

Door Swing and Encroachment



From the well-known blog idighardware.com, Lori Greene brings some much-needed clarity to codes.

BY LORI GREENE, AHC/CDC, CCPR, FDHI

WHAT DETERMINES THE DIRECTION IN WHICH A DOOR MUST SWING?
According to the 2009 edition of the International Building Code (1008.1.2), if a door is a required egress door, it generally needs to be

a swinging door that is hung on hinges or pivots. There are several exceptions to this requirement, which would allow a different type of door to be used in certain applications:

- Private garages, office areas, factory and storage areas with an occupant load of 10 or less
- Group I-3 occupancies used as a place of detention
- Critical or intensive care patient rooms within suites of healthcare facilities
- Doors within or serving a single dwelling unit in Groups R-2 and R-3
- In other than Group H occupancies, revolving doors complying with Section 1008.1.4.1
- In other than Group H occupancies, horizontal sliding doors complying with Section 1008.1.4.3 are permitted in a means of egress.
- Power-operated doors in accordance with Section 1008.1.4.2
- Doors serving a bathroom within an individual sleeping unit in Group R-1
- In other than Group H occupancies, manually operated horizontal sliding doors are permitted in a means of egress from spaces with an occupant load of 10 or less.

Several of these exceptions address horizontal sliding doors, including the sliding office doors that have become more common due to the high price of square footage and the amount of floor space a typical swinging door requires. Sliding doors to individual bathrooms are also being used more often due to space constraints. The exceptions for power-operated doors, horizontal sliding doors and revolving doors refer to additional requirements that include provisions for egress through these doors—revolving doors must “collapse,” sliders must be able to be opened with a force perpendicular to the door, commonly referred to as “breakout” or “break-away,” and there are maximum force requirements for these operations.

This section of the IBC also addresses the direction of door swing. In High Hazard (Group H) occupancies, all doors must swing in the direction of egress travel, regardless of the occupant load. In other occupancy types, the door must swing in the direction of egress travel when the door is serving 50 or more occupants.

Photos Courtesy of Lori Greene, AHC/CDC, CCPR, FDHI

2009 IBC, Section 1008.1.2: Doors shall swing in the direction of egress travel where serving an occupant load of 50 or more persons or a Group H occupancy.

The 2009 edition of NFPA 101, *The Life Safety Code* (7.2.1.4.2) also requires doors to swing in the direction of egress travel when serving a High Hazard occupancy of any occupant load or other occupancy types with an occupant load of 50 or more (with limited exceptions for horizontal sliding doors and smoke barrier doors in existing healthcare occupancies). In addition, NFPA 101 requires doors leading to an exit enclosure to swing in the direction of egress travel, except when the door serves an individual living unit that opens directly into the exit enclosure.

Depending on the code being enforced, other locations where doors are required to swing in the direction of egress travel may include refrigeration machinery rooms (IBC), certain electric rooms (NFPA 70, *National Electric Code*, and the IBC), some stair doors in Mercantile occupancies (NFPA 101) and doors in aircraft loading walkways (NFPA 101). Consult the applicable code or standard for more information on these requirements.

Encroachment

When a door swings in the direction of egress travel, it may swing into a corridor that is part of an egress path where a certain egress width must be maintained. The term “encroachment” refers to how far a door projects into the required egress width, and it is measured with the door in two different positions: with the door in its fully-open position, and with the door in the position where it encroaches upon the egress width to the greatest extent (often 90 degrees).

The minimum egress width is defined by the 2009 IBC, Section 1018.2 (see text below). Egress width is determined by one of two methods: either the width required by this section, or a calculation based on the number of occupants and a width factor (the greater of the two prevails). For example, the 2009 IBC (1005.1) uses a factor of 0.2 inches per occupant for egress components other than stairways (0.3 inches per occupant for stairways). If a corridor is serving as a required means of egress for 300 occupants, the required egress width is 5 feet (300 occupants x 0.2 inches per

occupant = 60 inches). This required egress width is greater than the minimum corridor width of 44 inches required by section 1018.2.

2009 IBC, Section 1018.2: Corridor width. The minimum corridor width shall be as determined in Section 1005.1, but not less than 44 inches (1118 mm).

Exceptions:

1. **Twenty-four inches (610 mm)—**
For access to and utilization of electrical, mechanical or plumbing systems or equipment.
2. **Thirty-six inches (914 mm)—**
With a required occupant capacity of less than 50.
3. **Thirty-six inches (914 mm)—**
Within a dwelling unit.
4. **Seventy-two inches (1829 mm)—**
In Group E with a corridor having a required capacity of 100 or more.
5. **Seventy-two inches (1829 mm)—**
In corridors and areas serving gurney traffic in occupancies where patients receive outpatient medical care, which causes the patient to be not capable of self-preservation.
6. **Ninety-six inches (2438 mm)—**
In Group I-2 in areas where required for bed movement.

International Building Code Commentary, 2009 Edition

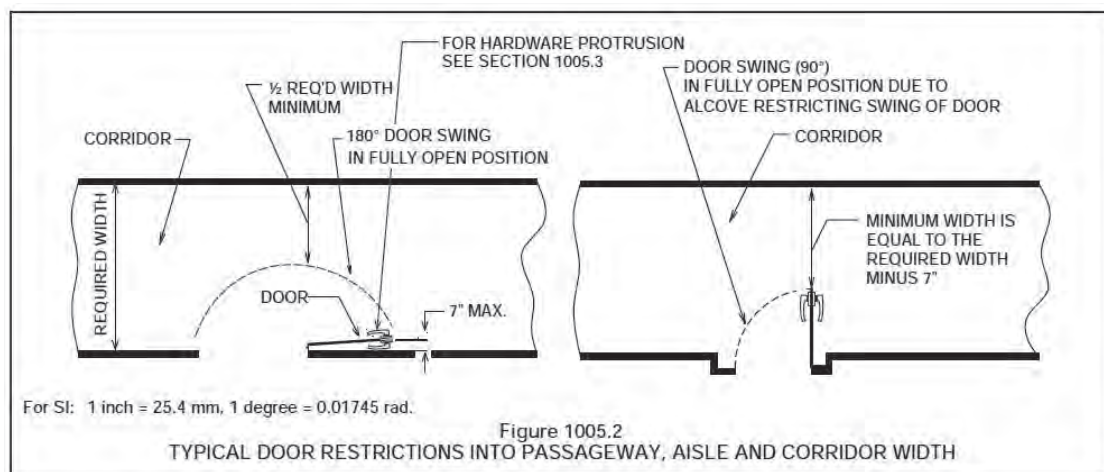


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When a door swings into the required egress width, the encroachment must be considered. According to Section 1005.2 of the 2009 IBC, a door may not reduce the required egress width by more than one-half at any point during the door's swing. For example, if a corridor is 5 feet wide and the required egress width is 5 feet, a 3-foot door swinging into that corridor will encroach too far into the required egress width, because at 90 degrees the door will obstruct more than half of the width. These restrictions do not apply to doors within individual dwelling units or sleeping units of R-2 and R-3 occupancies, which would include apartments, hotels, dormitories and child/adult care facilities.

The same section states that when doors are fully open, they may not reduce the required means of egress width by more than 7 inches. Section 1005.3 of the 2009 IBC states that the "surface-mounted latch release hardware" mounted on the corridor side of the open door is exempt from inclusion in the 7-inch projection when it is mounted between 34 inches and 48 inches above the finished floor. NFPA 101 (2009) contains very similar requirements in Section 7.2.1.4.3.

One piece of hardware to consider with regard to encroachment is the door closer because it may limit the fully-open position of the door. For example, a closer with a built-in stop (or a separate overhead stop) may have a maximum degree of opening of 110 degrees. The corridor must be wide enough to provide the required egress width with the door in this position; the door is only allowed to project 7 inches into the required width when it is fully open—110 degrees in this case.


In Summary

Doors must typically swing in the direction of egress travel when serving:

- **A High Hazard occupancy of any occupant load**
- **Any occupancy type with an occupant load of 50 or more occupants (consult the code for exceptions)**
- **Exit enclosure doors except when serving one living unit (NFPA 101 only)**

Two measurements must be taken into account with regard to encroachment:

- **The door may not extend more than halfway into the required egress width at any point in the door's swing.**
- **The door may not extend more than 7 inches into the required egress width when in the fully-open position. Latching hardware on the corridor side of the open door is not taken into account if it is mounted between 34 inches and 48 inches above the finished floor.**

Codes may vary depending on the edition adopted, as well as local requirements. Consult the applicable codes for more information. The Authority Having Jurisdiction makes the final determination on matters related to code compliance. 

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