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2024 IBC Fire Protection and Life Safety Systems Changes

by

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2024 IBC Fire Protection and Life Safety Systems Changes
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Course Outline:

IBC Overview

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Chapter 9 Fire Protection and Life Safety Systems - Contents

Chapter 9 Fire Protection and Life Safety Systems - Changes

Helpful References

Examination



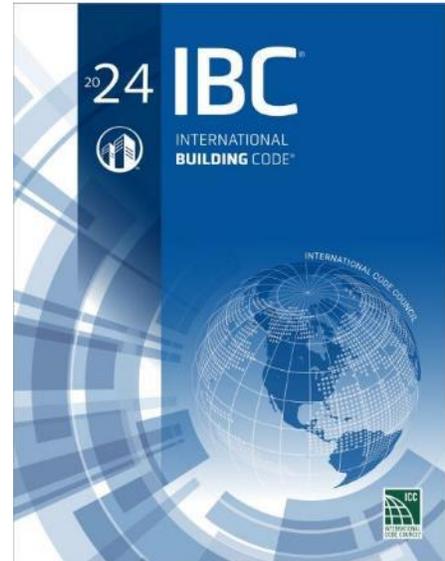
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IBC Overview

The International Building Code (IBC) by the International Code Council (ICC) is a detailed set of regulations that are used to govern construction and design standards. The main objective of the IBC code is to protect public health, welfare, and safety by establishing minimum quality standards for building improvements. The code has a significant focus on the structural and life safety designs of new buildings.

When the IBC was formed in 2000, it was a merging of the following codes which are now discontinued:

- Uniform Building Code (UBC)
- BOCA National Building Code (BOCA/NBC)
- Standard Building Code (SBC)



The IBC is adopted in all 50 states, Canada, and many other countries. Most states adopt the latest IBC with amendments for additional requirements. Often it takes a few years for the latest IBC to be officially adopted by each state.

The IBC is updated every three years (2018, 2021, 2024, 2027, etc.). This course covers the changes between the 2021 to 2024 editions.



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The IBC is part of a larger collection of volumes by the International Code Council (ICC). The full collection of (15) ICC volumes include the following:

- **2024 International Building Code (IBC)**
- 2024 International Residential Code without Energy (IRC)
- 2024 International Fire Code (IFC)
- 2024 International Plumbing Code (IPC)
- 2024 International Mechanical Code (IMC)
- 2024 International Fuel Gas Code (IFGC)
- 2024 International Existing Building Code (IEBC)
- 2024 International Property Maintenance Code (IPMC)
- 2024 International Zoning Code (IZC)
- 2024 International Swimming Pool and Spa Code (ISPSC)
- 2024 International Private Sewage Disposal Code (IPSDC)
- 2024 International Wildland Urban Interface Code (IWUIC)
- 2024 ICC Performance Code for Buildings and Facilities (ICCPC)
- 2024 International Green Construction Code (IgCC)
- 2024 International Energy Conservation Code (IECC)

The International Fire Code (IFC) has many similar requirements to the fire protection requirements in the IBC. The IBC only applies to new buildings while the IFC also covers existing buildings and non-building fire protection applications.

All codes are available online at this ICC website, although a subscription is required to be able to select and copy-paste the code text:

<https://www.iccsafe.org/about/2024-i-code-upd>



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The covers of the (15) IBC volumes/books are shown in Figure 1, with the volume addressed in this course circled in red.



Figure 1: Covers of the full collection of 2024 ICC volumes/books, with the IBC volume addressed in this course circled in red.

Source: <https://codes.iccsafe.org/codes/i-codes/2024-icodes>



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2024 IBC Contents

The following is the 2024 IBC table of contents with the chapter covered by this course in **bold**:

- Overview
- Copyright
- Preface
- Arrangement and Format of the 2021 IBC
- Chapter 1 Scope and Administration
- Chapter 2 Definitions
- Chapter 3 Occupancy Classification and Use
- Chapter 4 Special Detailed Requirements Based on Occupancy and Use
- Chapter 5 General Building Heights and Areas
- Chapter 6 Types of Construction
- Chapter 7 Fire and Smoke Protection Features
- Chapter 8 Interior Finishes
- Chapter 9 Fire Protection and Life Safety Systems**
- Chapter 10 Means of Egress
- Chapter 11 Accessibility
- Chapter 12 Interior Environment
- Chapter 13 Energy Efficiency
- Chapter 14 Exterior Walls
- Chapter 15 Roof Assemblies and Rooftop Structures
- Chapter 16 Structural Design
- Chapter 17 Special Inspections and Tests
- Chapter 18 Soils and Foundations
- Chapter 19 Concrete
- Chapter 20 Aluminum
- Chapter 21 Masonry
- Chapter 22 Steel
- Chapter 23 Wood
- Chapter 24 Glass and Glazing
- Chapter 25 Gypsum Board, Gypsum Panel Products and Plaster
- Chapter 26 Plastic
- Chapter 27 Electrical
- Chapter 28 Mechanical Systems



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- Chapter 29 Plumbing Systems
- Chapter 30 Elevators and Conveying Systems
- Chapter 31 Special Construction
- Chapter 32 Encroachments Into the Public Right-Of-Way
- Chapter 33 Safeguards During Construction
- Chapter 34 Reserved
- Chapter 35 Referenced Standards
 - Appendix A Employee Qualifications
 - Appendix B Board of Appeals
 - Appendix C Group U—Agricultural Buildings
 - Appendix D Fire Districts
 - Appendix E Supplementary Accessibility Requirements
 - Appendix F Rodentproofing
 - Appendix G Flood-Resistant Construction
 - Appendix H Signs
 - Appendix I Patio Covers
 - Appendix J Grading
 - Appendix K Administrative Provisions
 - Appendix L Earthquake Recording Instrumentation
 - Appendix M Tsunami-Generated Flood Hazards
 - Appendix N Replicable Buildings
 - Appendix O Performance-Based Application
- Index



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Chapter 9 Fire Protection and Life Safety Systems - Contents

The contents of Chapter 9 are pasted below, with those in **bold** with changes in 2024.

Chapter 9 Fire Protection and Life Safety Systems

Section 901 General

Section 902 Fire Pump and Riser Room Size

Section 903 Automatic Sprinkler Systems

Section 904 Alternative Automatic Fire-Extinguishing Systems

Section 905 Standpipe Systems

Section 906 Portable Fire Extinguishers

Section 907 Fire Alarm and Detection Systems

Section 908 Emergency Alarm Systems

Section 909 Smoke Control Systems

Section 910 Smoke and Heat Removal

Section 911 Fire Command Center

Section 912 Fire Department Connections

Section 913 Fire Pumps

Section 914 Emergency Responder Safety Features

Section 915 Carbon Monoxide (Co) Detection

Section 916 Gas Detection Systems

Section 917 Mass Notification Systems

Section 918 Emergency Responder Communication Coverage

IBC User Notes

The following text is included at the beginning of Chapter 9:

***About this chapter:** Chapter 9 prescribes the minimum requirements for active fire protection equipment systems to perform the functions of detecting a fire, alerting the occupants or fire department of a fire emergency, mass notification, gas detection, controlling smoke and controlling or extinguishing the fire. Generally, the requirements are based on the occupancy, the height and the area of the building, because these are the factors that most affect firefighting capabilities and the relative hazard of a specific building or portion thereof. This chapter parallels and is substantially duplicated in Chapter 9 of the International Fire Code ®.*



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Chapter 9 Fire Protection and Life Safety Systems - Changes

The following is a paste of all substantive changes to Chapter 9 from 2021 to 2024, with the text changes highlighted **yellow**. Changes not shown include formatting, removing repetitive statements, renumbering, modifying text to match IFC, and adding “automatic” in front of “sprinkler systems”.

903.2 Where required.

2021 IBC:

[F] 903.2 Where required.

Approved *automatic sprinkler systems* in new buildings and structures shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

Exception: Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

2024 IBC:

[F] 903.2 Where required. **P CDP**

Approved *automatic sprinkler systems* in new buildings and structures shall be provided in the locations described in [Sections 903.2.1](#) through [903.2.12](#).

Exception: Spaces or areas in telecommunications *buildings* used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries **not required to have an automatic sprinkler system by Section 1207 of the International Fire Code for energy storage systems** and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with [Section 907.2](#) and are separated from the remainder of the *building* by not less than 1-hour *fire barriers* constructed in accordance with [Section 707](#) or not less than 2-hour *horizontal assemblies* constructed in accordance with [Section 711](#), or both.



Figure 2: A 6 MWh battery storage power station may be exempt from needing an automatic sprinkler system per 2024 IBC 903.2, unless it has lithium-based batteries.

Source: commons.wikimedia.org/wiki/File:Tesvolt_battery_energy_storage_system_Rheineck.jpg, Kecko



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903.2.2 Group B.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 903.2.2 Group B. **CPD**

An automatic sprinkler system shall be provided for Group B occupancies as required in [Sections 903.2.2.1 and 903.2.2.2](#)

Note that Group B (business) occupancies include buildings for office, professional, or service-type transactions, including:

- Airport traffic control towers
- Ambulatory care facilities
- Animal hospitals, kennels, and pounds
- Banks
- Barber and beauty shops
- Car washes
- Civic administration
- Clinic-outpatient
- Dry cleaning and laundries
- Educational occupancies for students above the 12th grade
- Electronic data processing
- Food processing establishments and commercial kitchens
- Laboratories
- Motor vehicle showrooms



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903.2.2.2 Laboratories involving testing, research and development

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 903.2.2.2 Laboratories involving testing, research and development. P

An automatic sprinkler system shall be installed throughout the fire areas utilized for the research and development or testing of lithium-ion or lithium metal batteries.

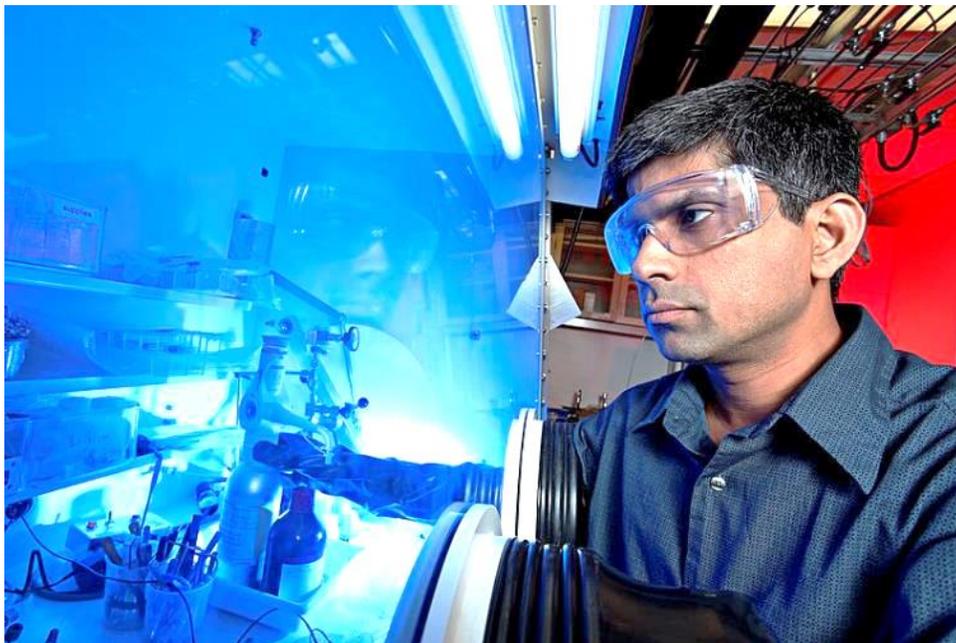


Figure 3: Research lab for making and testing prototype lithium-ion battery cells.
Section 903.2.2.2 required an automatic sprinkler system in this area.

Source: commons.wikimedia.org/wiki/File:Prototype_battery_testing_(5113771331).jpg, Oak Ridge National Laboratory



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903.2.4 Group F-1

2021 IBC:

[F] 903.2.4 Group F-1. P



An *automatic sprinkler system* shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m²).

2024 IBC:

[F] 903.2.4 Group F-1. P CDP

An *automatic sprinkler system* shall be provided throughout all *buildings* containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m²).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m²).
4. A Group F-1 occupancy is used to manufacture lithium-ion or lithium metal batteries.
5. A Group F-1 occupancy is used to manufacture vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries where the batteries are installed as part of the manufacturing process.

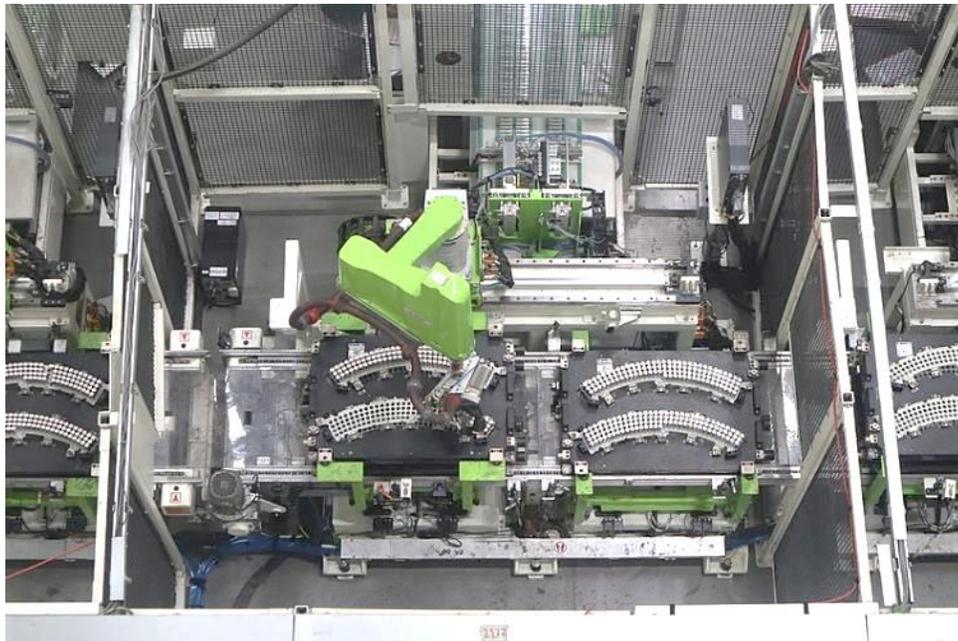


Figure 4: Lithium battery assembly for electric scooters. The cylindrical silver batteries are arranged in arc formations. The room requires an automatic sprinkler system.

Source: commons.wikimedia.org/wiki/File:OLA_Electric_scooter_battery_assembly.jpg, Gnoeee



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903.2.7.3 Lithium-ion or lithium metal battery storage.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 903.2.7.3 Lithium-ion or lithium metal battery storage. P

An automatic sprinkler system shall be provided in a room or space within a Group M occupancy where required for the storage of lithium-ion or lithium metal batteries by [Section 320](#) of the *International Fire Code* or [Chapter 32](#) of the *International Fire Code*.

903.2.9 Group S-1.

2021 IBC:

[F] 903.2.9 Group S-1. P

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 fire area used for the storage of commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).

2024 IBC:

[F] 903.2.9 Group S-1. P

An automatic sprinkler system shall be provided throughout all buildings containing a Group S-1 occupancy where one of the following conditions exists:

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m²).
2. A Group S-1 fire area is located more than three stories above grade plane.
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m²).
4. A Group S-1 fire area used for the storage of commercial motor vehicles where the fire area exceeds 5,000 square feet (464 m²).
5. A Group S-1 fire area used for the storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m²).



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903.2.9.1 Repair garages.

2021 IBC:

[F] 903.2.9.1 Repair garages.

An automatic sprinkler system shall be provided throughout all buildings used as *repair garages* in accordance with [Section 406](#), as shown:

1. Buildings having two or more *stories above grade plane*, including basements, with a *fire area* containing a *repair garage* exceeding 10,000 square feet (929 m²).
2. Buildings not more than one *story above grade plane*, with a *fire area* containing a *repair garage* exceeding 12,000 square feet (1115 m²).
3. Buildings with *repair garages* servicing vehicles parked in basements.
4. A Group S-1 *fire area* used for the repair of commercial motor vehicles where the *fire area* exceeds 5,000 square feet (464 m²).

2024 IBC:

[F] 903.2.9.1 Repair garages. P

An automatic sprinkler system shall be provided throughout all buildings used as *repair garages* in accordance with [Section 406](#), as shown:

1. Buildings having two or more *stories above grade plane*, including basements, with a *fire area* containing a *repair garage* exceeding 10,000 square feet (929 m²).
2. Buildings not more than one *story above grade plane*, with a *fire area* containing a *repair garage* exceeding 12,000 square feet (1115 m²).
3. Buildings with *repair garages* servicing vehicles parked in *basements*.
4. A Group S-1 *fire area* used for the repair of *commercial motor vehicles* where the *fire area* exceeds 5,000 square feet (464 m²).
5. A Group S-1 *fire area* used for the storage of lithium-ion or lithium metal powered vehicles where the *fire area* exceeds 500 square feet (46.4 m²).

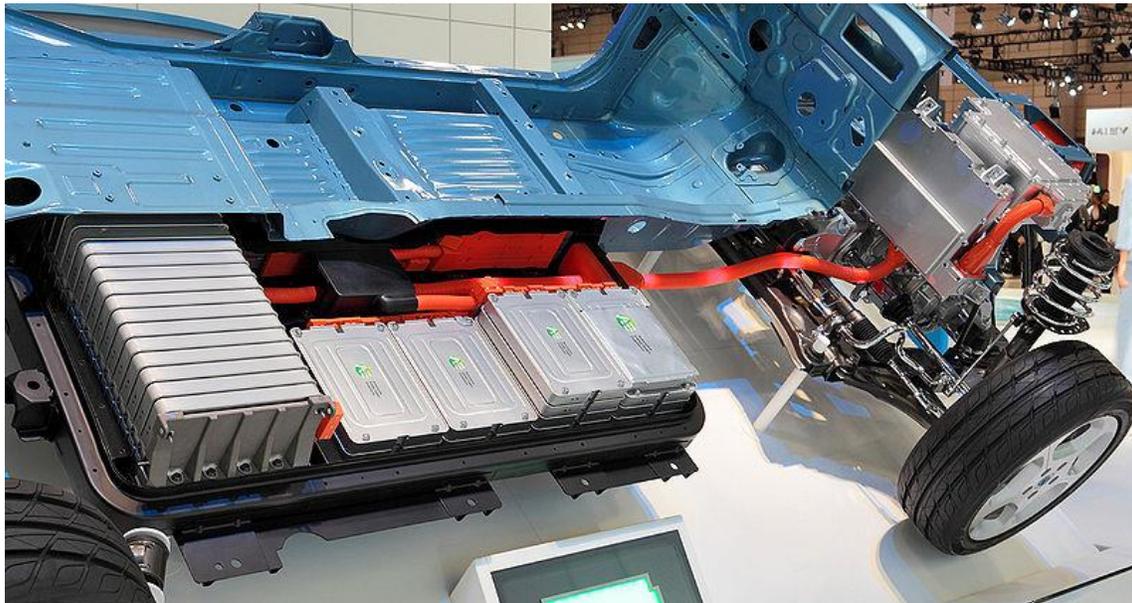


Figure 5: Lithium ion batteries in a Nissan Leaf electric vehicle.

Source: commons.wikimedia.org/wiki/File:Nissan_Leaf_012.JPG, Tennen-Gas, CC-BY-SA-3.0



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903.3.1.1.1 Exempt locations.

2021 IBC:

[F] 903.3.1.1.1 Exempt locations.

Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an *approved* automatic fire detection system in accordance with [Section 907.2](#) that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from a room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment.

1. A room where the application of water, or flame and water, constitutes a serious life or fire hazard.
2. A room or space where sprinklers are considered undesirable because of the nature of the contents, where *approved* by the fire code official.
3. Generator and transformer rooms separated from the remainder of the building by walls and floor/ceiling or roof/ceiling assemblies having a *fire-resistance rating* of not less than 2 hours.
4. Rooms or areas that are of noncombustible construction with wholly noncombustible contents.
5. Fire service access elevator machine rooms and machinery spaces.
6. Machine rooms, machinery spaces, control rooms and control spaces associated with occupant evacuation elevators designed in accordance with [Section 3008](#).

2024 IBC:

[F] 903.3.1.1.1 Exempt locations. **P**

Automatic sprinklers shall not be required in the following rooms or areas where such rooms or areas are protected with an *approved* automatic fire detection system in accordance with [Section 907.2](#) that will respond to visible or invisible particles of combustion. Sprinklers shall not be omitted from a room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment.



1. A room or space where sprinklers **constitute a serious life or fire hazard** because of the nature of the contents, where *approved* by the fire code official.
2. Generator and transformer rooms separated from the remainder of the *building* by walls and floor/ceiling or roof/ceiling assemblies having a *fire-resistance rating* of not less than 2 hours.
3. Rooms or areas that are of noncombustible construction with wholly noncombustible contents.
4. Fire service access elevator machine rooms and machinery spaces.
5. Machine rooms, machinery spaces, control rooms and control spaces associated with occupant evacuation elevators designed in accordance with [Section 3008](#).



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903.3.1.1.3 Lithium-ion or lithium metal batteries.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 903.3.1.1.3 Lithium-ion or lithium metal batteries. P CDP

Where *automatic sprinkler systems* are required by this code for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based on a series of fire tests. Such tests shall be conducted or witnessed and reported by an *approved testing laboratory* involving test scenarios that address the range of variables associated with the intended arrangement of the hazards to be protected.

903.3.1.2 NFPA 13R sprinkler systems.

2021 IBC:

[F] 903.3.1.2 NFPA 13R sprinkler systems. P

Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with [NFPA 13R](#) where the Group R occupancy meets all of the following conditions:

1. Four stories or fewer above *grade plane*.
2. The floor level of the highest *story* is 30 feet (9144 mm) or less above the lowest level of fire department vehicle access.
3. The floor level of the lowest *story* is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access.

The number of stories of Group R occupancies constructed in accordance with [Sections 510.2](#) and [510.4](#) shall be measured from grade plane.

2024 IBC:

[F] 903.3.1.2 NFPA 13R sprinkler systems. P

Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with [NFPA 13R](#) where the Group R occupancy meets all of the following conditions:

1. Four *stories* or fewer above *grade plane*.
2. For other than Group R-2 occupancies, the floor level of the highest *story* is 30 feet (9144 mm) or less above the lowest level of fire department vehicle access.

For Group R-2 occupancies, the roof assembly is less than 45 feet (13 716 mm) above the lowest level of fire department vehicle access. The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the *building* to the eave of the highest pitched roof, the intersection of the highest roof to the *exterior wall*, or the top of the highest parapet, whichever yields the greatest distance.

3. The floor level of the lowest *story* is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access.

The number of *stories* of Group R occupancies constructed in accordance with [Sections 510.2](#) and [510.4](#) shall be measured from grade plane.

Notes:

- **Group R-2 occupancies** contain multiple sleeping units or more than two dwelling units where the occupants are primarily permanent.
- An **NFPA 13** sprinkler system has a dual purpose of property protection and life safety while an **NFPA 13R** sprinkler system has the purpose of providing life safety only, and thus is generally less expensive to install.



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903.4 Sprinkler system supervision and alarms.

2021 IBC:

[F] 903.4 Sprinkler system supervision and alarms.

Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all sprinkler systems shall be electrically supervised by a *listed* fire alarm control unit.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwelling*s.
2. Limited area sprinkler systems in accordance with [Section 903.3.8](#).
3. *Automatic sprinkler systems* installed in accordance with [NFPA 13R](#) where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.
8. Underground key or hub gate valves in roadway boxes.

2024 IBC:

[A] 903.4 Sprinkler system supervision and alarms.

Automatic sprinkler system supervision and alarms shall comply with [Sections 903.4.1 through 903.4.3](#).

[F] 903.4.1 Electronic supervision. CDP

Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all automatic sprinkler systems shall be electrically supervised by a *listed fire alarm control unit*.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwelling*s.
2. Limited area sprinkler systems in accordance with [Section 903.3.8](#), provided that backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position unless supplying an occupancy required to be equipped with a *fire alarm system*, in which case the backflow preventer valves shall be electrically supervised by a tamper switch installed in accordance with [NFPA 72](#) and separately annunciated.
3. *Automatic sprinkler systems* installed in accordance with [NFPA 13R](#) where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.
8. Underground key or hub gate valves in roadway boxes.



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903.4.3 Alarms.

2021 IBC:

[F] 903.4.2 Alarms.

An approved audible device, located on the exterior of the building in an approved location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building fire alarm system.

2024 IBC:

[F] 903.4.3 Alarms. P

An approved audible **and visual sprinkler waterflow alarm** device, located on the exterior of the *building* in an *approved* location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. **Where a waterflow switch is required by Section 903.4.1 to be electrically supervised, such sprinkler waterflow alarm devices shall be powered by a fire alarm control unit or, where provided, a fire alarm system.** Where a *fire alarm system* is **provided**, actuation of the *automatic sprinkler system* shall actuate the *building fire alarm system*.

Exception: *Automatic sprinkler systems* protecting one- and two-family dwellings.



Figure 6: Example audible and visual fire alarm devices.

Source: en.wikipedia.org/wiki/File:Wheelock_mt2.jpg, Ben Schumin, CC-BY-SA-4.0
en.wikipedia.org/wiki/File:Fire-Alarm-System-Devices.jpg, CaptainChris2019, CC-BY-SA-4.0



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903.5 Inspection, testing and maintenance.

2021 IBC:

[F] 903.5 Testing and maintenance. E

Sprinkler systems shall be tested and maintained in accordance with the [International Fire Code](#).

2024 IBC:

[F] 903.5 Inspection, testing and maintenance. P

Automatic sprinkler systems shall be inspected, tested and maintained in accordance with the [International Fire Code](#).

904.12 Hybrid fire extinguishing systems.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 904.12 Hybrid fire extinguishing systems. P

Hybrid fire extinguishing systems shall be designed, installed, maintained, periodically inspected and tested in accordance with [NFPA 770](#). Records of inspection and testing shall be maintained.



Figure 7: Example hybrid fire extinguishing system with nitrogen canisters.

Source: www.Nanomistfiresafety.com, K.C. Adiga



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904.14.1 Manual system operation.

2021 IBC:

[F] 904.13.1 Manual system operation.

A manual actuation device shall be located at or near a *means of egress* from the cooking area not less than 10 feet (3048 mm) and not more than 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be installed not more than 48 inches (1200 mm) or less than 42 inches (1067 mm) above the floor and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exception: *Automatic sprinkler systems* shall not be required to be equipped with manual actuation means.

2024 IBC:

[F] 904.14.1 Manual system operation. P

A manual actuation device shall be located at or near a *means of egress* from the cooking area not less than 10 feet (3048 mm) and not more than 20 feet (6096 mm) from the kitchen exhaust system. The manual actuation device shall be installed not more than 48 inches (1200 mm) or less than 42 inches (1067 mm) above the floor and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Exceptions:

1. *Automatic sprinkler systems* shall not be required to be equipped with manual actuation means.
2. Where locating the manual actuation device between 10 feet (3048 mm) and 20 feet (6096 mm) from the cooking area is not feasible, the fire code official is permitted to accept a location at or near a *means of egress* from the cooking area, where the manual actuation device is unobstructed and in view from the *means of egress*.



Figure 8: Example manual actuation device for a fire protection system.

Source: <https://portal.reactonfire.com/products/re7270-25-manual-actuator>



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905.3 Required installations.

2021 IBC:

[F] 905.3 Required Installations. P

Standpipe systems shall be installed where required by [Sections 905.3.1](#) through [905.3.8](#). Standpipe systems are allowed to be combined with *automatic sprinkler systems*.

Exception: Standpipe systems are not required in Group R-3 occupancies.

2024 IBC:

[F] 905.3 Required installations. P

Standpipe systems shall be installed where required by [Sections 905.3.1](#) through [905.3.7](#). Standpipe systems are allowed to be combined with *automatic sprinkler systems*.

Exceptions:

1. Standpipe systems are not required in Group R-2 townhouses.
2. Standpipe systems are not required in Group R-3 occupancies.

905.3.4 Underground buildings (was Stages)

2021 IBC:

[F] 905.3.4 Stages.

Stages greater than 1,000 square feet in area (93 m²) shall be equipped with a Class III wet standpipe system with 1¹/₂-inch and 2¹/₂-inch (38 mm and 64 mm) hose connections on each side of the stage.

Exception: Where the building or area is equipped throughout with an *automatic sprinkler system*, a 1¹/₂-inch (38 mm) hose connection shall be installed in accordance with [NFPA 13](#) or in accordance with [NFPA 14](#) for Class II or III standpipes.

[F] 905.3.4.1 Hose and cabinet.

The 1¹/₂-inch (38 mm) hose connections shall be equipped with sufficient lengths of 1¹/₂-inch (38 mm) hose to provide fire protection for the stage area. Hose connections shall be equipped with an *approved* adjustable fog nozzle and be mounted in a cabinet or on a rack.

[F] 905.3.5 Underground buildings.

Underground buildings shall be equipped throughout with a Class I automatic wet or manual wet standpipe system.

2024 IBC (Stages section removed):

[F] 905.3.4 Underground buildings. P CDP

Underground *buildings* shall be equipped throughout with a Class I automatic wet or manual wet *standpipe system*.



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905.3.7 Vegetative roof and landscaped roof standpipe systems.

2021 IBC:

[F] 905.3.8 Landscaped roofs.

Buildings or structures that have landscaped roofs and that are equipped with a standpipe system shall have the standpipe system extended to the roof level on which the landscaped roof is located.

2024 IBC:

[F] 905.3.7 Vegetative roof and landscaped roof standpipe systems.

Buildings or structures that have landscaped roofs or vegetative roofs and that are equipped with a standpipe system shall have the standpipe system extended to the roof level on which the landscaped roof or vegetative roof is located.



Figure 9: Example vegetative roof (green roof).

Source: commons.wikimedia.org/wiki/File:Green_Roof_Shed.JPG, Newtben33, CC-BY-SA-3.0



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905.4 Location of Class I standpipe hose connections.

2021 IBC:

[F] 905.4 Location of Class I standpipe hose connections. P

Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway*, a hose connection shall be provided for each story above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the fire code official.
Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.
2. On each side of the wall adjacent to the exit opening of a *horizontal exit*.
Exception: Where floor areas adjacent to a *horizontal exit* are reachable from an *interior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the *horizontal exit*.
3. In every *exit passageway*, at the entrance from the *exit passageway* to other areas of a building.
Exception: Where floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the building.

2024 IBC:

[F] 905.4 Location of Class I standpipe hose connections. P CDP

Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway* or *exterior exit stairway*, a hose connection shall be provided for each *story* above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the fire code official.
Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.
2. On each side of the wall adjacent to the exit opening of a *horizontal exit*.
Exception: Where floor areas adjacent to a *horizontal exit* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the *horizontal exit*.
3. In every *exit passageway*, at the entrance from the *exit passageway* to other areas of a *building*.
Exception: Where floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the *building*.

...



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907.2.1 Group A

2021 IBC:

[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.

2024 IBC:

[F] 907.2.1 Group A. P

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.

Exceptions:

1. *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.
2. *Manual fire alarm boxes* and the associated occupant notification system or emergency voice/alarm communication system are not required for Group A-5 outdoor bleacher-type seating having an *occupant load* of greater than or equal to 300 and less than 15,000 occupants, provided that all of the following are met:
 - 2.1. A public address system with standby power is provided.
 - 2.2. Enclosed spaces attached to or within 5 feet (1524 mm) of the outdoor bleacher-type seating compose, in the aggregate, a maximum of 10 percent of the overall area of the outdoor bleacher-type seating or 1,000 square feet (92.9 m²), whichever is less.
 - 2.3. Enclosed accessory spaces under or attached to the outdoor bleacher-type seating shall be separated from the bleacher-type seating in accordance with [Section 1030.1.1.1](#).
 - 2.4. All *means of egress* from the bleacher-type seating are open to the outside.
3. *Manual fire alarm boxes* and the associated occupant notification system or emergency voice/alarm communication system are not required for temporary Group A-5 outdoor bleacher-type seating, provided that all of the following are met:
 - 3.1. There are no enclosed spaces under or attached to the outdoor bleacher-type seating.
 - 3.2. The bleacher-type seating is erected for a period of less than 180 days.
 - 3.3. Evacuation of the bleacher-type seating is included in an *approved* fire safety plan.



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907.2.2.2 Laboratories involving research and development or testing.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 907.2.2.2 Laboratories involving research and development or testing. P

A fire alarm system activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed throughout the entire fire area utilized for the research and development or testing of lithium-ion or lithium metal batteries.

907.2.4.1 Manufacturing involving lithium-ion or lithium metal batteries.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 907.2.4.1 Manufacturing involving lithium-ion or lithium metal batteries. P

A fire alarm system activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed throughout the entire fire area where lithium-ion or lithium metal batteries are manufactured; and where the manufacturer of vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries when the batteries are installed as part of the manufacturing process.

907.2.7 Group M.

2021 IBC:

[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 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.

2024 IBC:

[F] 907.2.7 Group M. P

Fire alarm systems shall be required in Group M occupancies in accordance with [Sections 907.2.7.1](#) and [907.2.7.2](#).



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907.2.7 Group M.

2021 IBC:

[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 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](#).

2024 IBC:

[F] 907.2.7 Group M. P

Fire alarm systems shall be required in Group M occupancies in accordance with [Sections 907.2.7.1](#) and [907.2.7.2](#).

[F] 907.2.7.1 Occupant load. P

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



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907.2.7.2 Storage of lithium-ion or lithium metal batteries.

The following subsection was added to 2024 IBC:

2024 IBC:

[F] 907.2.7.2 Storage of lithium-ion or lithium metal batteries.

A *fire alarm system* activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed in a room or space within a Group M occupancy where required for the storage of lithium-ion or lithium metal batteries in accordance with [Section 320](#) of the *International Fire Code*.

907.2.10 Group S.

2021 IBC:

[F] 907.2.10 Group S. P

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.

2024 IBC:

[A] 907.2.10 Group S. P

A *fire alarm system* shall be installed in a Group S occupancy as required by [Sections 907.2.10.1](#) and [907.2.10.2](#).

[F] 907.2.10.1 Public- and self-storage occupancies.

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] 907.2.10.2 Storage of lithium-ion or lithium metal batteries. P

A *fire alarm system* activated by an air-sampling-type smoke detection system or a radiant-energy-sensing detection system shall be installed throughout the entire fire area where required for the storage of lithium-ion batteries or lithium metal batteries in accordance with [Section 320](#) of the *International Fire Code*.



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907.2.11 Single- and multiple-station smoke alarms.

2021 IBC:

[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.

2024 IBC:

[F] 907.2.11 Single- and multiple-station smoke alarms. [P](#) [CDP](#)

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](#), [NFPA 72](#) and the manufacturer's instructions.

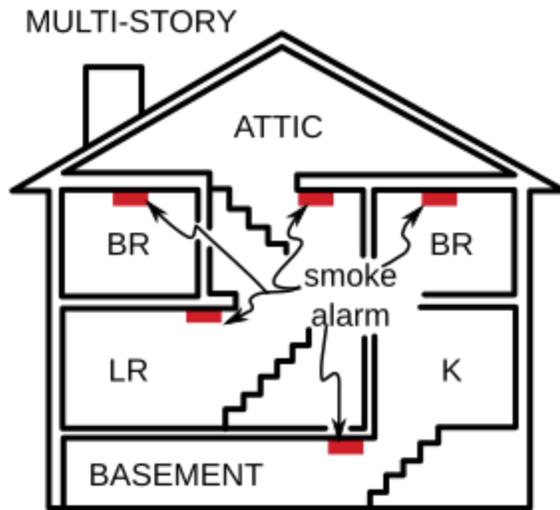


Figure 10: Smoke alarm with Wi-Fi and multiple-station capability (interconnected smoke alarm devices in different rooms).

Source: commons.wikimedia.org/wiki/File:FireAngel_smoke_detector_system_-_2021-07-07_-_Andy_Mabbett_-_01.jpg.
Andy Mabbett, CC-BY-SA-4.0



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907.2.11.3 Installation near cooking appliances.

2021 IBC:

[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](#):

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.

2024 IBC:

[F] 907.2.11.3 Installation near cooking appliances. P

Smoke alarms shall be installed **not less than 10 feet (3048 mm) horizontally from a permanently installed cooking appliance.**

Exception: Smoke alarms shall be permitted to be installed not less than 6 feet (1829 mm) horizontally from a permanently installed cooking appliance where necessary to comply with [Section 907.2.11.1](#) or [907.2.11.2](#).



Figure 11: Smoke alarm near a stove (cooking appliance).

Source: commons.wikimedia.org/wiki/File:Fire_Safety_-_Person_with_a_prosthetic_leg_testing_their_smoke_alarm.jpg



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907.5.2.1.3 Audible alarm signal frequency in Group R-1, R-2 and I-1 sleeping rooms.

2021 IBC:

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

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.

2024 IBC

[F] 907.5.2.1.3 Audible **alarm** signal frequency in Group R-1, R-2 **and I-1** sleeping rooms. P

Audible **alarm** signal frequency in Group R-1, R-2 **and I-1** 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 **audible** signal.

In sleeping rooms of Group R-1, R-2 **and I-1** occupancies, the audible *alarm signal* 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. P

In sleeping rooms of Group R-1, R-2 **and I-1** 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 *alisted* notification appliance or a *smoke detector* with an integral 520-Hz sounder.



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909.6.1 Minimum pressure difference.

2021 IBC:

[F] 909.6.1 Minimum pressure difference.

The pressure difference across a *smoke barrier* used to separate smoke zones shall be not less than 0.05-inch water gage (0.0124 kPa) in fully sprinklered buildings.

In buildings permitted to be other than fully sprinklered, the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.

2024 IBC:

[F] 909.6.1 Minimum pressure difference. P

The pressure difference across a *smoke barrier* used to separate smoke zones shall be not less than 0.05-inch water gage (0.0124 kPa) in building **equipped throughout with automatic sprinkler systems.**

In *buildings* permitted to be **not equipped throughout with automatic sprinkler systems,** the smoke control system shall be designed to achieve pressure differences not less than two times the maximum calculated pressure difference produced by the design fire.

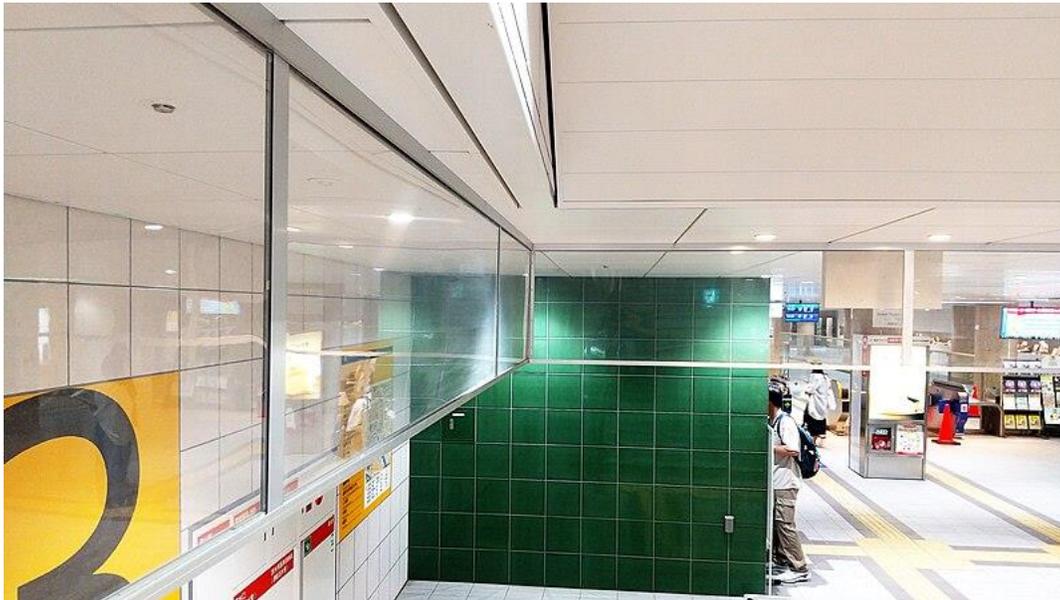


Figure 12: Smoke barrier panels hanging from the ceiling.

Source: commons.wikimedia.org/wiki/File:Kushida_Shrine_Station_the_smoke_protection_barrier_at_the_3rd_exit_Gionmachi_Hakata-ku_Fukuoka_20240809.jpg, Hirho, CC-BY-SA-4.0



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909.18.3 Dampers.

2021 IBC:

[F] 909.18.3 Dampers.

Dampers shall be tested for function in their installed condition.

2024 IBC

[F] 909.18.3 Dampers. P

Dampers shall be tested for function in their installed condition in accordance with [NFPA 80](#) and [NFPA 105](#).

909.20 Smokeproof enclosures

2021 IBC:

909.20 Smokeproof enclosures. P

Where required by [Section 1023.12](#), a *smokeproof enclosure* shall be constructed in accordance with this section. A *smokeproof enclosure* shall consist of an *interior exit stairway* or *ramp* that is enclosed in accordance with the applicable provisions of [Section 1023](#) and an open exterior balcony, ventilated vestibule or pressurized *stair* and pressurized entrance vestibule meeting the requirements of this section. Where access to the roof is required by the [International Fire Code](#), such access shall be from the *smokeproof enclosure* where a *smokeproof enclosure* is required.

2024 IBC:

909.20 Smokeproof enclosures. P

Where required by [Section 1023.12](#), a *smokeproof enclosure* shall be constructed in accordance with this section. A *smokeproof enclosure* shall consist of an *interior exit stairway* or *ramp* that is enclosed in accordance with the applicable provisions of [Section 1023](#) and an open exterior balcony **or** pressurized *stair* and pressurized entrance vestibule meeting the requirements of this section. Where access to the roof is required by the [International Fire Code](#), such access shall be from the *smokeproof enclosure* where a *smokeproof enclosure* is required.



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909.20.1 Access.

2021 IBC:

909.20.1 Access.

Access to the *stairway* or *ramp* shall be by way of a vestibule or an open exterior balcony. The minimum dimension of the vestibule shall be not less than the required width of the *corridor* leading to the vestibule but shall not have a width of less than 44 inches (1118 mm) and shall not have a length of less than 72 inches (1829 mm) in the direction of egress travel.

2024 IBC:

909.20.1 Access. P

Access to the *stairway* or *ramp* shall be by way of a vestibule or an open exterior balcony. The minimum dimension of the vestibule shall be not less than the required **clear** width of the *corridor* leading to the vestibule but shall not have a width of less than 44 inches (1118 mm) and shall not have a length of less than 72 inches (1829 mm) in the direction of egress travel **into the *stairway*, measured in a straight line between the centerline of the doorways into the vestibule and *stairway*.**

909.20.4 Stairway and ramp pressurization alternative.

2021 IBC:

909.20.4.4 Stairway or ramp shaft air movement system.

The *stairway* or *ramp shaft* shall be provided with a dampered relief opening and supplied with sufficient air to maintain a minimum positive pressure of 0.10 inch of water (25 Pa) in the *shaft* relative to the vestibule with all doors closed.

909.20.5 Stairway and ramp pressurization alternative.

Where the building is equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#), the vestibule is not required, provided that each *interior exit stairway* or *ramp* is pressurized to not less than 0.10 inch of water (25 Pa) and not more than 0.35 inches of water (87 Pa) in the *shaft* relative to the building measured with all *interior exit stairway* and *ramp* doors closed under maximum anticipated conditions of stack effect and wind effect.

2024 IBC (eliminated shaft air movement system):

909.20.4 Stairway and ramp pressurization alternative. P

Where the *building* is equipped throughout with an *automatic sprinkler system* in accordance with [Section 903.3.1.1](#), the vestibule is not required, provided that each *interior exit stairway* or *ramp* is pressurized to not less than 0.10 inch of water (25 Pa) and not more than 0.35 inches of water (87 Pa) in the *shaft* relative to the *building* measured with all *interior exit stairway* and *ramp* doors closed under maximum anticipated conditions of stack effect and wind effect.



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909.20.5.4 Smoke detection.

The following subsection was added in 2024 IBC.

2024 IBC:

909.20.5.4 Smoke detection. P

The fan system shall be equipped with a *smoke detector* that will automatically shut down the fan system when smoke is detected within the system.

909.21 Elevator hoistway pressurization alternative.

2021 IBC:

909.21 Elevator hoistway pressurization alternative.

Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with [Sections 909.21.1](#) through [909.21.11](#).

2024 IBC:

909.21 Elevator hoistway pressurization alternative. P

Where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with [Sections 909.21.1](#) through [909.21.11](#). The design shall consider the interaction effects of the operation of multiple smoke control systems for all design scenarios in accordance with [Section 909.4.7](#). All components or systems associated with the means of mitigating adverse interaction shall comply with the applicable subsections of Section 909.

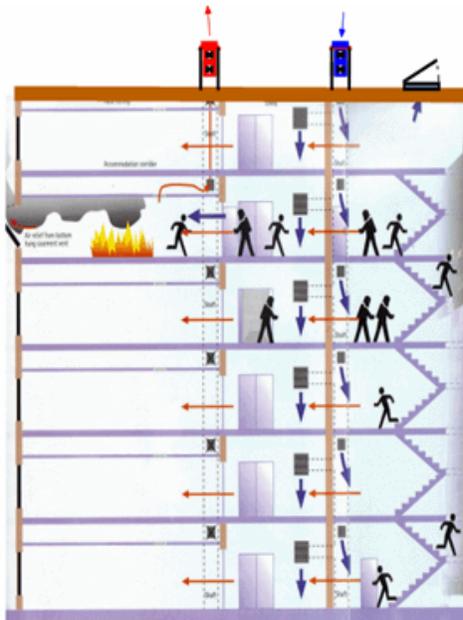


Figure 13: Stairway and elevator pressurization system that forces smoke outside.

Source: <https://fanturk.org/stair-elevator-pressurization-systems>



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909.21.6 Activation of pressurization system.

2021 IBC:

909.21.6 Activation of pressurization system.

The elevator pressurization system shall be activated upon activation of either the building fire alarm system or the elevator lobby smoke detectors. Where both a building fire alarm system and elevator lobby smoke detectors are present, each shall be independently capable of activating the pressurization system.

2024 IBC:

909.21.6 Activation of pressurization system. P

The elevator pressurization system shall be activated upon activation of the elevator lobby *smoke detectors*.



Figure 14: Elevator lobby with smoke detectors circled in red.

Source: commons.wikimedia.org/wiki/File:Elevator_lobby,_Robert_N.C._Nix_Federal_Building,_Philadelphia,_Pennsylvania_LCCN2010718965.tif, p.d.



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912.5 Signs.

2021 IBC:

[F] 912.5 Signs. P

A metal sign with raised letters not less than 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: "AUTOMATIC SPRINKLERS," "STANDPIPES," or "TEST CONNECTION," or a combination thereof as applicable. Where the fire department connection does not serve the entire building, a sign shall be provided indicating the portions of the building served.

2024 IBC:

[F] 912.5 Signs. P CDP

A metal sign with raised letters not less than 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: "AUTOMATIC SPRINKLERS," "STANDPIPES," "TEST CONNECTION," "STANDPIPE AND AUTOSPKR" or "AUTOSPKR AND STANDPIPE," or a combination thereof as applicable.

[F] 912.5.1 Lettering. P CDP

Each fire department connection (FDC) shall be designated by a sign with raised letters not less than 1 inch (25.4 mm) in height. For manual standpipe systems, the sign shall also indicate that the system is manual and that it is either wet or dry.

[F] 912.5.2 Serving multiple buildings. P CDP

Where a fire department connection (FDC) services multiple *buildings, structures* or locations, a sign shall be provided indicating the *building, structures* or locations served. Where the FDC does not serve the entire *building*, a sign shall be provided indicating the portions of the *building* served.

[F] 912.5.3 Multiple or combined systems. P CDP

Where combination or multiple system types are supplied by the fire department connection, the sign or combination of signs shall indicate both designated services.

[F] 912.5.4 Indication of pressure. P CDP

The sign also shall indicate the pressure required at the outlets to deliver the *standpipe system* demand.

Exception: Where the pressure required is 150 pounds per square inch (1034 kPa) or less.



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CARBON MONOXIDE (CO) DETECTION 915.1 & 915.2.

2021 IBC:

[F] 915.1 General.

Carbon monoxide detection shall be installed in new buildings in accordance with Sections 915.1.1 through 915.6. Carbon monoxide detection shall be installed in existing buildings in accordance with Chapter 11 of the *International Fire Code*.

[F] 915.1.1 Where required.

Carbon monoxide detection shall be provided in Group I-1, I-2, I-4 and R occupancies and in classrooms in Group E occupancies in the locations specified in Section 915.2 where any of the conditions in Sections 915.1.2 through 915.1.6 exist.

[F] 915.1.2 Fuel-burning appliances and fuel-burning fireplaces.

Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms that contain a fuel-burning appliance or a fuel-burning fireplace.

[F] 915.1.3 Fuel burning, forced-air furnaces.

Carbon monoxide detection shall be provided in dwelling units, sleeping units and classrooms served by a fuel-burning, forced-air furnace.

Exception: Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms if a carbon monoxide detector is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.

[F] 915.1.4 Fuel-burning appliances outside of dwelling units, sleeping units and classrooms.

Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms located in buildings that contain fuel-burning appliances or fuel-burning fireplaces.

Exceptions:

1. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms without communicating openings between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.
2. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms where a carbon monoxide detector is provided in one of the following locations:
 - 2.1. In an *approved* location between the fuel-burning appliance or fuel-burning fireplace and the *dwelling unit*, *sleeping unit* or classroom.
 - 2.2. On the ceiling of the room containing the fuel-burning appliance or fuel-burning fireplace.

[F] 915.1.5 Private garages.

Carbon monoxide detection shall be provided in *dwelling units*, *sleeping units* and classrooms in buildings with attached *private garages*.

Exceptions:

1. Carbon monoxide detection shall not be required in dwelling units, sleeping units and classrooms without communicating openings between the *private garage* and the *dwelling unit*, *sleeping unit* or classroom.
2. Carbon monoxide detection shall not be required in *dwelling units*, *sleeping units* and classrooms located more than one *story* above or below a *private garage*.
3. Carbon monoxide detection shall not be required where the *private garage* connects to the building through an *open-ended corridor*.
4. Where a carbon monoxide detector is provided in an *approved* location between openings to a *private garage* and *dwelling units*, *sleeping units* or classrooms.



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[F] 915.1.6 Exempt garages.

For determining compliance with [Section 915.1.5](#), an *open parking garage* complying with [Section 406.5](#) or an enclosed parking garage complying with [Section 406.6](#) shall not be considered a *private garage*.

[F] 915.2 Locations.

Where required by [Section 915.1.1](#), carbon monoxide detection shall be installed in the locations specified in [Sections 915.2.1](#) through [915.2.3](#).

[F] 915.2.1 Dwelling units.

Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a fuel-burning appliance is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.

[F] 915.2.2 Sleeping units.

Carbon monoxide detection shall be installed in *sleeping units*.

Exception: Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a fuel-burning appliance and is not served by a forced air furnace.

2024 IBC:

[F] 915.1 General. P CDP

Carbon monoxide (CO) detection shall be installed in new *buildings* in accordance with [Section 915.1.1](#). Carbon monoxide detection shall be installed in *existing buildings* in accordance with [Chapter 11](#) of the *International Fire Code*.

Exception: Carbon monoxide detection is not required in Group S, Group F and Group U occupancies that are not normally occupied.

[F] 915.1.1 Where required. P CDP

Carbon monoxide detection shall be **installed** in the locations specified in [Section 915.2](#) where any of the **following** conditions exist.

1. In *buildings* that contain a CO source.
2. In *buildings* that contain or are supplied by a CO-producing forced-air furnace.
3. In *buildings* with attached *private garages*.
4. In *buildings* that have a CO-producing vehicle that is used within the *building*.

[F] 915.2 Locations. P CDP

Carbon monoxide detection shall be installed in the locations specified in [Sections 915.2.1](#) through [915.2.3](#).

[F] 915.2.1 Dwelling units. P CDP

Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a **CO source** is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.

[F] 915.2.2 Sleeping units. P CDP

Carbon monoxide detection shall be installed in *sleeping units*.

Exception: Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a **CO source** and is not served by a **CO-producing** forced-air furnace.



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[F] 915.2.3 Group E occupancies. P CDP

A carbon monoxide system that uses carbon monoxide detectors shall be installed in Group E occupancies. Alarm signals from carbon monoxide detectors shall be automatically transmitted to an on-site location that is staffed by school personnel.

Exception: Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an occupant load of 30 or less.

[F] 915.2.4 CO-producing forced-air furnace. P CDP

Carbon monoxide detection complying with Item 2 of Section 915.1.1 shall be installed in all enclosed rooms and spaces served by a fuel-burning, forced-air furnace.

Exceptions:

1. Where a carbon monoxide detector is provided in the first room or space served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location.
2. Dwelling units that comply with Section 915.2.1.

[F] 915.2.5 Private garages. CDP

Carbon monoxide detection complying with Item 3 of Section 915.1.1 shall be installed within enclosed occupiable rooms or spaces that are contiguous to the attached private garage.

Exceptions:

1. In buildings without communicating openings between the private garage and the building.
2. In rooms or spaces located more than one story above or below a private garage.
3. Where the private garage connects to the building through an open-ended corridor.
4. An open parking garage complying with Section 406.5 or an enclosed parking garage complying with Section 406.6 shall not be considered a private garage.
5. Dwelling units that comply with Section 915.2.1.

[F] 915.2.6 All other occupancies. CDP

For locations other than those specified in Section 915.2.1 through 915.2.5, carbon monoxide detectors shall be installed on the ceiling of enclosed rooms or spaces containing CO producing devices or served by a CO source forced-air furnace.

Exception: Where environmental conditions prohibit the installation of carbon monoxide detector in an enclosed room or space, carbon monoxide detectors shall be installed in an approved enclosed location contiguous with the room or space that contains a CO source.



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915.3 Carbon monoxide detection & 915.4 Carbon monoxide alarms

2021 IBC:

[F] 915.3 Carbon monoxide detection. ■

Carbon monoxide detection required by [Sections 915.1](#) through [915.2.3](#) shall be provided by carbon monoxide alarms complying with [Section 915.4](#) or carbon monoxide detection systems complying with [Section 915.5](#).

[F] 915.4 Carbon monoxide alarms. ■

Carbon monoxide alarms shall comply with [Sections 915.4.1](#) through [915.4.4](#).

[F] 915.4.1 Power source. ■

Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.

[F] 915.4.2 Listings. ■

Carbon monoxide alarms shall be listed in accordance with [UL 2034](#).

[F] 915.4.3 Locations. ■

Carbon monoxide alarms shall only be installed in *dwelling units* and in *sleeping units*. They shall not be installed in locations where the code requires carbon monoxide detectors to be used.

[F] 915.4.4 Combination alarms. ■

Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be listed in accordance with [UL 217](#) and [UL 2034](#).



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2024 IBC:

[F] 915.3 Carbon monoxide detection. **P** **CDP**

Carbon monoxide detection required by [Sections 915.1](#) through [915.2.3](#) shall be provided by *carbon monoxide alarms* complying with [Section 915.4](#) or carbon monoxide detection systems complying with [Section 915.5](#).

[F] 915.3.1 Alarm limitations. **CDP**

Carbon monoxide alarms shall only be installed in *dwelling units* and in *sleeping units*. They shall not be installed in locations where the code requires *carbon monoxide detectors* to be used.

[F] 915.3.2 Fire alarm system required. **CDP**

New buildings that are required by [Section 907.2](#) to have a *fire alarm system* and by [Section 915.2](#) to have *carbon monoxide detectors* shall be connected to the *fire alarm system* in accordance with [NFPA 72](#).

[F] 915.3.3 Fire alarm systems not required. **CDP**

In new *buildings* that are not required by [Section 907.2](#) to have a *fire alarm system*, carbon monoxide detection shall be provided by one of the following:

1. *Carbon monoxide detectors* connected to an *approved* carbon monoxide detection system in accordance with [NFPA 72](#).
2. *Carbon monoxide detectors* connected to an *approved* combination system in accordance with [NFPA 72](#).
3. *Carbon monoxide detectors* connected to an *approved fire alarm system* in accordance with [NFPA 72](#).
4. Where *approved* by the fire code official, *carbon monoxide alarms* maintained in accordance with the manufacturer's instructions.

[F] 915.3.4 Installation. **CDP**

Carbon monoxide detection shall be installed in accordance with [NFPA 72](#) and the manufacturer's instructions.

[F] 915.4 Carbon monoxide alarms. **P** **CDP**

Carbon monoxide alarms shall comply with [Sections 915.4.1](#) through [915.4.4](#).

[F] 915.4.1 Power source. **P** **CDP**

Carbon monoxide alarms shall receive their primary power from the *building* wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Where installed in *buildings* without commercial power, battery-powered *carbon monoxide alarms* shall be an acceptable alternative.

[F] 915.4.2 Listings. **P** **CDP**

Carbon monoxide alarms shall be *listed* in accordance with [UL 2034](#).

[F] 915.4.3 Combination alarms. **P** **CDP**

Combination carbon monoxide/*smoke alarms* shall be an acceptable alternative to *carbon monoxide alarms*. Combination carbon monoxide/*smoke alarms* shall be *listed* in accordance with [UL 217](#) and [UL 2034](#).

[F] 915.4.4 Interconnection. **P**

Where more than one *carbon monoxide alarm* is required to be installed, *carbon monoxide alarms* shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms. Physical interconnection of *carbon monoxide alarms* shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm.



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915.5 Carbon monoxide detection systems.

The following subsection was added in 2024 IBC.

2024 IBC:

[F] 915.5.4 Occupant notification. **P** **CDP**

Activation of a *carbon monoxide detector* shall annunciate at the control unit and shall initiate audible and visible alarm notification throughout the *building*.

Exception: Occupant notification is permitted to be limited to the area where the carbon monoxide *alarm signal* originated and other signaling zones in accordance with the fire safety plan, provided that the *alarm signal* from an activated *carbon monoxide detector* is automatically transmitted to an *approved* on-site location or off-premises location.

[F] 915.5.5 Duct detection. **CDP**

Carbon monoxide detectors placed in environmental air ducts or plenums shall not be used as a substitute for the required protection in Section 915.



Figure 15: Example carbon monoxide (CO) detectors.

Source: commons.wikimedia.org/wiki/File:FA370_Carbon_monoxide_detector,_The_Hague_(2023)_02.jpg, Donald Trung Quoc Don; commons.wikimedia.org/wiki/File:Carbon_monoxide_detector.jpg, 384, CC-BY-SA-4.0



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917 MASS NOTIFICATION SYSTEMS

2021 IBC:

[F] 917.1 College and university campuses.

Prior to construction of a new building requiring a fire alarm system on a multiple-building college or university campus having a cumulative building *occupant load* of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with [NFPA 72](#). Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.

2024 IBC:

[F] 917.1 College and university campuses. P CDP

Prior to construction of a new *building* requiring a *fire alarm system* on a multiple-*building* college or university campus having a cumulative *building occupant load* of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with [NFPA 72](#). Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.

[F] 917.2 Group E occupancies. P CDP

Prior to construction of a new *building* containing a Group E occupancy requiring a *fire alarm system* and having an *occupant load* of 500 or more, a mass notification risk analysis shall be conducted in accordance with [NFPA 72](#). Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.



Figure 16: Example mass notification control panel (left)
and mass messages sent out (center and right)

Source: commons.wikimedia.org/wiki/File:Vigilant_VM-1R.jpg, TheBMG, CC-BY-SA-3.0



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Helpful References

2021 IBC:

<https://codes.iccsafe.org/content/IBC2021P2>

2024 IBC:

<https://codes.iccsafe.org/content/IBC2024P1>

2024 IBC, Chapter 9:

<https://codes.iccsafe.org/content/IBC2024P1/chapter-9-fire-protection-and-life-safety-systems>

Significant Changes to 2024 International Codes:

<https://www.larimer.gov/building/2024-building-codes-are-coming/significant-changes-2024-international-codes>