

Horizontal Exits

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Assume you're the designer of a large, multi-story office building. Based on the occupant load, you need three stairways within exit enclosures. Now, if you could eliminate one of those stairways by working in a fire-resistance-rated wall and a couple of fire-resistance-rated doors at each floor, would you do it? If cost is a factor, your answer would likely be a resounding "Yes!" Enter the horizontal exit.

The horizontal exit is probably the least understood and most under-utilized of all the means of egress components. In essence, the horizontal exit is an exit that allows occupants to egress from one side of a building to another side through a fire-resistance-rated assembly, such as a fire wall or fire barrier. The horizontal exit provides an additional layer of fire-resistive protection between the fire source and the occupants to allow them to safely exit through a vertical exit enclosure, or some other exit component.

The requirements for horizontal exits are found in Section 1022 of the 2006 *International Building Code* (Section 1021 for those still using the 2003 edition), and are quite minimal compared to those of other egress components. At the very basic level, horizontal exits can not serve as the only exit from a portion of a building, and where two or more exits are required, no more than half of those can be horizontal exits. There are, however, exceptions to this provision.

The first exception is for I-2 occupancies, such as hospitals and nursing homes, where up to two-thirds of the required exits may be horizontal exits. In most cases, the occupants in this type of occupancy are non-ambulatory; while some even may be bedridden. In this situation, the horizontal exit provides a refuge area, giving rescue workers additional time to evacuate all occupants.

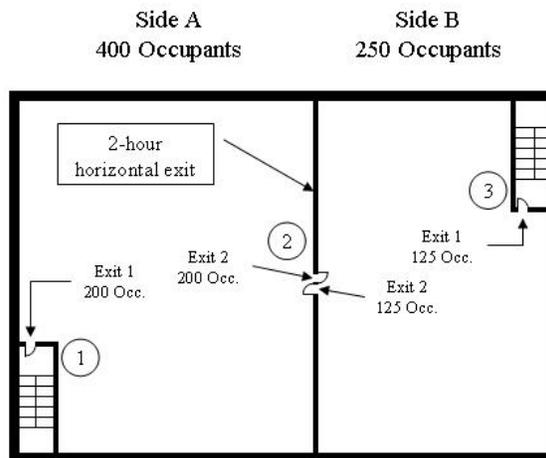
The second exception is for I-3 occupancies, which include jails, prisons, and other facilities where the occupants are confined. This exception allows 100% of the required exits to be horizontal exits. For obvious reasons, the majority of occupants in this occupancy type need to be under control, even during an emergency. Therefore, the code permits the occupants to be transferred from one secure area of the building to another secure area.

Determining exit width where horizontal exits are used is not any different than determining exit width for other common egress systems. For example, if the occupant load for an area on one side of a horizontal exit requires 72 inches of egress width, then 36 inches is applied to the door in the horizontal exit, and the remaining width is applied to another egress component, such as a door into a stairway exit enclosure. Occupants exiting through the horizontal exit are not included in the occupant load that determines the egress width for exits on the other side.

To illustrate this, assume a floor in a Group B office building has 650 occupants: 400 occupants on one side (Side A) of the horizontal exit and 250 occupants on the other side (Side B). On Side A, the 400 occupants will be evenly split so that 200 occupants will egress via a stairway exit enclosure and the other 200 will exit through the horizontal exit. Essentially, there are now 450 occupants on Side B, or the discharge side of the horizontal exit. But the code only requires that the exit width for the exit from Side B be based on the original 200 occupants, assuming that the horizontal exit will provide protection long enough to allow the additional 250 occupants to use the stairway exit enclosure when it clears.

Actually, the example above only provides half of the story. Side B will also require a minimum of two exits, which means that its original 250 occupants will be evenly divided so that 125 occupants will exit through the stairway exit enclosure and the other 125 occupants can egress through the horizontal exit. This creates a problem since the doors in the horizontal exit must swing in the direction of exit travel if the occupant load is 50 or more (Section 1008.1.2). Since double-acting doors are not permitted in fire-resistance-rated assemblies, two doors, each swinging in the opposite direction, will be necessary to comply with the requirements of the code.

In this example, the minimum three exits required by Table 1019.1 for occupant loads exceeding 500 is provided, since the horizontal exit is considered one of the three required exits. If the horizontal exit had not been furnished, a third stairway exit enclosure would have been required to fulfill the minimum three-exit requirement. The diagram below depicts the example just described.



Even though the exit width on the discharge side of a horizontal exit is not required to include the occupants exiting through the horizontal exit, the area of refuge on the discharge side must be of adequate size to accommodate the influx of occupants. Section 1021.4 establishes the criteria to determine the capacity of this area of refuge. For most occupancy groups, the capacity is calculated at 3 sq. ft. per occupant, excluding stairways, courts, elevators, and other shafts. Additionally, areas that would normally be locked from building occupants must also be excluded from the area available for use as a refuge area. Unlike exit width, the occupant load used to determine this minimum capacity is based on the original occupant load, plus the occupant load based on the exit width of the horizontal exit.

Using Side B of the previous example, the capacity of the refuge area will include the original 250 occupants, plus the occupant capacity of the door that discharges into Side B. Assuming the building is sprinklered throughout and the door has a clear width of 34 inches, the occupant capacity of the horizontal exit door is 226 (34 in. divided by 0.15 in. per occupant). Therefore, the minimum refuge area capacity is based on a total of 476 occupants, which calculates to be 1,428 sq. ft. (3 sq. ft. x 476 occupants).

As previously mentioned, the 3 sq. ft. per occupant is applicable to most occupancy types; however, special exceptions apply to certain occupancies. For Group I-3, the area is based on 6 sq. ft. per occupant; for ambulatory occupancies in Group I-2, it is 15 sq. ft. per occupant; and for nonambulatory occupancies

in Group I-2, it is 30 sq. ft. per occupant. For the latter, the exceptionally large area is necessary to accommodate occupants that are bedridden.

The construction of a horizontal exit must comply with the requirements of a fire wall per Section 705 or a fire barrier per Section 706. The minimum fire-resistance rating for horizontal exits is 2 hours. Walls used for horizontal exits must extend from exterior wall to exterior wall, and extend vertically through all floors of the building. If the floor construction has a 2-hour fire-resistance rating and no unprotected openings, then the horizontal exit is only required to extend vertically from the floor to the bottom of the floor or roof deck above. This exception allows flexibility in arranging the horizontal exits on each floor, especially if the floor plans vary from floor to floor. If a building utilizes a fire wall for a purpose other than a horizontal exit, the designer can take advantage of the fire wall and use it as a horizontal exit, provided it complies with all of the other requirements for horizontal exits.

Openings in horizontal exits are required to have a minimum 1-1/2 hour rating complying with Section 715. In addition to the requirements of Section 715, doors in horizontal exits must be self-closing or automatic-closing when activated by a smoke detector. For doors in a cross-corridor condition, only the automatic-closing type is permitted.

It's interesting; the concept of a horizontal exit is so simple, and yet few designers take advantage of the benefits it offers. Creative use of horizontal exits can increase design versatility, lower building costs, and at the same time protect building occupants.

To comment on this article, suggest other topics, or submit a question regarding codes, contact the author at ron@specsandcodes.com.

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