – Bombardier)

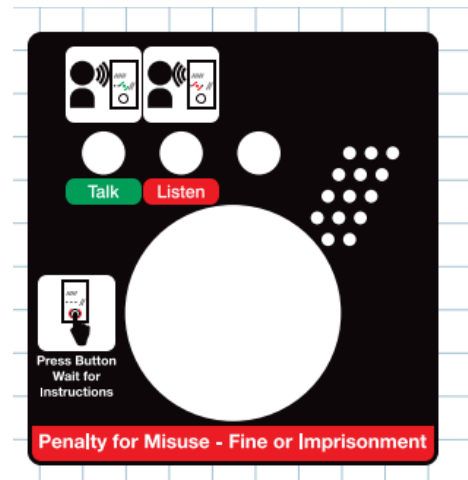


FIGURE B.6.6

Passenger Emergency Alarm Locator and Instructions (TTC – Flexity Outlook – Bombardier)



FIGURE B.6.7

Passenger Emergency Intercom Locator
(CATS – S70 – Siemens)



FIGURE B.6.8

Passenger Emergency Intercom Locator
(PAAC – SD-400 – Siemens)



FIGURE B.6.9

Passenger Emergency Intercom Locator and Instructions
(LACMTA – A650 – BRED A)



FIGURE B.6.10

Emergency Assistance Intercom Locator and Instructions
(LACMTA – P3010 – Kinki Sharyo)



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FIGURE B.6.11

Emergency Assistance Intercom Locator and Instructions (SEPTA – M-4 – AdTranz)



FIGURE B.6.12

Passenger Emergency Intercom Locator and Instructions (LACMTA – P2550 – BRED A)



FIGURE B.6.13

Passenger Emergency Intercom Locator and Instructions (MBTA – #12 Main Line – Hawker Siddeley Canada)



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FIGURE B.6.14

Passenger Emergency Intercom Locator and Instructions (VMR – Tempe Streetcar – Brookville)



B.7 Emergency instructions signage

Provided emergency instructions signage drawings and photographs mostly incorporated pictograms with text and reference hazards associated with the right-of-way.

FIGURE B.7.1
Emergency Instructions (NYCT – R-143 – Kawasaki)

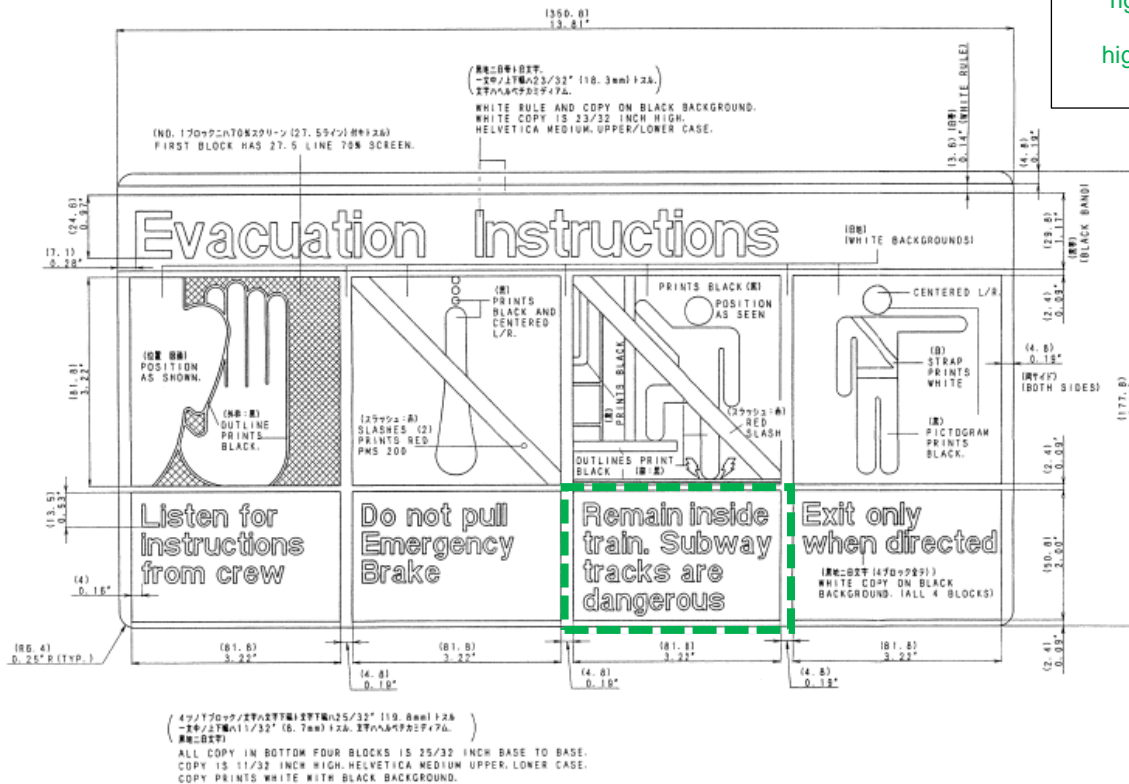
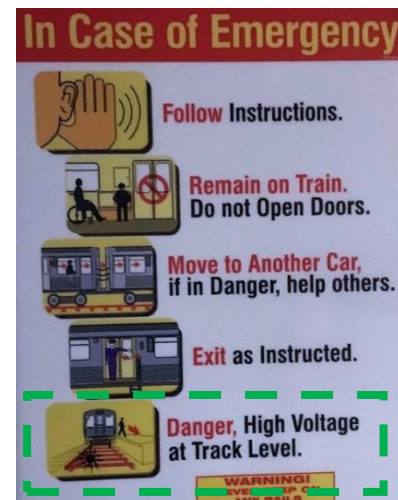


FIGURE B.7.2
Emergency Instructions
(SEPTA – M-4 – AdTranz)



FIGURE B.7.3
Emergency Instructions
(CTA – 3200 – Morrison-Knudsen)



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FIGURE B.7.4

Emergency Instructions (SEPTA – N-5 – Asea Brown Boveri)

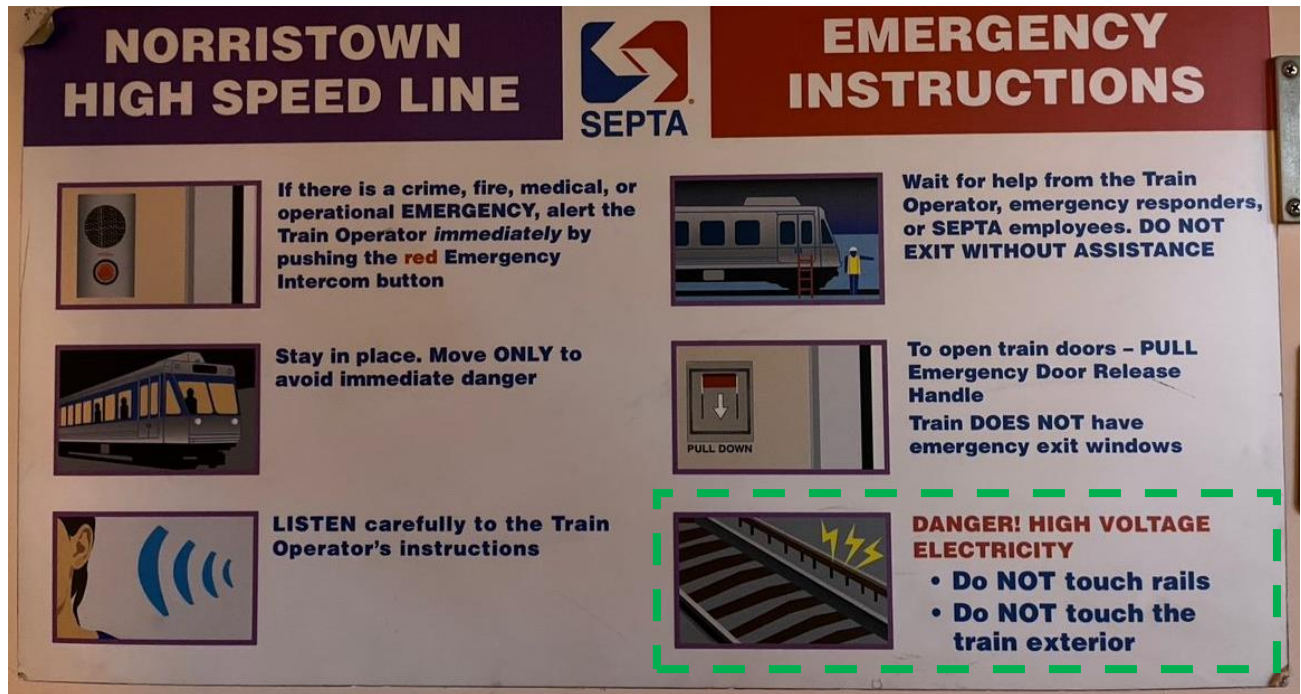


FIGURE B.7.5

Emergency Instructions (LACMTA – P3010 – Kinki Sharyo)



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FIGURE B.7.6
Emergency Instructions (LACMTA – A650 – BREDA)



B.8 Emergency equipment signage

FIGURE B.8.1

Emergency Equipment
(TTC – Flexity Outlook – Bombardier)

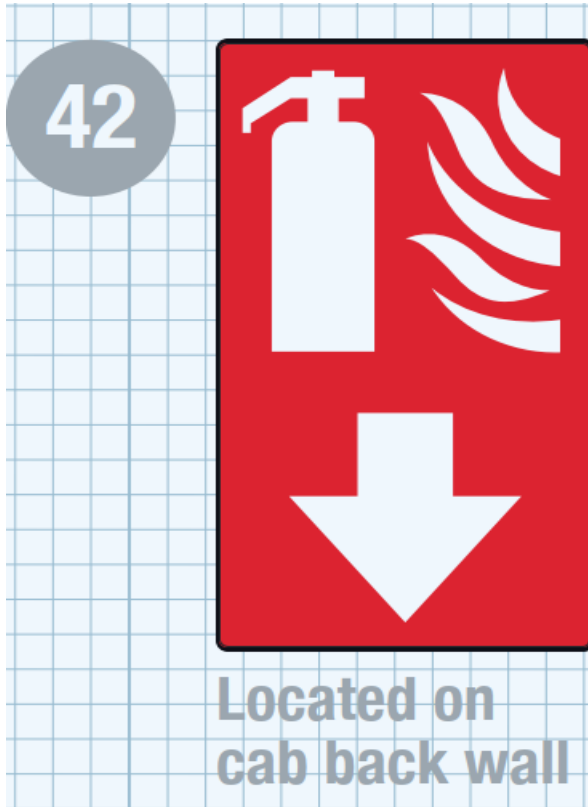


FIGURE B.8.2

Emergency Equipment
(VMR – Tempe Streetcar – Brookville)



FIGURE B.8.3
Emergency Equipment
(LACMTA – P3010 – Kinki Sharyo)



FIGURE B.8.4
Emergency Equipment
LACMTA – P2000 – Kinki Sharyo)



B.9 Electric hazard warning signage

FIGURE B.9.1
Hazard Signage (VMR – Tempe Streetcar – Brookville)



B.10 Emergency brake application/stop signage

FIGURE B.10.1

Emergency Brake (NYCT – R-160 – Alstom)

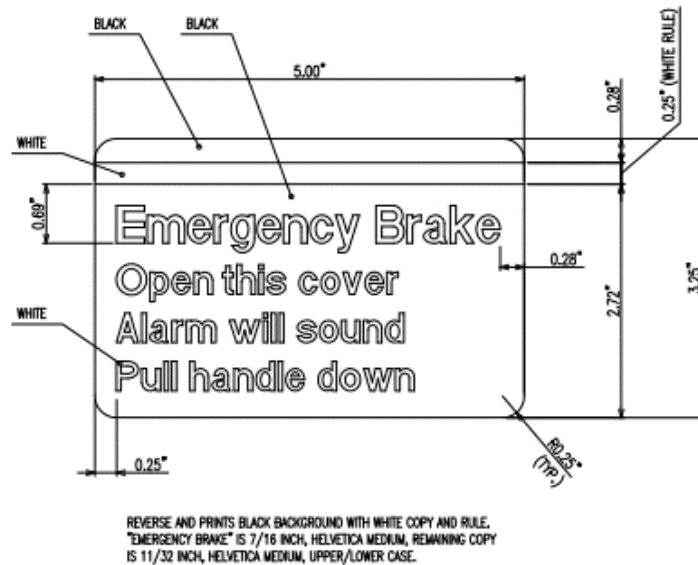


FIGURE B.10.2

Emergency Brake Valve (NYCT – R-160 – Alstom)

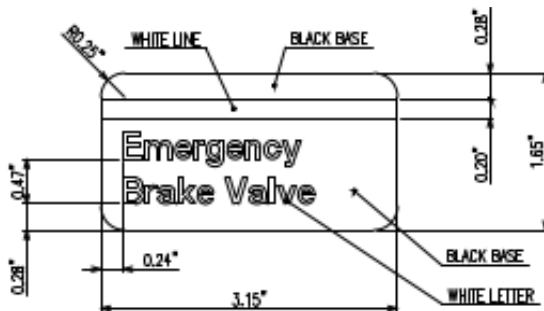
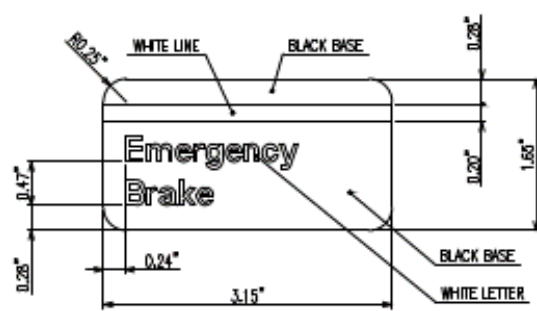


FIGURE B.10.3

Emergency Brake (NYCT – R-160 – Alstom)



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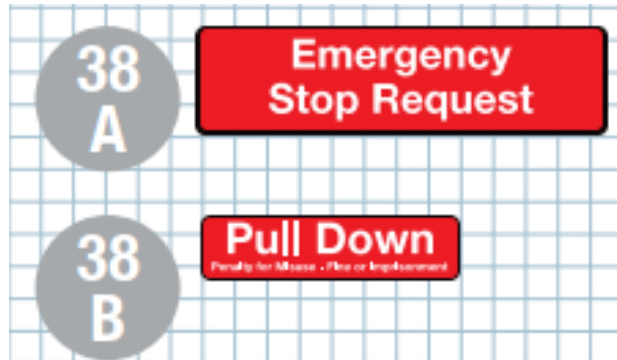
FIGURE B.10.4

Emergency Brake Application (MBTA – 0600 – Hawker Siddeley Canada)



FIGURE B.10.5

Emergency Stop Request (TTC – Flexity Outlook – Bombardier)



Appendix C (informative): Photographic examples of exterior signage

C.1 Exterior signage

FIGURE C.1.1

Emergency Shutdown Closed
(MBTA – Type 9 – CAF USA)



FIGURE C.1.2

Emergency Shutdown Open
(MBTA – Type 9 – CAF USA)



FIGURE C.1.3

High Voltage Hazard (MBTA – Type 9 – CAF USA)



FIGURE C.1.4

High Voltage Hazard (MBTA – Type 9 – CAF USA)



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FIGURE C.1.5

Emergency Door Release (MBTA – Type 9 – CAF USA)



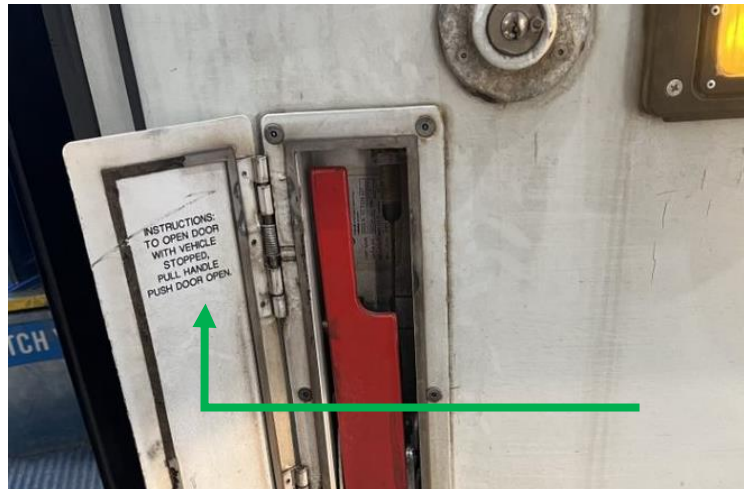
FIGURE C.1.6

Emergency Release
(VMR – Tempe Streetcar – Brookville)



FIGURE C.1.7

Manual Door Release
(PAAC – SD-400 – Siemens)



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FIGURE C.1.8

Emergency Brake Release Locator (LACMTA – P2000 – Kinki Sharyo)



Appendix D (informative): Photographic examples of roof access signage

FIGURE D.1.1

Roof Access Hazard Signage (SEPTA – Unknown – Unknown)



FIGURE D.1.2

Interior Emergency Exit Roof Access Signage Inside Locomotive Cab (SEPTA – Unknown – Unknown)



FIGURE D.1.3

Interior Emergency Exit Roof Access Signage (SEPTA – Unknown – Unknown)



FIGURE D.1.4

Exterior Emergency Roof Access Signage (SEPTA – Unknown – Unknown)