DECODED:

Calculating the Egress Width of Door Openings

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

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A **COMMON QUESTION WHEN REPLACING DOORS AND HARDWARE DURING** a renovation is whether one leaf of a pair can be fixed in place or whether an opening can be eliminated completely. It's risky to make this decision without consulting the Authority Having Jurisdiction (AHJ), but it is helpful to understand some of the factors that could affect the location, size and quantity of required exits before preparing your request for the AHJ.

Generally, the *International Building Code* (IBC) requires each space to have at least two exits or exit access doorways, and Chapter 10 states, *"It shall be unlawful to alter a building or structure in a manner that will reduce the number of exits or the capacity of the means of egress to less than required by this code."* But the required number of exits/exit access doorways may be increased or decreased depending on several factors:

- For rooms or spaces with a low occupant load, one exit may be acceptable. For example, Table 1015.1 in the 2012 edition of the IBC allows a single exit for Assembly, Business, Educational, Factory and Industrial, Mercantile, and Utility occupancies with an occupant load of 49 or less.
- For larger spaces in these use groups with an occupant load of more than 49, a second exit is required.
- For spaces with a high occupant load, the IBC requires additional exits—a minimum of three exits for any space with an occupant load of 501 to 1,000, and four exits if the occupant load is more than 1,000.
- Consult the code for information specific to your project, as there are several exceptions to these requirements.

Section 1005 of the 2012 IBC covers Means of Egress Sizing, including sizing for stairways and "other egress components"—doors, gates, corridors, aisles and ramps. The required egress width for these other components of an egress route is calculated by multiplying the occupant load served by the egress capacity factor:

- For buildings without a sprinkler system and emergency voice/alarm communication system, the egress capacity factor is 0.2 inches per occupant.
- For H (High Hazard) and I-2 (Institutional—typically hospitals and nursing homes; refer to the code for the full definition), the egress capacity factor for doors is 0.2 inches per occupant.
- For other use groups (H and I-2 excluded) with a sprinkler system and emergency voice/alarm communication system, the egress capacity factor for doors is 0.15 inches per occupant.

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Egress Capacity Factors

The method used by NFPA 101, *Life Safety Code*, to calculate egress capacity is the same, but the egress capacity factors vary slightly from those of the IBC:

- For non-sprinklered healthcare occupancies, the egress capacity factor is 0.5 inches per occupant.
- For occupancies with high-hazard contents, the egress capacity factor is 0.4 inches per occupant.
- For all other occupancies, the egress capacity factor is 0.2 inches per occupant.

NFPA 101 no longer limits the maximum width of egress doors—past editions limited the width to 48 inches.

For example, if the occupant load of a non-sprinklered space is 300 occupants, the required egress width of the exits or exit access doorways serving that space is 300 occupants x 0.2 inches per occupant = 60 inches. So the egress doors serving that space must have a total of 60 inches of clear width. This doesn't mean that an equal pair of doors providing 30 inches of clear width each is sufficient because of the requirements for multiple exit locations and minimum clear width (read on).

To determine the egress capacity of a door, or how many people a door will accommodate, divide the clear opening width of the door by 0.2 inches per occupant or 0.15 inches per occupant (see previous page to choose which factor to use). For example, if a door in a non-sprinklered building has a clear opening width of 32 inches, the egress capacity of that door would be 32 inches / 0.2 inches per occupant = 160 occupants.

The clear opening width of a door is measured from the face of the door with the door open 90 degrees to the stop on the strike jamb of the frame. For pairs of doors, the clear width of the active leaf is measured from the face of the door to the removable mullion or to the edge of the inactive leaf in the closed position. To calculate the egress width of the entire opening for a pair without a mullion, measure between the faces of both doors when open to 90 degrees.

If you are looking at a door on a set of plans rather than measuring the clear width of an existing door, the exact clear opening width can vary slightly depending on the hinges or pivots. But a rule of thumb to find the nominal clear opening width for a single door hung on full-mortise hinges is to take the frame opening width and subtract half of the hinge width, the hinge backset, and the height of the stop on the strike jamb. So for a 3-foot door that is hung on 4½-inch-wide hinges with a ¼-inch hinge backset and a ⅝-inch stop, the calculation would be 36 inches (frame opening width) – [(2¼ inches (half of the hinge width) + ¼ inch (hinge backset) + ⅝ inch (frame stop)] for a total of 32⅞ inches of clear width.

Remember, doors in a path of egress and doors on an accessible route are typically required to have a clear opening width of at least 32 inches. In some cases, this required width is increased for doors in healthcare facilities, or it may be decreased for some existing doors. For pairs of doors, at least one leaf is required to provide the 32-inch clear width unless the applicable code or standard contains an exception that allows an alternative. The IBC also includes a limit on the *maximum* width of egress doors—doors in a means of egress may not be more than 48 inches wide.

There are additional factors that may affect the size and location of egress doors, such as limitations on travel distance and the common path of travel, as well as the requirement for exits to be remotely located from each other. These requirements will be covered in the next edition of "Decoded."

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