

an equivalent grasping surface, and have eased edges with corner radii of not less than $\frac{1}{8}$ inch. Handrails shall be placed to provide a minimum $1\frac{1}{2}$ inches knuckle clearance from the nearest adjacent surface. Where on-board fare collection devices are used, a horizontal passenger assist shall be located between boarding passengers and the fare collection device and shall prevent passengers from sustaining injuries on the fare collection device or windshield in the event of a sudden deceleration. Without restricting the vestibule space, the assist shall provide support for a boarding passenger from the door through the boarding procedure. Passengers shall be able to lean against the assist for security while paying fares.

(b) Where provided within passenger compartments, handrails or stanchions shall be sufficient to permit safe on-board circulation, seating and standing assistance, and alighting by persons with disabilities.

§ 1192.157 Lighting.

(a) Any stepwell or doorway immediately adjacent to the driver shall have, when the door is open, at least 2 foot-candles of illumination measured on the step tread.

(b) The vehicle doorway shall have outside light(s) which, when the door is open, provide at least 1 foot-candle of illumination on the pathway to the door for a distance of 3 feet (915 mm) to the bottom step tread or lift outer edge. Such light(s) shall be shielded to protect the eyes of entering and exiting passengers.

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§ 1192.159 Mobility aid accessibility.

(a)(1) *General.* All vehicles covered by this subpart shall provide a level-change mechanism or boarding device (e.g., lift or ramp) complying with paragraph (b) or (c) of this section and sufficient clearances to permit a wheelchair or other mobility aid user to reach a securement location. At least two securement locations and devices, complying with paragraph (d) of this section, shall be provided.

(2) *Exception.* If portable or station-based lifts, ramps or bridge plates

meeting the applicable requirements of this section are provided at stations or other stops required to be accessible under regulations issued by the Department of Transportation, the bus is not required to be equipped with a vehicle-borne device.

(b) *Vehicle lift*—(1) *Design load.* The design load of the lift shall be at least 600 pounds (2665 N). Working parts, such as cables, pulleys, and shafts, which can be expected to wear, and upon which the lift depends for support of the load, shall have a safety factor of at least six, based on the ultimate strength of the material. Nonworking parts, such as platform, frame and attachment hardware which would not be expected to wear, shall have a safety factor of at least three, based on the ultimate strength of the material.

(2) *Controls*—(i) *Requirements.* The controls shall be interlocked with the vehicle brakes, transmission, or door, or shall provide other appropriate mechanisms or systems, to ensure that the vehicle cannot be moved when the lift is not stowed and so the lift cannot be deployed unless the interlocks or systems are engaged. The lift shall deploy to all levels (i.e., ground, curb, and intermediate positions) normally encountered in the operating environment. Where provided, each control for deploying, lowering, raising, and stowing the lift and lowering the roll-off barrier shall be of a momentary contact type requiring continuous manual pressure by the operator and shall not allow improper lift sequencing when the lift platform is occupied. The controls shall allow reversal of the lift operation sequence, such as raising or lowering a platform that is part way down, without allowing an occupied platform to fold or retract into the stowed position.

(ii) *Exception.* Where the lift is designed to deploy with its long dimension parallel to the vehicle axis and which pivots into or out of the vehicle while occupied (i.e., “rotary lift”), the requirements of this paragraph (b)(2) prohibiting the lift from being stowed while occupied shall not apply if the stowed position is within the passenger compartment and the lift is intended to be stowed while occupied.

(3) *Emergency operation.* The lift shall incorporate an emergency method of deploying, lowering to ground level with a lift occupant, and raising and stowing the empty lift if the power to the lift fails. No emergency method, manual or otherwise, shall be capable of being operated in a manner that could be hazardous to the lift occupant or to the operator when operated according to manufacturer's instructions, and shall not permit the platform to be stowed or folded when occupied, unless the lift is a rotary lift and is intended to be stowed while occupied.

(4) *Power or equipment failure.* Platforms stowed in a vertical position, and deployed platforms when occupied, shall have provisions to prevent their deploying, falling, or folding any faster than 12 inches/second (305 mm/sec) or their dropping of an occupant in the event of a single failure of any load carrying component.

(5) *Platform barriers.* The lift platform shall be equipped with barriers to prevent any of the wheels of a wheelchair or mobility aid from rolling off the platform during its operation. A movable barrier or inherent design feature shall prevent a wheelchair or mobility aid from rolling off the edge closest to the vehicle until the platform is in its fully raised position. Each side of the lift platform which extends beyond the vehicle in its raised position shall have a barrier a minimum 1½ inches (13 mm) high. Such barriers shall not interfere with maneuvering into or out of the aisle. The loading-edge barrier (outer barrier) which functions as a loading ramp when the lift is at ground level, shall be sufficient when raised or closed, or a supplementary system shall be provided, to prevent a power wheelchair or mobility aid from riding over or defeating it. The outer barrier of the lift shall automatically raise or close, or a supplementary system shall automatically engage, and remain raised, closed, or engaged at all times that the platform is more than 3 inches (75 mm) above the roadway or sidewalk and the platform is occupied. Alternatively, a barrier or system may be raised, lowered, opened, closed, engaged, or disengaged by the lift operator, provided an interlock or inherent design feature prevents the lift from

rising unless the barrier is raised or closed or the supplementary system is engaged.

(6) *Platform surface.* The platform surface shall be free of any protrusions of ¼ inch (6.5 mm) high and shall be slip resistant. The platform shall have a minimum clear width of 28½ inches (725 mm) at the platform, a minimum clear width of 30 inches (760 mm) measured from 2 inches (50 mm) above the platform surface to 30 inches (760 mm) above the platform, and a minimum clear length of 48 inches (1220 mm) measured from 2 inches (50 mm) above the surface of the platform to 30 inches (760 mm) above the surface of the platform. (See Figure 1 to this part.)

(7) *Platform gaps.* Any openings between the platform surface and the raised barriers shall not exceed ⅝ inch (16 mm) in width. When the platform is at vehicle floor height with the inner barrier (if applicable) down or retracted, gaps between the forward lift platform edge and the vehicle floor shall not exceed ½ inch (13 mm) horizontally and ⅝ inch (16 mm) vertically. Platforms on semi-automatic lifts may have a hand hold not exceeding 1½ inches (28 mm) by 4½ inches (113 mm) located between the edge barriers.

(8) *Platform entrance ramp.* The entrance ramp, or loading-edge barrier used as a ramp, shall not exceed a slope of 1:8, measured on level ground, for a maximum rise of 3 inches (75 mm), and the transition from roadway or sidewalk to ramp may be vertical without edge treatment up to ¼ inch (6.5 mm). Thresholds between ¼ inch (6.5 mm) and ½ inch (13 mm) high shall be beveled with a slope no greater than 1:2.

(9) *Platform deflection.* The lift platform (not including the entrance ramp) shall not deflect more than 3 degrees (exclusive of vehicle roll or pitch) in any direction between its unloaded position and its position when loaded with 600 pounds (2665 N) applied through a 26 inch (660 mm) by 26 inch test pallet at the centroid of the platform.

(10) *Platform movement.* No part of the platform shall move at a rate exceeding 6 inches/second (150 mm/sec) during lowering and lifting an occupant, and shall not exceed 12 inches/second (300 mm/sec) during deploying or stowing.

This requirement does not apply to the deployment or stowage cycles of lifts that are manually deployed or stowed. The maximum platform horizontal and vertical acceleration when occupied shall be 0.3g.

(11) *Boarding direction.* The lift shall permit both inboard and outboard facing of wheelchair and mobility aid users.

(12) *Use by standees.* Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The platform may be marked to indicate a preferred standing position.

(13) *Handrails.* Platforms on lifts shall be equipped with handrails on two sides, which move in tandem with the lift, and which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8 inches (200 mm) long with the lowest portion a minimum 30 inches (760 mm) above the platform and the highest portion a maximum 38 inches (965 mm) above the platform. The handrails shall be capable of withstanding a force of 100 pounds (445 N) concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1¼ inches (32 mm) and 1½ inches (38 mm) or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than ⅝ inch (3.5 mm). Handrails shall be placed to provide a minimum 1½ inches (38 mm) knuckle clearance from the nearest adjacent surface. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(c) *Vehicle ramp*—(1) *Design load.* Ramps 30 inches (760 mm) or longer shall support a load of 600 pounds (2665 N), placed at the centroid of the ramp distributed over an area of 26 inches by 26 inches (660 mm by 660 mm), with a safety factor of at least 3 based on the ultimate strength of the material. Ramps shorter than 30 inches (760 mm) shall support a load of 300 pounds (1332 N).

(2) *Ramp surface.* The ramp surface shall be continuous and slip resistant; shall not have protrusions from the

surface greater than ¼ inch (6.5 mm) high; shall have a clear width of 30 inches (760 mm); and shall accommodate both four-wheel and three-wheel mobility aids.

(3) *Ramp threshold.* The transition from roadway or sidewalk and the transition from vehicle floor to the ramp may be vertical without edge treatment up to ¼ inch (6.5 mm). Changes in level between ¼ inch (6.5 mm) and ½ inch (13 mm) shall be beveled with a slope no greater than 1:2.

(4) *Ramp barriers.* Each side of the ramp shall have barriers at least 2 inches (50 mm) high to prevent mobility aid wheels from slipping off.

(5) *Slope.* Ramps shall have the least slope practicable and shall not exceed 1:4 when deployed to ground level. If the height of the vehicle floor from which the ramp is deployed is 3 inches (75 mm) or less above a 6 inch (150 mm) curb, a maximum slope of 1:4 is permitted; if the height of the vehicle floor from which the ramp is deployed is 6 inches (150 mm) or less, but greater than 3 inches (75 mm), above a 6 inch (150 mm) curb, a maximum slope of 1:6 is permitted; if the height of the vehicle floor from which the ramp is deployed is 9 inches (225 mm) or less, but greater than 6 inches (150 mm), above a 6 inch curb, a maximum slope of 1:8 is permitted; if the height of the vehicle floor from which the ramp is deployed is greater than 9 inches (225 mm) above a 6 inch (150 mm) curb, a slope of 1:12 shall be achieved. Folding or telescoping ramps are permitted provided they meet all structural requirements of this section.

(6) *Attachment.* When in use for boarding or alighting, the ramp shall be firmly attached to the vehicle so that it is not subject to displacement when loading or unloading a heavy power mobility aid and that no gap between vehicle and ramp exceeds ⅝ inch (16 mm).

(7) *Stowage.* A compartment, securement system, or other appropriate method shall be provided to ensure that stowed ramps, including portable ramps stowed in the passenger area, do not impinge on a passenger's wheelchair or mobility aid or pose any hazard to passengers in the event of a sudden stop or maneuver.

(8) *Handrails.* If provided, handrails shall allow persons with disabilities to grasp them from outside the vehicle while starting to board, and to continue to use them throughout the boarding process, and shall have the top between 30 inches (760 mm) above the ramp surface. The handrails shall be capable of withstanding a force of 100 pounds (445 N) concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. The handrail shall have a cross-sectional diameter between 1¼ inches (32 mm) and 1½ inches (38 mm) or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than ⅜ inch (3.5 mm). Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

(d) *Securement devices*—(1) *Design load.* Securement systems, and their attachments to vehicles, shall restrain a force in the forward longitudinal direction of up to 2,000 pounds (8,880 N) per securement leg or clamping mechanism and a minimum of 4,000 pounds (17,760 N) for each mobility aid.

(2) *Location and size.* The securement system shall be placed as near to the accessible entrance as practicable and shall have a clear floor area of 30 inches (760 mm) by 48 inches (1220 mm). Such space shall adjoin, and may overlap, an access path. Not more than 6 inches (150 mm) of the required clear floor space may be accommodated for footrests under another seat, modesty panel, or other fixed element provided there is a minimum of 9 inches (230 mm) from the floor to the lowest part of the seat overhanging the space. Securement areas may have fold-down seats to accommodate other passengers when a wheelchair or mobility aid is not occupying the area, provided the seats, when folded up, do not obstruct the clear floor space required. (See Figure 2 to this part.)

(3) *Mobility aids accommodated.* The securement system shall secure common wheelchairs and mobility aids and shall either be automatic or easily attached by a person familiar with the system and mobility aid and having average dexterity.

(4) *Orientation.* At least one securement device or system required by paragraph (a) of this section shall secure the wheelchair or mobility aid facing toward the front of the vehicle. Additional securement devices or systems shall secure the wheelchair or mobility aid facing forward or rearward. Where the wheelchair or mobility aid is secured facing the rear of the vehicle, a padded barrier shall be provided. The padded barrier shall extend from a height of 38 inches (965 mm) from the vehicle floor to a height of 56 inches (1420 mm) from the vehicle floor with a width of 18 inches (455 mm), laterally centered immediately in back of the seated individual. Such barriers need not be solid provided equivalent protection is afforded.

(5) *Movement.* When the wheelchair or mobility aid is secured in accordance with manufacturer's instructions, the securement system shall limit the movement of an occupied wheelchair or mobility aid to no more than 2 inches (50 mm) in any direction under normal vehicle operating conditions.

(6) *Stowage.* When not being used for securement, or when the securement area can be used by standees, the securement system shall not interfere with passenger movement, shall not present any hazardous condition, shall be reasonably protected from vandalism, and shall be readily accessed when needed for use.

(7) *Seat belt and shoulder harness.* For each wheelchair or mobility aid securement device provided, a passenger seat belt and shoulder harness, complying with all applicable provisions of the Federal Motor Vehicle Safety Standards (49 CFR part 571), shall also be provided for use by wheelchair or mobility aid users. Such seat belts and shoulder harnesses shall not be used in lieu of a device which secures the wheelchair or mobility aid itself.

[63 FR 51698, 51702, Sept. 28, 1998]

§ 1192.161 Moveable aisle armrests.

A minimum of 50% of aisle seats, including all moveable or removable seats at wheelchair or mobility aid securement locations, shall have an armrest on the aisle side which can be