

a configuration which allows passengers to grasp such assists from outside the vehicle while starting to board, and to continue using such handrails or stanchions throughout the boarding process. Handrails shall have a cross-sectional diameter between 1¼ inches and 1½ inches or shall provide an equivalent grasping surface, and have eased edges with corner radii of not less than ⅛ inch. Handrails shall be placed to provide a minimum 1½ 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.

(c) At all doors on level-entry vehicles, and at each entrance accessible by lift, ramp, bridge plate or other suitable means, handrails, stanchions, passenger seats, vehicle driver seat platforms, and fare boxes, if applicable, shall be located so as to allow a route at least 32 inches wide so that at least two wheelchair or mobility aid users can enter the vehicle and position the wheelchairs or mobility aids in areas, each having a minimum clear space of 48 inches by 30 inches, which do not unduly restrict movement of other passengers. Space to accommodate wheelchairs and mobility aids may be provided within the normal area used by standees and designation of specific spaces is not required. Particular attention shall be given to ensuring maximum maneuverability immediately inside doors. Ample vertical stanchions from ceiling to seat-back rails shall be provided. Vertical stanchions from ceiling to floor shall not interfere with wheelchair or mobility aid circulation and shall be kept to a minimum in the vicinity of accessible doors.

§ 38.79 Floors, steps and thresholds.

(a) Floor surfaces on aisles, step treads, places for standees, and areas where wheelchair and mobility aid users are to be accommodated shall be slip-resistant.

(b) All thresholds and step edges shall have a band of color(s) running the full width of the step or threshold which contrasts from the step tread and riser or adjacent floor, either light-on-dark or dark-on-light.

§ 38.81 Lighting.

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

(b) Other stepwells, and doorways with lifts, ramps or bridge plates, shall have, at all times, at least 2 foot-candles of illumination measured on the step tread or lift or ramp, when deployed at the vehicle floor level.

(c) The doorways of vehicles not operating at lighted station platforms shall have outside lights which provide at least 1 foot-candle of illumination on the station platform or street surface for a distance of 3 feet perpendicular to all points on the bottom step tread. Such lights shall be located below window level and shielded to protect the eyes of entering and exiting passengers.

§ 38.83 Mobility aid accessibility.

(a)(1) *General.* All new light rail vehicles, other than level entry vehicles, covered by this subpart shall provide a level-change mechanism or boarding device (e.g., lift, ramp or bridge plate) complying with either paragraph (b) or (c) of this section and sufficient clearances to permit at least two wheelchair or mobility aid users to reach areas, each with a minimum clear floor space of 48 inches by 30 inches, which do not unduly restrict passenger flow. Space to accommodate wheelchairs and mobility aids may be provided within the normal area used by standees and designation of specific spaces is not required.

(2) *Exception.* If lifts, ramps or bridge plates meeting the requirements of this

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section are provided on station platforms or other stops required to be accessible, or mini-high platforms complying with §38.73(d) of this part are provided, the vehicle is not required to be equipped with a car-borne device. Where each new vehicle is compatible with a single platform-mounted access system or device, additional systems or devices are not required for each vehicle provided that the single device could be used to provide access to each new vehicle if passengers using wheelchairs or mobility aids could not be accommodated on a single vehicle.

(b) *Vehicle lift*—(1) *Design load*. The design load of the lift shall be at least 600 pounds. 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, propulsion system, 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 physical or safety constraints prevent the deployment at some stops of a lift having its long dimension perpendicular to the vehicle

axis, the transportation entity may specify a lift which 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 paragraph (b)(2)(i) of this section prohibiting the lift from being stowed while occupied shall not apply to a lift design of this type if the stowed position is within the passenger compartment and the lift is intended to be stowed while occupied.

(iii) *Exception*. The brake or propulsion system interlocks requirement does not apply to a station platform mounted lift provided that a mechanical, electrical or other system operates to ensure that vehicles do not move when the lift is in use.

(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 intended to be stowed while occupied.

(4) *Power or equipment failure*. Lift 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 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 lift 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 lift 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 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 on the outboard of the lift shall automatically rise or close, or a supplementary system shall automatically engage, and remain raised, closed, or engaged at all times that the lift is more than 3 inches above the station platform or roadway and the lift 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 lift platform surface shall be free of any protrusions over $\frac{1}{4}$ inch high and shall be slip resistant. The lift platform shall have a minimum clear width of $28\frac{1}{2}$ inches at the platform, a minimum clear width of 30 inches measured from 2 inches above the lift platform surface to 30 inches above the surface, and a minimum clear length of 48 inches measured from 2 inches above the surface of the platform to 30 inches above the surface. (See Fig. 1)

(7) *Platform gaps.* Any openings between the lift platform surface and the raised barriers shall not exceed $\frac{5}{8}$ inch wide. When the lift is at vehicle floor height with the inner barrier (if applicable) down or retracted, gaps between the forward lift platform edge and vehicle floor shall not exceed $\frac{1}{2}$ inch horizontally and $\frac{5}{8}$ inch vertically. Platforms on semi-automatic lifts may have a hand hold not exceeding $1\frac{1}{2}$ inches by $4\frac{1}{2}$ inches 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, and the transition from the station platform or roadway to ramp may be vertical without edge treatment up to $\frac{1}{4}$ inch. Thresholds between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch

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) in any direction between its unloaded position and its position when loaded with 600 pounds applied through a 26 inch by 26 inch test pallet at the centroid of the lift platform.

(10) *Platform movement.* No part of the platform shall move at a rate exceeding 6 inches/second during lowering and lifting an occupant, and shall not exceed 12 inches/second 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 wheelchairs and mobility aids.

(12) *Use by standees.* Lifts shall accommodate persons using walkers, crutches, canes or braces or who otherwise have difficulty using steps. The lift 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 which shall be graspable and provide support to standees throughout the entire lift operation. Handrails shall have a usable component at least 8 inches long with the lowest portion a minimum 30 inches above the platform and the highest portion a maximum 38 inches above the platform. The handrails shall be capable of withstanding a force of 100 pounds concentrated at any point on the handrail without permanent deformation of the rail or its supporting structure. Handrails shall have a cross-sectional diameter between $\frac{1}{4}$ inches and $1\frac{1}{2}$ inches or shall provide 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. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

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

(2) *Ramp surface.* The ramp or bridge plate surface shall be continuous and slip resistant, shall not have protrusions from the surface greater than ¼ inch, shall have a clear width of 30 inches, and shall accommodate both four-wheel and three-wheel mobility aids.

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

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

(5) *Slope.* Ramps or bridge plates shall have the least slope practicable. If the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 3 inches or less above the station platform a maximum slope of 1:4 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 6 inches or less, but more than 3 inches, above the station platform a maximum slope of 1:6 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is 9 inches or less, but more than 6 inches, above the station platform a maximum slope of 1:8 is permitted; if the height of the vehicle floor, under 50% passenger load, from which the ramp is deployed is greater than 9 inches above the station platform 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*—(i) *Requirement.* When in use for boarding or alighting, the ramp or bridge plate shall be attached to the vehicle, or otherwise prevented

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from moving such that it is not subject to displacement when loading or unloading a heavy power mobility aid and that any gaps between vehicle and ramp or bridge plate, and station platform and ramp or bridge plate, shall not exceed ⅝ inch.

(ii) *Exception.* Ramps or bridge plates which are attached to, and deployed from, station platforms are permitted in lieu of vehicle devices provided they meet the displacement requirements of paragraph (c)(6)(i) of this section.

(7) *Stowage.* A compartment, securement system, or other appropriate method shall be provided to ensure that stowed ramps or bridge plates, including portable ramps or bridges plates 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.

(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 and 38 inches above the ramp surface. The handrails shall be capable of withstanding a force of 100 pounds 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 and 1½ inches or shall provide an equivalent grasping surface, and have "eased" edges with corner radii of not less than ⅛ inch. Handrails shall not interfere with wheelchair or mobility aid maneuverability when entering or leaving the vehicle.

§ 38.85 Between-car barriers.

Where vehicles operate in a high-platform, level-boarding mode, devices or systems shall be provided to prevent, deter or warn individuals from inadvertently stepping off the platform between cars. Appropriate devices include, but are not limited to, pantograph gates, chains, motion detectors or other suitable devices.

§ 38.87 Public information system.

(a) Each vehicle shall be equipped with an interior public address system