Understanding Fire Alarm Survivability and Pathway Requirements

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What we will discuss today

• For this presentation, we will base the survivability requirements on a three story nursing home
• We will discuss the NFPA 72 Chapter 12 classes of circuits and pathways
• We will also briefly discuss the NFPA 72 Chapter 26 monitoring requirements
What are the fire alarm requirements?

Based on NFPA 101, 2012 (CMS) and/or 2015 (state)
Chapter 18, New Health Care Occupancies
NFPA 72, 2010 (CMS) or 2013 (state)

What is required for fire protection?

Based on NFPA 101, 2012 (CMS) and/or 2015 (state)
Chapter 18, New Health Care Occupancies
NFPA 72, 2010 (CMS) or 2013 (state)
NFPA 101 - Chapter 18
New Health Care Occupancies

18.3.4 Detection, Alarm, and Communications Systems.
18.3.4.1 General. Health care occupancies shall be provided with a fire alarm system in accordance with Section 9.6.

(This does not mean that everything in 9.6 is applicable.)

9.6 Fire Detection, Alarm, and Communications Systems.

9.6.1* General.
9.6.1.1 The provisions of Section 9.6 shall apply only where specifically required by another section of this Code.
9.6 Fire Detection, Alarm, and Communications Systems.

9.6.1.3 A fire alarm system required for life safety shall be installed, tested, and maintained in accordance with the applicable requirements of NFPA 70, National Electrical Code, and NFPA 72, National Fire Alarm and Signaling Code, unless it is an approved existing installation, which shall be permitted to be continued in use.

18.3.4 Detection, Alarm, and Communications Systems.

18.3.4.2* Initiation.

18.3.4.2.1 Initiation of the required fire alarm systems shall be by

- by manual means in accordance with 9.6.2
- by means of any required sprinkler system workflow alarms, detection devices, or detection systems, unless otherwise permitted by 18.3.4.2.2.
18.3.4 Detection, Alarm, and Communications Systems.

**18.3.4.2** Initiation.

**18.3.4.2.2** Manual fire alarm boxes in patient sleeping areas shall not be required at exits if located at all nurses’ control stations or other continuously attended staff location, provided that both of the following criteria are met:

(1) Such manual fire alarm boxes are visible and continuously accessible.

(2) Travel distances required by 9.6.2.5 are not exceeded.

18.3.4 Detection, Alarm, and Communications Systems.

**18.3.4.3** Notification. Positive alarm sequence in accordance with 9.6.3.4 shall be permitted.
18.3.4 Detection, Alarm, and Communications Systems.

18.3.4.3.1 Occupant Notification. Occupant notification shall be accomplished automatically in accordance with 9.6.3, unless otherwise modified by the following:

(1) Paragraph 9.6.3.2.3 shall not be permitted to be used.

(2)*In lieu of audible alarm signals, visible alarm-indicating appliances shall be permitted to be used in critical care areas.

9.6 Fire Detection, Alarm, and Communications Systems.

9.6.3.2.3* Smoke detectors located at doors for the exclusive operation of automatic door release shall not be required to activate the building evacuation alarm, provided that the power supply and installation wiring to the detectors are monitored by the building fire alarm system, and the activation of the detectors initiates a supervisory signal at a constantly attended location.
9.6 Fire Detection, Alarm, and Communications Systems.

9.6.3.6 The general evacuation alarm signal shall operate in accordance with one of the methods prescribed by 9.6.3.6.1 through 9.6.3.6.3.

9.6.3.6.1 The general evacuation alarm signal shall operate throughout the entire building.

9.6.3.6.2* Where total evacuation of occupants is impractical due to building configuration, only the occupants in the affected zones shall be notified initially. Provisions shall be made to selectively notify occupants in other zones to afford orderly evacuation of the entire building.
9.6 Fire Detection, Alarm, and Communications Systems.

A.9.6.3.6.2 To approve an evacuation plan to selectively notify building occupants, the authority having jurisdiction should consider several building parameters, including building compartmentation, detection and suppression system zones, occupant loads, and the number and arrangement of the means of egress.

9.6 Fire Detection, Alarm, and Communications Systems.

9.6.3.6.3 Where occupants are incapable of evacuating themselves because of age, physical or mental disabilities, or physical restraint, the private operating mode, as described in NFPA72, National Fire Alarm and Signaling Code, shall be permitted to be used.

Only the attendants and other personnel required to evacuate occupants from a zone, area, floor, or building shall be required to be notified. The notification shall include means to readily identify the zone, area, floor, or building in need of evacuation.
18.3.4 Detection, Alarm, and Communications Systems.

18.3.4.3.2 Emergency Forces Notification.
18.3.4.3.2.1 Fire department notification shall be accomplished in accordance with 9.6.4.

18.3.4.5 Detection.
18.3.4.5.1 General. Detection systems, where required, shall be in accordance with Section 9.6.

18.3.4.5.2 Detection in Spaces Open to Corridors. See 18.3.6.1.
18.3.4 Detection, Alarm, and Communications Systems.

18.3.4.5.3* Nursing Homes. An approved automatic smoke detection system shall be installed in corridors throughout smoke compartments containing patient sleeping rooms and in spaces open to corridors as permitted in nursing homes by 18.3.6.1, unless otherwise permitted by one of the following:

(18.3.6.1 – corridor separation from other areas)

18.3.4 Detection, Alarm, and Communications Systems.

(1) Corridor systems shall not be required where each patient sleeping room is protected by an approved smoke detection system.

(2) Corridor systems shall not be required where patient room doors are equipped with automatic door-closing devices with integral smoke detectors on the room side installed in accordance with their listing, provided that the integral detectors provide occupant notification.
18.3.4 Detection, Alarm, and Communications Systems.

18.3.5 Extinguishment Requirements.

18.3.5.1* Buildings containing health care occupancies shall be protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 9.7, unless otherwise permitted by 18.3.5.5.

18.3.5.4 The sprinkler system required by 18.3.5.1 shall be installed in accordance with 9.7.1.1(1).

NFPA 72

• Chapter 23 is applicable for tone signals
  – 23.10 Fire Alarm Systems Using Tone
• Chapter 24 is applicable for voice
  – 23.9 In-Building Fire Emergency Voice/Alarm Communications
**NFPA 72-2010**

**24.3.5 Pathway Survivability.**

**24.3.5.1** Pathway survivability levels shall be as described in Section 12.4.

(24.3.6 in 2013 – same requirements unless noted)

**NFPA 72-2010**

**24.3.5 Pathway Survivability.**

**24.3.5.3** The pathway survivability requirements in 24.3.5.4 through 24.3.5.12 shall apply to notification and communications circuits and other circuits necessary to ensure the continued operation of the emergency communications system.
NFPA 72-2010

24.3.5 Pathway Survivability.
24.3.5.4.1 For systems employing relocation or partial evacuation, a Level 2 or Level 3 pathway survivability shall be required.
24.3.5.4.2 For systems that do not employ relocation or partial evacuation, a Level 0, Level 1, Level 2, or Level 3 pathway survivability shall be required.

Circuits and Pathways (2013)

12.2.1* Performance and survivability characteristics of signaling pathways (interconnections) shall comply with the defined designations of this chapter.
12.4 Pathway Survivability. All pathways shall comply with NFPA 70, National Electrical Code.

12.4.1 Pathway Survivability Level 0. Level 0 pathways shall not be required to have any provisions for pathway survivability.

12.4.2 Pathway Survivability Level 1. Pathway survivability Level 1 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, with any interconnecting conductors, cables, or other physical pathways installed in metal raceways.
12.4.3 Pathway Survivability Level 2. Pathway survivability Level 2 shall consist of one or more of the following:
(1) 2-hour fire-rated circuit integrity (CI) cable
(2) 2-hour fire-rated cable system [electrical circuit protective system(s)]
(3) 2-hour fire-rated enclosure or protected area
(4) 2-hour performance alternatives approved by the authority having jurisdiction

12.4.4 Pathway Survivability Level 3. Pathway survivability Level 3 shall consist of pathways in buildings that are fully protected by an automatic sprinkler system in accordance with NFPA 13, Standard for the Installation of Sprinkler Systems, and one or more of the following:
(1) 2-hour fire-rated circuit integrity (CI) cable
(2) 2-hour fire-rated cable system [electrical circuit protective system(s)]
(3) 2-hour fire-rated enclosure or protected area
(4) 2-hour performance alternatives approved by the authority having jurisdiction
Circuits and Pathways (2013)

12.3* Pathway Class Designations. Pathways shall be designated as Class A, Class B, Class C, Class D, Class E, or Class X, depending on their performance.

12.3.1* Class A. A pathway shall be designated as Class A when it performs as follows:

(1) It includes a redundant path.
(2) Operational capability continues past a single open, and the single open fault shall result in the annunciation of a trouble signal.
(3) Conditions that affect the intended operation of the path are annunciated as a trouble signal.
(4) Operational capability is maintained during the application of a single ground fault.
(5) A single ground condition shall result in the annunciation of a trouble signal.

Exception: Requirements in 12.3.1(4) and (5) shall not apply to nonconductive pathways (e.g., wireless or fiber).
12.3.2* Class B. A pathway shall be designated as Class B when it performs as follows:

(1) It does not include a redundant path.
(2) Operational capability stops at a single open.
(3) Conditions that affect the intended operation of the path are annunciated as a trouble signal.

(4) Operational capability is maintained during the application of a single ground fault.
(5) A single ground condition shall result in the annunciation of a trouble signal.

Exception: Requirements in 12.3.2(4) and (5) shall not apply to nonconductive pathways (e.g., wireless or fiber).
12.3.3* Class C. A pathway shall be designated as Class C when it performs as follows:

(1) It includes one or more pathways where operational capability is verified via end-to-end communication, but the integrity of individual paths is not monitored.

(2) A loss of end-to-end communication is annunciated.

12.3.4* Class D. A pathway shall be designated as Class D when it has fail-safe operation, where no fault is annunciated, but the intended operation is performed in the event of a pathway failure.

12.3.5* Class E. A pathway shall be designated as Class E when it is not monitored for integrity.
12.3.6* Class X. A pathway shall be designated as Class X when it performs as follows:

(1) It includes a redundant path.
(2) Operational capability continues past a single open, and the single open fault shall result in the annunciation of a trouble signal.
(3) Operational capability continues past a single short-circuit, and the single short-circuit fault shall result in the annunciation of a trouble signal.
(4) Operational capability continues past a combination open fault and ground fault.

(5) Conditions that affect the intended operation of the path are annunciated as a trouble signal.
(6) Operational capability is maintained during the application of a single ground fault.
(7) A single ground condition shall result in the annunciation of a trouble signal.

Exception: Requirements in 12.3.6(3), (4), (6), and (7) shall not apply to nonconductive pathways (e.g., wireless or fiber).
Supervising Station Alarm Systems (2013)

26.6.3 Communications Methods. The communications methods used to transmit signals to supervising stations shall meet the requirements of 26.6.3.1 for performance-based technologies, or 26.6.3.2 or 26.6.3.3 for prescriptive-based technologies.

26.6.3.1* Performance-Based Technologies. 26.6.3.1.1 Conformance. Communications methods operating on principles different from specific methods covered by this chapter shall be permitted to be installed if they conform to the performance requirements of this section and to all other applicable requirements of this Code.
26.6.3.1* Performance-Based Technologies.

26.6.3.1.5 Single Communications Path.
• supervised at an interval of not more than 60 minutes.

26.6.3.1.6 Multiple Communications Paths.
• supervised within not more than 6 hours.

(A) A system employing a DACT shall employ one telephone line (number). In addition, one of the following transmission means shall be employed:
(1) One-way private radio alarm system
(2) Two-way RF multiplex system
(3) Transmission means complying with 26.6.3.1

Exception: Where access to two technologies in the preceding list is not available at the protected premises, with the approval of the authority having jurisdiction, a telephone line (number) shall be permitted to be used as the second transmission means…
Questions?

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