

February 2015

## Boarding and Alighting Subcommittee

### Report

Full length level boarding should be the highest priority and most preferred method of boarding on all rail modes, whether light rail, rapid rail, intercity rail, and/or commuter rail.

When full length level boarding is not required or possible, boarding should be, as often as possible, by ramp or bridge-plate as the primary 100% reliable and quick means for boarding. Mechanical lifts should be a back-up alternative when necessary. Where mechanical lifts are needed, they should be car-borne, not station-based.

**NOTES:** The underlined red text below indicates sections that include new material that differs from the current Access Board Guidelines.

Text in [brackets] indicates references to specifications for elements that need to be filled in. Access Board staff assistance is requested to calculate accurate metric specifications that correspond to inches/pounds.

Bulleted Text in Italics and all capitols is the Rationale.

### Scoping

- **General.**
  - Rapid rail (e.g., subway) and High-speed rail cars purchased after the effective date of these requirements (to be determined by DOT) shall be designed for full-length platform level boarding [using the same definition of level-entry boarding as in the DOT ADA regulation issued in 2011] and meet the provisions of this section. In stations constructed on or after January 26, 1992, all car doors through which passengers board and alight shall meet the gap requirements set forth below. In stations constructed prior to January 26, 1992, at least one door serving each on board seating area for wheelchairs and mobility aids shall meet these requirements.
  - Rationale: This was essentially required under the current regulations but is being restated to show the somewhat differing requirements for different modes. Rapid rail and high speed rail have the most stringent requirements for boarding all cars for the full length of the platform with minimal horizontal and vertical gaps.

- All doors on light rail cars and commuter rail cars operating exclusively at level boarding station platforms shall comply with the gap requirements. At least one door through which passengers board and alight on each side serving each on-board seating area for wheelchairs and mobility aids of intercity rail cars, and commuter rail cars operating at mixed high and low platforms, shall meet these requirements.
- Rational: This requires all new light rail cars and commuter cars to be designed to meet gap requirements and have at least one accessible door which provides access to the on-board seating area for wheelchair and mobility aid users. The requirement recognizes that platforms on many existing light rail and commuter rail lines will have a mix of high and low platforms and mini-highs.
- All doors on AGT (people mover) cars operating at speeds of 20 mph or slower shall meet the requirements for “people movers” set forth below.
- **Boarding and Alighting.** All new rail and fixed guideway vehicles shall be compatible with level boarding. All steps shall incorporate a trap to cover the steps and bring the car floor level to the doorway. Doorways shall have a minimum vertical clearance of 74 inches from the closed trap to the lintel.
- **Gaps.** Wherever either or both of the conditions in (i) and (ii) are met, a car-borne ramp or bridgeplate or a car-borne lift shall be employed:
  - (i) the horizontal gap between the boarding platform and the vehicle floor exceeds 2 inches
  - (ii) the vertical difference between the boarding platform height and the vehicle floor exceeds plus or minus 5/8 inches.
  - Rational: This recognizes the reality that the gaps in the original accessibility regulations were difficult to achieve in intercity, commuter rail and some light rail systems and requires intercity, commuter and light rail cars to provide a car-borne ramp or bridgeplate to mitigate the gap.
- **People Movers.** The horizontal gap between platform and car floor shall not exceed 1 inch (25 mm). The vertical difference between platform and car floor shall not exceed plus or minus 5/8 inch.

- Rationale: Because of the nature of people movers which operate on exclusive right of ways and travel at lower speeds, they should be able to be designed and constructed to meet these tolerances.
- Operation. Where car doors open automatically at platforms designed for level boarding, ramps and bridgeplates shall deploy automatically. Deployment shall be integrated with door opening and closing. Manually deployed ramps and bridgeplates shall be permitted where doors are opened by train personnel and where the horizontal gap exceeds 12 inches (300 mm).
- Advisory Operation, The Committee recognizes that any gap between a rail vehicle and a platform can be a safety hazard for all travelers. The Committee recommends that the Board require all entries on new vehicles to have automated bridgeplates or ramps where gaps exist at platforms by the year 2020.
- Rationale: Based on examples of automated ramps or bridgeplates being used in some European rail systems, the majority of the committee felt that automated ramps or bridgeplates for new rail cars beginning in the third decade of the 21<sup>st</sup> century were not beyond reach. The majority of committee members felt that based on videos they had seen of automated ramps or bridgeplates on European equipment, provision of automated ramps or bridgeplates would increase safety for all passengers (by mitigating the vertical and horizontal gaps) and would speed boarding and alighting and therefore reduce dwell time.

You Tube Videos of automated gap fillers from some European Trains. Gap fillers in use are visible at beginning of each of these videos:

Liepzig - <https://www.youtube.com/watch?v=xSwPYrkzUyc#t=4m51s>

Stuttgart - [https://www.youtube.com/watch?v=dv\\_Dp6i8ev0](https://www.youtube.com/watch?v=dv_Dp6i8ev0)

Vienna - <https://www.youtube.com/watch?v=-yjbnkraBCQ#t=0m30s>

## **OBJECTION/CONCERN REGARDING AUTOMATED RAMPS OR BRIDGEPLATES**

Rationale: At least one large transit authority that operates both commuter rail and rapid rail raised strong concerns that automated ramps or bridgeplates would pose safety hazards to both passengers on the platforms and passengers on the rail cars. The concerns involved keeping passengers on the platforms away from the deploying ramp or bridgeplates. The agency also raised technical concerns that an automated ramp or bridgeplate would be difficult to design to meet the largest vertical and horizontal gaps in the system. The agency raised concerns that elements of an automated ramp or bridgeplate within the car could present a

tripping hazard in the car. The agency also raised technical concerns about the complexity, cost, weight, reliability (particularly in adverse weather conditions), and safety interlockings of what it envisioned to be a complicated mechanism provided to every door of a commuter rail or rapid rail car.

## Ramps and Bridgeplates

- **General.** Ramps and bridgeplates shall comply with this section. Ramps and bridgeplates shall be permitted to fold or telescope if all the technical requirements are met.

Rationale: The Boarding and Alighting Subcommittee considered gap fillers (car-borne or station-based devices or materials that are used to reduce the horizontal and/or vertical gap between the platform and the vehicle). Discussion revealed considerable concerns related to their maintenance as well as incidents of entrapment. The Subcommittee encourages further development on these devices to resolve these problems.

- **Design Load.** The design load of ramps and bridgeplates 30 inches (760 mm) or more in length shall be 800 pounds (364 kg) minimum. The design load of ramps and bridgeplates less than 30 inches (760 mm) in length shall be 400 pounds (182 kg) minimum. Ramps and bridgeplates shall have a design safety factor of at least 3, based on the ultimate strength of the material.
  - **Advisory Design Load.** The design load is the weight the ramp or bridgeplate is designed to support without damage or permanent deformation. Some deflection may occur under maximum load.

Rationale: The increase in design load reflects the research that the combined weight of power wheelchairs and users is increasing and the industry is providing higher capacity lifts and higher capacity lifts will likely be provided in the new Access Board's non-rail vehicle accessibility guidelines.

- **Handrails.** Handrails complying with [fill in latest version of specifications for Handrails, Stanchions, and Handholds] shall be provided on ramps and bridgeplates where the horizontal gap between the platform and car floor exceeds 12 inches (300 mm).

Rationale: This recognized that in some circumstances longer ramps and bridgeplates are necessary and thus handrails are needed in these situations.

(i.e. Amtrak set-back platforms in Maine have a considerable horizontal gap to provide clearance for freight trains using the same track)

- **Clear Width.** The ramp and bridgeplate clear width shall be 32 inches (800 mm) minimum.
  - **Advisory Clear Width.** A wider ramp or bridgeplate is recommended because it is more usable by passengers who use wheelchairs, and accommodates a broader range of passengers with disabilities. The ramp or bridgeplate can be nearly as wide as the door.

- **Attachment.** When used for boarding and alighting, ramps and bridgeplates shall be firmly attached to the vehicle, shall not be subject to displacement from the vehicle, and shall overlap the platform. Ramps and bridgeplates shall engage to the vehicle in such a manner that they may not be dislodged by horizontal or vertical movement until actively disengaged by a member of the crew.

Rationale: This was added based on some experience of wheeled mobility device users who reported situations when ramps and bridgeplates were not securely connected to the rail car.

- **Manual Operation.** Power operated ramps and bridgeplates shall be capable of being operated manually and in a manner that is safe for the occupant and operator if the power fails.
- **Surfaces.** Ramp and bridgeplate surfaces shall comply with [fill in latest version of specifications for Surfaces], and shall be uninterrupted from edge to edge.
  - **Advisory Surfaces.** Ramp and bridgeplate surfaces must be uninterrupted from edge to edge to accommodate three-wheel scooters. Expanded metal or perforated materials are permitted, as long as the openings comply with [fill in latest version of specifications for Openings].
- **Edge Barriers.** The edges of ramps and bridgeplates shall have barriers 2 inches (51 mm) high minimum extending from the vehicle doorway to 6 inches from the outer end, and shall taper down smoothly.
- **Slope.** Ramps and bridgeplates shall have slopes not steeper than 1:8 (12.5 percent) when deployed to station platforms, measured at 50 percent passenger load.
  - **Advisory Slope.** The Department of Transportation regulations at 49 CFR 37.165(f) requires vehicle operators to assist passengers with

disabilities with the use of boarding devices, even if the vehicle operators must leave their seats. Providing ramps and bridgeplates with the least possible slope accommodates a broader range of passengers with disabilities and minimizes the need for assistance.

- **Transitions.** Surface discontinuities at transitions from boarding and alighting areas to ramps and bridgeplates shall comply with [fill in latest version of specifications for Surface Discontinuities].
- **Visual Contrast.** The perimeter of the ramp and bridgeplate surface shall be outlined. The outline shall be 1 inch (25 mm) wide minimum and shall contrast visually with the rest of the ramp and bridgeplate surface either light-on-dark or dark-on-light.
- **Gaps.** When deployed for boarding and alighting, gaps between the ramp or bridgeplate surface and vehicle floor, and the ramp or bridgeplate surface and the station platform, shall not permit passage of a sphere more than 5/8 inch (16 mm) in diameter.
- **Stowage.** Where portable ramps or bridgeplates are permitted, a compartment, securement system, or other method shall be provided within the vehicle to stow the ramps and bridgeplates when not in use. When stowed in passenger areas, portable ramps and bridgeplates shall not pose a hazard to passengers, and shall not interfere with the maneuvering of wheelchairs.

## Lifts

### General.

- **Design Load.** The lift design load shall be 800 pounds (364 kg) minimum. Load carrying components that are subject to wear shall have a design safety factor of at least six, based on the ultimate strength of the material. Other components that are not subject to wear shall have a design safety factor of at least three, based on the ultimate strength of the material.  
Rationale: Same as above for ramps, consistency with proposed regulations for non-rail vehicles.

### Controls.

- **Interlocks.** Lift controls shall be interlocked with the vehicle brakes, transmission, propulsion system, or door, or shall provide other systems to

prevent the vehicle from moving when the lift is not stowed. Lift controls shall not be operable unless the interlocks are engaged.

- **Sequence.** Lift controls shall be of a momentary contact type requiring continuous manual pressure. Lift controls shall permit the operator to change the operation sequence. Lift controls shall not permit the lift platform to be folded, retracted, or stowed when occupied, unless the platform is designed to be occupied when stowed in the passenger area of the vehicle.
  - **Advisory Sequence.** A rotary lift is an example of a lift platform that is designed to be occupied when the platform is rotated into a stowed position in the passenger area of the vehicle.
- **Manual Operation.** Lifts shall be capable of being operated manually if the power to the lift fails. The manual operation shall be safe for the occupant and operator when operated according to the manufacturer's instructions. When operated manually, the lift platform shall deploy and lower to the boarding and alighting area or the roadway with an occupant; shall rise to the vehicle floor without an occupant; and shall stow. The lift platform shall not fold, retract, or stow when occupied, unless the platform is designed to be occupied when stowed in the passenger area of the vehicle. Doors that must be opened to allow the lift to operate shall have interior and exterior manual releases.

#### **Lift Platforms.**

- **Surfaces.** Lift platform surfaces shall comply with general provisions for accessible routes [fill in latest version of specifications for Surfaces].
- **Size.** The lift platform clear width shall be 32 inches (800 mm) minimum measured from the platform surface to 40 inches (1015 mm) minimum above the platform surface. The lift platform clear length shall be 54 inches (1372 mm) minimum measured from the platform surface to 40 inches (1015 mm) above the platform surface.

Rationale: Same as above for ramps, consistency with proposed regulations for non-rail vehicles.

- **Edge Barriers.** Lift platforms shall have edge barriers complying with [fill in latest version of specifications for Lift Edge Barriers] to prevent the wheels of wheelchairs from rolling off the platforms. Openings between lift platform surfaces and raised barriers shall not permit passage of a sphere 5/8 inch (16 mm) in diameter. Edge barriers shall not interfere with the maneuvering of wheelchairs.
- **Gaps.** When the lift platform is at the vehicle floor level and any edge barrier is lowered, the gap between the platform surface and the vehicle floor shall not permit passage of a sphere 5/8 inch (16 mm) in diameter.

- **Threshold Ramps.** Threshold ramps from boarding and alighting areas to lift platforms and edge barriers used as threshold ramps shall have slopes not steeper than 1:8 (12.5 percent) for a rise of 3 inches (75 mm) maximum. The slope shall be measured when the lift platform is level. Surface discontinuities at transitions from boarding and alighting areas to threshold ramps shall comply with [fill in latest version of specifications for Surface Discontinuities].
- **Visual Contrast.** The perimeter of the lift platform surface shall be outlined. The outline shall be 1 inch (25 mm) wide minimum and shall contrast visually with the rest of the platform surface either light-on-dark or dark-on-light.
- **Deflection.** When occupied, lift platforms shall be permitted to deflect 3 degrees maximum in any direction with respect to the platform's unloaded position, exclusive of vehicle roll or pitch.
- **Movement.** Lift platform movement shall comply with the following:
  - **Normal Operating Conditions.** When occupied, lift platforms shall move at a rate of 6 inches/second (150 mm/second) maximum, and the horizontal and vertical acceleration shall be 0.3g maximum under normal operating conditions. When folding, retracting, or stowing, lift platforms shall move at a rate of 12 inches/second (306 mm/second) maximum under normal operating conditions, unless the platform is folded and stowed manually.
  - **Power or Equipment Failure.** In the event of a power failure or single failure of any load carrying component, lift platforms that are occupied or are stowed in a vertical position shall move at rate of 12 inches/second (306 mm/second) maximum.
- **Boarding Direction.** Lift platforms shall permit passengers who use wheelchairs to board the platforms facing either toward or away from the vehicle.
- **Standeers.** Lift platforms shall be usable by passengers who use walkers, crutches, canes, or braces or who otherwise have difficulty using steps. Lift platforms shall be permitted to be marked to indicate a preferred standing position.
- **Handrails.** Lifts platforms shall have handrails complying with general provisions for handrails [refer to latest version of specifications for Handrails, Stanchions, and Handholds] on two sides of the platform that move in tandem with the platform to provide support for passengers in a standing position. Handrails shall have a usable gripping surface 8 inches (205 mm) long minimum. The gripping surface shall be 30 inches (760 mm) minimum and 38 inches (965 mm) maximum above the lift platform surface. Handrails shall not interfere with the maneuvering of wheelchairs.