National Fire Alarm and Signaling Code® Handbook

Ninth Edition

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With the complete text of the 2019 edition of *NFPA 72®, National Fire Alarm and Signaling Code®*

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How to Use the *National Fire Alarm and Signaling Code Handbook*, 2019 Edition

NFPA 720 icons indicate requirements previously found in NFPA 720, *Standard for the Installation of Carbon Monoxide (CO) Detection and Warning Equipment*

Nonmandatory Annex A material follows its corresponding Code text

System Design Tip icons identify commentary important to architects and engineers

Commentary text is shaded in green to distinguish it from Code text

NFPA 720

Δ

System Design Tip

23.1 Application.

23.1.1* The application, installation, and performance of alarm and signaling systems within protected premises shall comply with the requirements of this chapter.

A.23.1.1 Chapter 23 is intended to cover alarm and signaling systems and their components, such as fire alarm, mass notification, carbon monoxide, and other signaling systems.

In-building mass notification systems, defined in 3.3.90.1.3, are systems used to provide appropriate information and instructions to occupants in emergency situations, including terrorist threats, chemical or biological hazards, and natural disasters. These systems can be separate from or integrated with the fire alarm system. When a fire alarm system is also used for mass notification, the system is considered a *combination system*, as defined in 3.3.111.1, and the requirements of 23.8.4 for combination systems apply. Because these systems are also used for mass notification, the requirements of Chapter 24 also apply.

FAQ How is the need established for a fire alarm system and its features?

Chapter 23 does not require the installation of a protected premises (local) fire alarm system or any type of emergency control functions. Required systems are needed due to requirements of other applicable codes or statutes that have been adopted by the enforcing jurisdiction (see 23.3.1). Typically, the need for these systems and their features is established by enabling codes such as the local building code or NFPA *101®*, *Life Safety Code®*. Those codes are the source of any requirements for the installation of a fire alarm system, supervisory functions, or other emergency control functions controlled by a protected premises (local) fire alarm system. For nonrequired systems, the system designer is responsible for determining the functions and features that the system will include. Chapter 23 explains the methods of accomplishing these functions where required by another code, standard, or authority having jurisdiction or where selected by the system designer to meet the goals of the system owner. See Section 23.3 and associated commentary.

FM icons in Chapter 14 identify material of interest to facility managers

Commentary includes answers to frequently asked questions

Commentary exhibits are set off with green horizontal lines

As with other requirements in the Code, the inspection, testing, and maintenance requirements are considered minimum. In some cases, the authority having jurisdiction may impose requirements that are more stringent. For example, owners of large, high-value industrial facilities may establish corporate policies requiring more frequent system testing as part of their overall risk management strategy to minimize the potential for disruption of their operations.

FM

14.1.4 The requirements of this chapter shall apply to both new and existing systems.

FAQ Are the requirements of Chapter 14 retroactive?

The requirements of Chapter 14 are retroactive as applied to an existing system because compliance does not require changes to the system equipment, devices, circuits, or functions. It is expected that the most current edition of the Code be used for inspection, testing, and maintenance of both new

EXHIBIT 14.1

Fire Pump Installation. (Courtesy of Jeffrey Moore, P.E., JENSEN HUGHES)

For the convenience of the user, the requirements of Code paragraphs 17.7.3.2 through 17.7.3.5 have been organized in the tabular format below:

Spot-Type Smoke Detector Spacing and Mounting Location for Various Ceiling Types

Ceiling Slope	Ceiling Construction†	Special Conditions	Detector Spacing, *S*	Detector Mounting Location
Level (slope less than or equal to 1-in-8)	Smooth ceiling	—	One of the following: 1) Less than or equal to 30 ft (9.1 m) between detectors and less than or equal to one half spacing at right angles from walls or partitions within 15 percent of the ceiling height 2) All points within 70 percent of the nominal 30 ft (9.1 m) spacing Maximum coverage area adjusted for high air movement in accordance with 17.7.6.3, where appropriate.	Ceiling or sidewall within 12 in. (300 mm) of the ceiling
	Solid joist, beam, or intersecting beam (waffle or pan-type) with the following conditions: • Beam depth less than 10 percent of the ceiling height	—	Apply spacing for a level ceiling with smooth construction	For beams or intersecting beams: Ceiling or bottom of beams For solid joists: Bottom of joists
	Solid joist, beam, or intersecting beam (waffle or pan-type) with the following conditions: • Beam depth equal to or greater than 10 percent of the ceiling height • Beam spacing equal to or greater than 40 percent of the ceiling height	—	In each beam pocket	Ceiling
		In corridor 15 ft (4.6 m) wide or less with beams perpendicular to the corridor length	Apply spacing for a level ceiling with smooth construction	Ceiling or sidewall within 12 in. (300 mm) of the ceiling or bottom of beams/joists
		In room 900 ft^2 (84 m^2) or less	Apply spacing for a level ceiling with smooth construction	Ceiling or bottom of beams/joists
	Solid joist, beam, or intersecting beam (waffle or pan-type) with the following conditions: • Beam depth equal to or greater than 10 percent of the ceiling height • Beam spacing less than 40 percent of the ceiling height	—	Spacing parallel to beams: Apply spacing for a level ceiling with smooth construction Spacing perpendicular to beams: Apply one half the spacing for a level ceiling with smooth construction	For beams or intersecting beams: Ceiling or bottom of beams For solid joists: Bottom of joists
		In corridor 15 ft (4.6 m) wide or less with beams perpendicular to the corridor length	Apply spacing for a level ceiling with smooth construction	Ceiling or sidewall within 12 in. (300 mm) of the ceiling or bottom of beams/joists
		In room 900 ft^2 (84 m^2) or less	Apply spacing for a level ceiling with smooth construction	Ceiling or bottom of beams/joists
Shed or Peaked (slope greater than 1-in-8)	Smooth ceiling	—	Apply spacing for a level ceiling with smooth construction, based on the horizontal projection of the ceiling Locate a row of detectors within 36 in. (910 mm) of the peak, measured horizontally	Ceiling
	Solid joist or beam having all of the following conditions: • Beams/joists parallel to slope • Beam/joist depth less than 10 percent of the average ceiling height over the slope	—	Apply spacing for a level ceiling with smooth construction, based on the horizontal projection of the ceiling Locate a row of detectors within 36 in. (910 mm) of the peak, measured horizontally	For beams: Ceiling For solid joists: Bottom of joists
	Solid joist or beam having all of the following conditions: • Beams/joists parallel to slope • Beam/joist depth equal to or greater than 10 percent of the average ceiling height over the slope • Beam/joist spacing less than 40 percent of the average ceiling height over the slope	—	Perpendicular to slope: Apply one half the spacing for a level ceiling with smooth construction, based on the horizontal projection of the ceiling Parallel to slope: Apply spacing for a level ceiling with smooth construction, based on the horizontal projection of the ceiling Locate a row of detectors within 36 in. (910 mm) of the peak, measured horizontally	For beams: Ceiling For solid joists: Bottom of joists

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Shed or Peaked (slope greater than 1-in-8)	Smooth ceiling	—	Apply spacing for a level ceiling with smooth construction, based on the horizontal projection of the ceiling Locate a row of detectors within 36 in. (910 mm) of the peak, measured horizontally	Ceiling
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Locations of Frequently Asked Questions in Handbook Commentary

Topic	FAQ	Section
Administrative	Does *NFPA 72* require the installation of a fire alarm system or other emergency system?	1.1.1
	Where the required system features are not specified through a framework of higher level mandates, who must determine the needs and features?	A.1.2.4
	Are the requirements of *NFPA 72* retroactive?	1.4.1
	Who approves equipment and installations?	A.3.2.1
	What is a nonrequired system, and what requirements must it meet?	A.23.3.2
	What type of information does the equipment listing contain?	10.3.1
	What is a releasing service fire alarm control unit?	3.3.108.2.2
Control Units, Power Supplies, and System Circuits	What is the purpose of voltage drop calculations?	18.3.2.3
	Who is responsible for selection of a circuit performance class?	23.4.2
	Where is T-tapping allowed, and where is it not allowed?	A.12.6
	Who is responsible for completing the record of completion form?	7.5.6.3
	What format must be used to mark the date of manufacture on the battery?	10.6.10.1.2
Inspection, Testing, and Maintenance	Are the requirements of Chapter 14 retroactive?	14.1.4
	Who should be notified before testing a fire alarm system?	14.2.4.1
	Are measurements of sound pressure levels required throughout the building for periodic testing?	14.4.3.2 22(1)
	After acceptance testing, should systems be tested periodically for intelligibility?	14.4.11.1
	Who is responsible for maintaining fire alarm system records?	14.6.1.3
Initiating Devices	Does Chapter 17 establish the need for the installation of initiating devices?	A.17.1.2
	How is ceiling height measured?	3.3.39
	What do analog initiating devices measure and transmit?	3.3.141.1
	What causes stratification?	3.3.287
	What does "total coverage" mean?	17.5.3.1
	What requirements apply to installations of nonrequired coverage?	17.5.3.3.1
	When is a statement of the detection system performance objective required to be included in the design documentation?	A.17.6.1.1
	Why must mechanical guards be listed for use with the detector?	17.4.2
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	What is the basis of the spacing factor, *S*, for heat detectors?	17.6.3.1.1
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	Where must detectors be installed if duct detection is used in return air applications?	A.17.7.5.4.2.2
	Does the requirement to replace smoke alarms every 10 years apply to system smoke detectors?	14.4.5.8
	Does *NFPA 72* require sprinkler system supervision?	A.23.8.5.6
	Does *NFPA 72* require connection of a waterflow alarm initiating device to a fire alarm system?	A.23.8.5.5
	What type of flow switch should be used in a dry pipe, preaction, or deluge-type system?	17.13.2
	Does *NFPA 72* require supervision of fire suppression systems other than sprinklers?	23.8.5.8
	Why does the Code require at least one manual fire alarm box?	A.23.8.5.1.2
Notification Appliances	Do all fire alarm systems require the installation of notification appliances for occupant notification?	A.23.2.1
	What is the purpose of alarm annunciation?	10.18.1.1.2
	Where are the requirements to have occupant notification or staff notification?	18.1.1
	Which individuals are private operating mode signals intended to alert?	3.3.193.1
	What conditions must be satisfied to reduce or eliminate audible signaling?	18.4.4.2
	Why not use the same low frequency tone in all areas?	A.18.4.1.1
	Why are audibility measurements not required for textual (voice) signals?	18.4.1.6
	Does *NFPA 72* require intelligibility in all spaces? What guidance does the designer have to plan and designate acoustically distinguishable spaces (ADSs) and to determine which spaces should have intelligibility or not when other governing laws, codes, or standards, as noted in 18.4.11.3, do not stipulate?	18.4.11
	What is the purpose of the minimum and maximum mounting heights for wall-mounted visual notification appliances?	18.5.5.3
	Are the spacing requirements for corridors based on direct or indirect viewing of appliances?	18.5.5.6.4
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	Which code requires the installation of fire alarm initiating devices for Elevator Phase I Emergency Recall Operation?	21.3.1
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	What is the purpose of elevator shutdown?	21.4
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	What information should an effective emergency message contain?	24.2.3
	What are some basic issues that must be addressed by the MNS risk analysis?	24.3.12
	Can a loudspeaker be provided with a control that allows occupants to lower the volume?	24.5.15.2

Topic	FAQ	Section
Supervising Stations	When is a remote supervising station alarm system used?	3.3.291.3
	Why is it important to notify supervising station customers of changes in service?	A.26.2.7.1
	What important distinctions are involved when true central station service is provided?	A.26.3.2
	Can a listed central station also provide remote supervising station service?	A.26.5.3.1.4
	What are some of the duties that a runner may be asked to perform?	3.3.254
	How often must a DACT initiate a signal?	A.26.6.4.1.5(4)
	How can telephone lines connected to a DACR be monitored for integrity?	26.6.4.2.2
Household	Where is the requirement to have smoke detection established?	A.29.8.1.1(5)
	Does the Code permit the use of both smoke alarms and smoke detectors?	A.29.3.3
	What important changes have been made in the Code regarding requirements for interconnection of smoke alarms?	A.29.8.2.1.1
	What course of action is needed when the number of smoke alarms exceeds 12?	A.29.11.2.1
	Where is the requirement to have CO detection established?	A.29.7.1.1
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	What are the periodic testing requirements for household fire alarm systems and smoke alarms?	A.29.6.3
	Does the 10-year replacement requirement apply to all smoke alarms?	29.13

Room Spacing for Wall-Mounted Visual Notification Appliances

Maximum Room Size		*Minimum Required Light Output [Effective Intensity (cd)]*	
ft	*m*	*One Visual Notification Appliance per Room*	*Four Visual Notification Appliances per Room (One per Wall)*
20 × 20	6.10 × 6.10	15	NA
28 × 28	8.53 × 8.53	30	NA
30 × 30	9.14 × 9.14	34	NA
40 × 40	12.2 × 12.2	60	15
45 × 45	13.7 × 13.7	75	19
50 × 50	15.2 × 15.2	94	30
54 × 54	16.5 × 16.5	110	30
55 × 55	16.8 × 16.8	115	30
60 × 60	18.3 × 18.3	135	30
63 × 63	19.2 × 19.2	150	37
68 × 68	20.7 × 20.7	177	43
70 × 70	21.3 × 21.3	184	60
80 × 80	24.4 × 24.4	240	60
90 × 90	27.4 × 27.4	304	95
100 × 100	30.5 × 30.5	375	95
110 × 110	33.5 × 33.5	455	135
120 × 120	36.6 × 36.6	540	135
130 × 130	39.6 × 39.6	635	185

NA: Not allowable.

TABLE 18.5.5.5.1(a)

Room Spacing for Ceiling-Mounted Visual Notification Appliances

Maximum Room Size		*Maximum Lens Height**		*Minimum Required Light Output (Effective Intensity); One Visual Notification Appliance (cd)*
ft	*m*	*ft*	*m*	
20 × 20	6.1 × 6.1	10	3.0	15
30 × 30	9.1 × 9.1	10	3.0	30
40 × 40	12.2 × 12.2	10	3.0	60
44 × 44	13.4 × 13.4	10	3.0	75
20 × 20	6.1 × 6.1	20	6.1	30
30 × 30	9.1 × 9.1	20	6.1	45
44 × 44	13.4 × 13.4	20	6.1	75
46 × 46	14.0 × 14.0	20	6.1	80
20 × 20	6.1 × 6.1	30	9.1	55
30 × 30	9.1 × 9.1	30	9.1	75
50 × 50	15.2 × 15.2	30	9.1	95
53 × 53	16.2 × 16.2	30	9.1	110
55 × 55	16.8 × 16.8	30	9.1	115
59 × 59	18.0 × 18.0	30	9.1	135
63 × 63	19.2 × 19.2	30	9.1	150
68 × 68	20.7 × 20.7	30	9.1	177
70 × 70	21.3 × 21.3	30	9.1	185

*This does not preclude mounting lens at lower heights.

TABLE 18.5.5.5.1(b)

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