



**ABOUT CODE CORNER**

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*Your local codes or ordinances may vary.*

**Code Corner**  
**SECTION 907**  
**FIRE ALARM AND DETECTION SYSTEMS**  
**PART I**

**907.1 General.** This section covers the application, installation, performance and maintenance of fire alarm systems and their components in new and existing buildings and structures. The requirements of Section 907.2 are applicable to new buildings and structures. The requirements of Section 907.9 are applicable to existing buildings and structures.

- *Fire alarm systems, which typically include manual fire alarm systems and automatic fire detection systems, must be installed in accordance with Section 907 and NFPA 72. As indicated in this section, only Section 907.9 is intended to be applicable to existing buildings and structures.*

*Manual fire alarm systems are installed in buildings to limit fire casualties and property losses. Fire alarm systems do this by promptly notifying the occupants of the building of an*

*emergency, which increases the time available for evacuation. Similarly, when fire alarm systems are supervised, the fire department will be promptly notified and its response time relative to the onset of the fire will be reduced.*

*Automatic fire detection systems are required under certain conditions to increase the likelihood that a fire is detected and occupants are given an early warning. The detection system is a system of devices and associated hardware that activates the alarm system. The automatic detecting devices are to be smoke detectors, unless a condition exists that calls for the use of a different type of detector.*

**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 Building Code, and relevant laws, ordinances, rules and regulations, as determined by the fire code official.

- *Construction documents for fire alarm systems must be submitted for review to determine compliance with the code, the IBC and NFPA 72. All of the information required by this section may not be available during the design stage and initial permit process. Later submission of more detailed shop drawings may be required in accordance with Section 907.1.2. These provisions are intended to reflect the minimum scope of information needed to determine code compliance. When the work can be briefly described on the application form, the fire code official may utilize judgment in determining the need for more detailed documents.*

**907.1.2 Fire alarm shop**

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*About the 2012 Edition ... The Center will be publishing sections of the 2012 IFC for your review and comparison. Please note that CCFS is not suggesting you adopt this new regulation. Any regulations used in your state/organization should be in accordance with the recommendations set forth by your local Building Regulations Organization and State Fire Marshal's Office.*

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**drawings.** Shop drawings for fire alarm systems shall be submitted for review and approval prior to system installation, and shall include, but not be limited to, all of the following:

1. A floor plan that indicates the use of all rooms.
2. Locations of alarm-initiating devices.
3. Locations of alarm notification appliances, including candela ratings for visible alarm notification appliances.
4. Location of fire alarm control unit, transponders and notification power supplies.
5. Annunciators.
6. Power connection.
7. Battery calculations.
8. Conductor type and sizes.
9. Voltage drop calculations.
10. Manufacturers' data sheets indicating model numbers and listing information for equipment, devices and materials.
11. Details of ceiling height and construction.
12. The interface of fire

safety control functions.

13. Classification of the supervising station.

□ *Since the fire protection contractor(s) may not have been selected at the time a permit is issued for construction of a building, detailed shop drawings for fire alarm systems may not be available. Because they provide the information necessary to determine code compliance, as specified in this section, they must be submitted and approved by the fire code official before the contractor can begin installing the system.*

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

□ *The components of the fire alarm system must be approved for use in the planned system. NFPA 72 requires all devices, combinations of devices, appliances and equipment to be labeled for their proposed use. The testing agency will test the components for*

*use in various types of systems and stipulate the use of the component on the label. Evidence of listing and labeling of the system components must be submitted with the shop drawings. In some instances, the entire system may be labeled.*

*At least one major testing agency, Underwriters Laboratories, Inc. (UL), has a program in which alarm installation and service companies are issued a certificate and become listed by the agency as being qualified to design, install and maintain local, auxiliary, remote station or proprietary fire alarm systems. The listed companies may then issue a certificate showing that the system is in compliance with Section 907. Terms of the company certification by UL include the company being responsible for keeping accurate system documentation, including as-built record drawings, acceptance test records and complete maintenance records on a given system. The company is also responsible for the required periodic inspection and testing of the system under contract with the owner. A similar program*

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*has been available for many years for central station alarm service, whereas the UL program is relatively new to the industry. Even though this company and system listing program is not required by the code or NFPA 72, it can be a valuable tool for the fire code official in determining compliance with the referenced standard.*

*Another issue that must be considered is the compatibility of the system components as required by NFPA 72. The labeling of system components discussed above should include any compatibility restrictions for components. Compatibility is primarily an issue of the ability of smoke detectors and fire alarm control panels (FACPs) to function properly when interconnected and affects the two-wire type of smoke detectors, which obtain their operating power over the same pair of wires used to transmit signals to the FACP (the control unit initiating device circuits). Laboratories will test for component compatibility either by actual testing or by reviewing the circuit parameters of both the detector and*

*the FACP. Generally, if both the two-wire detector and the FACP are of the same brand, there should not be a compatibility problem. Nevertheless, the fire code official must be satisfied that the components are listed as being compatible. Failure to comply with the compatibility requirements of NFPA 72 can lead to system malfunction or failure when it may be needed the most.*

**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.

A minimum of 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 water-flow 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 accessible to the public.

▫ *This section specifies the occupancies or conditions in new buildings or structures that require some form of fire alarm system. The fire alarm system is either a manual fire alarm system (manual fire alarm boxes) or an automatic smoke detection system. These systems must, upon activation, provide occupant notification*

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*throughout the area protected by the system unless other alternative provisions are allowed by this section.*

*Manual fire alarm systems must be installed in certain occupancies depending on the number of occupants, capabilities of the occupants and height of the building. An automatic smoke detection system must be installed in those occupancies and conditions where the need to detect the fire is essential to evacuation or protection of the occupants. The requirements for automatic smoke detection are generally based on the evacuation needs of the occupants and whether the occupancy includes sleeping accommodations.*

*Fire alarm systems must be installed in accordance with the code and NFPA 72. NFPA 72 identifies the minimum performance, location, mounting, testing and maintenance requirements for fire alarm systems. Smoke detectors must be used, except when ambient conditions would prohibit their use. In that case other detec-*

*tion methods may be used. The manufacturer's literature will identify the limitations on the use of smoke detectors, including environmental conditions such as humidity, temperature and airflow.*

*Only certain occupancies are required to have either a manual fire alarm or automatic fire detection system installed (see Figure 907.2). The need for either system is generally determined by the number of occupants, the height of the building or the ability of the occupants for self-preservation.*

*Note that generally the fire alarm requirements are based upon occupancy and not on fire area. Figure 907.2 contains the conditions that require when either system must be installed in a building. The extent that an alarm system must be installed in a building once it has been determined that such a system is required is based on several factors. One, if it is the only occupancy in the building, then it would be required throughout the building. Two, if the*

*building is a mixed occupancy, it can either be separated or nonseparated. If the occupancy is separated in accordance with Section 508.4 of the IBC, then the alarm system is only required within that separated portion of the building. If the building is considered a nonseparated, mixed occupancy building, then Section 508.3.1 of the IBC states that the code apply to each portion of the building based upon the occupancy classification of that space and the most restrictive provisions of Chapter 9 shall apply to the building or portion thereof in which the nonseparated occupancies are located. Therefore, if you had a Group A occupancy in a nonseparated mixed occupancy (containing other occupancies such as Group B and M) where the Group A occupancy exceeds an occupant load of 300, then the entire nonseparated mixed occupancy would require the alarm system. Note that Section 508.3.1 focuses on each space to determine occupancy and requirements. Once the occupant load is determined, then any requirements, such as fire alarms, would be required*

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throughout.

The code does not address whether or not a nonseparated mixed occupancy has a completely independent means of egress such as in a strip mall. Additionally, in a building containing primarily Group A occupancies, the code does not clearly address whether such occupancies within a building should be looked at as an aggregate or individual space. This issue has been clarified in the 2012 edition of the code through the use of the fire area concept for Group A occupancies, but only for the basic manual fire alarm requirements in Section 907.2.1. The emergency voice/ alarm communication requirements in Section 907.2.1.1 still simply provide a criteria of 1000 or more occupants in a Group A occupancy. A building with multiple Group A occupancies without using the concept of separation of egress paths would need to be reviewed in aggregate. Fire area separation could not be used to provide separation of occupancies in this case.

Figure 907.2 (next page) contains the threshold requirements for when a manual fire alarm system or an automatic fire detection system is required based on the occupancy group. It is important to remember that although the requirement for manual pull stations may not apply (e.g., sprinklered buildings), alarm and occupant notification may still be required. Sections 907.2.11 through 907.2.23 contain additional requirements for fire alarm systems depending on special occupancy conditions such as atriums, high-rise buildings or covered mall buildings.

The single manual fire alarm box required by this section is needed to provide a means of manually activating a fire alarm system that only contains automatic devices such as sprinkler waterflow switches or smoke detectors. Its primary use is for alarm system maintenance technicians to be able to manually activate the fire alarm system in the event of a fire during the time the system or portions of the system is down for maintenance.

Note that this requirement is not subject to any of the exceptions in Sections 907.2.1 through 907.2.23 that might waive the need for manual fire alarm boxes in certain buildings.

Exception 1 recognizes the specialized nature of fire alarm systems installed only for emergency elevator control and supervision.

Exception 2 waives the single manual fire alarm box but gives the fire code official authority to require it in sprinklered buildings for use by fire watch personnel or sprinkler maintenance personnel to be able to manually activate the fire alarm system in the event of a fire during the time the sprinkler system is down for maintenance.

**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. Group A occupancies not separated from

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one another in accordance with Section 707.3.9 of the International Building Code 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 re-

quired 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.

□ *Group A occupancies are typically occupied by a significant number of people who are not com-*

MANUAL FIRE ALARM SYSTEM	
Occupancy Group(s)	Threshold
Assembly (A-1, A-2, A-3, A-4, A-5)	All with an occupant load of > 300 (907.2.1)
Business (B)	Total occupant load of > 500; or, > 100 above/below level of exit discharge; or, in Group B fire areas containing an ambulatory care facility (907.2.2)
Educational (E)	> 50 occupants (several exceptions for manual fire alarm box placement) (907.2.3)
Factory (F-1, F-2)	> 2 stories with occupant load of > 500 above/below lowest level of exit discharge (exception for sprinklers) (907.2.4)
High hazard (H)	Group H-5 and in occupancies for manufacture of organic coatings. (907.2.5)
Institutional (I-1, I-2, I-3, I-4)	All (exceptions for I-1 and I-2 manual fire alarm box placement and private mode signaling) (907.2.6)
Mercantile (M)	Total occupant load of > 500; or, occupant load of >100 above/below level of exit discharge (907.2.7)
Hotels (R-1)	All (exceptions for < 2 stories with sleeping units having exit directly to exterior; sprinklers) (907.2.8.1)
Multi-family (R-2)	If units > 3 stories above lowest level of exit discharge; or, > 1 story below highest level of exit discharge; or, > 16 units (exceptions for < 2 stories with sleeping units having exit directly to exterior; sprinklers) (907.2.9.1)
Residential care/assisted living (R-4)	All (exceptions for sprinklers, manual fire alarm boxes at staff locations, direct exit to exterior, less than 2 story) (907.2.10.1)
AUTOMATIC SMOKE DETECTION SYSTEM	
Business (B) Ambulatory care facilities	Facility plus public use areas outside of it including public corridors and elevator lobbies (exception for sprinklers) (907.2.2.1)
High hazard (H)	Highly toxic gases, organic peroxides, oxidizers (907.2.5)
Institutional (I-1, I-2, I-3)	All, in specific areas by occupancy (907.2.6.1, 907.2.6.2, 907.2.6.3.3)
Hotels (R-1)	All, in interior corridors (exception for buildings without interior corridors and with sleeping units having exit directly to exterior) (907.2.8.2)
Residential care/assisted living (R-4)	All, in corridors, waiting areas open to corridors, nonsleeping area habitable spaces and kitchens (exceptions for sprinklers and sleeping units having exit directly to exterior) (907.2.10.2)
College and university buildings (R-2 dormitories)	Common spaces; laundry, mechanical and storage rooms; interior corridors. No interior corridors and each unit has direct exit access or exit.

**Figure 907.2**  
**SUMMARY OF MANUAL FIRE ALARM AND AUTOMATIC SMOKE DETECTION SYSTEM THRESHOLDS**

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pletely familiar with their surroundings. The provisions of this section address three separate situations regarding the application of the alarm requirements for Group A occupancies. The three situations addressed by the provisions are: (1) where an assembly occupancy and another occupancy are involved, (2) where multiple assembly areas exist in a building, and (3) where the assembly use occurs in and is a part of a Group E occupancy.

In situations where an assembly area and another occupancy are involved, the code specifies that it is the occupant load “due to the assembly occupancy” that would need to be 300 or more before the manual alarm system is required. For example, if the building is constructed with an assembly occupancy, such as a restaurant, with an occupant load of 250 and an adjacent office area with an occupant load of 100, the assembly space would not require an alarm system because the occupant load “due to the assembly occupancy” is less than 300. This is really simply a clarification of

the way the provisions were intended to be applied. This would be the intended way to apply the provision whether the building was constructed using the accessory-, separated-, or non-separated- occupancy requirements of Chapter 5.

In buildings that contain multiple assembly areas, the second portion of the code text requires that the aggregate occupant load of the assembly areas is used unless the spaces are separated as required for fire areas in Section 707.3.9 of the IBC. Consider two examples to address this portion of the requirements. In a multi-theater complex, the auditoriums are generally not separated from each other by the 2-hour fire-resistance rating that Table 707.3.9 of the IBC would require; therefore, the aggregate occupant load of all of the assembly spaces would be combined to determine if the occupant load was 300 or more. If it was, then the manual alarm would be required in all of the assembly spaces. As another example, consider a strip mall shopping center with a restaurant at

one end of the building with an occupant load of 200 and a different restaurant with an occupant load of 150 at the other end of the building. Even though these are two completely separate establishments and have an amount of retail occupancy between them, the occupant load of the assembly areas does exceed 300. Therefore, unless a 2-hour fire-resistance-rated separation complying with Section 707.3.9 of the IBC is provided somewhere between the two restaurants to separate them into different fire areas, a manual fire alarm would be required in the Group A occupancies. If a complying separation is provided at some point in the building, then each assembly space can be reviewed independently and would not require the installation of the alarm system. Be aware that the separation of assembly spaces or the need to aggregate the occupant loads from them could occur not only on the same floor within a building but also to assembly uses located on different stories.

The exception allows the omission of manual fire alarm boxes in buildings

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equipped throughout with an automatic sprinkler system if activation of the sprinkler system will activate the building evacuation alarms associated with the manual fire alarm system.

This section also permits assembly-type areas in Group E occupancies to comply with Section 907.2.3 instead of the requirements of this section. A typical high school, for example,

contains many areas used for assembly purposes such as a gymnasium, cafeteria, auditorium or library; however, they all exist to serve as an educational facility as their main function. The exception does not eliminate the fire alarm system and occupant notification system, but rather permits them to be initiated automatically by the sprinkler water-flow switch(es) instead of by the manual fire alarm boxes. It also re-

duces the possibility of mischievous or malicious false alarms being turned on by manual fire alarm boxes in venues where large numbers of people congregate.

Next Month: 907.2.1.1 System initiation in Group A occupancies with an occupant load of 1,000 or more.

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