NFPA 101:
Life Safety Code

An Overview for the Electrical Trade

Presented by:

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7.8 Illumination of Means of Egress

7.8.1 General.

7.8.1.1* Illumination of means of egress shall be provided in accordance with Section 7.8 for every building and structure where required in Chapter 11 through Chapter 42. For the purposes of this requirement, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of this requirement, exit discharge shall include only designated stairs, aisles, corridors, ramps, escalators, walkways, and exit passageways leading to a public way.

7.8.1.2 Illumination of means of egress shall be continuous during the time that the conditions of occupancy require that the means of egress be available for use, unless otherwise provided in 7.8.1.2.2.

7.8.1.2.1 Artificial lighting shall be employed at such locations and for such periods of time as are necessary to maintain the illumination to the minimum criteria values herein specified.

7.8.1.2.2 Automatic, motion sensor–type lighting switches shall be permitted within the means of egress, provided that the switch controllers are equipped for fail-safe operation, the illumination timers are set for a minimum 15-minute duration, and the motion sensor is activated by any occupant movement in the area served by the lighting units.

7.8.1.3* The floors and other walking surfaces within an exit and within the portions of the exit access and exit discharge designated in 7.8.1.1 shall be illuminated as follows:

(1) During conditions of stair use, the minimum illumination for new stairs shall be at least 108 lux (10 ft-candle), measured at the walking surfaces.
(2) The minimum illumination for floors and walking surfaces, other than new stairs, shall be to values of at least 10.8 lux (1 ft-candle), measured at the floor.
(3) In assembly occupancies, the illumination of the floors of exit access shall be at least 2.2 lux (0.2 ft-candle) during periods of performances or projections involving directed light.
(4)* The minimum illumination requirements shall not apply where operations or processes require low lighting levels.

7.8.1.4* Required illumination shall be arranged so that the failure of any single lighting unit does not result in an illumination level of less than 2.2 lux (0.2 ft-candle) in any designated area.

7.8.1.5 The equipment or units installed to meet the requirements of Section 7.10 also shall be permitted to serve the function of illumination of means of egress, provided that all requirements of Section 7.8 for such illumination are met.

7.8.2 Sources of Illumination.

7.8.2.1* Illumination of means of egress shall be from a source considered reliable by the authority having jurisdiction.

7.8.2.2 Battery-operated electric lights and other types of portable lamps or lanterns shall not be used for primary illumination of means of egress. Battery-operated electric lights shall be permitted to be used as an emergency source to the extent permitted under Section 7.9.

7.9 Emergency Lighting

7.9.1 General.

7.9.1.1* Emergency lighting facilities for means of egress shall be provided in accordance with Section 7.9 for the following:

(1) Buildings or structures where required in Chapter 11 through Chapter 42
(2) Underground and limited access structures as addressed in Section 11.7
(3) High-rise buildings as required by other sections of this Code
(4) Doors equipped with delayed-egress locks
(5) Stair shaft and vestibule of smokeproof enclosures, for which the following also apply:
   (a) The stair shaft and vestibule shall be permitted to include a standby generator that is installed for the smokeproof enclosure mechanical ventilation equipment.
   (b) The standby generator shall be permitted to be used for the stair shaft and vestibule emergency lighting power supply.

7.9.1.2 For the purposes of 7.9.1.1, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of 7.9.1.1, exit discharge shall include only designated stairs, ramps, aisles, walkways, and escalators leading to a public way.

7.9.1.3 Where maintenance of illumination depends on changing from one energy source to another, a delay of not more than 10 seconds shall be permitted.

7.9.2 Performance of System.

7.9.2.1* Emergency illumination shall be provided for not less than 1½ hours in the event of failure of normal lighting. Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 10.8 lux (1 ft-candle) and, at any point, not less than 1.1 lux (0.1 ft-candle), measured along the path of egress at floor level. Illumination levels shall be permitted to decline to not less than an average of 6.5 lux (0.6 ft-candle) and, at any point, not less than 6.5 lux (0.06 ft-candle) at the end of the 1½ hours. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.

7.9.2.2* The emergency lighting system shall be arranged to provide the required illumination automatically in the event of any interruption of normal lighting due to any of the following:

(1) Failure of a public utility or other outside electrical power supply
(2) Opening of a circuit breaker or fuse
(3) Manual act(s), including accidental opening of a switch controlling normal lighting facilities

7.9.2.3 Emergency generators providing power to emergency lighting systems shall be installed, tested, and maintained in accordance with NFPA 110, Standard for Emergency and Standby Power Systems. Stored electrical energy systems, where required in this Code, shall be installed and tested in accordance with NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Power Systems.

7.9.2.4* Battery-operated emergency lights shall use only reliable types of rechargeable batteries provided with suitable facilities for maintaining them in properly charged condition. Batteries used in such lights or units shall be approved for their intended use and shall comply with NFPA 70, National Electrical Code®.

7.9.2.5 The emergency lighting system shall be either continuously in operation or shall be capable of repeated automatic operation without manual intervention.

7.9.3 Periodic Testing of Emergency Lighting Equipment.

7.9.3.1 Required emergency lighting systems shall be tested in accordance with one of the three options offered by 7.9.3.1.1, 7.9.3.1.2, or 7.9.3.1.3.

7.9.3.1.1 Testing of required emergency lighting systems shall be permitted to be conducted as follows:

(1) Functional testing shall be conducted at 30-day intervals for not less than 30 seconds.
(2) Functional testing shall be conducted annually for not less than 1½ hours if the emergency lighting system is battery powered.
(3) The emergency lighting equipment shall be fully operational for the duration of the tests required by 7.9.3.1.1(1) and 7.9.3.1.1(2).
(4) Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

7.9.3.1.2 Testing of required emergency lighting systems shall be permitted to be conducted as follows:

(1) Self-testing/self-diagnostic battery-operated emergency lighting equipment shall be provided.
(2) Self-testing/self-diagnostic battery-operated emergency lighting equipment shall automatically perform not less than once every 30 days a test for not less than 30 seconds and a diagnostic routine.
(3) Self-testing/self-diagnostic battery-operated emergency lighting equipment shall indicate failures by a status indicator.
(4) A visual inspection shall be performed at intervals not exceeding 30 days.
(5) Functional testing shall be conducted annually for not less than 1½ hours.
(6) Self-testing/self-diagnostic battery-operated emergency lighting equipment shall be fully operational for the duration of the 1½ hour test.
(7) Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

7.9.3.1.3 Testing of required emergency lighting systems shall be permitted to be conducted as follows:

(1) Computer-based, self-testing/self-diagnostic battery-operated emergency lighting equipment shall be provided.
(2) The emergency lighting equipment shall automatically perform not less than once every 30 days a test for not less than 30 seconds and a diagnostic routine.
(3) The emergency lighting equipment shall automatically perform annually a test for not less than 1½ hours.
(4) The emergency lighting equipment shall be fully operational for the duration of the tests required by 7.9.3.1.3(2) and 7.9.3.1.3(3).
(5) The computer-based system shall be capable of providing a report of the history of tests and failures at all times.

7.10 Means of Egress Marking

7.10.1 General.

7.10.1.1 Where Required. Means of egress shall be marked in accordance with Section 7.10 where required in Chapter 11 through Chapter 42.

7.10.1.2* Exits. Exits, other than main exterior exit doors that obviously and clearly are identifiable as exits, shall be marked by an approved sign that is readily visible from any direction of exit access.

7.10.1.3 Exit Stair Door Tactile Signage. Tactile signage shall be provided to meet the following criteria, unless otherwise provided in 7.10.1.4:

(1) Tactile signage shall be located at each exit door requiring an exit sign.
(2) Tactile signage shall read as follows: EXIT
(3) Tactile signage shall comply with ICC/ANSI A117.1, American National Standard for Accessible and Usable Buildings and Facilities.

7.10.1.4 Existing Exemption. The requirements of 7.10.1.3 shall not apply to existing buildings, provided that the occupancy classification does not change.

7.10.1.5 Exit Access.

7.10.1.5.1 Access to exits shall be marked by approved, readily visible signs in all cases where the exit or way to reach the exit is not readily apparent to the occupants.

7.10.1.5.2* New sign placement shall be such that no point in an exit access corridor is in excess of the rated viewing distance or 30 m (100 ft), whichever is less, from the nearest sign.

7.10.1.6* Floor Proximity Exit Signs. Where floor proximity exit signs are required in Chapter 11 through Chapter 42, such signs shall be located near the floor level in addition to those signs required for doors or corridors. The signs shall be illuminated in accordance with 7.10.5. Externally illuminated signs shall be sized in accordance with 7.10.6.1. The bottom of the sign shall be not less than 150 mm (6 in.) but not more than 455 mm (18 in.) above the floor. For exit doors, the sign shall be mounted on the door or adjacent to the door, with the nearest edge of the sign within 100 mm (4 in.) of the door frame.

7.10.1.7* Floor Proximity Egress Path Marking. Where floor proximity egress path marking is required in Chapter 11 through Chapter 42, a listed and approved floor proximity egress path marking system that is internally illuminated shall be installed within 455 mm (18 in.) of the floor. The system shall provide a visible delineation of the path of travel along the designated exit access and shall be essentially continuous, except as interrupted by doorways, hallways, corridors, or other such architectural features. The system shall operate continuously or at any time the building fire alarm system is activated. The activation, duration, and continuity of operation of the system shall be accordance with 7.9.2.

7.10.1.8* Visibility. Every sign required in Section 7.10 shall be located and of such size, distinctive color, and design that it is readily visible and shall provide contrast with decorations, interior finish, or other signs. No decorations, furnishings, or equipment that impairs visibility of a sign shall be permitted. No brightly illuminated sign (for other than exit purposes), display, or object in or near the line of vision of the required exit sign that could detract attention from the exit sign shall be permitted.

7.10.1.9 Mounting Location. The bottom of new egress markings shall be located at a vertical distance of not more than 2030 mm (80 in.) above the top edge of the egress opening intended for designation by that marking. Egress markings shall be located at a horizontal distance of not more than the required width of the egress opening, as

(2) The directional indicator shall be of a chevron type, as shown in Figure 7.10.6.2.1.
(3) The directional indicator shall be identifiable as a directional indicator at a distance of 12 m (40 ft).
(4) A directional indicator larger than the minimum established for compliance with 7.10.6.2.1(3) shall be proportionately increased in height, width and stroke.
(5) The directional indicator shall be located at the end of the sign for the direction indicated.

7.10.6.2.2 The requirements of 7.10.6.2.1 shall not apply to approved existing signs.

7.10.6.3* Level of Illumination. Externally illuminated signs shall be illuminated by not less than 54 lux (5 ft-candles) at the illuminated surface and shall have a contrast ratio of not less than 0.5.

7.10.7 Internally Illuminated Signs.

7.10.7.1 Listing. Internally illuminated signs shall be listed in accordance with UL 924, Standard for Safety Emergency Lighting and Power Equipment, unless they meet one of the following criteria:
(1) They are approved existing signs.
(2) They are existing signs having the required wording in legible letters not less than 100 mm (4 in.) high.
(3) They are signs that are in accordance with 7.10.1.3 and 7.10.1.6.

7.10.7.2* Photoluminescent Signs. The face of a photoluminescent sign shall be continually illuminated while the building is occupied. The illumination levels on the face of the photoluminescent sign shall be in accordance with its listing. The charging illumination shall be a reliable light source as determined by the authority having jurisdiction. The charging light source shall be of a type specified in the product markings.

measured from the edge of the egress opening intended for designation by that marking to the nearest edge of the marking.

7.10.2* Directional Signs. A sign complying with 7.10.3 with a directional indicator showing the direction of travel shall be placed in every location where the direction of travel to reach the nearest exit is not apparent.

7.10.3* Sign Legend.

7.10.3.1 Signs required by 7.10.1 and 7.10.2 shall read as follows in plainly legible letters, or other appropriate wording shall be used:

EXIT

7.10.3.2* Where approved by the authority having jurisdiction, pictograms shall be permitted.

7.10.4* Power Source. Where emergency lighting facilities are required by the applicable provisions of Chapter 11 through Chapter 42 for individual occupancies, the signs, other than approved self-luminous signs, shall be illuminated by the emergency lighting facilities. The level of illumination of the signs shall be in accordance with 7.10.6.3 or 7.10.7 for the required emergency lighting duration as specified in 7.9.2.1. However, the level of illumination shall be permitted to decline to 60 percent at the end of the emergency lighting duration.

7.10.5 Illumination of Signs.

7.10.5.1* General. Every sign required by 7.10.1.2 or 7.10.1.5, other than where operations or processes require low lighting levels, shall be suitably illuminated by a reliable light source. Externally and internally illuminated signs shall be legible in both the normal and emergency lighting mode.

7.10.5.2* Continuous Illumination.

7.10.5.2.1 Every sign required to be illuminated by 7.10.6.3 and 7.10.7 shall be continuously illuminated as required under the provisions of Section 7.8 unless otherwise provided in 7.10.5.2.2.

7.10.5.2.2* Illumination for signs shall be permitted to flash on and off upon activation of the fire alarm system.

7.10.6 Externally Illuminated Signs.

7.10.6.1* Size of Signs.

7.10.6.1.1 Externally illuminated signs required by 7.10.1 and 7.10.2, other than approved existing signs, unless otherwise provided in 7.10.6.1.2, shall read EXIT, or other appropriate wording shall be used, in plainly legible letters sized as follows:

(1) For new signs, the letters shall be not less than 150 mm (6 in.) high, with the principal strokes of letters not less than 19 mm (¾ in.) wide.
(2) For existing signs, the required wording shall be permitted to be in plainly legible letters not less than 100 mm (4 in.) high.
(3) The word EXIT shall be in letters of a width not less than 51 mm (2 in.), except the letter I, and the minimum spacing between letters shall be not less than 9.5 mm (in.).
(4) Sign legend elements larger than the minimum established in 7.10.6.1.1(1) through 7.10.6.1.1(3) shall use letter widths, strokes, and spacing in proportion to their height.

7.10.6.1.2 The requirements of 7.10.6.1.1 shall not apply to marking required by 7.10.1.3 and 7.10.1.6.

7.10.6.2* Size and Location of Directional Indicator.

7.10.6.2.1 Directional indicators, unless otherwise provided in 7.10.6.2.2, shall comply with the following:

(1) The directional indicator shall be located outside of the EXIT legend, not less than 9.5 mm (in.) from any letter.

7.2.1.6.2 Access-Controlled Egress Doors

7.2.1.6.2 Access-Controlled Egress Doors. Where permitted in Chapter 11 through Chapter 42, doors in the means of egress shall be permitted to be equipped with an approved entrance and egress access control system, provided that the following criteria are met:

(1) One of the following shall be provided:
   (a) A sensor on the egress side, arranged to detect an occupant approaching doors that are arranged to unlock in the direction of egress upon detection of an approaching occupant or loss of power to the sensor
   (b) Listed panic hardware or fire exit hardware that, when operated, unlocks the door
(2) Loss of power to the part of the access control system that locks the doors shall automatically unlock the doors in the direction of egress.
(3) The doors shall be arranged to unlock in the direction of egress from a manual release device located 1015 mm to 1220 mm (40 in. to 48 in.) vertically above the floor and within 1525 mm (60 in.) of the secured doors.
(4) The manual release device specified in 7.2.1.6.2(3) shall be readily accessible and clearly identified by a sign that reads as follows: PUSH TO EXIT.
(5) When operated, the manual release device shall result in direct interruption of power to the lock — independent of the access control system electronics — and the doors shall remain unlocked for not less than 30 seconds.
(6) Activation of the building fire-protective signaling system, if provided, shall automatically unlock the doors in the direction of egress, and the doors shall remain unlocked until the fire-protective signaling system has been manually reset.
(7) Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically unlock the doors in the direction of egress, and the doors shall remain unlocked until the fire-protective signaling system has been manually reset.

7.7.2.1.6.1 Delayed-Egress Locks

7.2.1.6.1 **Delayed-Egress Locks.** Approved, listed, delayed-egress locks shall be permitted to be installed on doors serving low and ordinary hazard contents in buildings protected throughout by an approved, supervised automatic fire detection system in accordance with Section 9.6 or an approved, supervised automatic sprinkler system in accordance with Section 9.7, and where permitted in Chapter 12 through Chapter 42, provided that the following criteria are met:

(1) The doors shall unlock upon actuation of one of the following:
   (a) An approved, supervised automatic sprinkler system in accordance with Section 9.7
   (b) Any heat detector
   (c) Not more than two smoke detectors of an approved, supervised automatic fire detection system in accordance with Section 9.6

(2) The doors shall unlock upon loss of power controlling the lock or locking mechanism.

(3)* An irreversible process shall release the lock within 15 seconds, or 30 seconds where approved by the authority having jurisdiction, upon application of a force to the release device required in 7.2.1.5.9 under the following conditions:
   (a) The force shall not be required to exceed 67 N (15 lbf).
   (b) The force shall not be required to be continuously applied for more than 3 seconds.
   (c) The initiation of the release process shall activate an audible signal in the vicinity of the door.
   (d) Once the door lock has been released by the application of force to the releasing device, relocking shall be by manual means only.

(4)* A readily visible, durable sign in letters not less than 25 mm (1 in.) high and not less than 3.2 mm (in.) in stroke width on a contrasting background that reads as follows shall be located on the door adjacent to the release device:

PUSH UNTIL ALARM SOUNDS
DOOR CAN BE OPENED IN 15 SECONDS

7.2.1.8 Self-Closing Devices (on doors)

7.2.1.8.1* A door normally required to be kept closed shall not be secured in the open position at any time and shall be self-closing or automatic-closing in accordance with 7.2.1.8.2.

7.2.1.8.2 In any building of low or ordinary hazard contents, as defined in 6.2.2.2 and 6.2.2.3, or where approved by the authority having jurisdiction, doors shall be permitted to be automatic-closing, provided that the following criteria are met:

(1) Upon release of the hold-open mechanism, the door becomes self-closing.

(2) The release device is designed so that the door instantly releases manually and, upon release, becomes self-closing, or the door can be readily closed.

(3) The automatic releasing mechanism or medium is activated by the operation of approved smoke detectors installed in accordance with the requirements for smoke detectors for door release service in NFPA 72®, National Fire Alarm Code®.

(4) Upon loss of power to the hold-open device, the hold-open mechanism is released and the door becomes self-closing.

(5) The release by means of smoke detection of one door in a stair enclosure results in closing all doors serving that stair.

7.2.1.9 Powered Doors

7.2.1.9.1* General. Where means of egress doors are operated by power upon the approach of a person or are provided with power-assisted manual operation, the design shall be such that, in the event of power failure, the doors open manually to allow egress travel or close when necessary to safeguard the means of egress.

7.2.1.9.1.1 The forces required to manually open the doors specified in 7.2.1.9.1 shall not exceed those required in 7.2.1.4.5, except that the force required to set the door in motion shall not exceed 222 N (50 lbf).

7.2.1.9.1.2 The door shall be designed and installed so that, when a force is applied to the door on the side from which egress is made, it shall be capable of swinging from any position to provide full use of the required width of the opening in which it is installed (see 7.2.1.4).

7.2.1.9.1.3 A readily visible, durable sign in letters not less than 25 mm (1 in.) high on a contrasting background that reads as follows shall be located on the egress side of each door:

IN EMERGENCY, PUSH TO OPEN

7.2.1.9.1.4 Sliding, power-operated doors in exit access serving an occupant load of fewer than 50 that manually open in the direction of door travel with forces not exceeding those required in 7.2.1.4.5 shall not be required to have the swing-out feature required by 7.2.1.9.1.2. The required sign shall be in letters not less than 25 mm (1 in.) high on a contrasting background and shall read as follows:
IN EMERGENCY, SLIDE TO OPEN

7.2.1.9.1.5* In the emergency breakout mode, a door leaf located within a two-leaf opening shall be exempt from the minimum 810-mm (32-in.) single-leaf requirement of 7.2.1.2.4, provided that the clear width of the single leaf is not less than 760 mm (30 in.).

7.2.1.9.1.6 For a biparting sliding door in the emergency breakout mode, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 810-mm (32-in.) single-leaf requirement of 7.2.1.2.4 if a clear opening of not less than 810 mm (32 in.) is provided by all leafs broken out.

7.2.1.9.1.7 Doors complying with 7.2.1.14 shall be permitted to be used.

7.2.1.9.1.8 The requirements of 7.2.1.9.1 through 7.2.1.9.1.7 shall not apply in detention and correctional occupancies where otherwise provided in Chapter 22 and Chapter 23.

(b) The firestopping material shall be capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time-temperature fire conditions of NFPA 251 under a minimum positive pressure differential of 2.5 N/m2 (0.01 in. water column) at the location of the penetration for the time period equivalent to the required fire resistance rating of the assembly penetrated.

8.3.5.1.2 The maximum nominal diameter of the following penetrating items shall be not greater than 100 mm (4 in.), and the aggregate area of all penetrating items shall not exceed 64,520 mm2 (100 in.2) in any 9.3 m2 (100 ft2) of floor or wall area:

(1) Steel, ferrous, or copper cables
(2) Cable or wire with steel jackets
(3) Cast-iron, steel, or copper pipes
(4) Steel conduit or tubing

8.3.5.1.3 Firestop systems and devices shall have an F rating of at least 1 hour, but not less than the required fire-resistive rating of the fire barrier penetrated.

8.3.5.1.4 Penetrations in fire-rated horizontal assemblies shall be required to have a T rating of at least 1 hour, but not less than the rating of the horizontal assembly, and shall not be required for the following:

(1) Floor penetrations contained within the cavity of a wall assembly
(2) Penetrations through floors or floor assemblies where the penetration is not in direct contact with combustible material

8.3.5.2 Sleeves. Where the penetrating item uses a sleeve to penetrate the wall or floor, the sleeve shall be securely set in the wall or floor, and the space between the item and the sleeve shall be filled with a material that complies with 8.3.5.1.

8.3.5.3 Insulation and Coverings. Insulation and coverings for penetrating items shall not pass through the wall or floor unless the insulation or covering has been tested as part of the firestop system or device.

8.3.5.4 Transmission of Vibrations. Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

(1) It shall be provided on either side of the wall or floor.
(2) It shall be designed for the specific purpose.

8.3.5.5 Transitions.

8.3.5.5.1 Where piping penetrates a fire resistance–rated wall or floor assembly, combustible piping shall not connect to noncombustible piping within 915 mm (36 in.) of the firestop system or device without demonstration that the transition will not reduce the fire resistance rating, except in the case of previously approved installations.

8.3.5.5.2 Unshielded couplings shall not be used to connect noncombustible piping to combustible piping unless it can be demonstrated that the transition complies with the fire-resistive requirements of 8.3.5.5.

8.3.5.6 Membrane Penetrations.

8.3.5.6.1 Membrane penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a membrane of a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device and shall comply with 8.3.5.1 through 8.3.5.5.2.

8.3.5.6.2 The firestop system or device shall be tested in accordance with ASTM E-814 or ANSI/UL 1479 at a minimum positive pressure differential of 2.5 N/m2(0.01 in. water column) between the exposed and the unexposed surface of the test assembly, unless one of the following is met:

(1) Membrane penetrations of ceilings that are not an integral part of a fire resistance–rated floor/ceiling or roof/ceiling assembly shall be permitted.

7.1.3.2.1(6) Penetrations in Exit Enclosures

(6) Penetrations into, and openings through, an exit enclosure assembly shall be limited to the following:
- (a) Doors permitted by 7.1.3.2.1(5)
- (b) Electrical conduit serving the stairway
- (c) Required exit doors
- (d) Ductwork and equipment necessary for independent stair pressurization
- (e) Water or steam piping necessary for the heating or cooling of the exit enclosure
- (f) Sprinkler piping
- (g) Standpipes
- (h) Existing penetrations protected in accordance with 8.3.5
- (i) Penetrations for fire alarm circuits where the circuits are installed in metal conduit and the penetrations are protected in accordance with 8.3.5.

(7) Penetrations or communicating openings shall be prohibited between adjacent exit enclosures.

7.1.3.2.2 An exit enclosure shall provide a continuous protected path of travel to an exit discharge.

7.1.3.2.3* 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 7.2.2.5.3.)

8.3.5 Fire Barrier Penetrations

8.3.5 Penetrations. The provisions of 8.3.5 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations in fire walls, fire barrier walls, and fire resistance–rated horizontal assemblies. The provisions of 8.3.5 shall not apply to approved existing materials and methods of construction used to protect existing through-penetrations and existing membrane penetrations in fire walls, fire barrier walls, or fire resistance–rated horizontal assemblies, unless otherwise required by Chapter 12 through Chapter 42.

8.3.5.1 Firestop Systems and Devices Required. Penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device. The firestop system or device shall be tested in accordance with ASTM E-814 or ANSI/UL 1479 at a minimum positive pressure differential of 2.5 N/m2 (0.01 in. water column) between the exposed and the unexposed surface of the test assembly.

8.3.5.1.1 The requirements of 8.3.5.1 shall not apply where otherwise permitted by any one of the following:
- (1) Where penetrations are tested and installed as part of an assembly tested and rated in accordance with NFPA 251, Standard Methods of Tests of Fire Endurance of Building Construction and Materials
- (2) Where penetrations through floors are enclosed in a shaft enclosure designed as a fire barrier
- (3) Where concrete, grout, or mortar has been used to fill the annular spaces around cast-iron, copper, or steel piping that penetrates one or more concrete or masonry fire resistance–rated assemblies and both of the following criteria are also met:
  - (a) The nominal diameter of each penetrating item shall not exceed 150 mm (6 in.), and the opening size shall not exceed 0.09 m2 (1 ft2).
  - (b) The thickness of the concrete, grout, or mortar shall be the full thickness of the assembly
- (4) Where firestopping materials are used with the penetrating items in 8.3.5.1.1(1) through 8.3.5.1.1(3) and both of the following criteria are also met:
  - (a) The penetration shall be limited to only one floor.

(2) Membrane penetrations of steel, ferrous, or copper conduits, pipes, tubes, or combustion vents or exhaust vents shall be permitted where the annular space is protected with an approved material, and the aggregate area of the openings does not exceed 0.06 m2 (0.7 ft2) in any 9.3 m2 (100 ft2) of ceiling area.

(3) Electrical outlet boxes and fittings shall be permitted, provided that such devices are listed for use in fire resistance–rated assemblies and are installed in accordance with their listing.

(4) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate.

8.3.5.6.3 Where walls or partitions are required to have a fire resistance rating of not less than 1 hour, recessed fixtures shall be installed in the wall or partition in such a manner that the required fire resistance is not reduced, unless one of the following is met:

(1) Any steel electrical box not exceeding 0.01 m2 (0.1 ft2) shall be permitted where the aggregate area of the openings provided for the boxes does not exceed 0.06 m2 (0.7 ft2) in any 9.3 m2 (100 ft2) of wall area, and, where outlet boxes are installed on opposite sides of the wall, the boxes shall be separated by one of the following:

(a) Horizontal distance of not less than 610 mm (24 in.)

(b) Horizontal distance of not less than the depth of the wall cavity, where the wall cavity is filled with cellulose loose-fill, rock wool, or slag wool insulation

(c)* Solid fireblocking

(d) Other listed materials and methods

(2) Membrane penetrations for any listed electrical outlet box made of any material shall be permitted, provided that such boxes have been tested for use in fire resistance–rated assemblies and are installed in accordance with the instructions included in the listing.

(3) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate.

9.6.2.10 Smoke Alarms

9.6.2.10 Smoke Alarms.

9.6.2.10.1 Where required by another section of this Code, single-station and multiple-station smoke alarms shall be in accordance with NFPA 72®, National Fire Alarm Code®. System smoke detectors in accordance with NFPA 72®, National Fire Alarm Code®, and arranged to function in the same manner as single-station or multiple-station smoke alarms shall be permitted in lieu of smoke alarms.

9.6.2.10.2 Power for smoke alarms. All newly installed smoke alarms in one & two family dwellings, multiple unit dwellings, lodging or rooming houses, hotels and dormitories shall be directly wired to a non-dedicated electrical branch circuit for the building and by battery.

9.6.2.10.3* In new construction, where two or more smoke alarms are required within a dwelling unit, suite of rooms, or similar area, they shall be arranged so that operation of any smoke alarm shall cause the alarm in all smoke alarms within the dwelling unit, suite of rooms, or similar area to sound, unless otherwise permitted by the following:

(1) The requirement of 9.6.2.10.3 shall not apply where permitted by another section of this Code.

(2) The requirement of 9.6.2.10.3 shall not apply to configurations that provide equivalent distribution of the alarm signal.

9.6.2.10.4 The alarms shall sound only within an individual dwelling unit, suite of rooms, or similar area and shall not actuate the building fire alarm system, unless otherwise permitted by the authority having jurisdiction. Remote annunciation shall be permitted.

9.6.2.11 Where required by Chapter 11 through Chapter 42, an automatic fire detection system shall be provided in hazardous areas for initiation of the signaling system.

9.9.1 Carbon Monoxide Detection

9.9.1 Carbon Monoxide Detection. Where required by another section of this Code carbon monoxide alarms (detectors) shall be installed in accordance with NFPA 720, Standard for the Installation of Carbon Monoxide Warning Equipment in Dwelling Units, 2005 Edition. NFPA 720 covers the selection, application, installation, location, testing and maintenance of carbon monoxide warning equipment in all buildings in which people sleep. *[section 720:1.1.2 is amended by this section]*

9.9.2 Power for Carbon Monoxide Alarms. All newly installed carbon monoxide alarms in multiple unit dwellings, lodging or rooming houses, hotels and dormitories, or other buildings in which people sleep shall be directly wired to a non-dedicated electrical branch circuit for the building and by battery. Carbon monoxide detectors in existing one-two family dwellings shall be permitted to be powered by any approved source.