

2021 Virginia Construction Code

CHAPTER 9 FIRE PROTECTION AND LIFE SAFETY SYSTEMS

SECTION 907 FIRE ALARM AND DETECTION SYSTEMS

[F] 907.1 General.

This section covers the application, installation, performance and maintenance of fire alarm systems and their components.

[F] 907.1.1 Construction documents.

Construction documents for fire alarm systems shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code, the [International Fire Code](#); and relevant laws, ordinances, rules and regulations, as determined by the fire code official.

[F] 907.1.2 Fire alarm shop drawings.

Shop drawings for fire alarm systems shall be prepared in accordance with [NFPA 72](#) and submitted for review and approval prior to system installation.

[F] 907.1.3 Equipment.

Systems and components shall be *listed* and *approved* for the purpose for which they are installed.

[F] 907.2 Where required—new buildings and structures.

An *approved* fire alarm system installed in accordance with the provisions of this code and [NFPA 72](#) shall be provided in new buildings and structures in accordance with [Sections 907.2.1](#) through [907.2.23](#) and provide occupant notification in accordance with [Section 907.5](#), unless other requirements are provided by another section of this code.

Not fewer than one manual fire alarm box shall be provided in an *approved* location to initiate a fire *alarm signal* for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions:

1. The manual fire alarm box is not required for fire alarm systems dedicated to elevator recall control and supervisory service.
2. The manual fire alarm box is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. Where provided, the manual fire alarm box shall not be located in an area that is open to the public.

[F] 907.2.1 Group A.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group A occupancies where the *occupant load* due to the assembly occupancy is 300 or more, or where the Group A *occupant load* is more than 100 persons above or below the *lowest level of exit discharge* Group A occupancies not separated from one another in accordance with [Section 707.3.10](#) shall be considered as a single occupancy for the purposes of applying this section. Portions of Group E occupancies occupied for assembly purposes shall be provided with a fire alarm system as required for the Group E occupancy.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

907.2.1.1 System initiation in Group A occupancies with an occupant load of 1,000 or more and in certain night clubs.

Activation of the fire alarm in Group A occupancies with an occupant load of 1,000 or more and in *night clubs* with an occupant load of 300 or more shall initiate a signal using an emergency voice and alarm communications system in accordance with [Section 907.5.2.2](#).

Exception: Where approved, the prerecorded announcement is allowed to be manually deactivated for a period of time, not to exceed 3 minutes, for the sole purpose of allowing a live voice announcement from an approved, constantly attended location.

[F] 907.2.1.2 Emergency voice/alarm communication captions.

Stadiums, arenas and grandstands required to caption audible public announcements shall be in accordance with [Section 907.5.2.2.4](#).

[F] 907.2.2 Group B.

A manual fire alarm system, [which activates the occupant notification system in accordance with Section 907.5](#), shall be

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installed in Group B occupancies where one of the following conditions exists:

1. The combined Group B *occupant load* of all floors is 500 or more.
2. The Group B *occupant load* is more than 100 persons above or below the lowest *level of exit discharge*.
3. The *fire area* contains an *ambulatory care facility*.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.2.1 Ambulatory care facilities.

Fire areas containing *ambulatory care facilities* shall be provided with an electronically supervised automatic smoke detection system installed within the *ambulatory care facility* and in *public use areas* outside of tenant spaces, including public *corridors* and elevator lobbies.

Exception: Buildings equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#), provided that the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

907.2.3 Group E.

A manual fire alarm system that activates the occupant notification system meeting the requirements of [Section 907.5](#) and installed in accordance with [Section 907.6](#) shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the *building* fire alarm system.

Exceptions:

1. A manual fire alarm system is not required in Group E occupancies with an occupant load of 50 or less.
2. Manual fire alarm boxes are not required in Group E occupancies where all of the following apply:
 - 2.1. Interior corridors are protected by smoke detectors.
 - 2.2. Auditoriums, cafeterias, gymnasiums, and similar areas are protected by heat detectors or other approved detection devices.
 - 2.3. Shops and laboratories involving dusts or vapors are protected by heat detectors or other approved detection devices.
3. Manual fire alarm boxes shall not be required in Group E occupancies where the *building* is equipped throughout with an approved automatic sprinkler system installed in accordance with [Section 903.3.1.1](#), the occupant notification system will activate on sprinkler water flow and manual activation is provided from a normally occupied location.

[F] 907.2.4 Group F.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group F occupancies where both of the following conditions exist:

1. The Group F occupancy is two or more *stories* in height.
2. The Group F occupancy has a combined *occupant load* of 500 or more above or below the lowest *level of exit discharge*.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.5 Group H.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group H-5 occupancies and in occupancies used for the manufacture of organic coatings. An automatic smoke detection system shall be installed for *highly toxic* gases, organic peroxides and oxidizers in accordance with [Chapters 60, 62 and 63](#), respectively, of the *International Fire Code*.

[F] 907.2.6 Group I.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group I occupancies. An automatic smoke detection system that activates the occupant notification system in accordance with [Section 907.5](#) shall be provided in accordance with [Sections 907.2.6.1, 907.2.6.2 and 907.2.6.3.3](#).

Exceptions:

1. Manual fire alarm boxes in sleeping units of Group I-1 and I-2 occupancies shall not be required *abxits* if located at all care providers' control stations or other constantly attended staff locations, provided that such manual fire alarm boxes are visible and provided with *ready access*, and the distances of travel required in [Section 907.4.2.1](#) are not exceeded.

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2. Occupant notification systems are not required to be activated where private mode signaling installed in accordance with [NFPA 72](#) is *approved* by the fire code official and staff evacuation responsibilities are included in the fire safety and evacuation plan required by [Section 404](#) of the *International Fire Code*.

[F] 907.2.6.1 Group I-1.

In Group I-1 occupancies, an automatic smoke detection system shall be installed *incorridors*, waiting areas open to corridors and *habitable spaces* other than *sleeping units* and kitchens. The system shall be activated in accordance with [Section 907.5](#).

Exceptions:

1. For Group I-1, Condition 1 occupancies, smoke detection *inhabitable spaces* is not required where the facility is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#).
2. Smoke detection is not required for exterior balconies.

[F] 907.2.6.1.1 Smoke alarms.

Single- and multiple-station smoke alarms shall be installed in accordance with [Section 907.2.11](#).

[F] 907.2.6.2 Group I-2.

An automatic smoke detection system shall be installed *incorridors* in Group I-2, Condition 1 facilities and spaces permitted to be open to the corridors by [Section 407.2](#). The system shall be activated in accordance with [Section 907.4](#). Group I-2, Condition 2 occupancies shall be equipped with an automatic smoke detection system as required in [Section 407](#).

Exceptions:

1. Corridor smoke detection is not required *insmoke compartments* that contain sleeping units where such units are provided with smoke detectors that comply with [UL 268](#). Such detectors shall provide a visual display on the corridor side of each sleeping unit and shall provide an audible and visual alarm at the care providers' station attending each unit.
2. Corridor smoke detection is not required *insmoke compartments* that contain sleeping units where sleeping unit doors are equipped with automatic door-closing devices with integral smoke detectors on the unit sides installed in accordance with their listing, provided that the integral detectors perform the required alerting function.

[F] 907.2.6.3 Group I-3 occupancies.

Group I-3 occupancies shall be equipped with a manual fire alarm system and automatic smoke detection system installed for alerting staff.

[F] 907.2.6.3.1 System initiation.

Actuation of an *automatic fire-extinguishing system*, *automatic sprinkler system*, a manual fire alarm box or a fire detector shall initiate an approved fire *alarm signal* that automatically notifies staff.

[F] 907.2.6.3.2 Manual fire alarm boxes.

Manual fire alarm boxes are not required to be located in accordance with [Section 907.4.2](#) where the fire alarm boxes are provided at staff-attended locations having direct supervision over areas where manual fire alarm boxes have been omitted.

[F] 907.2.6.3.2.1 Manual fire alarm boxes in detainee areas.

Manual fire alarm boxes are allowed to be locked in areas occupied by detainees, provided that staff members are present within the subject area and have keys readily available to operate the manual fire alarm boxes.

[F] 907.2.6.3.3 Automatic smoke detection system.

An automatic smoke detection system shall be installed throughout resident housing areas, including *sleeping units* and contiguous day rooms, group activity spaces and other common spaces normally open to residents.

Exceptions:

1. Other *approved* smoke detection arrangements providing equivalent protection, including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards *listed* for the purpose, are allowed where necessary to prevent damage or tampering.
2. *Sleeping units* in Use Conditions 2 and 3 as described in [Section 308](#).
3. Smoke detectors are not required *insleeping units* with four or fewer occupants *insmoke compartments* that are equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#).

[F] 907.2.7 Group M.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be

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installed in Group M occupancies where one of the following conditions exists:

1. The combined Group M *occupant load* of all floors is 500 or more persons.
2. The Group M *occupant load* is more than 100 persons above or below the lowest *level of exit discharge*.

Exceptions:

1. A manual fire alarm system is not required in *covered or open mall buildings* complying with [Section 402](#).
2. Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) and the occupant notification appliances will automatically activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.7.1 Occupant notification.

During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a waterflow switch shall not be required to activate the alarm notification appliances when an *alarm signal* is activated at a *constantly attended location* from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed in accordance with [Section 907.5.2.2](#).

[F] 907.2.8 Group R-1.

Fire alarm systems and smoke alarms shall be installed in Group R-1 occupancies as required in [Sections 907.2.8.1](#) through [907.2.8.3](#).

[F] 907.2.8.1 Manual fire alarm system.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group R-1 occupancies.

Exceptions:

1. A manual fire alarm system is not required in buildings not more than two *stories* in height where all individual *sleeping units* and contiguous *attic* and crawl spaces to those units are separated from each other and public or common areas by not less than 1-hour *fire partitions* and each individual *sleeping unit* has an *exit* directly to a *public way, egress court or yard*.
2. Manual fire alarm boxes are not required throughout the building where all of the following conditions are met:
 - 2.1. The building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) or [903.3.1.2](#).
 - 2.2. The notification appliances will activate upon sprinkler water flow.
 - 2.3. Not fewer than one manual fire alarm box is installed at an *approved* location.

[F] 907.2.8.2 Automatic smoke detection system.

An automatic smoke detection system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed throughout all interior *corridors* serving *sleeping units*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *sleeping units* and where each *sleeping unit* has a *means of egress* door opening directly to an *exit* or to an exterior *exit access* that leads directly to an *exit*.

[F] 907.2.8.3 Smoke alarms.

Single- and multiple-station smoke alarms shall be installed in accordance with [Section 907.2.11](#).

[F] 907.2.9 Group R-2.

Fire alarm systems and smoke alarms shall be installed in Group R-2 occupancies as required in [Sections 907.2.9.1](#) through [907.2.9.3](#).

[F] 907.2.9.1 Manual fire alarm system.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group R-2 occupancies where any of the following conditions apply:

1. Any *dwelling unit* or *sleeping unit* is located three or more *stories* above the lowest *level of exit discharge*.
2. Any *dwelling unit* or *sleeping unit* is located more than one *story* below the highest *level of exit discharge* of *exits* serving the *dwelling unit* or *sleeping unit*.
3. The building contains more than 16 *dwelling units* or *sleeping units*.

Exceptions:

1. A fire alarm system is not required in buildings not more than two *stories* in height where all *dwelling units* or *sleeping units* and contiguous *attic* and crawl spaces are separated from each other and public or common areas by not less than 1-hour *fire partitions* and each *dwelling unit* or *sleeping unit* has an *exit* directly to a *public way, egress court or yard*.

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2. Manual fire alarm boxes are not required where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) or [903.3.1.2](#) and the occupant notification appliances will automatically activate throughout the notification zones upon a sprinkler water flow.
3. A fire alarm system is not required in buildings that do not have interior *corridors* serving dwelling units and are protected by an *approved automatic sprinkler system* installed in accordance with [Section 903.3.1.1](#) or [903.3.1.2](#), provided that *dwelling units* either have a *means of egress* door opening directly to an exterior *exit* access that leads directly to the exits or are served by open-ended *corridors* designed in accordance with [Section 1027.6](#), Exception 3.

[F] 907.2.9.2 Smoke alarms.

Single- and multiple-station smoke alarms shall be installed in accordance with [Section 907.2.11](#).

[F] 907.2.9.3 Group R-2 college and university buildings.

An automatic smoke detection system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group R-2 occupancies operated by a college or university for student or staff housing in all of the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms and storage rooms.
3. All interior *corridors* serving *sleeping units* or *dwelling units*.

Exception: An automatic smoke detection system is not required in buildings that do not have interior *corridors* serving *sleeping units* or *dwelling units* and where each *sleeping unit* or *dwelling unit* either has a *means of egress* door opening directly to an exterior *exit* access that leads directly to an *exit* or a *means of egress* door opening directly to an *exit*.

Required smoke alarms in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college or university for student or staff housing shall be interconnected with the fire alarm system in accordance with [NFPA 72](#).

[F] 907.2.10 Group S.

A manual fire alarm system that activates the occupant notification system in accordance with [Section 907.5](#) shall be installed in Group S public and self-storage occupancies three stories or greater in height for interior corridors and interior common areas. Visible notification appliances are not required within storage units.

Exception: Manual fire alarm boxes are not required where the building is equipped throughout with an automatic sprinkler system installed in accordance with [Section 903.3.1.1](#), and the occupant notification appliances will activate throughout the notification zones upon sprinkler water flow.

[F] 907.2.11 Single- and multiple-station smoke alarms.

Listed single- and multiple-station smoke alarms complying with [UL 217](#) shall be installed in accordance with [Sections 907.2.11.1](#) through [907.2.11.7](#) and [NFPA 72](#).

[F] 907.2.11.1 Group R-1.

Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In sleeping areas.
2. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *sleeping unit*.
3. In each *story* within the *sleeping unit*, including basements. For *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

[F] 907.2.11.2 Groups R-2, R-3, R-4 and I-1.

Single or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.
3. In each *story* within a *dwelling unit*, including basements but not including crawl spaces and uninhabitable *attics*. In *dwelling units* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.

[F] 907.2.11.3 Installation near cooking appliances.

Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by [Section 907.2.11.1](#) or [907.2.11.2](#):

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1. Ionization smoke alarms shall not be installed less than 20 feet (6096 mm) horizontally from a permanently installed cooking appliance.
2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 feet (3048 mm) horizontally from a permanently installed cooking appliance.
3. Photoelectric smoke alarms shall not be installed less than 6 feet (1829 mm) horizontally from a permanently installed cooking appliance.

[F] 907.2.11.4 Installation near bathrooms.

Smoke alarms shall be installed not less than 3 feet (914 mm) horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm required by [Section 907.2.11.1](#) or [907.2.11.2](#).

[F] 907.2.11.5 Interconnection.

Where more than one smoke alarm is required to be installed within an individual *dwelling unit* or *sleeping unit* in Group R or I-1 occupancies, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit. Physical interconnection of smoke alarms shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm. The alarm shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

[F] 907.2.11.6 Power source.

In new construction, required smoke alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be equipped with a battery backup. Smoke alarms with integral strobes that are not equipped with battery backup shall be connected to an emergency electrical system in accordance with [Section 2702](#). Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for overcurrent protection.

Exception: Smoke alarms are not required to be equipped with battery backup where they are connected to an emergency electrical system that complies with [Section 2702](#).

[F] 907.2.11.7 Smoke detection system.

Smoke detectors listed in accordance with [UL 268](#) and provided as part of the building *fire alarm system* shall be an acceptable alternative to single- and multiple-station *smoke alarms* and shall comply with the following:

1. The *fire alarm system* shall comply with all applicable requirements in [Section 907](#).
2. Activation of a smoke detector in a *dwelling unit* or *sleeping unit* shall initiate alarm notification in the *dwelling unit* or *sleeping unit* in accordance with [Section 907.5.2](#).
3. Activation of a smoke detector in a *dwelling unit* or *sleeping unit* shall not activate alarm notification appliances outside of the *dwelling unit* or *sleeping unit*, provided that a supervisory signal is generated and monitored in accordance with [Section 907.6.6](#).

[F] 907.2.12 Special amusement buildings.

An automatic smoke detection system shall be provided in *special amusement buildings* in accordance with [Sections 907.2.12.1](#) through [907.2.12.3](#).

[F] 907.2.12.1 Alarm.

Activation of any single smoke detector, the *automatic sprinkler system* or any other automatic fire detection device shall immediately activate an audible and visible alarm at the building at a *constantly attended location* from which emergency action can be initiated, including the capability of manual initiation of requirements in [Section 907.2.12.2](#).

[F] 907.2.12.2 System response.

The activation of two or more smoke detectors, a single smoke detector equipped with a *alarm verification feature*, the *automatic sprinkler system* or other *approved* fire detection device shall automatically do all of the following:

1. Cause illumination of the *means of egress* with light of not less than 1 footcandle (11 lux) at the walking surface level.
2. Stop any conflicting or confusing sounds and visual distractions.
3. Activate an *approved* directional exit marking that will become apparent in an emergency.
4. Activate a prerecorded message, audible throughout the *special amusement building*, instructing patrons to proceed to the nearest exit. Alarm signals used in conjunction with the prerecorded message shall produce a sound that is distinctive from other sounds used during normal operation.

[F] 907.2.12.3 Emergency voice/alarm communication system.

An emergency voice/alarm communication system, which is allowed to serve as a public address system, shall be installed in accordance with [Section 907.5.2.2](#) and be audible throughout the entire *special amusement building*.

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[F] 907.2.13 High-rise buildings.

High-rise buildings shall be provided with an automatic smoke detection system in accordance with [Section 907.2.13.1](#), a fire department communication system in accordance with [Section 907.2.13.2](#) and an emergency voice/alarm communication system in accordance with [Section 907.5.2.2](#).

Exceptions:

1. Airport traffic control towers in accordance with [Sections 412](#) and [907.2.22](#).
2. *Open parking garages* in accordance with [Section 406.5](#).
3. Buildings with an occupancy in Group A-5 in accordance with [Section 303.1](#).
4. Low-hazard special occupancies in accordance with [Section 503.1.1](#).
5. Buildings with an occupancy in Group H-1, H-2 or H-3 in accordance with [Section 415](#).
6. In Group I-1 and I-2 occupancies, the alarm shall sound at a *constantly attended location* and occupant notification shall be broadcast by the emergency voice/alarm communication system.

[F] 907.2.13.1 Automatic smoke detection.

Automatic smoke detection in high-rise buildings shall be in accordance with [Sections 907.2.13.1.1](#) and [907.2.13.1.2](#).

[F] 907.2.13.1.1 Area smoke detection.

Area smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall activate the emergency voice/alarm communication system in accordance with [Section 907.5.2.2](#). In addition to smoke detectors required by [Sections 907.2.1](#) through [907.2.9](#), smoke detectors shall be located as follows:

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room that is not provided with sprinkler protection.
2. In each elevator machine room, machinery space, control room and control space and in elevator lobbies.

[F] 907.2.13.1.2 Duct smoke detection.

Duct smoke detectors complying with [Section 907.3.1](#) shall be located as follows:

1. In the main return air and exhaust air plenum of each air-conditioning system having a capacity greater than 2,000 cubic feet per minute (cfm) (0.94 m³/s). Such detectors shall be located in a serviceable area downstream of the last duct inlet.
2. At each connection to a vertical duct or riser serving two or more stories from a return air duct or plenum of an air-conditioning system. In Group R-1 and R-2 occupancies, a smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm (2.4 m³/s) and serving not more than 10 air-inlet openings.

[F] 907.2.13.2 Fire department communication system.

Where a wired communication system is *approved* in lieu of an *in-building two-way* emergency responder *communication* coverage system in accordance with [Section 510](#) of the *International Fire Code*, the wired fire department communication system shall be designed and installed in accordance with [NFPA 72](#) and shall operate between a fire command center complying with [Section 911](#), elevators, elevator lobbies, emergency and standby power rooms, fire pump rooms, *areas of refuge* and inside *interior exit stairways*. The fire department communication device shall be provided at each floor level within the *interior exit stairway*.

[F] 907.2.13.3 Multiple-channel voice evacuation.

In buildings with an occupied floor more than 120 feet (36 576 mm) above the lowest level of fire department vehicle access, voice evacuation systems for high-rise buildings shall be multiple-channel systems.

[F] 907.2.14 Atriums connecting more than two stories.

A fire alarm system shall be installed in occupancies with an *atrium* that connects more than two *stories*, with smoke detection installed in locations required by a rational analysis in [Section 909.4](#) and in accordance with the system operation requirements in [Section 909.17](#). The system shall be activated in accordance with [Section 907.5](#). Such occupancies in Group A, E or M shall be provided with an emergency voice/alarm communication system complying with the requirements of [Section 907.5.2.2](#).

[F] 907.2.15 High-piled combustible storage areas.

An automatic smoke detection system shall be installed throughout high-piled combustible storage areas where required by [Section 3206.5](#) of the *International Fire Code*.

[F] 907.2.16 Aerosol storage uses.

Aerosol product rooms and general-purpose warehouses containing aerosol products shall be provided with an *approved* manual fire alarm system where required by the [International Fire Code](#).

[F] 907.2.17 Lumber, wood structural panel and veneer mills.

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Lumber, wood structural panel and veneer mills shall be provided with a manual fire alarm system.

[F] 907.2.18 Underground buildings with smoke control systems.

Where a smoke control system is installed in an underground building in accordance with this code, automatic smoke detectors shall be provided in accordance with [Section 907.2.18.1](#).

[F] 907.2.18.1 Smoke detectors.

Not fewer than one smoke detector *listed* for the intended purpose shall be installed in all of the following areas:

1. Mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar rooms.
2. Elevator lobbies.
3. The main return and exhaust air plenum of each air-conditioning system serving more than one story and located in a serviceable area downstream of the last duct inlet.
4. Each connection to a vertical duct or riser serving two or more floors from return air ducts or plenums of heating, ventilating and air-conditioning systems, except that in Group R occupancies, a *listed* smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cubic feet per minute (2.4 m³/s) and serving not more than 10 air-inlet openings.

[F] 907.2.18.2 Alarm required.

Activation of the smoke control system shall activate an audible alarm at a *constantly attended location*.

[F] 907.2.19 Deep underground buildings.

Where the lowest level of a structure is more than 60 feet (18 288 mm) below the finished floor of the lowest *level of exit discharge*, the structure shall be equipped throughout with a manual fire alarm system, including an emergency voice/alarm communication system installed in accordance with [Section 907.5.2.2](#).

[F] 907.2.20 Covered and open mall buildings.

Where the total floor area exceeds 50,000 square feet (4645 m²) within either a *covered mall building* or within the perimeter line of an *open mall building*, an emergency voice/alarm communication system shall be provided. Access to emergency voice/alarm communication systems serving a mall, required or otherwise, shall be provided for the fire department. The system shall be provided in accordance with [Section 907.5.2.2](#).

[F] 907.2.21 Residential aircraft hangars.

Not fewer than one single-station smoke alarm shall be installed within a *residential aircraft hangar* as defined in [Chapter 2](#) and shall be interconnected into the residential smoke alarm or other sounding device to provide an alarm that will be audible in all sleeping areas of the *dwelling*.

[F] 907.2.22 Airport traffic control towers.

An automatic smoke detection system that activates the occupant notification system in accordance with [Section 907.5](#) shall be provided in airport control towers in accordance with [Sections 907.2.22.1](#) and [907.2.22.2](#).

Exception: Audible appliances shall not be installed within the control tower cab.

[F] 907.2.22.1 Airport traffic control towers with multiple exits and automatic sprinklers.

Airport traffic control towers with multiple *exits* and equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#) shall be provided with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Outside each opening into *interior exit stairways*.
5. Along the single *means of egress* permitted from observation levels.
6. Outside each opening into the single *means of egress* permitted from observation levels.

[F] 907.2.22.2 Other airport traffic control towers.

Airport traffic control towers with a single exit or where sprinklers are not installed throughout shall be provided with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical and mechanical equipment rooms.
3. Airport terminal radar and electronics rooms.
4. Office spaces incidental to the tower operation.
5. Lounges for employees, including sanitary facilities.
6. *Means of egress*.
7. Utility *shafts* where access to smoke detectors can be provided.

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[F] 907.2.23 Energy storage systems.

An automatic smoke detection system or radiant-energy detection system shall be installed in rooms, areas and walk-in units containing energy storage systems as required in Section 1207.5.4 of the *International Fire Code*.

[F] 907.3 Fire safety functions.

Automatic fire detectors utilized for the purpose of performing fire safety functions shall be connected to the building's fire alarm control unit where a fire alarm system is required by Section 907.2. Detectors shall, upon actuation, perform the intended function and activate the alarm notification appliances or activate a visible and audible supervisory signal at a *constantly attended location*. In buildings not equipped with a fire alarm system, the automatic fire detector shall be powered by normal electrical service and, upon actuation, perform the intended function. The detectors shall be located in accordance with NFPA 72.

[F] 907.3.1 Duct smoke detectors.

Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct smoke detectors shall be connected to the building's fire alarm control unit where a fire alarm system is required by Section 907.2. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a *constantly attended location* and shall perform the intended fire safety function in accordance with this code and the *International Mechanical Code*. In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal and not as a fire alarm. They shall not be used as a substitute for required open area detection.

Exceptions:

1. The supervisory signal at a *constantly attended location* is not required where duct smoke detectors activate the building's alarm notification appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and an audible signal in an *approved* location. Smoke detector trouble conditions shall activate a visible or audible signal in an *approved* location and shall be identified as air duct detector trouble.

907.3.2 Special locking systems.

Where special locking systems are installed on means of egress doors in accordance with Section 407.4.1.1 or 1010.1.9.8, an automatic detection system shall be installed as required by that section.

[F] 907.3.3 Elevator emergency operation.

Automatic fire detectors installed for elevator emergency operation shall be installed in accordance with the provisions of ASME A17.1/CSA B44 and NFPA 72.

[F] 907.3.4 Wiring.

The wiring to the auxiliary devices and equipment used to accomplish the fire safety functions shall be monitored for integrity in accordance with NFPA 72.

[F] 907.4 Initiating devices.

Where a fire alarm system is required by another section of this code, occupant notification in accordance with Section 907.5 shall be initiated by one or more of the following. Initiating devices shall be installed in accordance with Sections 907.4.1 through 907.4.3.1.

1. Manual fire alarm boxes.
2. Automatic fire detectors.
3. Automatic sprinkler system waterflow devices.
4. Automatic fire-extinguishing systems.

[F] 907.4.1 Protection of fire alarm control unit.

In areas that are not continuously occupied, a single smoke detector shall be provided at the location of each fire alarm control unit, notification appliance circuit power extenders, and supervising station transmitting equipment.

Exception: Where ambient conditions prohibit installation of a smoke detector, a heat detector shall be permitted.

[F] 907.4.2 Manual fire alarm boxes.

Where a manual fire alarm system is required by another section of this code, it shall be activated by fire alarm boxes installed in accordance with Sections 907.4.2.1 through 907.4.2.6.

[F] 907.4.2.1 Location.

Manual fire alarm boxes shall be located not more than 5 feet (1524 mm) from the entrance to each exit. In buildings not protected by an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, additional manual fire alarm boxes shall be located so that the distance of travel to the nearest box does not exceed 200 feet (60 960 mm).

[F] 907.4.2.2 Height.

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The height of the manual fire alarm boxes shall be not less than 42 inches (1067 mm) and not more than 48 inches (1372 mm) measured vertically, from the floor level to the activating handle or lever of the box.

[F] 907.4.2.3 Color.

Manual fire alarm boxes shall be red in color.

[F] 907.4.2.4 Signs.

Where fire alarm systems are not monitored by an *approved* supervising station in accordance with Section 907.6.6, an *approved* permanent sign shall be installed adjacent to each manual fire alarm box that reads: WHEN ALARM SOUNDS CALL FIRE DEPARTMENT.

Exception: Where the manufacturer has permanently provided this information on the manual fire alarm box.

[F] 907.4.2.5 Protective covers.

The fire code official is authorized to require the installation of listed manual fire alarm box protective covers to prevent malicious false alarms or to provide the manual fire alarm box with protection from physical damage. The protective cover shall be transparent or red in color with a transparent face to permit visibility of the manual fire alarm box. Each cover shall include proper operating instructions. A protective cover that emits a local *alarm signal* shall not be installed unless *approved*. Protective covers shall not project more than that permitted by Section 1003.3.3.

[F] 907.4.2.6 Unobstructed and unobscured.

Manual fire alarm boxes shall be provided with ready access, unobstructed, unobscured and visible at all times.

[F] 907.4.3 Automatic smoke detection.

Where an automatic smoke detection system is required, it shall utilize smoke detectors unless ambient conditions prohibit such an installation. In spaces where smoke detectors cannot be utilized due to ambient conditions, *approved* automatic *heat detectors* shall be permitted.

[F] 907.4.3.1 Automatic sprinkler system.

For conditions other than specific fire safety functions noted in Section 907.3, in areas where ambient conditions prohibit the installation of smoke detectors, an *automatic sprinkler system* installed in such areas in accordance with Section 903.3.1.1 or 903.3.1.2 and that is connected to the fire alarm system shall be *approved* as automatic heat detection.

[F] 907.5 Occupant notification.

Occupant notification by fire alarms shall be in accordance with Sections 907.5.1 through 907.5.2.3.3. Occupant notification by smoke alarms in Group R-1 and R-2 occupancies shall comply with Section 907.5.2.1.3.2.

907.5.1 Alarm activation and annunciation.

Upon activation, fire alarm systems shall initiate occupant notification and shall annunciate at the fire alarm control unit, or where allowed elsewhere by Section 907, at a *constantly attended location*.

907.5.1.1 Presignal feature.

A presignal feature shall be *provided only where approved*. The presignal shall be annunciated at an *approved, constantly attended location, having the capability to activate the occupant notification system* in the event of fire or other emergency.

[F] 907.5.2 Alarm notification appliances.

Alarm notification appliances shall be provided and shall be *listed* for their purpose.

[F] 907.5.2.1 Audible alarms.

Audible alarm notification appliances shall be provided and emit a distinctive sound that is not to be used for any purpose other than that of a fire alarm.

Exceptions:

1. Audible alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A visible *alarm notification appliance* installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of audible alarm notification appliances throughout a suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
3. Where provided, audible notification appliances located in each enclosed occupant evacuation elevator lobby in accordance with Section 3008.9.1 shall be connected to a separate notification zone for manual paging only.

[F] 907.5.2.1.1 Average sound pressure.

The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (dBA) above the average

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ambient sound level or 5 dBA above the maximum sound level having a duration of not less than 60 seconds, whichever is greater, in every *occupiable space* within the building.

Exception: Sound pressure levels in Group I-3 occupancies shall be permitted to be limited to only the notification of occupants in the affected smoke compartment.

[F] 907.5.2.1.2 Maximum sound pressure.

The **total** sound pressure level **produced by combining the ambient sound pressure level with all audible** notification appliances **operating** shall **not exceed** 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than 105 dBA, visible alarm notification appliances shall be provided in accordance with **NFPA 72** and audible alarm notification appliances shall not be required.

[F] 907.5.2.1.3 Audible signal frequency in Group R-1 and R-2 sleeping rooms.

Audible signal frequency in Group R-1 and R-2 occupancies shall be in accordance with **Sections 907.5.2.1.3.1 and 907.5.2.1.3.2.**

[F] 907.5.2.1.3.1 Fire alarm system signal.

In sleeping rooms of Group R-1 and R-2 occupancies, the audible alarm activated by a fire alarm system shall be a 520-Hz low-frequency signal complying with **NFPA 72.**

[F] 907.5.2.1.3.2 Smoke alarm signal in sleeping rooms.

In sleeping rooms of Group R-1 and R-2 occupancies that are required by **Section 907.2.8 or 907.2.9** to have a fire alarm system, the audible *alarm signal* activated by single- or multiple-station smoke alarms in the *dwelling unit or sleeping unit* shall be a 520-Hz signal complying with **NFPA 72.** Where a sleeping room smoke alarm is unable to produce a 520-Hz signal, the 520-Hz *alarm signal* shall be provided by a *listed* notification appliance or a smoke detector with an integral 520-Hz sounder.

[F] 907.5.2.2 Emergency voice/alarm communication systems.

Emergency voice/alarm communication systems required by this code shall be designed and installed in accordance with **NFPA 72.** The operation of any automatic fire detector, sprinkler waterflow device or manual fire alarm box shall automatically sound an alert tone followed by voice instructions giving *approved* information and directions for a general or staged evacuation in accordance with the building's fire safety and evacuation plans required by **Section 404** of the *International Fire Code.* In high-rise buildings, the system shall operate on at least the alarming floor, the floor above and the floor below. Speakers shall be provided throughout the building by paging zones. At a minimum, paging zones shall be provided as follows:

1. Elevator groups.
2. *Interior exit stairways.*
3. Each floor.
4. *Areas of refuge* as defined in **Chapter 2.**

Exception: In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

[F] 907.5.2.2.1 Manual override.

A manual override for emergency voice communication shall be provided on a selective and all-call basis for all paging zones.

[F] 907.5.2.2.2 Live voice messages.

The emergency voice/alarm communication system shall have the capability to broadcast live voice messages by paging zones on a selective and all-call basis.

[F] 907.5.2.2.3 Alternative uses.

The emergency voice/alarm communication system shall be allowed to be used for other announcements, provided that the manual fire alarm use takes precedence over any other use.

[F] 907.5.2.2.4 Emergency voice/alarm communication captions.

Where stadiums, arenas and *grandstands* have 15,000 fixed seats or more and provide audible public announcements, the emergency/voice alarm communication system shall provide prerecorded or real-time captions. Prerecorded or live emergency captions shall be from an *approved* location constantly attended by personnel trained to respond to an emergency.

[F] 907.5.2.2.5 Standby power.

Emergency voice/alarm communications systems shall be provided with **standby** power in accordance with **Section 2702.**

[F] 907.5.2.3 Visible alarms.

Visible alarm notification appliances shall be provided in accordance with **Sections 907.5.2.3.1 through 907.5.2.3.3.**

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Exceptions:

1. Deleted.
2. Visible alarm notification appliances shall not be required in exits as defined in Chapter 2.
3. Visible alarm notification appliances shall not be required in elevator cars.
4. Visual alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
5. A visible alarm notification appliance installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of visible alarm notification appliances throughout the suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.

[F] 907.5.2.3.1 Public use areas and common use areas.

Visible alarm notification appliances shall be provided in public use areas and common use areas.

Exception: Where employee work areas have audible alarm coverage, the notification appliance circuits serving the employee work areas shall be initially designed with not less than 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing-impaired employee(s).

[F] 907.5.2.3.2 Groups I-1 and R-1.

Habitable spaces in dwelling units and sleeping units in Group I-1 and R-1 occupancies in accordance with Table 907.5.2.3.2 shall be provided with visible alarm notification. Visible alarms shall be activated by the in-room smoke alarm and the building fire alarm system.

**[F] TABLE 907.5.2.3.2
VISIBLE ALARMS**

NUMBER OF SLEEPING UNITS OR DWELLING UNITS	SLEEPING ACCOMMODATIONS WITH VISIBLE ALARMS
6 to 25	2
26 to 50	4
51 to 75	7
76 to 100	9
101 to 150	12
151 to 200	14
201 to 300	17
301 to 400	20
401 to 500	22
501 to 1,000	5% of total
1,001 and over	50 plus 3 for each 100 over 1,000

[F] 907.5.2.3.3 Group R-2.

In Group R-2 occupancies required by Section 907 to have a fire alarm system, each story that contains dwelling units and sleeping units shall be provided with the capability to support future visible alarm notification appliances in accordance with Chapter 11 of ICC A117.1. Such capability shall accommodate wired or wireless equipment.

[F] 907.5.2.3.3.1 Wired equipment.

Where wired equipment is used to comply with the future capability required by Section 907.5.2.3.3, the system shall include one of the following capabilities:

1. The replacement of audible appliances with combination audible/visible appliances or additional visible notification appliances.
2. The future extension of the existing wiring from the unit smoke alarm locations to required locations for visible appliances.
3. For wired equipment, the fire alarm power supply and circuits shall have not less than 5-percent excess capacity to accommodate the future addition of visible alarm notification appliances, and a single access point to such circuits shall be available on every story. Such circuits shall not be required to be extended beyond a single access point on a story. The fire alarm system shop drawings required by Section 907.1.2 shall include the power supply and circuit documentation to accommodate the future addition of visible notification appliances.

[F] 907.6 Installation and monitoring.

A fire alarm system shall be installed and monitored in accordance with Sections 907.6.1 through 907.6.6.3 and NFPA 72.

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[F] 907.6.1 Wiring.

Wiring shall comply with the requirements of [NFPA 70](#) and [NFPA 72](#). Wireless protection systems utilizing radio-frequency transmitting devices shall comply with the special requirements for supervision of low-power wireless systems in [NFPA 72](#).

[F] 907.6.2 Power supply.

The primary and secondary power supply for the fire alarm system shall be provided in accordance with [NFPA 72](#).

Exception: Back-up power for single-station and multiple-station smoke alarms as required in [Section 907.2.11.6](#).

[F] 907.6.3 Initiating device identification.

The fire alarm system shall identify the specific *initiating device* address, location, device type, floor level where applicable and status including indication of normal, alarm, trouble and supervisory status, as appropriate.

Exceptions:

1. Fire alarm systems in single-story buildings less than 22,500 square feet (2090 m²) in area.
2. Fire alarm systems that only include manual fire alarm boxes, waterflow initiating devices and not more than 10 additional alarm-initiating devices.
3. Special initiating devices that do not support individual device identification.
4. Fire alarm systems or devices that are replacing existing equipment.

[F] 907.6.3.1 Annunciation.

The *initiating device* status shall be annunciated at an *approved* on-site location.

[F] 907.6.4 Zones.

Each floor shall be zoned separately and a zone shall not exceed 22,500 square feet (2090 m²). The length of any zone shall not exceed 300 feet (91 440 mm) in any direction.

Exception: *Automatic sprinkler system* zones shall not exceed the area permitted by [NFPA 13](#).

[F] 907.6.4.1 Zoning indicator panel.

A zoning indicator panel and the associated controls shall be provided in an *approved* location. The visual zone indication shall lock in until the system is reset and shall not be canceled by the operation of an audible-alarm silencing switch.

[F] 907.6.4.2 High-rise buildings.

In high-rise buildings, a separate zone by floor shall be provided for each of the following types of alarm-initiating devices where provided:

1. Smoke detectors.
2. Sprinkler waterflow devices.
3. Manual fire alarm boxes.
4. Other *approved* types of automatic fire *protection* systems.

[F] 907.6.5 Access.

Access shall be provided to each fire alarm device and notification appliance for periodic inspection, maintenance and testing.

[F] 907.6.6 Monitoring.

Fire alarm systems required by this chapter or by the [International Fire Code](#) shall be monitored by an *approved* supervising station in accordance with [NFPA 72](#).

Exception: Monitoring by a supervising station is not required for:

1. Single- and multiple-station smoke alarms required by [Section 907.2.11](#).
2. Smoke detectors in Group I-3 occupancies.
3. *Automatic sprinkler systems* in one- and two-family dwellings.

[F] 907.6.6.1 Transmission of alarm signals.

Transmission of alarm signals to a supervising station shall be in accordance with [NFPA 72](#).

[F] 907.6.6.2 MIY Monitoring.

Direct transmission of alarms associated with monitor it yourself (MIY) transmitters to a public safety answering point (PSAP) shall not be permitted unless *approved* by the *fire code official*.

[F] 907.6.6.3 Termination of monitoring service.

Termination of fire alarm monitoring services shall be in accordance with [Section 901.9](#) of the *International Fire Code*.

[F] 907.7 Acceptance tests and completion.

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Upon completion of the installation, the fire alarm system and all fire alarm components shall be tested in accordance with [NFPA 72](#).

[F] 907.7.1 Single- and multiple-station alarm devices.

When the installation of the alarm devices is complete, each device and interconnecting wiring for multiple-station alarm devices shall be tested in accordance with the smoke alarm provisions of [NFPA 72](#).

[F] 907.7.2 Record of completion.

A record of completion in accordance with [NFPA 72](#) verifying that the system has been installed and tested in accordance with the *approved* plans and specifications shall be provided.

[F] 907.7.3 Instructions.

Operating, testing and maintenance instructions and *record drawings* ("as-builts") and equipment specifications shall be provided at an *approved* location.

[F] 907.8 Inspection, testing and maintenance.

The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with [Section 907.8](#) of the *International Fire Code*.