**[BE] 1010.1.9.5 Unlatching.** The unlatching of any door or leaf shall not require more than one operation.

### **Exceptions:**

- 1. Places of detention or restraint.
- 2. Where manually operated bolt locks are permitted by Section 1010.1.9.4.
- 3. Doors with automatic flush bolts as permitted by Section 1010.1.9.3, Item 3.
- 4. Doors from individual *dwelling units* and *sleeping units* of Group R occupancies as permitted by Section 1010.1.9.3, Item 4.

**[BE] 1010.1.9.5.1 Closet and bathroom doors in Group R-4 occupancies.** In Group R-4 occupancies, closet doors that latch in the closed position shall be openable from inside the closet, and bathroom doors that latch in the closed position shall be capable of being unlocked from the ingress side.

**[BE] 1010.1.9.6 Controlled egress doors in Groups I-1 and I-2.** Electric locking systems, including electro-mechanical locking systems and electromagnetic locking systems, shall be permitted to be locked in the means of egress in Group I-1 or I-2 occupancies where the clinical needs of persons receiving care require their containment. Controlled egress doors shall be permitted in such occupancies where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907, provided that the doors are installed and operate in accordance with all of the following:

- 1. The door locks shall unlock upon actuation of the *automatic sprinkler system* or automatic fire detection system.
- 2. The door locks shall unlock upon loss of power controlling the lock or lock mechanism.
- 3. The door locking system shall be installed to have the capability of being unlocked by a switch located at the fire command center, a nursing station or other approved location. The switch shall directly break power to the lock.
- 4. A building occupant shall not be required to pass through more than one door equipped with a controlled egress locking system before entering an exit.
- The procedures for unlocking the doors shall be described and approved as part of the emergency planning and preparedness required by Chapter 4.
- 6. All clinical staff shall have the keys, codes or other means necessary to operate the locking systems.
- 7. Emergency lighting shall be provided at the door.

8. The door locking system units shall be *listed* in accordance with UL 294.

#### **Exceptions:**

- 1. Items 1 through 4 shall not apply to doors to areas occupied by persons who, because of clinical needs, require restraint or containment as part of the function of a psychiatric treatment area.
- 2. Items 1 through 4 shall not apply to doors to areas where a *listed* egress control system is utilized to reduce the risk of child abduction from nursery and obstetric areas of a Group I-2 hospital.

**[BE] 1010.1.9.7 Delayed egress.** Delayed egress locking systems, shall be permitted to be installed on doors serving any occupancy except Group A, E and H in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or an *approved* automatic smoke or heat detection system installed in accordance with Section 907. The locking system shall be installed and operated in accordance with all of the following:

- 1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the *automatic sprinkler system* or automatic fire detection system, allowing immediate, free egress.
- 2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.
- 3. The delayed egress locking system shall have the capability of being deactivated at the fire command center and other approved locations.
- 4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.

**Exception:** Where *approved*, a delay of not more than 30 seconds is permitted on a delayed egress door.

5. The egress path from any point shall not pass through more than one delayed egress locking system.

**Exception:** In Group I-2 or I-3 occupancies, the egress path from any point in the building shall not pass through more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds.

- 6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:
  - 6.1. For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
  - 6.2. For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
  - 6.3 The sign shall comply with the visual character requirements in ICC A117.1.

**Exception:** Where *approved*, in Group I occupancies, the installation of a sign is not required where care recipients who, because of clinical needs, require restraint or containment as part of the function of the treatment area.

- 7. Emergency lighting shall be provided on the egress side of the door.
- 8. The delayed egress locking system units shall be *listed* in accordance with UL 294.

**[BE] 1010.1.9.8 Sensor release of electrically locked egress doors.** The electric locks on sensor-released doors located in a *means of egress* in buildings with an occupancy in Groups A, B, E, I-1, I-2, I-4, M, R-1 or R-2 and entrance doors to tenant spaces in occupancies in Groups A, B, E, I-1, I-2, I-4, M, R-1 or R-2 are permitted where installed and operated in accordance with all of the following criteria:

- 1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.
- 2. Loss of power to the lock or locking system shall automatically unlock the doors.
- 3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches (1016 mm to 1219 mm) vertically above the floor and within 5 feet (1524 mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads "PUSH TO EXIT." When operated, the manual unlocking device shall result in direct interruption of power to the lock—independent of other electronics—and the doors shall remain unlocked for not less than 30 seconds.
- 4. Activation of the building fire alarm system, where provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.
- 5. Activation of the building *automatic sprinkler* system or fire detection system, where provided,

shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.

6. The door locking system units shall be listed in accordance with UL 294.

**[BE] 1010.1.9.9 Electromagnetically locked egress doors.** Doors in the *means of egress* in buildings with an occupancy in Group A, B, E, I-1, I-2, I-4, M, R-1 or R-2 and doors to tenant spaces in Group A, B, E, I-1, I-2, I-4, M, R-1 or R-2 shall be permitted to be locked with an electromagnetic locking system where equipped with hardware that incorporates a built-in switch and where installed and operated in accordance with all of the following:

- 1. The hardware that is affixed to the door leaf has an obvious method of operation that is readily operated under all lighting conditions.
- 2. The hardware is capable of being operated with one hand.
- 3. Operation of the hardware directly interrupts the power to the electromagnetic lock and unlocks the door immediately.
- 4. Loss of power to the locking system automatically unlocks the door.
- 5. Where *panic* or *fire exit hardware* is required by Section 1010.1.10, operation of the *panic* or *fire exit hardware* also releases the electromagnetic lock.
- 6. The locking system units shall be *listed* in accordance with UL 294.

**[BE] 1010.1.9.10 Locking arrangements in correctional facilities.** In occupancies in Groups A-2, A-3, A-4, B, E, F, I-2, I-3, M and S within correctional and detention facilities, doors in *means of egress* serving rooms or spaces occupied by persons whose movements are controlled for security reasons shall be permitted to be locked where equipped with egress control devices that shall unlock manually and by not less than one of the following means:

- 1. Activation of an *automatic sprinkler system* installed in accordance with Section 903.3.1.1.
- 2. Activation of an approved manual fire alarm box.
- 3. A signal from a constantly attended location.

**[BE] 1010.1.9.11 Stairway doors.** Interior *stairway means of egress* doors shall be openable from both sides without the use of a key or special knowledge or effort.

## **Exceptions:**

- 1. *Stairway* discharge doors shall be openable from the egress side and shall only be locked from the opposite side.
- 2. This section shall not apply to doors arranged in accordance with Section 403.5.3 of the *International Building Code*.

- 3. In *stairways* serving not more than four stories, doors are permitted to be locked from the side opposite the egress side, provided they are openable from the egress side and capable of being unlocked simultaneously without unlatching upon a signal from the fire command center, if present, or a signal by emergency personnel from a single location inside the main entrance to the building.
- 4. *Stairway* exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group B, F, M and S occupancies where the only interior access to the tenant space is from a single *exit stairway* where permitted in Section 1006.3.2.
- 5. *Stairway* exit doors shall be openable from the egress side and shall only be locked from the opposite side in Group R-2 occupancies where the only interior access to the *dwelling unit* is from a single exit stairway where permitted in Section 1006.3.2.

**[BE] 1010.1.10 Panic and fire exit hardware.** Doors serving a Group H occupancy and doors serving rooms or spaces with an *occupant load* of 50 or more in a Group A or E occupancy shall not be provided with a latch or lock other than *panic hardware* or *fire exit hardware*.

#### **Exceptions:**

- 1. A main *exit* of a Group A occupancy shall be permitted to be locking in accordance with Section 1010.1.9.3, Item 2.
- 2. Doors serving a Group A or E occupancy shall be permitted to be electromagnetically locked in accordance with Section 1010.1.9.9.

Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet (1829 mm) wide, and that contain over-current devices, switching devices or control devices with exit or exit access doors, shall be equipped with *panic hardware* or *fire exit hardware*. The doors shall swing in the direction of egress travel.

**[BE] 1010.1.10.1 Installation.** Where *panic* or *fire exit hardware* is installed, it shall comply with the follow-ing:

- 1. *Panic hardware* shall be *listed* in accordance with UL 305.
- 2. *Fire exit hardware* shall be *listed* in accordance with UL 10C and UL 305.
- 3. The actuating portion of the releasing device shall extend not less than one-half of the door leaf width.
- 4. The maximum unlatching force shall not exceed 15 pounds (67 N).

**[BE] 1010.1.10.2 Balanced doors.** If *balanced doors* are used and *panic hardware* is required, the *panic hardware* shall be the push-pad type and the pad shall not extend more than one-half the width of the door measured from the latch side.

**[BE] 1010.2 Gates.** Gates serving the *means of egress* system shall comply with the requirements of this section. Gates used as a component in a *means of egress* shall conform to the applicable requirements for doors.

**Exception:** Horizontal sliding or swinging gates exceeding the 4-foot (1219 mm) maximum leaf width limitation are permitted in fences and walls surrounding a stadium.

**[BE] 1010.2.1 Stadiums.** *Panic hardware* is not required on gates surrounding stadiums where such gates are under constant immediate supervision while the public is present, and where safe dispersal areas based on 3 square feet  $(0.28 \text{ m}^2)$  per occupant are located between the fence and enclosed space. Such required safe dispersal areas shall not be located less than 50 feet (15 240 mm) from the enclosed space. See Section 1028.5 for *means of egress* from safe dispersal areas.

**[BE] 1010.3 Turnstiles.** Turnstiles or similar devices that restrict travel to one direction shall not be placed so as to obstruct any required *means of egress*.

**Exception:** Each turnstile or similar device shall be credited with a capacity based on not more than a 50-person *occupant load* where all of the following provisions are met:

- 1. Each device shall turn free in the direction of egress travel when primary power is lost and on the manual release by an employee in the area.
- 2. Such devices are not given credit for more than 50 percent of the required egress capacity or width.
- 3. Each device is not more than 39 inches (991 mm) high.
- 4. Each device has not less than  $16^{1/2}$  inches (419 mm) clear width at and below a height of 39 inches (991 mm) and not less than 22 inches (559 mm) clear width at heights above 39 inches (991 mm).

Where located as part of an *accessible route*, turnstiles shall have not less than 36 inches (914 mm) clear at and below a height of 34 inches (864 mm), not less than 32 inches (813 mm) clear width between 34 inches (864 mm) and 80 inches (2032 mm) and shall consist of a mechanism other than a revolving device.

**[BE] 1010.3.1 High turnstile.** Turnstiles more than 39 inches (991 mm) high shall meet the requirements for revolving doors.

**[BE] 1010.3.2 Additional door.** Where serving an *occupant load* greater than 300, each turnstile that is not portable shall have a side-hinged swinging door that conforms to Section 1010.1 within 50 feet (15 240 mm).

## SECTION 1011 STAIRWAYS

**[BE] 1011.1 General.** *Stairways* serving occupied portions of a building shall comply with the requirements of Sections 1011.2 through 1011.13. Alternating tread devices shall comply with Section 1011.14. Ships ladders shall comply with Section 1011.15. Ladders shall comply with Section 1011.16.

**Exception:** Within rooms or spaces used for assembly purposes, stepped *aisles* shall comply with Section 1029.

**[BE] 1011.2 Width and capacity.** The required capacity of *stairways* shall be determined as specified in Section 1005.1, but the minimum width shall be not less than 44 inches (1118 mm). See Section 1009.3 for *accessible means of egress stairways*.

## **Exceptions:**

- 1. *Stairways* serving an *occupant load* of less than 50 shall have a width of not less than 36 inches (914 mm).
- 2. Spiral stairways as provided for in Section 1011.10.
- 3. Where an incline platform lift or *stairway* chairlift is installed on *stairways* serving occupancies in Group R-3, or within *dwelling units* in occupancies in Group R-2, a clear passage width not less than 20 inches (508 mm) shall be provided. Where the seat and platform can be folded when not in use, the distance shall be measured from the folded position.

**[BE] 1011.3 Headroom.** *Stairways* shall have a headroom clearance of not less than 80 inches (2032 mm) measured vertically from a line connecting the edge of the *nosings*. Such headroom shall be continuous above the *stairway* to the point where the line intersects the landing below, one tread depth beyond the bottom riser. The minimum clearance shall be maintained the full width of the *stairway* and landing.

## **Exceptions:**

- 1. *Spiral stairways* complying with Section 1011.10 are permitted a 78-inch (1981 mm) headroom clearance.
- 2. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; where the *nosings* of treads at the side of a *flight* extend under the edge of a floor opening through which the *stair* passes, the floor opening shall be allowed to project horizontally into the required headroom not more than  $4^{3}/_{4}$  inches (121 mm).

**[BE] 1011.4 Walkline.** The walkline across *winder* treads shall be concentric to the direction of travel through the turn and located 12 inches (305 mm) from the side where the *winders* are narrower. The 12-inch (305 mm) dimension shall be measured from the widest point of the clear *stair* width at the walking surface of the *winder*. Where *winders* are adjacent within the *flight*, the point of the widest clear *stair* width of the adjacent *winders* shall be used.

**[BE] 1011.5 Stair treads and risers.** *Stair* treads and risers shall comply with Sections 1011.5.1 through 1011.5.5.3.

**[BE] 1011.5.1 Dimension reference surfaces.** For the purpose of this section, all dimensions are exclusive of carpets, rugs or runners.

**[BE] 1011.5.2 Riser height and tread depth.** *Stair* riser heights shall be 7 inches (178 mm) maximum and 4 inches (102 mm) minimum. The riser height shall be measured vertically between the *nosings* of adjacent treads. Rectangular tread depths shall be 11 inches (279 mm) minimum measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's *nosing. Winder* treads shall have a minimum tread depth of 11 inches (279 mm) between the vertical planes of the foremost projection of adjacent treads shall have a minimum tread depth of 11 inches (279 mm) between the vertical planes of the foremost projection of adjacent treads at the intersections with the walkline and a minimum tread depth of 10 inches (254 mm) within the clear width of the *stair*.

# **Exceptions:**

- 1. *Spiral stairways* in accordance with Section 1011.10.
- 2. *Stairways* connecting stepped *aisles* to cross aisles or concourses shall be permitted to use the riser/tread dimension in Section 1029.13.2.
- 3. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; the maximum riser height shall be  $7^{3}_{/4}$  inches (197 mm); the minimum tread depth shall be 10 inches (254 mm); the minimum *winder* tread depth at the walkline shall be 10 inches (254 mm); and the minimum *winder* tread depth shall be 6 inches (152 mm). A *nosing* projection not less than  $3^{3}_{/4}$  inch (19.1 mm) but not more than  $1^{1}_{/4}$  inches (32 mm) shall be provided on *stairways* with solid risers where the tread depth is less than 11 inches (279 mm).
- 4. See Section 403.1 of the *International Existing Building Code* for the replacement of existing *stairways*.
- 5. In Group I-3 facilities, *stairways* providing access to guard towers, observation stations and control rooms, not more than 250 square feet (23 m<sup>2</sup>) in area, shall be permitted to have a maximum riser height of 8 inches (203 mm) and a minimum tread depth of 9 inches (229 mm).

**[BE] 1011.5.3 Winder treads.** *Winder* treads are not permitted in *means of egress stairways* except within a *dwelling unit.* 

# **Exceptions:**

- 1. Curved *stairways* in accordance with Section 1011.9.
- 2. *Spiral stairways* in accordance with Section 1011.10.

**[BE] 1011.5.4 Dimensional uniformity.** *Stair* treads and risers shall be of uniform size and shape. The tolerance between the largest and smallest riser height or between the largest and smallest tread depth shall not exceed  $\frac{3}{8}$  inch (9.5 mm) in any *flight* of *stairs*. The greatest *winder* tread depth at the walkline within any *flight* of *stairs* shall not exceed the smallest by more than  $\frac{3}{8}$  inch (9.5 mm).

#### **Exceptions:**

- 1. *Stairways* connecting stepped *aisles* to cross *aisles* or concourses shall be permitted to comply with the dimensional nonuniformity in Section 1029.13.2.
- 2. Consistently shaped *winders*, complying with Section 1011.5, differing from rectangular treads in the same *flight* of *stairs*.
- 3. Nonuniform riser dimension complying with Section 1011.5.4.1.

[BE] 1011.5.4.1 Nonuniform height risers. Where the bottom or top riser adjoins a sloping public way, walkway or driveway having an established grade and serving as a landing, the bottom or top riser is permitted to be reduced along the slope to less than 4 inches (102 mm) in height, with the variation in height of the bottom or top riser not to exceed one unit vertical in 12 units horizontal (8-percent slope) of stair width. The nosings or leading edges of treads at such nonuniform height risers shall have a distinctive marking stripe, different from any other *nosing* marking provided on the stair flight. The distinctive marking stripe shall be visible in descent of the *stair* and shall have a slip-resistant surface. Marking stripes shall have a width of not less than 1 inch (25 mm) but not more than 2 inches (51 mm).

**[BE] 1011.5.5 Nosing and riser profile.** Nosings shall have a curvature or bevel of not less than  $^{1}/_{16}$  inch (1.6 mm) but not more than  $^{9}/_{16}$  inch (14.3 mm) from the foremost projection of the tread. Risers shall be solid and vertical or sloped under the tread above from the underside of the *nosing* above at an angle not more than 30 degrees (0.52 rad) from the vertical.

**[BE] 1011.5.5.1 Nosing projection size.** The leading edge (*nosings*) of treads shall project not more than  $1^{1}/_{4}$  inches (32 mm) beyond the tread below.

**[BE] 1011.5.5.2 Nosing projection uniformity.** *Nosing* projections of the leading edges shall be of uniform size, including the projections of the *nosing's* leading edge of the floor at the top of a *flight*.

[BE] 1011.5.5.3 Solid risers. Risers shall be solid.

## **Exceptions:**

1. Solid risers are not required for *stairways* that are not required to comply with Section 1009.3, provided that the opening between treads does not permit the passage of a sphere with a diameter of 4 inches (102 mm).

- 2. Solid risers are not required for occupancies in Group I-3 or in Group F, H and S occupancies other than areas accessible to the public. There are no restrictions on the size of the opening in the riser.
- 3. Solid risers are not required for *spiral stairways* constructed in accordance with Section 1011.10.

**[BE] 1011.6 Stairway landings.** There shall be a floor or landing at the top and bottom of each *stairway*. The width of landings shall be not less than the width of *stairways* served. Every landing shall have a minimum width measured perpendicular to the direction of travel equal to the width of the *stairway*. Where the *stairway* has a straight run the depth need not exceed 48 inches (1219 mm). Doors opening onto a landing shall not reduce the landing to less than one-half the required width. When fully open, the door shall not project more than 7 inches (178 mm) into a landing. Where wheel-chair spaces are required on the *stairway* landing in accordance with Section 1009.6.3, the wheelchair space shall not be located in the required width of the landing and doors shall not swing over the wheelchair spaces.

**Exception:** Where *stairways* connect stepped *aisles* to cross *aisles* or concourses, *stairway* landings are not required at the transition between *stairways* and stepped *aisles* constructed in accordance with Section 1029.

**[BE] 1011.7 Stairway construction.** *Stairways* shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood *handrails* shall be permitted for all types of construction.

**[BE] 1011.7.1 Stairway walking surface.** The walking surface of treads and landings of a *stairway* shall not be sloped steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. *Stairway* treads and landings shall have a solid surface. Finish floor surfaces shall be securely attached.

## **Exceptions:**

- 1. Openings in stair walking surfaces shall be a size that does not permit the passage of 1/2-inch-diameter (12.7 mm) sphere. Elongated openings shall be placed so that the long dimension is perpendicular to the direction of travel.
- 2. In Group F, H and S occupancies, other than areas of parking structures accessible to the public, openings in treads and landings shall not be prohibited provided a sphere with a diameter of  $1^{1}/_{8}$  inches (29 mm) cannot pass through the opening.

**[BE] 1011.7.2 Outdoor conditions.** Outdoor *stairways* and outdoor approaches to *stairways* shall be designed so that water will not accumulate on walking surfaces.

**[BE] 1011.7.3 Enclosures under interior stairways.** The walls and soffits within enclosed usable spaces under enclosed and unenclosed *stairways* shall be protected by 1-hour fire-resistance- rated construction or the *fire-resis*-

*tance rating* of the *stairway* enclosure, whichever is greater. Access to the enclosed space shall not be directly from within the *stairway* enclosure.

**Exception:** Spaces under *stairways* serving and contained within a single residential *dwelling unit* in Group R-2 or R-3 shall be permitted to be protected on the enclosed side with  $\frac{1}{2}$ -inch (12.7 mm) gypsum board.

**[BE] 1011.7.4 Enclosures under exterior stairways.** There shall not be enclosed usable space under *exterior exit stairways* unless the space is completely enclosed in 1-hour fire-resistance-rated construction. The open space under *exterior stairways* shall not be used for any purpose.

**[BE] 1011.8 Vertical rise.** A *flight* of *stairs* shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

**Exception:** *Spiral stairways* used as a *means of egress* from technical production areas.

**[BE] 1011.9 Curved stairways.** Curved *stairways* with *winder* treads shall have treads and risers in accordance with Section 1011.5 and the smallest radius shall be not less than twice the minimum width or required capacity of the *stairway*.

**Exception:** The radius restriction shall not apply to curved *stairways* in Group R-3 and within individual *dwelling units* in Group R-2.

**[BE] 1011.10 Spiral stairways.** *Spiral stairways* are permitted to be used as a component in the *means of egress* only within *dwelling units* or from a space not more than 250 square feet (23 m<sup>2</sup>) in area and serving not more than five occupants, or from technical production areas in accordance with Section 410.6 of the *International Building Code*.

A *spiral stairway* shall have a  $7^{1}/_{2}$ -inch (191 mm) minimum clear tread depth at a point 12 inches (305 mm) from the narrow edge. The risers shall be sufficient to provide a headroom of 78 inches (1981 mm) minimum, but riser height shall not be more than  $9^{1}/_{2}$  inches (241 mm). The minimum *stairway* clear width at and below the *handrail* shall be 26 inches (660 mm).

**[BE] 1011.11 Handrails.** *Stairways* shall have *handrails* on each side and shall comply with Section 1014. Where glass is used to provide the *handrail*, the *handrail* shall also comply with Section 2407 of the *International Building Code*.

# **Exceptions:**

- 1. *Stairways* within *dwelling units*, and *spiral stairways* are permitted to have a *handrail* on one side only.
- 2. Decks, patios and walkways that have a single change in elevation where the landing depth on each side of the change of elevation is greater than what is required for a landing do not require *handrails*.
- 3. In Group R-3 occupancies, a change in elevation consisting of a single riser at an entrance or egress door does not require *handrails*.

4. Changes in room elevations of three or fewer risers within *dwelling units* and *sleeping units* in Group R-2 and R-3 do not require *handrails*.

**[BE] 1011.12 Stairway to roof.** In buildings four or more stories above grade plane, one *stairway* shall extend to the roof surface, unless the roof has a slope steeper than four units vertical in 12 units horizontal (33-percent slope).

**Exception:** Other than where required by Section 1011.12.1, in buildings without an occupied roof, access to the roof from the top story shall be permitted to be by an *alternating tread device*, a ships ladder or a permanent ladder.

**[BE] 1011.12.1 Stairway to elevator equipment.** Roofs and penthouses containing elevator equipment that must be accessed for maintenance are required to be accessed by a *stairway*.

**[BE] 1011.12.2 Roof access.** Where a *stairway* is provided to a roof, access to the roof shall be provided through a penthouse complying with Section 1510.2 of the *International Building Code*.

**Exception:** In buildings without an occupied roof, access to the roof shall be permitted to be a roof hatch or trap door not less than 16 square feet  $(1.5 \text{ m}^2)$  in area and having a minimum dimension of 2 feet (610 mm).

**[BE] 1011.13 Guards.** *Guards* shall be provided along *stair-ways* and landings where required by Section 1015 and shall be constructed in accordance with Section 1015. Where the roof hatch opening providing the required access is located within 10 feet (3049 mm) of the roof edge, such roof access or roof edge shall be protected by *guards* installed in accordance with Section 1015.

**[BE] 1011.14 Alternating tread devices.** Alternating tread devices are limited to an element of a means of egress in buildings of Groups F, H and S from a mezzanine not more than 250 square feet  $(23 \text{ m}^2)$  in area and that serves not more than five occupants; in buildings of Group I-3 from a guard tower, observation station or control room not more than 250 square feet  $(23 \text{ m}^2)$  in area and for access to unoccupied roofs. Alternating tread devices used as a means of egress shall not have a rise greater than 20 feet (6096 mm) between floor levels or landings.

**[BE] 1011.14.1 Handrails of alternating tread devices.** *Handrails* shall be provided on both sides of *alternating tread devices* and shall comply with Section 1014.

**[BE] 1011.14.2 Treads of alternating tread devices.** Alternating tread devices shall have a minimum tread depth of 5 inches (127 mm), a minimum projected tread depth of  $8^{1/2}$  inches (216 mm), a minimum tread width of 7 inches (178 mm) and a maximum riser height of  $9^{1/2}$  inches (241 mm). The tread depth shall be measured horizontally between the vertical planes of the foremost projections of adjacent treads. The riser height shall be measured vertically between the leading edges of adjacent treads. The riser height shall be measured vertically between the horizontal of between 50 and 70 degrees (0.87 and 1.22 rad). The initial tread of the device shall begin at the same elevation as the platform, landing or floor surface.

**Exception:** Alternating tread devices used as an element of a means of egress in buildings from a mezzanine area not more than 250 square feet (23 m<sup>2</sup>) in area that serves not more than five occupants shall have a minimum tread depth of 3 inches (76 mm) with a minimum projected tread depth of  $10^{1/2}$  inches (267 mm). The rise to the next alternating tread surface shall not exceed 8 inches (203 mm).

**[BE] 1011.15 Ships ladders.** Ships ladders are permitted to be used in Group I-3 as a component of a *means of egress* to and from control rooms or elevated facility observation stations not more than 250 square feet  $(23 \text{ m}^2)$  with not more than three occupants and for access to unoccupied roofs. The minimum clear width at and below the *handrails* shall be 20 inches (508 mm).

**[BE] 1011.15.1 Handrails of ships ladders.** *Handrails* shall be provided on both sides of ships ladders.

**[BE] 1011.15.2 Treads of ships ladders.** Ships ladders shall have a minimum tread depth of 5 inches (127 mm). The tread shall be projected such that the total of the tread depth plus the *nosing* projection is not less than  $8^{1}/_{2}$  inches (216 mm). The maximum riser height shall be  $9^{1}/_{2}$  inches (241 mm).

**[BE] 1011.16 Ladders.** Permanent ladders shall not serve as a part of the *means of egress* from occupied spaces within a building. Permanent ladders shall be permitted to provide access to the following areas:

- 1. Spaces frequented only by personnel for maintenance, repair or monitoring of equipment.
- Nonoccupiable spaces accessed only by catwalks, crawl spaces, freight elevators or very narrow passageways.
- 3. Raised areas used primarily for purposes of security, life safety or fire safety including, but not limited to, observation galleries, prison guard towers, fire towers or lifeguard stands.
- 4. Elevated levels in Group U not open to the general public.
- 5. Nonoccupied roofs that are not required to have *stairway* access in accordance with Section 1011.12.1.
- 6. Ladders shall be constructed in accordance with Section 306.5 of the *International Mechanical Code*.

#### SECTION 1012 RAMPS

**[BE] 1012.1 Scope.** The provisions of this section shall apply to ramps used as a component of a *means of egress*.

#### **Exceptions:**

- 1. Ramped *aisles* within assembly rooms or spaces shall comply with the provisions in Section 1029.
- 2. Curb ramps shall comply with ICC A117.1.

3. Vehicle *ramps* in parking garages for pedestrian *exit access* shall not be required to comply with Sections 1012.3 through 1012.10 where they are not an *accessible route* serving accessible parking spaces, other required accessible elements or part of an *accessible means of egress*.

**[BE] 1012.2 Slope.** *Ramps* used as part of a *means of egress* shall have a running slope not steeper than one unit vertical in 12 units horizontal (8-percent slope). The slope of other pedestrian *ramps* shall not be steeper than one unit vertical in eight units horizontal (12.5-percent slope).

**[BE] 1012.3 Cross slope.** The slope measured perpendicular to the direction of travel of a *ramp* shall not be steeper than one unit vertical in 48 units horizontal (2-percent slope).

**[BE] 1012.4 Vertical rise.** The rise for any *ramp* run shall be 30 inches (762 mm) maximum.

**[BE] 1012.5 Minimum dimensions.** The minimum dimensions of *means of egress ramps* shall comply with Sections 1012.5.1 through 1012.5.3.

**[BE] 1012.5.1 Width and capacity.** The minimum width and required capacity of a *means of egress ramp* shall be not less than that required for *corridors* by Section 1020.2. The clear width of a *ramp* between *handrails*, if provided, or other permissible projections shall be 36 inches (914 mm) minimum.

**[BE] 1012.5.2 Headroom.** The minimum headroom in all parts of the *means of egress ramp* shall be not less than 80 inches (2032 mm).

**[BE] 1012.5.3 Restrictions.** *Means of egress ramps* shall not reduce in width in the direction of egress travel. Projections into the required *ramp* and landing width are prohibited. Doors opening onto a landing shall not reduce the clear width to less than 42 inches (1067 mm).

**[BE] 1012.6 Landings.** *Ramps* shall have landings at the bottom and top of each *ramp*, points of turning, entrance, *exits* and at doors. Landings shall comply with Sections 1012.6.1 through 1012.6.5.

**[BE] 1012.6.1 Slope.** Landings shall have a slope not steeper than one unit vertical in 48 units horizontal (2-percent slope) in any direction. Changes in level are not permitted.

**[BE] 1012.6.2 Width.** The landing width shall be not less than the width of the widest *ramp* run adjoining the landing.

**[BE] 1012.6.3 Length.** The landing length shall be 60 inches (1525 mm) minimum.

### **Exceptions:**

 In Group R-2 and R-3 individual *dwelling* and sleeping units that are not required to be Accessible units, Type A units or Type B units in accordance with Section 1107 of the *International Building Code*, landings are permitted to be 36 inches (914 mm) minimum. 2. Where the *ramp* is not a part of an *accessible route*, the length of the landing shall not be required to be more than 48 inches (1220 mm) in the direction of travel.

**[BE] 1012.6.4 Change in direction.** Where changes in direction of travel occur at landings provided between *ramp* runs, the landing shall be 60 inches by 60 inches (1524 mm by 1524 mm) minimum.

**Exception:** In Group R-2 and R-3 individual *dwelling* or *sleeping units* that are not required to be Accessible units, Type A units or Type B units in accordance with Section 1107 of the *International Building Code*, landings are permitted to be 36 inches by 36 inches (914 mm by 914 mm) minimum.

**[BE] 1012.6.5 Doorways.** Where doorways are located adjacent to a *ramp* landing, maneuvering clearances required by ICC A117.1 are permitted to overlap the required landing area.

**[BE] 1012.7 Ramp construction.** *Ramps* shall be built of materials consistent with the types permitted for the type of construction of the building, except that wood *handrails* shall be permitted for all types of construction.

**[BE] 1012.7.1 Ramp surface.** The surface of *ramps* shall be of slip-resistant materials that are securely attached.

**[BE] 1012.7.2 Outdoor conditions.** Outdoor *ramps* and outdoor approaches to *ramps* shall be designed so that water will not accumulate on walking surfaces.

**[BE] 1012.8 Handrails.** *Ramps* with a rise greater than 6 inches (152 mm) shall have *handrails* on both sides. *Handrails* shall comply with Section 1014.

**[BE] 1012.9 Guards.** *Guards* shall be provided where required by Section 1015 and shall be constructed in accordance with Section 1015.

**[BE] 1012.10 Edge protection.** Edge protection complying with Section 1012.10.1 or 1012.10.2 shall be provided on each side of *ramp* runs and at each side of *ramp* landings.

Exceptions:

- 1. Edge protection is not required on *ramps* that are not required to have *handrails*, provided they have flared sides that comply with the ICC A117.1 curb *ramp* provisions.
- 2. Edge protection is not required on the sides of *ramp* landings serving an adjoining *ramp* run or *stairway*.
- 3. Edge protection is not required on the sides of *ramp* landings having a vertical dropoff of not more than  $1/_2$  inch (12.7 mm) within 10 inches (254 mm) horizontally of the required landing area.

**[BE] 1012.10.1 Curb, rail, wall or barrier.** A curb, rail, wall or barrier shall be provided to serve as edge protection. A curb shall be not less than 4 inches (102 mm) in height. Barriers shall be constructed so that the barrier prevents the passage of a 4-inch-diameter (102 mm) sphere, where any portion of the sphere is within 4 inches (102 mm) of the floor or ground surface.

**[BE] 1012.10.2 Extended floor or ground surface.** The floor or ground surface of the *ramp* run or landing shall extend 12 inches (305 mm) minimum beyond the inside face of a *handrail* complying with Section 1014.

## SECTION 1013 EXIT SIGNS

**[BE] 1013.1 Where required.** *Exits* and *exit access* doors shall be marked by an *approved* exit sign readily visible from any direction of egress travel. The path of egress travel to *exits* and within *exits* shall be marked by readily visible exit signs to clearly indicate the direction of egress travel in cases where the *exit* or the path of egress travel is not immediately visible to the occupants. Intervening *means of egress* doors within *exits* shall be marked by exit signs. Exit sign placement shall be such that no point in an *exit access corridor* or *exit passageway* is more than 100 feet (30 480 mm) or the *listed* viewing distance for the sign, whichever is less, from the nearest visible *exit* sign.

## **Exceptions:**

- 1. Exit signs are not required in rooms or areas that require only one *exit* or *exit access*.
- 2. Main exterior *exit* doors or gates that are obviously and clearly identifiable as *exits* need not have *exit* signs where *approved* by the *fire code official*.
- 3. Exit signs are not required in occupancies in Group U and individual *sleeping units* or *dwelling units* in Group R-1, R-2 or R-3.
- 4. Exit signs are not required in dayrooms, sleeping rooms or dormitories in occupancies in Group I-3.
- 5. In occupancies in Groups A-4 and A-5, exit signs are not required on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.

**[BE] 1013.2 Floor-level exit signs in Group R-1.** Where exit signs are required in Group R-1 occupancies by Section 1013.1, additional low-level exit signs shall be provided in all areas serving guest rooms in Group R-1 occupancies and shall comply with Section 1013.5.

The bottom of the sign shall be not less than 10 inches (254 mm) nor more than 12 inches (305 mm) above the floor level. The sign shall be flush mounted to the door or wall. Where mounted on the wall, the edge of the sign shall be within 4 inches (102 mm) of the door frame on the latch side.

**[BE] 1013.3 Illumination.** Exit signs shall be internally or externally illuminated.

**Exception:** Tactile signs required by Section 1013.4 need not be provided with illumination.

**[BE] 1013.4 Raised character and braille exit signs.** A sign stating EXIT in visual characters, raised characters and braille and complying with ICC A117.1 shall be provided adjacent to each door to an area of refuge, an exterior area for

assisted rescue, an exit stairway or ramp, an exit passageway and the exit discharge.

**[BE] 1013.5 Internally illuminated exit signs.** Electrically powered, *self-luminous* and *photoluminescent exit* signs shall be *listed* and labeled in accordance with UL 924 and shall be installed in accordance with the manufacturer's instructions and Section 604. Exit signs shall be illuminated at all times.

**[BE] 1013.6 Externally illuminated exit signs.** Externally illuminated exit signs shall comply with Sections 1013.6.1 through 1013.6.3.

**[BE] 1013.6.1 Graphics.** Every exit sign and directional exit sign shall have plainly legible letters not less than 6 inches (152 mm) high with the principal strokes of the letters not less than  $\frac{3}{4}$  inch (19.1 mm) wide. The word "EXIT" shall have letters having a width not less than 2 inches (51 mm) wide, except the letter "I," and the minimum spacing between letters shall be not less than  $\frac{3}{8}$  inch (9.5 mm). Signs larger than the minimum established in this section shall have letter widths, strokes and spacing in proportion to their height.

The word "EXIT" shall be in high contrast with the background and shall be clearly discernible when the means of exit sign illumination is or is not energized. If a chevron directional indicator is provided as part of the exit sign, the construction shall be such that the direction of the chevron directional indicator cannot be readily changed.

**[BE] 1013.6.2 Exit sign illumination.** The face of an exit sign illuminated from an external source shall have an intensity of not less than 5 footcandles (54 lux).

**[BE] 1013.6.3 Power source.** Exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than 90 minutes in case of primary power loss, the sign illumination means shall be connected to an emergency power system provided from storage batteries, unit equipment or an on-site generator. The installation of the emergency power system shall be in accordance with Section 604.

## **Exceptions:**

- 1. *Approved* exit sign illumination means that provide continuous illumination independent of external power sources for a duration of not less than 90 minutes, in case of primary power loss, are not required to be connected to an emergency electrical system.
- 2. Group I-2 Condition 2 exit sign illumination shall not be provided by unit equipment battery only.

## SECTION 1014 HANDRAILS

**[BE] 1014.1 Where required.** *Handrails* serving *stairways*, *ramps*, stepped *aisles* and ramped *aisles* shall be adequate in strength and attachment in accordance with Section 1607.8 of the *International Building Code. Handrails* required for *stairways* by Section 1011.11 shall comply with Sections 1014.2 through 1014.9. *Handrails* required for *ramps* by Section 1012.8 shall comply with Sections 1014.2 through 1014.8.

*Handrails* for stepped *aisles* and ramped *aisles* required by Section 1029.15 shall comply with Sections 1014.2 through 1014.8.

**[BE] 1014.2 Height.** *Handrail* height, measured above *stair* tread *nosings*, or finish surface of *ramp* slope, shall be uniform, not less than 34 inches (864 mm) and not more than 38 inches (965 mm). *Handrail* height of *alternating tread devices* and ships ladders, measured above tread *nosings*, shall be uniform, not less than 30 inches (762 mm) and not more than 34 inches (864 mm).

# **Exceptions:**

- 1. Where handrail fittings or bendings are used to provide continuous transition between *flights*, the fittings or bendings shall be permitted to exceed the maximum height.
- 2. In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are associated with a Group R-3 occupancy or associated with individual *dwelling units* in Group R-2 occupancies; where handrail fittings or bendings are used to provide continuous transition between *flights*, transition at *winder* treads, transition from *handrail* to *guard*, or where used at the start of a *flight*, the *handrail* height at the fittings or bendings shall be permitted to exceed the maximum height.
- 3. *Handrails* on top of a *guard* where permitted along stepped *aisles* and ramped *aisles* in accordance with Section 1029.15.

**[BE] 1014.3 Handrail graspability.** Required *handrails* shall comply with Section 1014.3.1 or shall provide equivalent graspability.

**Exception:** In Group R-3 occupancies; within *dwelling units* in Group R-2 occupancies; and in Group U occupancies that are accessory to a Group R-3 occupancy or accessory to individual *dwelling units* in Group R-2 occupancies; *handrails* shall be Type I in accordance with Section 1014.3.1, Type II in accordance with Section 1014.3.2 or shall provide equivalent graspability.

**[BE] 1014.3.1 Type I.** *Handrails* with a circular cross section shall have an outside diameter of not less than  $1^{1}/_{4}$  inches (32 mm) and not greater than 2 inches (51 mm). Where the *handrail* is not circular, it shall have a perimeter dimension of not less than 4 inches (102 mm) and not greater than  $6^{1}/_{4}$  inches (160 mm) with a maximum cross-sectional dimension of  $2^{1}/_{4}$  inches (57 mm) and minimum cross-sectional dimension of 1 inch (25 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

**[BE] 1014.3.2 Type II.** *Handrails* with a perimeter greater than  $6^{1}/_{4}$  inches (160 mm) shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of  $3^{1}/_{4}$  inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of not less than  $5^{1}/_{16}$  inch (8 mm) within  $7^{1}/_{8}$  inch (22 mm) below the widest portion of the profile. This required depth shall continue for not less than  $3^{1}/_{8}$  inch (10 mm) to a level that is not less than  $13^{1}/_{4}$  inches (45 mm)

below the tallest portion of the profile. The minimum width of the *handrail* above the recess shall be not less than  $1^{1}/_{4}$  inches (32 mm) to a maximum of  $2^{3}/_{4}$  inches (70 mm). Edges shall have a minimum radius of 0.01 inch (0.25 mm).

**[BE] 1014.4 Continuity.** *Handrail* gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.

**Exceptions:** 

- 1. *Handrails* within *dwelling units* are permitted to be interrupted by a newel post at a turn or landing.
- 2. Within a *dwelling unit*, the use of a volute, turnout, starting easing or starting newel is allowed over the lowest tread.
- 3. Handrail brackets or balusters attached to the bottom surface of the *handrail* that do not project horizon-tally beyond the sides of the *handrail* within  $1^{1}/_{2}$  inches (38 mm) of the bottom of the *handrail* shall not be considered obstructions. For each  $1/_{2}$  inch (12.7 mm) of additional *handrail* perimeter dimension above 4 inches (102 mm), the vertical clearance dimension of  $1^{1}/_{2}$  inches (38 mm) shall be permitted to be reduced by  $1/_{8}$  inch (3.2 mm).
- 4. Where *handrails* are provided along walking surfaces with slopes not steeper than 1:20, the bottoms of the handrail gripping surfaces shall be permitted to be obstructed along their entire length where they are integral to crash rails or bumper guards.
- 5. *Handrails* serving stepped *aisles* or ramped *aisles* are permitted to be discontinuous in accordance with Section 1029.15.1.

**[BE] 1014.5 Fittings.** *Handrails* shall not rotate within their fittings.

**[BE] 1014.6 Handrail extensions.** *Handrails* shall return to a wall, *guard* or the walking surface or shall be continuous to the *handrail* of an adjacent *flight* of *stairs* or ramp run. Where *handrails* are not continuous between *flights* the *handrails* shall extend horizontally not less than 12 inches (305 mm) beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser. At *ramps* where *handrails* are not continuous between runs, the *handrails* shall extend horizontally above the landing 12 inches (305 mm) minimum beyond the top and bottom of *ramp* runs. The extensions of *handrails* shall be in the same direction of the *flights* of *stairs* at *stairways* and the *ramp* runs at *ramps*.

## **Exceptions:**

- 1. *Handrails* within a *dwelling unit* that is not required to be accessible need extend only from the top riser to the bottom riser.
- 2. *Handrails* serving *aisles* in rooms or spaces used for assembly purposes are permitted to comply with the *handrail* extensions in accordance with Section 1029.15.
- 3. *Handrails* for *alternating tread devices* and ships ladders are permitted to terminate at a location verti-

cally above the top and bottom risers. *Handrails* for *alternating tread devices* are not required to be continuous between *flights* or to extend beyond the top or bottom risers.

**[BE] 1014.7 Clearance.** Clear space between a *handrail* and a wall or other surface shall be not less than  $1^{1}/_{2}$  inches (38 mm). A *handrail* and a wall or other surface adjacent to the *handrail* shall be free of any sharp or abrasive elements.

[BE] 1014.8 Projections. On ramps and on ramped aisles that are part of an *accessible route*, the clear width between handrails shall be 36 inches (914 mm) minimum. Projections into the required width of *aisles*, *stairways* and *ramps* at each side shall not exceed  $4^{1/2}$  inches (114 mm) at or below the handrail height. Projections into the required width shall not be limited above the minimum headroom height required in Section 1011.3. Projections due to intermediate handrails shall not constitute a reduction in the egress width. Where a pair of intermediate handrails are provided within the stairway width without a walking surface between the pair of intermediate handrails and the distance between the pair of intermediate handrails is greater than 6 inches (152 mm), the available egress width shall be reduced by the distance between the closest edges of each such intermediate pair of handrails that is greater than 6 inches (152 mm).

**[BE] 1014.9 Intermediate handrails.** *Stairways* shall have intermediate *handrails* located in such a manner that all portions of the *stairway* minimum width or required capacity are within 30 inches (762 mm) of a *handrail*. On monumental *stairs, handrails* shall be located along the most direct path of egress travel.

#### SECTION 1015 GUARDS

**[BE] 1015.1 General.** *Guards* shall comply with the provisions of Section 1015.2 through 1015.7. Operable windows with sills located more than 72 inches (1829 mm) above finished grade or other surface below shall comply with Section 1015.8.

**[BE] 1015.2 Where required.** *Guards* shall be located along open-sided walking surfaces, including *mezzanines*, equipment platforms, *aisles*, *stairs*, *ramps* and landings that are located more than 30 inches (762 mm) measured vertically to the floor or grade below at any point within 36 inches (914 mm) horizontally to the edge of the open side. *Guards* shall be adequate in strength and attachment in accordance with Section 1607.8 of the *International Building Code*.

**Exception:** *Guards* are not required for the following locations:

- 1. On the loading side of loading docks or piers.
- 2. On the audience side of stages and raised platforms, including *stairs* leading up to the stage and raised platforms.
- 3. On raised stage and platform floor areas, such as runways, *ramps* and side stages used for entertainment or presentations.

- 4. At vertical openings in the performance area of stages and platforms.
- 5. At elevated walking surfaces appurtenant to stages and platforms for access to and utilization of special lighting or equipment.
- 6. Along vehicle service pits not accessible to the public.
- 7. In assembly seating areas at cross aisles in accordance with Section 1029.16.2.

**[BE] 1015.2.1 Glazing.** Where glass is used to provide a *guard* or as a portion of the *guard* system, the *guard* shall comply with Section 2407 of the *International Building Code*. Where the glazing provided does not meet the strength and attachment requirements of Section 1607.8 of the *International Building Code*, complying *guards* shall be located along glazed sides of open-sided walking surfaces.

**[BE] 1015.3 Height.** Required *guards* shall be not less than 42 inches (1067 mm) high, measured vertically as follows:

- 1. From the adjacent walking surfaces.
- 2. On *stairways* and stepped *aisles*, from the line connecting the leading edges of the tread *nosings*.
- 3. On *ramps* and ramped *aisles*, from the *ramp* surface at the *guard*.

## **Exceptions:**

- 1. For occupancies in Group R-3 not more than three stories above grade in height and within individual *dwelling units* in occupancies in Group R-2 not more than three stories above grade in height with separate *means of egress*, required *guards* shall be not less than 36 inches (914 mm) in height measured vertically above the adjacent walking surfaces or adjacent *fixed seating*.
- 2. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, *guards* on the open sides of *stairs* shall have a height not less than 34 inches (864 mm) measured vertically from a line connecting the leading edges of the treads.
- 3. For occupancies in Group R-3, and within individual *dwelling units* in occupancies in Group R-2, where the top of the *guard* also serves as a *handrail* on the open sides of *stairs*, the top of the *guard* shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm) measured vertically from a line connecting the leading edges of the treads.
- 4. The *guard* height in assembly seating areas shall comply with Section 1029.16 as applicable.
- 5. Along *alternating tread devices* and ships ladders, *guards* where the top rail also serves as a *handrail* shall have height not less than 30 inches (762 mm) and not more than 34 inches (864 mm), measured vertically from the leading edge of the device tread *nosing*.

**[BE] 1015.4 Opening limitations.** Required *guards* shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter from the walking surface to the required *guard* height.

## Exceptions:

- 1. From a height of 36 inches (914 mm) to 42 inches (1067 mm), *guards* shall not have openings that allow passage of a sphere  $4^{3}/_{8}$  inches (111 mm) in diameter.
- 2. The triangular openings at the open sides of a *stair*, formed by the riser, tread and bottom rail shall not allow passage of a sphere 6 inches (152 mm) in diameter.
- 3. At elevated walking surfaces for access to and use of electrical, mechanical or plumbing systems or equipment, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
- 4. In areas that are not open to the public within occupancies in Group I-3, F, H or S, and for *alternating tread devices* and ships ladders, *guards* shall not have openings that allow passage of a sphere 21 inches (533 mm) in diameter.
- 5. In assembly seating areas, *guards* required at the end of *aisles* in accordance with Section 1029.16.4 shall not have openings that allow passage of a sphere 4 inches (102 mm) in diameter up to a height of 26 inches (660 mm). From a height of 26 inches (660 mm) to 42 inches (1067 mm) above the adjacent walking surfaces, *guards* shall not have openings that allow passage of a sphere 8 inches (203 mm) in diameter.
- 6. Within individual *dwelling units* and *sleeping units* in Group R-2 and R-3 occupancies, *guards* on the open sides of *stairs* shall not have openings that allow passage of a sphere  $4^{3}/_{8}$  (111 mm) inches in diameter.

**[BE] 1015.5 Screen porches.** Porches and decks that are enclosed with insect screening shall be provided with *guards* where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

**[BE] 1015.6 Mechanical equipment, systems and devices.** *Guards* shall be provided where various components that require service are located within 10 feet (3048 mm) of a roof edge or open side of a walking surface and such edge or open side is located more than 30 inches (762 mm) above the floor, roof or grade below. The *guard* shall extend not less than 30 inches (762 mm) beyond each end of such components. The *guard* shall be constructed so as to prevent the passage of a sphere 21 inches (533 mm) in diameter.

**Exception:** *Guards* are not required where permanent fall arrest/restraint anchorage connector devices that comply with ANSI/ASSE Z 359.1 are affixed for use during the entire roof covering lifetime. The devices shall be re-evaluated for possible replacement when the entire roof covering is replaced. The devices shall be placed not more than