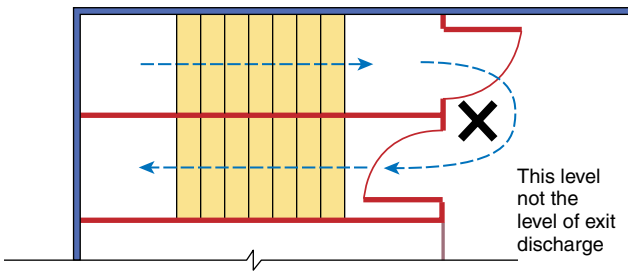
the exit enclosure. The new provision allows for membrane penetrations such as those for the installation of fire alarm system manual fire alarm boxes next to the door into the stair enclosure. In prior editions of the *Code,* such membrane penetrations on the outside of the exit enclosure were not addressed, since they were not specifically permitted by 14.3.1(10).

14.3.2 An exit enclosure shall provide a continuous protected path of travel to an exit discharge. [***101:***7.1.3.2.2]

Subsection 14.3.2 emphasizes that exit enclosures and the protection they afford the occupants must be continuous. It is a fundamental premise that, once an occupant has been provided the level of protection afforded by an exit, that level of protection must be maintained to the exit discharge.

Subsection 14.3.2 prohibits an exit stair or exit ramp arrangement that requires a person to leave the exit enclosure, become exposed to conditions on a floor, and then re-enter the exit enclosure to continue moving to the exit discharge. Exhibit 14.10 shows an unacceptable arrangement. The discontinuity of leaving the stair enclosure and then re-entering the stair enclosure to continue moving to the level of exit discharge creates too great a potential for exposing occupants to danger and blocking their egress route.

Exhibit 14.10



Unacceptable arrangement for enclosing a stair serving as a required exit.

14.3.3* An exit enclosure shall not be used for any purpose that has the potential to interfere with its use as an exit and, if so designated, as an area of refuge. *(See also 14.6.3.)* [***101:***7.1.3.2.3]

A.14.3.3 This provision prohibits the use of exit enclosures for storage or for installation of equipment not necessary for safety. Occupancy is prohibited other than for egress, refuge, and access. The intent is that the exit enclosure essentially be "sterile" with respect to fire safety hazards. [***101:***A.7.1.3.2.3]

Subsection 14.3.3 prohibits the use of an exit enclosure for any purpose that could potentially interfere with its use as an exit or as an area of refuge. For example, use of an enclosed exit stair to house vending machines, copying machines, or storage or to run electrical distribution wires and cables to areas of the building is prohibited. Standpipes and emergency lighting that are part of the life safety features are permitted only if their arrangement does not interfere with the passage of people. This limitation covers more than mechanical obstruction of the egress path; it includes any use that could interfere with the use of the exit. See also 14.4.1 and 14.6.3.

Exhibit 14.11 shows rolled carpet on a stair landing within an exit enclosure. The presence of the carpeting violates the requirement of 14.3.3 in two ways:

1. The carpet encroaches on the required egress width.
2. If the combustible carpet were to burn, the resultant heat and smoke would prevent the exit enclosure from serving its intended use.

The prohibitions of 14.3.3 also apply to exit passageways, because they also are exit enclosures.

Exhibit 14.11

Rolled carpet stored in an exit enclosure. (Courtesy of Jake Pauls)

14.4 Means of Egress Reliability

14.4.1* Maintenance. Means of egress shall be continuously maintained free of all obstructions or impediments to full instant use in the case of fire or other emergency. [***101:***7.1.10.1]

A.14.4.1 A proper means of egress allows unobstructed travel at all times. Any type of barrier including, but not limited to, the accumulations of snow and ice in those climates subject to such accumulations is an impediment to free movement in the means of egress. Another example of an obstruction or impediment to full instant use of means of egress is any security device or system that emits any medium that could obscure a means of egress. It is, however, recognized that obstructions occur on a short-duration basis. In these instances, awareness training should be provided to ensure that blockages are kept to a minimum and procedures are established for the control and monitoring of the area affected. [***101:***A.7.1.10.1]

The provision in 14.4.1 emphasizes the importance of keeping the egress system usable at all times. In the case of a

Class A mercantile occupancy, for example, the minimum 60 in. (1525 mm) exit access aisle width required by 36.2.5.6 and 37.2.5.6 of NFPA *101* must not, subsequent to receipt of the store's occupancy permit, be filled with mid-aisle displays that reduce the aisle width. Similarly, in a business occupancy with a new exit stair of the minimum 44 in. (1120 mm) width required by Table 7.2.2.2.1.2(B) of NFPA *101*, the stair width must not be reduced by the introduction of a mechanized chairlift that is installed, for example, to comply with legislation mandating accessibility for persons with mobility impairments. [For additional guidance on the installation of stair descent devices, see A.7.2.12.2.3 of NFPA *101*.] In an apartment building complex, the required width of the outside exit discharge sidewalk that runs along the side of the building must not be reduced by the presence of a trash dumpster on either a temporary or a permanent basis.

An egress path that was *Code* compliant when constructed might have its egress reliability compromised by human action. Exhibit 14.12 shows a stair with flaring tread width near its base. Graspable handrails were installed along the stair flight, but the placement of potted plants prevents the stair user from accessing a handrail while traveling on the lowest three treads.

Exhibit 14.12

Potted plants prevent access to required handrails. (Courtesy of Jake Pauls)

14.4.2 Furnishings and Decorations in Means of Egress.

Paragraphs 14.4.2.1 through 14.4.2.3 provide guidance for the interior decoration and maintenance of buildings that serve, for example, as restaurants and theaters, where mirrored wall surfaces and excessive decoration can camouflage and, in some cases, obstruct exits. For such occupancies, care must be taken to ensure that the required, standard, well-marked exit access that leads to an unobstructed exit is not obscured in the pursuit of period or style authenticity. For example, a restaurant that is heavily decorated with red wall coverings might use green exit signs to help meet the requirements of these paragraphs, despite the fact that Section 14.14 does not specify exit sign color.

14.4.2.1 No furnishings, decorations, or other objects shall obstruct exits or their access thereto, egress therefrom, or visibility thereof. [***101:***7.1.10.2.1]

14.4.2.2 No obstruction by railings, barriers, or gates shall divide the means of egress into sections appurtenant to individual rooms, apartments, or other occupied spaces. Where the AHJ finds the required path of travel to be obstructed by furniture or other movable objects, the authority shall be permitted to require that such objects be secured out of the way or shall be permitted to require that railings or other permanent barriers be installed to protect the path of travel against encroachment. [***101:***7.1.10.2.2]

Paragraph 14.4.2.2 relates to the arrangement of furniture, as well as to the arrangement of railings, gates, or barriers found in lobbies, foyers, waiting spaces, or staging areas of businesses, hospitals, health care clinics, hotels, and apartments. Because these large spaces are often subdivided by furniture (e.g., chairs, tables, and plants) or by railings and gates, furnishings must be prevented from blocking access to exits.

Paragraph 14.4.2.2 recommends fastening furnishings so that they are clear of access to exits or placing railings around furnishings to ensure that they are held within a fixed area and cannot be easily moved or rearranged. The *Code* recognizes the problem created by storage that is placed within the exit access aisles of storage rooms in mercantile occupancies, which is a violation of *Code* requirements. Both Chapters 36 and 37 of NFPA *101* require an unobstructed egress path to be maintained as a specific condition for permitting egress to pass through storerooms.

14.4.2.3 Mirrors shall not be placed on exit door leaves. Mirrors shall not be placed in or adjacent to any exit in such a manner as to confuse the direction of egress. [***101:***7.1.10.2.3]

14.4.2.4 Every door opening and every principal entrance that is required to serve as an exit shall be designed and constructed so that the path of egress travel is obvious and direct. Windows that, because of their physical configuration or design and the materials used in their construction, have the potential to be mistaken for door openings shall be made inaccessible to the occupants by barriers or railings. [***101:***7.2.1.1.2]

The purpose of the barriers or railings required by 14.4.2.4 is to prevent an occupant from walking through a window. Such barriers are not required to comply with the requirements of 7.2.2.4 of NFPA *101* applicable to guards. For example, intermediate rails or balusters spaced to meet the 4 in. (100 mm) diameter sphere requirement of 7.2.2.4.6.3 of NFPA *101* are not needed. A simple barrier rail, without ornamental grille-like fill or closely spaced

Exhibit 14.13

Circular decals that call attention to glass door in corridor egress path.

balusters, will adequately warn occupants to avoid walking into a glass wall or large windowpane.

Exhibit 14.13 shows a clear glass cross-corridor door in a hotel guest floor corridor. The circular decals on the door and glass sidelight call attention to the door positioned across the corridor egress path.

14.4.3 Impediments to Egress. Any device or alarm installed to restrict the improper use of a means of egress, and any device or system installed to monitor or record use of a means of egress, shall be designed and installed so that it cannot, even in case of failure, impede or prevent emergency use of such means of egress unless otherwise provided in 14.5.3 and Chapters 18, 19, 22, and 23 of NFPA *101*. [***101:***7.1.9]

14.5 Door Openings

Doors serve multiple purposes that relate to the comfort and safety of building occupants and provide protection from the following:

1. Weather, drafts, noise, and disturbance from adjoining areas
2. Trespass by unauthorized persons
3. Fire and smoke, with which this *Code* is concerned

14.5.1 Swing and Force to Open.

Δ **14.5.1.1* Swinging-Type Door Assembly Requirement.** Any door assembly in a means of egress shall be of the side-hinged or pivoted-swinging type, and shall be installed to be capable of swinging from any position to the full required width of the opening in which it is installed, unless otherwise specified as follows:

(1) Door assemblies in dwelling units, as provided in Chapter 24 of NFPA *101*, shall be permitted.
(2) Door assemblies in residential board and care occupancies, as provided in Chapters 32 and 33 of NFPA *101*, shall be permitted.
(3) Where permitted in Chapters 11 through 43 of NFPA *101*, horizontal-sliding or vertical-rolling security grilles or door assemblies that are part of the required means of egress shall be permitted, provided that all of the following criteria are met:
   (a) Such grilles or door assemblies shall remain secured in the fully open position during the period of occupancy by the general public.
   (b) On or adjacent to the grille or door opening, there shall be a readily visible, durable sign in letters not less than 1 in. (25 mm) high on a contrasting background that reads as follows: THIS DOOR TO REMAIN OPEN WHEN THE SPACE IS OCCUPIED.
   (c) Door leaves or grilles shall not be brought to the closed position when the space is occupied.
   (d) Door leaves or grilles shall be operable from within the space without the use of any special knowledge or effort.
   (e) Where two or more means of egress are required, not more than half of the means of egress shall be equipped with horizontal-sliding or vertical-rolling grilles or door assemblies.
(4) Horizontal-sliding door assemblies shall be permitted under any of the following conditions:
   (a) Horizontal-sliding door assemblies in detention and correctional occupancies, as provided in Chapters 22 and 23 of NFPA *101*, shall be permitted.
   (b) Special purpose horizontally sliding accordion or folding door assemblies complying with 7.2.1.14 of NFPA *101* shall be permitted.
   (c) Unless prohibited by Chapters 11 through 43 of NFPA *101*, horizontal-sliding door assemblies serving a room or area with an occupant load of fewer than 10 shall be permitted, provided that all of the following criteria are met:
      i. The area served by the door assembly has no high hazard contents.
      ii. The door assembly is readily operable from either side without special knowledge or effort.
      iii. The force required to operate the door assembly in the direction of door leaf travel is not more than 30 lbf (133 N) to set the door leaf in motion and is not more than 15 lbf (67 N) to close the door assembly or open it to the minimum required width.
      iv. The door assembly complies with any required fire protection rating, and, where rated, is self-closing or automatic-closing by means of smoke detection in accordance with 14.5.4 and is installed in accordance with NFPA 80.
      v. Corridor door assemblies required to be self-latching shall have a latch or other mechanism that ensures

that the door leaf will not rebound into a partially open position if forcefully closed.

(d) Where private garages, business areas, industrial areas, and storage areas with an occupant load not exceeding 10 contain only low or ordinary hazard contents, door openings to such areas and private garages shall be permitted to be horizontal-sliding door assemblies.

(5) Where private garages, business areas, industrial areas, and storage areas with an occupant load not exceeding 10 contain only low or ordinary hazard contents, door openings to such areas and private garages shall be permitted to be vertical-rolling door assemblies.

(6) Revolving door assemblies complying with 7.2.1.10 of NFPA *101* shall be permitted.

(7) Existing fusible link–operated horizontal-sliding or vertical-rolling fire door assemblies shall be permitted to be used as provided in Chapters 39, 40, and 42 of NFPA *101*.

[***101:***7.2.1.4.1]

Paragraph 14.5.1.1 requires that door assemblies within the means of egress be of the side-hinged or pivoted-swinging type. A pivoted-swinging door does not have hinges connecting the hinge stile edge of the door to the side of the door frame. Instead, pins inserted into the top and bottom of the door leaf, a short distance from the hinge stile edge, create the pivot point on which the door leaf swings. Side-hinged and pivoted-swinging types of door assemblies are the types most familiar to the general public, and their operation is readily understood.

Furthermore, 14.5.1.1 requires that the door leaf be capable of swinging to the full required width of the opening. The required width is determined by two width considerations. The first consideration involves the width required for egress capacity purposes. The second consideration involves the minimum clear width required, regardless of occupant load served. The required width is the larger of the two widths.

Items (1) and (2) of 14.5.1.1 recognize that some occupancy chapters in NFPA *101* provide exemptions to the requirement that door assemblies be of the side-hinged or pivoted-swinging type. Chapters 24, 32, and 33 of NFPA *101*, which apply to one- and two-family dwellings and residential board and care occupancies, do not require that door leaves be of the swinging type. These exemptions recognize the smaller numbers of persons using door assemblies within dwellings and the familiarity those occupants have with the operation of other door assembly types, such as sliding door assemblies.

Item (3) of 14.5.1.1 permits horizontal-sliding or vertical-rolling security grilles or door assemblies to be used in lieu of side-hinged- or pivoted-swinging-type door assemblies, provided that the exemption is specifically permitted by the applicable occupancy chapter in NFPA *101*. This exemption permits the type of security door assemblies and grilles normally found in mall structures.

Note that there is a difference between 14.5.1.1(3)(a) and 7.2.1.4.1(3)(c). Paragraph 14.5.1.1(3)(a) requires that the door assembly be fully open when the public occupies the space, while 14.5.1.1(3)(c) states that the grille or door leaf cannot be closed when the space is occupied. This allows the common practice of leaving the grille or door leaf partially closed at closing time and at other times when restricting entry to the general public is desired.

As referenced in 14.5.1.1(4)(a), detention and correctional occupancies permit certain sliding door assemblies, because swinging door leaves can become readily accessible weapons for use by residents against staff.

Paragraph 14.5.1.1(4)(b) recognizes the use of a special-purpose horizontally sliding accordion or folding door assembly under detailed conditions. One of the characteristic features of this door assembly is its operability in the direction of door leaf travel when a specified force is applied in the direction of occupant travel. See also 14.5.10.

Paragraph 14.5.1.1(4)(c) was new to the 2009 edition of NFPA *101* and expanded a provision that applied only to horizontal-sliding door assemblies in health care occupancies. The provision recognizes horizontal-sliding door assemblies serving fewer than 10 persons in any occupancy, unless an occupancy chapter specifically prohibits use of the provision. See the detailed criteria in 14.5.1.1(4)(c)i through 14.5.1.1(4)(c)v.

Paragraphs 14.5.1.1(4)(d) and 14.5.1.1(5) recognize that many private garages, small businesses, and industrial and storage buildings typically have only vertical-rolling or horizontal-sliding door assemblies and no side-hinged door assemblies. Provided that the maximum 10-person occupant load is not exceeded and there are no high hazard contents, such door assemblies are permitted to substitute for side-hinged or pivoted-swinging door assemblies.

Paragraph 14.5.1.1(6) cross-references the provisions of 14.5.6, which apply to revolving door assemblies. If 14.5.1.1(6) did not exist, it might be assumed, incorrectly, that revolving door assemblies violate the requirement for door assemblies to be side-hinged or pivoted-swinging.

Paragraph 14.5.1.1(7) recognizes the few occupancies in NFPA *101* that permit existing fusible link–operated sliding door assemblies to be positioned within the exit access of existing business, industrial, and storage occupancies if additional criteria are met. These provisions help to ensure that the door leaf is open when conditions in the door opening's vicinity are tenable for occupant movement and that it is closed once it is no longer safe for persons to seek egress via that exit access path.

A.14.5.1.1 Where doors are subject to two-way traffic, or where their opening can interfere with pedestrian traffic, an appropriately located vision panel can reduce the chance of accidents. [***101:***A.7.2.1.4.1]

Swinging doors in horizontal- or vertical-rolling partitions complying with the following should be permitted in a means of egress where the following criteria are met:

(1) The door or doors comply with 14.5.1.

(2) The partition in which the doors are mounted complies with the applicable fire protection rating and closes upon smoke

detection or power failure at a speed not exceeding 9 in./s (230 mm/s) and not less than 6 in./s (150 mm/s).

(3) The doors mounted in the partition are self-closing or automatic-closing in accordance with 14.5.4.1.

[***101:***A.7.2.1.4.1]

14.5.1.2* Door Leaf Swing Direction. Door leaves required to be of the side-hinged or pivoted-swinging type shall swing in the direction of egress travel under any of the following conditions:

(1) Where serving a room or area with an occupant load of 50 or more, except under any of the following conditions:
   (a) Door leaves in horizontal exits shall not be required to swing in the direction of egress travel where permitted by 7.2.4.3.8.1 or 7.2.4.3.8.2 of NFPA *101*.
   (b) Door leaves in smoke barriers shall not be required to swing in the direction of egress travel in existing health care occupancies, as provided in Chapter 19 of NFPA *101*.

(2) Where the door assembly is used in an exit enclosure, unless the door opening serves an individual living unit that opens directly into an exit enclosure

(3) Where the door opening serves a high hazard contents area

[***101:***7.2.1.4.2]

The provisions regulating the direction of door leaf swing appear in 14.5.1.2 of this *Code* and 7.2.4.3.8(1) of NFPA *101*.

Item (1) of 14.5.1.2 requires all door leaves serving in the means of egress from a room or area with an occupant load of 50 or more persons to swing in the direction of egress travel. For example, if the occupant load of a room with two exit access door assemblies is 80 persons, the door leaves of both door assemblies are required to swing in the direction of egress travel. The 50-person criterion is not related to the number of persons expected to use a given door opening but, rather, to the total occupant load of the room. Therefore, it would be incorrect in the case of this 80-person example to claim that 40 persons will move to each of the two door openings, that the 40-person number is fewer than the 50-person threshold, and that neither door leaf needs to swing in the direction of egress travel. The fact that the total occupant load of the room is more than 50 persons is a sufficient condition to require the exit access door leaves to swing in the direction of egress travel.

Item (2) of 14.5.1.2 requires a door leaf used in an exit enclosure to swing in the direction of egress travel. An example of a door leaf used in an exit enclosure is the door leaf in the opening between an exit access corridor and an enclosed exit stair. The main entrance and exit door leaf from an office building lobby to the outside is not a door leaf used in an exit enclosure, although it is an exit door. Door leaf swing direction for such a door would be regulated by the 50-person criterion of 14.5.1.2(1).

Item (3) of 14.5.1.2 requires a door leaf serving a high hazard contents area to swing in the direction of egress travel. Persons leaving high hazard contents spaces under fire or similar emergency must not be impeded, as would occur if they had to stop and pull a door toward them before egressing the space.

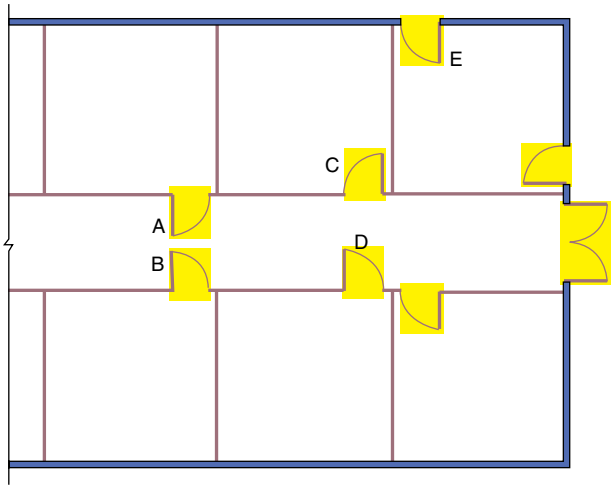
In NFPA *101*, 7.2.4.3.8(1) requires a swinging fire door assembly used in a horizontal exit to swing in the direction of egress travel.

If none of the requirements of 14.5.1.2(1) through (3) or 7.2.4.3.8(1) of NFPA *101* applies, a door leaf is permitted to swing against the direction of egress travel.

Ideally, all door leaves in a means of egress would swing in the direction of egress travel. However, because of operational concerns, there are cases where door leaf swing in the direction of egress travel is not desirable. For example, a classroom door leaf that swings into a corridor serving as an exit access for several classrooms might open against another door leaf or against the flow of people and possibly restrict the width available as corridor exit access. The *Code* recognizes this danger and permits the classroom/corridor door leaf from a room with an occupant load of fewer than 50 persons to swing against the direction of egress travel. This provision limits the number of people using a door opening whose door leaf swings against egress travel to that which is safe. The *Code* also recognizes similar constraints with regard to an exterior exit door assembly; although such a door assembly is considered an exit but not within an exit enclosure, the *Code* does not require that it swing in the direction of egress travel, unless it serves 50 or more occupants.

Exhibit 14.14 illustrates considerations involved in evaluating door leaf swing direction as addressed in 14.5.1.2. Door assembly C is permitted to swing back into the room if the room has an occupant load of fewer than 50 persons and does not have high hazard contents [see 14.5.1.2(1) and (3)]. Door assembly D must swing in the direction of egress travel if the room has an occupant load of 50 or more [see 14.5.1.2(1)]. Door assembly E, although it is an exit door assembly, is not used in an exit enclosure [see 14.5.1.2(2)], so its door leaf is permitted to swing back into the room if the occupant load is fewer than

Exhibit 14.14



Door leaf swing direction considerations.

50 and the room does not have high hazard contents. Door assemblies A and B are related to the encroachment-related provisions of 14.5.1.3. They open into the corridor directly opposite each other. Although this does not violate any *Code* provision, it is preferable that door leaves do not swing in a direction that blocks the use of the corridor when both are open.

Paragraph 14.5.1.2(1)(a) recognizes that the provisions of 7.2.4.3.8.1 of NFPA *101* exempt door leaves in horizontal exits from having to swing in the direction of egress travel in accordance with specific allowances and conditions for existing health care occupancies and existing detention and correctional occupancies. For these occupancies, staff is expected to be able to control occupant movement at horizontal exit door assemblies to prevent a crowd from pushing against a door leaf that is arranged to open only by swinging back toward the occupants. See 7.2.4.3.8.1 of NFPA *101*. Also see 7.2.4.3.8.2 of NFPA *101* for an exemption with applicability to any occupancy that recognizes the impracticality of replacing an existing horizontal exit door leaf with a pair of door leaves where the corridor does not have sufficient width to accommodate the pair.

Paragraph 14.5.1.2(1)(b) exempts smoke barrier door assemblies from having to swing in the direction of egress travel in existing health care occupancies. Such door assemblies usually span the width of a corridor. Because existing health care occupancies are permitted to have corridors as narrow as 48 in. (1220 mm), it might be impractical to install a pair of door leaves swinging in opposite directions. The single door leaf recognized by the exception swings in the correct direction for occupants on one side and swings against the direction of egress travel for occupants on the other side. Because staff directs the egress or relocation movement necessary during an emergency, the direction of door leaf swing problem is alleviated.

The exemption offered by 14.5.1.2(2) addresses the common design in apartment buildings in which door assemblies from the exit enclosure into apartment units normally swing into the apartment units. This design is common in a three-story, single-exit garden apartment. The swing of the door leaf in this arrangement is not a significant concern. The exemption also addresses another situation common to hotels where guest room door assemblies frequently open directly into an exit enclosure created to enclose a formerly open stair. Because it is often necessary to use part of the corridor to create a stair landing for the newly enclosed exit stair, the exemption offers some relief without compromising safety.

Per 14.5.1.2(3), door leaves to high hazard contents areas must swing in the direction of egress travel. A conflict sometimes arises between this requirement and the desire of those responsible for explosion control, who prefer that door leaves to areas subject to explosion be required to swing inward to impede spreading the effects of a blast to adjacent rooms and spaces. In new construction, this conflict can usually be resolved if the high hazard contents area can be located along an outside wall of the main building; the required egress door assemblies then open directly to the outside, which is desirable for life safety. This arrangement is also favorable for explosion relief, because it easily allows the door leaves to swing outward. In existing situations or where the hazardous area must be located internal to a building and away from exterior walls, the conflict is not easily resolved. The AHJ needs to work with the building owner, the insurer, and other involved parties to determine how best to reduce the explosion hazard while adequately providing needed life safety to those who work in the hazardous area. See also Section 7.11 of NFPA *101*.

N **A.14.5.1.2** See 7.4.2.1.2 and 7.4.2.2.2 of NFPA *101* for door swing direction requirements for working space about electrical equipment.

14.5.1.3 Door Leaf Encroachment.

14.5.1.3.1* During its swing, any door leaf in a means of egress shall leave not less than one-half of the required width of an aisle, a corridor, a passageway, or a landing unobstructed, unless both of the following conditions are met:

(1) The door opening provides access to a stair in an existing building.
(2) The door opening meets the requirement of 14.5.1.3.2.

[***101:***7.2.1.4.3.1]

Door leaves capable of swinging a full 180 degrees, so that they rest nearly flat against the wall in which the door opening is installed, have a greater utility than door leaves capable of swinging only 90 degrees. The 180-degree swinging door leaf can be fully opened into a corridor without significant intrusion on corridor width. The 90-degree swinging door leaf, however, might have to open into an unusually wide corridor, be set into an alcove, or otherwise be recessed so as not to exceed the maximum encroachment permitted by 14.5.1.3.1.

Note that 14.5.1.3.1 requires that, during its swing, a door leaf must leave unobstructed at least one-half the required width of a corridor. Note that this requirement is concerned with the required corridor width, which is not necessarily the same as the actual width. For example, in a corridor that is required to be 44 in. (1120 mm) wide but that is voluntarily constructed to be 56 in. (1420 mm) wide, a 34 in. (865 mm) wide door leaf — a door leaf that provides the minimum 32 in. (810 mm) clear width required by 7.2.1.2.3 of NFPA *101* — would swing to encroach on 34 in. (865 mm) of the corridor width. Although this encroachment is more than one-half the *actual* corridor width, it does leave one-half the *required* corridor width [22 in. (560 mm)] unobstructed. Such an arrangement meets the requirement of 14.5.1.3.1.

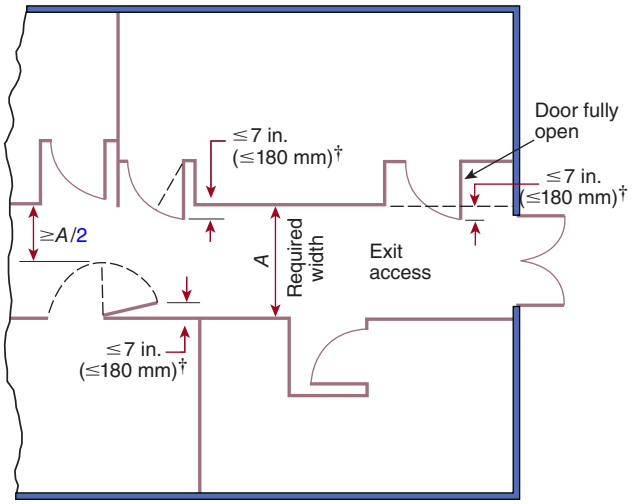
Door leaves that swing within a recessed pocket of the corridor, so as not to protrude into the required corridor width, provide the best arrangement for clear passage through an exit access corridor. Exhibit 14.15 shows a school classroom door swinging into a recessed pocket in the corridor. Door leaves that swing 180 degrees so that they come to rest against a wall and do not extend into more than 7 in. (180 mm) of required corridor width provide an acceptable arrangement. A door leaf that

Exhibit 14.15

Classroom door swinging into recessed pocket in corridor.

swings 90 degrees so that it comes to rest in the path of travel is considered not to encroach excessively on the exit access corridor width if not more than 7 in. (180 mm) of the required width of the corridor remains obstructed. Additionally, any door leaf swinging into the corridor must leave at least one-half the required corridor width unobstructed during its entire swing. See Exhibit 14.16.

Exhibit 14.16

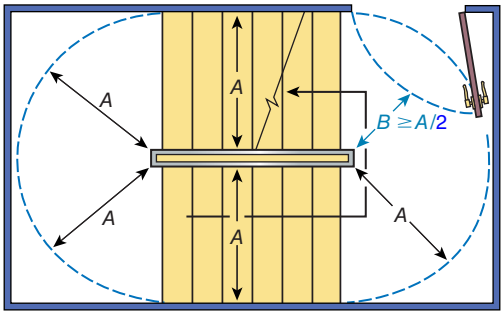


Door leaf swing into a corridor.

Door leaves of door assemblies serving as an entrance into an enclosed stair must not unduly block the stair landing or the stairs. Ideally, the door leaf should not reduce the required width either during its swing or while at rest. However, the *Code* does permit encroachment on the stair landing, as shown in Exhibit 14.17. For most stairs, Table 7.2.2.2.1.2(B) of NFPA *101* requires a 44 in. (1120 mm) clear width. In cases such as these, the $B \geq A/2$ rule shown in Exhibit 14.17 requires that the clearance between the leading edge of the opening door leaf and the stair newel post be at least 22 in. (560 mm). However, where the total occupant load of all floors served by the stair is fewer than 50 persons, 7.2.2.2.1.2(A) of NFPA *101* permits a 36 in. (915 mm) wide stair; in this case, the $B \geq A/2$ rule requires that the clearance between the leading edge of the opening door leaf and stair newel post be at least 18 in. (455 mm).

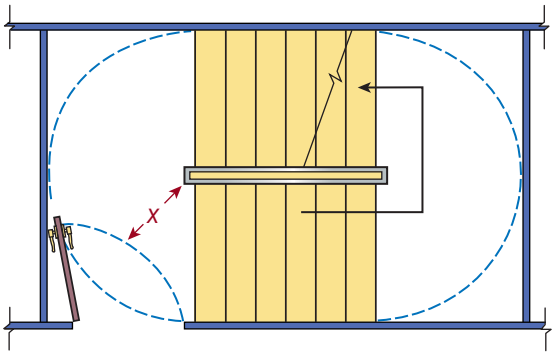
An acceptable arrangement for a door leaf opening onto a stair landing in an existing building is shown in Exhibit 14.18. In lieu of a $B \geq A/2$ rule, existing stairs are not required to maintain a specified clearance between the leading edge of the opening door leaf and the stair newel post.

Exhibit 14.17



Minimum required unobstructed clearance with door leaf encroaching on landing in new buildings.

Exhibit 14.18



Encroachment during door leaf swing not limited in existing buildings.

A.14.5.1.3.1 The requirements of 14.5.1.3 are not intended to apply to the swing of cross-corridor doors, such as smoke barrier doors and horizontal exits. Neither are the requirements intended to apply to doors from rooms that are typically unoccupied such as janitor's closets, electrical closets or telecommunications closets. [***101:***A.7.2.1.4.3.1]

14.5.1.3.2 When fully open, any door leaf in a means of egress shall not project more than 7 in. (180 mm) into the required width of an aisle, a corridor, a passageway, or a landing, unless the door leaf is equipped with an approved self-closing device and is not required by the provisions of 14.5.1.2 to swing in the direction of egress travel. [***101:***7.2.1.4.3.2]

14.5.1.3.3 Surface-mounted latch release hardware on the door leaf shall be exempt from being included in the maximum 7 in. (180 mm) projection requirement of 14.5.1.3.2, provided that both of the following criteria are met:

(1) The hardware is mounted to the side of the door leaf that faces the aisle, corridor, passageway, or landing when the door leaf is in the open position.
(2) The hardware is mounted not less than 34 in. (865 mm), and not more than 48 in. (1220 mm), above the floor.

[***101:***7.2.1.4.3.3]

The provision of 14.5.1.3.3 specifies that latch release hardware that is surface mounted to the side of the door leaf that faces the aisle, corridor, passageway, or landing when the door leaf is in the open position is exempted from inclusion in the maximum 7 in. (180 mm) projection specified in 14.5.1.3.1, provided that such hardware is mounted 34 in. to 48 in. (865 mm to 1220 mm) above the floor. The hardware on the back side of the door leaf is counted in the maximum 7 in. (180 mm) projection, but the hardware on the side of the door leaf that faces the landing is not. The provision is consistent with the door-opening clear width encroachment criteria of 7.2.1.2.1.1(5) of NFPA *101*. This provision helps to alleviate the problem where the AHJ cites the door leaf encroachment as excessive because of the latch release hardware that protrudes into the egress path. Wheelchair users are able to travel past the door without being encumbered, as the hardware must be at least 34 in. (865 mm) off the floor.

14.5.1.4 Screen Door Assemblies and Storm Door Assemblies. Screen door assemblies and storm door assemblies used in a means of egress shall be subject to the requirements for direction of swing that are applicable to other door assemblies used in a means of egress. [***101:***7.2.1.4.4]

14.5.1.5 Door Leaf Operating Forces.

Δ **14.5.1.5.1** The forces required to fully open any door leaf manually in a means of egress shall not exceed 15 lbf (67 N) to release the latch, 30 lbf (133 N) to set the leaf in motion, and 15 lbf (67 N) to open the leaf to the minimum required width, unless otherwise specified as follows:

(1) The opening forces for interior side-hinged or pivoted-swinging door leaves without closers shall not exceed 5 lbf (22 N).
(2) The opening forces for existing door leaves in existing buildings shall not exceed 50 lbf (222 N) applied to the latch stile.
(3) The opening forces for horizontal-sliding door leaves in detention and correctional occupancies shall be as provided in Chapters 22 and 23 of NFPA *101*.
(4) The opening forces for power-operated door leaves shall be as provided in 7.2.1.9 of NFPA *101*.

[***101:***7.2.1.4.5.1]

14.5.1.5.2 The forces specified in 14.5.1.5 shall be applied to the latch stile. [***101:***7.2.1.4.5.2]

The *Code* recognizes that several movements are necessary to move a door leaf from its closed to its fully open position. Paragraph 14.5.1.5.1 identifies each of those movements and limits the force needed to accomplish each. The force required to unlatch the door assembly is limited to 15 lbf (67 N); the force necessary to start the door leaf in motion or to overcome its inertia is limited to not more than 30 lbf (133 N); and the force necessary to move the door leaf to its required open position is limited to not more than 15 lbf (67 N).

Care must be taken to ensure that the 30 lbf (133 N) needed to overcome the inertia of a door leaf in a means of egress is not exceeded for door assemblies opening into pressurized stairs. The pressure necessary to protect the stair often might be such that 30 lbf (133 N) is insufficient to open the door leaf. The use of barometric relief dampers or other pressure-regulating methods might be required. See NFPA 92, *Standard for Smoke Control Systems*.

A person with severe mobility impairment, such as someone who uses a wheelchair, might find it difficult or impossible to exert even the 15 lbf (67 N) specified by 14.5.1.5.1. Specification of a lower operating force for self-closing door assemblies might adversely affect the door assembly closer's ability to perform its intended function of returning an open door leaf to the fully closed and latched position. For interior side-hinged or pivoted-swinging door assemblies without closers, no conflict exists between the needs of a closer and those of a person with physical disabilities. Therefore, 14.5.1.5.1(1) specifies that such door assemblies be operable when not more than 5 lbf (22 N) is applied at the latch stile.

Circumstances such as wet floors, smooth-soled shoes, and light body weight can render many people incapable of exerting 50 lbf (222 N) horizontally. Therefore, the maximum 50 lbf (222 N) operating requirement of earlier editions of the *Code* remains applicable only to existing door assemblies via the provisions of 14.5.1.5.1(2).

Items (3) and (4) of 14.5.1.5.1 address special situations where the operating force requirements of 14.5.1.5 cannot be applied. For horizontal-sliding door assemblies in detention and correctional occupancies, see 22.2.11.1.6 and 23.2.11.1.6 of NFPA *101*. For requirements specific to power-operated door assemblies, see 7.2.1.9 of NFPA *101*.

Paragraph 14.5.1.5.2 clarifies that the forces specified in 14.5.1.5.1 are to be applied to the latch stile.

14.5.2 Locks, Latches, and Alarm Devices.

An increase in thefts, muggings, and similar crimes has led to the practice of providing extra security on door assemblies within the means of egress. Such a practice, particularly where door assemblies to exit stairs and exit discharges are involved, is an open invitation to tragedy in the event of fire or other emergency. The provisions of 14.5.2 are aimed at preventing locked door assemblies in means of egress or any other unnecessary interference with the orderly movement of people through door openings in the event of fire. The *Code* has attempted to accomplish this objective while maintaining features that are essential to security within the building.

The requirement that door assemblies be easily openable from the egress side is consistent with the concept that all components in the means of egress must be under the control of the occupants. This requirement prohibits the use of key locks or hard-to-use devices, such as door handles or latches covered with glass that has to be broken. Where panic hardware or fire exit hardware is used, no device that might interfere with its operation can be used; however, this does not prevent the use of alarm connections that indicate that the door assembly is in use.

Requirements for door assemblies leading to exits also apply to door assemblies that open to roofs where, for example, exit stairs from a high-rise portion of the building discharge to the roof of the low-rise portion of the building and to exit discharge door assemblies leading to the street or other public way.

14.5.2.1 Door leaves shall be arranged to be opened readily from the egress side whenever the building is occupied. [***101:***7.2.1.5.1]

14.5.2.2* The requirement of 14.5.2.1 shall not apply to door leaves of listed fire door assemblies after exposure to elevated temperature in accordance with the listing, based on laboratory fire test procedures. [***101:***7.2.1.5.2]

A.14.5.2.2 Some fire door assemblies are listed for use with fire pins or fusible links that render the door leaf release inoperative upon exposure to elevated temperature during a fire. The door leaf release mechanism is made inoperative where conditions in the vicinity of the door opening become untenable for human occupancy, and such door opening no longer provides a viable egress path. [***101:***A.7.2.1.5.2]

14.5.2.3 Locks, if provided, shall not require the use of a key, a tool, or special knowledge or effort for operation from the egress side. [***101:***7.2.1.5.3]

Paragraph 14.5.2.1 establishes the principle that, when a building is occupied, door assemblies must be able to be opened easily from the side from which egress is to be made.

The provision of 14.5.2.2 is explained in A.14.5.2.2.

Paragraph 14.5.2.3 prohibits the installation of locks that require the use of a key, a tool, or special knowledge or effort to open the door leaf from the egress side. Door assemblies are generally permitted to be locked from the non-egress side, to prevent unauthorized entry into a building. However, door assemblies from an exit stair enclosure to the building floors might have to provide for re-entry as detailed in 14.5.2.8.

See the commentary following 14.5.2.6, which explains the concept whereby a door assembly with a magnetic lock, with building access via a card reader, can be considered a normal door assembly in compliance with 14.5.2.1, 14.5.2.3, and 14.5.2.10 if the door leaf has a latch release, like a lever handle with an integral switch that releases the lock to allow free egress by building occupants.

14.5.2.4 The requirements of 14.5.2.1 and 14.5.2.3 shall not apply where otherwise provided in Chapters 18 through 23 of NFPA *101*. [***101:***7.2.1.5.4]

Paragraph 14.5.2.4 cross-references the provisions applicable to health care occupancies and detention and correctional occupancies where door assemblies locked against egress by building occupants are permitted under specific conditions. For examples, see 18.1.1.1.7, 18.2.2.2.2, 18.2.2.2.4, and 18.2.2.2.5 of NFPA *101* and similar provisions in Chapter 19 of NFPA *101*. Also see 22.2.11.1 and 22.2.11.1.7 through 22.2.11.1.10 of NFPA *101* and similar provisions in Chapter 23 of NFPA *101*.

14.5.2.5 Key-Operated Locks.

Δ **14.5.2.5.1*** Exterior door assemblies shall be permitted to have key-operated locks from the egress side, provided that all of the following criteria are met:

(1) This alternative is permitted in Chapters 11 through 43 of NFPA *101* for the specific occupancy.
(2) A readily visible, durable sign in letters not less than 1 in. (25 mm) high on a contrasting background that reads as follows is located on or adjacent to the door leaf: THIS DOOR TO REMAIN UNLOCKED WHEN THE BUILDING IS OCCUPIED
(3) The locking device is of a type that is readily distinguishable as locked.
(4) A key is immediately available to any occupant inside the building when it is locked.

[***101:***7.2.1.5.5.1]

A.14.5.2.5.1 Where the entrance consists of an exterior vestibule, the locking arrangement should be permitted on the egress side of either the interior or exterior door of the vestibule. [***101:***A.7.2.1.5.5.1]

14.5.2.5.2 The alternative provisions of 14.5.2.5.1 shall be permitted to be revoked by the AHJ for cause. [***101:***7.2.1.5.5.2]

The provisions of 14.5.2.5.1 address key-operated locks that must meet four conditions — one of which is that the appropriate occupancy chapter of NFPA *101* must specifically permit use of the alternative. Compliance with 14.5.2.5.1(3), which requires that the locking device be of a type readily distinguishable as locked, is to be judged by the AHJ. Locks specifically designed to meet this requirement often have an indicating window mechanism that displays the word *open* when the device is in the unlocked position and the word *locked* when the device is in the locked position.

In permitting up to 10 persons in a locked building (i.e., an unoccupied building, as addressed in 7.2.1.1.3 of NFPA *101*), the *Code* does not dismiss such occupants as unimportant. The *Code* recognizes that there are instances in which a building must be occupied by security personnel or by janitorial crews when it is locked. Such persons are generally familiar with the premises, and the *Code* requires that they have keys available for egress when necessary.

The occupancies in the list that follows permit the use of the key-operated lock addressed by 14.5.2.5. Additional restrictions that might be imposed by the applicable occupancy chapter of NFPA *101* are contained in the paragraphs referenced within parentheses in the list. For example, in new assembly occupancies, use of a key-operated lock is restricted to the main exit of a building with an occupant load of not more than 500 persons. In addition, the main exit of the assembly occupancy is required to consist of a single door leaf or single pair of door leaves, and any latch on the door leaf or leaves is required to be released by panic hardware.

The occupancies permitting the use of the key-operated lock addressed in 14.5.2.5 are as follows:

1. Assembly occupancies (12.2.2.2.4 and 13.2.2.2.4 of NFPA *101*)
2. Mercantile occupancies (36.2.2.2.2 and 37.2.2.2.2 of NFPA *101*)
3. Business occupancies (38.2.2.2.3 and 39.2.2.2.3 of NFPA *101*)

Exhibit 14.19 shows the sign for an assembly occupancy required by 14.5.2.5.1(2).

Exhibit 14.19

Sign over door subject to locking in an assembly occupancy.

Δ **14.5.2.6 Door Hardware Release of Electrically Locked Egress Door Assemblies.** Door assemblies in the means of egress shall be permitted to be equipped with approved electrical locking systems released by the operation of door hardware provided that all of the following conditions are met:

(1) The hardware for egress-side occupant release of the electrical lock is affixed to the door leaf.
(2) The hardware has an obvious method of operation that is readily operated in the direction of egress under all lighting conditions.
(3) The hardware is capable of being operated with one hand in the direction of egress.
(4) Operation of the hardware directly interrupts the power supply to the electric lock and unlocks the door assembly in the direction of egress.
(5) Loss of power to the listed releasing hardware automatically electrically unlocks the door assembly in the direction of egress.
(6) Hardware for new installations is listed in accordance with ANSI/UL 294.

[***101:***7.2.1.5.6]

The provisions of 14.5.2.6 address door hardware release of electrically locked egress doors as a normal door assembly and not as a special locking arrangement. Note that the provisions are positioned within 14.5.2, related to traditional locks and latches, and not within 14.5.3, which addresses specialized, nontraditional locking arrangements like delayed-egress electrical locking systems and sensor-release of electrical locking systems.

The door assemblies addressed by 14.5.2.6 typically take the form of a door leaf that is held locked to its frame via an electromagnet. Some AHJs, in enforcing the provisions of earlier editions of the *Code*, often required any door assembly with an electromagnetic lock to comply with one of the sets of provisions of 14.5.3 for special locking arrangements, regardless of how the lock was operated. The text of 14.5.2.6 has the effect of equating the electrically controlled lock to a traditional, mechanically latched or locked door.

The criteria detailed in 14.5.2.6(1) through (6) ensure that the electrically controlled egress door assembly meets the requirements of 14.5.2.1, 14.5.2.3, and 14.5.2.10, as well as additional safeguards imposed, because the lock is electrically controlled. See also the third sentence of A.14.5.2.10.

14.5.2.7 Where permitted in Chapters 11 through 43 of NFPA *101*, key operation shall be permitted, provided that the key cannot be removed when the door leaf is locked from the side from which egress is to be made. [***101:***7.2.1.5.7]

Paragraph 14.5.2.7 permits what is known as *captive key* hardware, which is permitted in lodging or rooming houses via the provisions of 26.2.3.6 of NFPA *101*. The captive key lock has the potential for misuse and must be used carefully. The design of the lock is such that an occupant could unlock the door assembly from the inside, thus freeing the key; move through the door opening, taking the key to the outside; lock the door assembly from the outside; and leave the property — potentially leaving others locked in the building. Thus, this lock is permitted with limited use within the occupancy chapters of NFPA *101*.

Δ **14.5.2.8*** Every door assembly in a stair enclosure serving more than four stories, unless permitted by 14.5.2.8.2, shall meet one of the following conditions:

(1) Re-entry from the stair enclosure to the interior of the building shall be provided.
(2) An automatic release that is actuated with the initiation of the building fire alarm system shall be provided to unlock all stair enclosure door assemblies to allow re-entry.
(3) Selected re-entry shall be provided in accordance with 14.5.2.8.1.

[***101:***7.2.1.5.8]