

## CHAPTER 9

# FIRE PROTECTION SYSTEMS

### SECTION BC 901 GENERAL

**901.1 Scope.** The provisions of this chapter shall specify where fire protection systems are required and shall apply to the design, installation and operation of fire protection systems.

**901.1.1 Referenced standards.** Where this code makes reference to the nationally recognized standards NFPA 13, NFPA 13D, NFPA 13R, NFPA 14, or NFPA 72, such standard shall be as modified for New York City in accordance with Appendix Q.

**901.2 Fire protection systems.** Fire protection systems shall be installed, repaired, operated and maintained in accordance with this code and the *New York City Fire Code*. Any fire protection system for which an exception or reduction to the provisions of this code has been granted shall be considered to be a required system.

**Exception:** Any fire protection system or portion thereof not required by this code shall be permitted to be installed provided that such system meets the requirements of this code.

**901.3 Modifications.** No person shall remove or modify any fire protection system installed or maintained under the provisions of this code or the *New York City Fire Code* without approval by the commissioner.

**901.4 Threads.** Threads provided for Fire Department connections to sprinkler systems, standpipes, yard hydrants or any other fire hose connection shall be compatible with the connections used by the Fire Department.

**901.5 Acceptance tests.** Fire protection systems shall be tested in accordance with the requirements of this code and the *New York City Fire Code*. When required, the tests shall be conducted in the presence of the department or an approved agency. Tests required by this code, the *New York City Fire Code* and the standards listed in this code shall be conducted at the expense of the owner or the owner's representative. It shall be unlawful to occupy portions of a structure until the required fire protection systems within that portion of the structure have been tested and approved.

**901.6 Supervisory service.** Where required, fire protection systems shall be monitored by an approved supervising station in accordance with NFPA 72.

**901.6.1 Automatic sprinkler systems.** Automatic sprinkler systems shall be monitored by an approved supervising station.

#### Exceptions:

1. A supervising station is not required for automatic sprinkler systems protecting one- and two-family dwellings.
2. Limited area sprinkler systems serving fewer than 20 sprinkler heads.

**901.6.2 Fire alarm systems.** Fire alarm systems required by the provisions of Section 907.2 of this code and the *New York City Fire Code* shall be monitored by an approved supervising station in accordance with Section 907.14.

#### Exceptions:

1. Single- and multiple-station smoke alarms and carbon monoxide alarms required by Section 907.2.10.
2. Smoke detectors in Group I-3 occupancies.
3. Supervisory service is not required for automatic sprinkler systems in one- and two-family dwellings.

**901.6.3 Group H.** Manual fire alarm, automatic fire-extinguishing and emergency alarm systems in Group H occupancies shall be monitored by an approved supervising station.

**901.7 Fire areas.** Where buildings, or portions thereof, are divided into fire areas so as not to exceed the limits established for requiring a fire protection system in accordance with this chapter, such fire areas shall be separated by fire barriers having a fire-resistance rating of not less than that determined in accordance with Section 706.3.7.

### SECTION BC 902 DEFINITIONS

**902.1 Definitions.** The following words and terms shall, for the purposes of this chapter, and as used elsewhere in this code, have the meanings shown herein.

**ALARM NOTIFICATION APPLIANCE.** A fire alarm system component such as a bell, horn, speaker, light or text display that provides audible, tactile or visible outputs, or any combination thereof.

**ALARM SIGNAL.** A signal indicating an emergency requiring immediate action, such as a signal indicative of fire.

**ANNUNCIATOR.** A unit containing one or more indicator lamps, alphanumeric displays or other equivalent means in which each indication provides status information about a circuit, condition or location.

**AUDIBLE ALARM NOTIFICATION APPLIANCE.** A notification appliance that alerts by the sense of hearing.

**AUTOMATIC.** As applied to fire protection devices, any device, equipment, or system that initiates a system function as a result of a predetermined temperature rise, rate of temperature rise or combustion products, without the necessity for human intervention.

**AUTOMATIC FIRE-EXTINGUISHING SYSTEM.** An approved system of devices and equipment that automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire.

**AUTOMATIC SPRINKLER SYSTEM.** An automatic fire-extinguishing system utilizing water, designed in accordance with fire protection engineering standards. The system includes a suitable water supply and a network of specially sized or hydraulically designed piping installed in a structure or area, generally overhead, to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area.

**AVERAGE AMBIENT SOUND LEVEL.** The root mean square, A-weighted sound pressure level measured over a 24-hour period.

**CARBON DIOXIDE EXTINGUISHING SYSTEMS.** An automatic fire-extinguishing system supplying carbon dioxide (CO<sub>2</sub>) from a pressurized vessel through fixed pipes and nozzles. The system includes a manual- or automatic-actuating mechanism.

**CARBON MONOXIDE ALARM.** A single- or multiple-station alarm responsive to carbon monoxide and not connected to a system.

**CARBON MONOXIDE DETECTOR.** A listed device that senses carbon monoxide.

**CARBON MONOXIDE PRODUCING EQUIPMENT.** Any furnace, boiler, water heater, fireplace, cooking appliance, gas clothes dryer, apparatus, appliance or device that burns coal, kerosene, oil, wood, fuel gases and other petroleum products including, but not limited to, methane, natural gas, liquefied natural gas and manufactured fuel gases.

**CEILING LIMIT.** The maximum concentration of an air-borne contaminant to which one may be exposed, as published in DOL 29 CFR Part 1910.1000.

**CENTRAL STATION.** A facility that receives alarm signals from a protected premise and/or retransmits such alarm signals to a Fire Department communication office.

**CLEAN AGENT.** Electrically nonconducting, volatile or gaseous fire extinguishant that does not leave a residue upon evaporation.

**COMMERCIAL COOKING SYSTEM.** A system consisting of commercial cooking equipment, exhaust hood, filters, exhaust duct system, fire suppression system and other related appurtenances designed to capture grease-laden cooking vapors and exhaust them safely to the outdoors.

**CONSTANTLY ATTENDED LOCATION.** A designated location at a facility staffed by trained personnel on a continuous basis where alarm or supervisory signals are monitored and facilities are provided for notification of the Fire Department or other emergency services.

**DELUGE SPRINKLER SYSTEM.** A sprinkler system employing open sprinklers attached to a piping system connected to a water supply through a valve that is opened by the operation of a detection system installed in the same areas as the sprinklers. When this valve opens, water flows into the piping system and discharges from all sprinklers attached thereto.

**DETECTOR, HEAT.** A fire detector that senses heat produced by burning substances. Heat is the energy produced by combustion that causes substances to rise in temperature.

**DRY-CHEMICAL EXTINGUISHING SYSTEM.** A fire-extinguishing system designed to discharge a powder composed of small particles, usually of sodium bicarbonate, potassium bicarbonate, urea-potassium-based bicarbonate, potassium chloride or monoammonium phosphate, with added particulate material supplemented by special treatment to provide resistance to packing, resistance to moisture absorption (caking) and the proper flow capabilities.

**EMERGENCY ALARM SYSTEM.** A system to provide indication and warning of an emergency condition involving hazardous materials.

**EMERGENCY VOICE/ALARM COMMUNICATIONS.** Dedicated manual or automatic facilities for originating and distributing voice instructions, as well as alert and evacuation signals pertaining to a fire emergency, to the occupants of a building.

**FIRE ALARM BOX, MANUAL.** See "Manual Fire Alarm Box."

**FIRE ALARM CONTROL PANEL.** A system component that receives inputs from automatic and manual fire alarm devices and is capable of supplying power to detection devices and transponder(s) or off-premises transmitter(s). The control panel is capable of providing a transfer of power to the notification appliances and transfer of condition to relays or devices.

**FIRE ALARM SIGNAL.** A signal initiated by a fire alarm-initiating device such as a manual fire alarm box, automatic fire detector, water flow switch, or other device whose activation is indicative of the presence of a fire or fire signature.

**FIRE ALARM SYSTEM.** A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals.

**FIRE COMMAND CENTER.** The principal attended or unattended location where the status of detection, alarm communications and control systems is displayed, and from which the system(s) can be manually controlled.

**FIRE DETECTOR, AUTOMATIC.** A device designed to detect the presence of a fire signature and to initiate action.

**FIRE PROTECTION SYSTEM.** Approved devices, equipment and systems or combinations of systems used to detect a fire, activate an alarm, extinguish or control a fire, control or manage smoke and products of a fire or any combination thereof.

**FIRE SAFETY FUNCTIONS.** Building and fire control functions that are intended to increase the level of life safety for occupants or to control the spread of harmful effects of fire.

**FOAM-EXTINGUISHING SYSTEM.** A fire-extinguishing system designed to discharge a foam made from concentrates, either mechanically or chemically, over the area to be protected.

**HALOGENATED EXTINGUISHING SYSTEM.** An automatic fire-extinguishing system using one or more of the following halogen elements: fluorine, chlorine, bromine and iodine.

**INITIATING DEVICE.** A system component that originates transmission of a change-of-state condition, such as in a smoke detector, manual fire alarm box or supervisory switch.

**LIMITED AREA SPRINKLER SYSTEM.** An automatic sprinkler system serving fewer than 20 sprinkler heads on any single connection.

**LISTED.** See Chapter 1 of Title 28 of the *Administrative Code*.

**MANUAL FIRE ALARM BOX.** A manually operated device used to initiate an alarm signal.

**MULTIPLE-STATION ALARM DEVICE.** Two or more single-station alarm devices that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate. It also can consist of one single-station alarm device having connections to other detectors or to a manual fire alarm box.

**MULTIPLE-STATION SMOKE ALARM.** Two or more single-station smoke alarm devices that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate.

**PRESIGNAL SYSTEM.** A fire alarm system having a feature that allows initial fire alarm signals to sound in a constantly attended central location and for which a human action is subsequently required to achieve a general alarm, or a feature that allows the control equipment to delay the general alarm by more than 1 minute after the start of the alarm processing.

**RECORD DRAWINGS.** Drawings (“as built”) that document the location of all devices, appliances, wiring sequences, wiring methods and connections of the components of a fire alarm system as installed.

**SINGLE-STATION SMOKE ALARM.** An assembly incorporating the detector, the control equipment and the alarm-sounding device in one unit, operated from a power supply either in the unit or obtained at the point of installation.

**SMOKE ALARM.** A single- or multiple-station alarm responsive to smoke and not connected to a system.

**SMOKE DETECTOR.** A listed device that senses visible or invisible particles of combustion.

**SMOKEPROOF ENCLOSURE.** An exit stairway designed and constructed so that the movement of the products of combustion produced by a fire occurring in any part of the building into the enclosure is limited.

**STANDPIPE SYSTEM.** Piping installed in a building or structure that serves to transfer water from a water supply to hose connections at one or more locations in a building or structure for fire-fighting purposes, including the following types of systems:

**Automatic dry.** A dry standpipe system, normally filled with pressurized air, that is arranged through the use of a device, such as dry pipe valve, to admit water into the system piping automatically upon the opening of a hose valve. The water supply for an automatic dry standpipe system shall be capable of supplying the system demand.

**Automatic wet.** A wet standpipe system that has a water supply that is capable of supplying the system demand automatically.

**Manual dry.** A dry standpipe system that does not have a permanent water supply attached to the system. Manual dry standpipe systems require water from a Fire Department pumper to be pumped into the system through the Fire Department connection in order to meet the system demand.

**Manual wet.** A wet standpipe system connected to a water supply for the purpose of maintaining water within the system but that does not have a water supply capable of delivering the system demand attached to the system. Manual-wet standpipe systems require water from a Fire Department pumper to be pumped into the system in order to meet the system demand.

**Semiautomatic dry.** A dry standpipe system that is arranged through the use of a device, such as a deluge valve, to admit water into the system piping upon activation of a remote control device located at a hose connection. A remote control activation device shall be provided at each hose connection. The water supply for a semiautomatic dry standpipe system shall be capable of supplying the system demand.

**STANDPIPE SYSTEM, CLASSES OF.** Standpipe classes are as follows:

**Class I system.** A system providing 2½-inch (64 mm) hose connections to supply water for use by the Fire Department and those trained in handling heavy fire streams.

**Class II system.** A system providing 1½-inch (38 mm) hose stations to supply water for use primarily by the building occupants or by the Fire Department during initial response.

**Class III system.** A system providing 1½-inch (38 mm) hose stations to supply water for use by building occupants and 2½-inch (64 mm) hose connections to supply a larger volume of water for use by the Fire Department and those trained in handling heavy fire streams.

**SUPERVISING STATION.** A facility that receives signals and at which personnel are in attendance at all times to respond to these signals.

**SUPERVISORY SERVICE.** The service required to monitor performance of guard tours and the operative condition of fixed suppression systems or other systems for the protection of life and property.

**SUPERVISORY SIGNAL.** A signal indicating the need for action in connection with the supervision of guard tours, fire suppression systems or equipment, fire alarm systems, or the maintenance features of related systems.

**SUPERVISORY SIGNAL-INITIATING DEVICE.** An initiation device, such as a valve supervisory switch, water-level indicator or low-air pressure switch on a dry-pipe sprinkler system, whose change of state signals an off-normal condition and its restoration to normal of a fire protection or life safety system, or a need for action in connection with the supervision of guard tours, fire suppression systems or equipment, fire alarm systems, or the maintenance features of related systems.

**TIRES, BULK STORAGE OF.** Storage of tires where the area available for storage exceeds 20,000 cubic feet (566 m³).

**TROUBLE SIGNAL.** A signal initiated by the fire alarm system or device indicative of a fault in a monitored circuit or component.

**VISIBLE ALARM NOTIFICATION APPLIANCE.** A notification appliance that alerts by the sense of sight.

**WET-CHEMICAL EXTINGUISHING SYSTEM.** A solution of water and potassium-carbonate-based chemical, potassium-acetate-based chemical or a combination thereof, forming an extinguishing agent.

**WIRELESS PROTECTION SYSTEM.** A system or a part of a system that can transmit and receive signals without the aid of wire.

**ZONE.** A defined area within the protected premises. A zone can define an area from which a signal can be received, an area to which a signal can be sent or an area in which a form of control can be executed.

## SECTION BC 903 AUTOMATIC SPRINKLER SYSTEMS

**903.1 General.** Automatic sprinkler systems shall comply with this section. Installation of automatic sprinkler systems shall comply with the special inspection requirements of Chapter 17.

**903.1.1 Alternative protection.** Where the discharge of water would be hazardous, alternative automatic fire-extinguishing systems complying with Section 904 shall be permitted in lieu of automatic sprinkler protection where recognized by the applicable standard and approved by the commissioner.

**903.1.2 Construction documents.** Construction documents for automatic sprinkler systems shall contain plans that include the following data and information:

1. The location and size of water supplies and the location, spacing, number, and type of sprinkler heads to be used, with approximate location and size of all feed mains, valves and other essential features of the system. For hydraulically calculated systems, hydraulic data substantiating pipe sizes shown shall be submitted and hydraulic reference points and areas must be indicated on the plan.
2. A diagram showing the proposed sprinkler system in relation to principal construction features of the building, such as its size, walls, columns, and partitions; and such other information as may be necessary for the evaluation of the system.
3. The location, number, and type of any electrical or automatic devices or alarms to be used in the system.
4. In buildings where a new separate fire sprinkler system is required, the available water pressure at the top and bottom floors of each zone shall be shown on the riser diagram.
5. For street pressure-fed systems and fire pumps, a statement from the New York City Department of

Environmental Protection, giving the minimum water pressure in the main serving the building.

**903.2 Where required.** Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in this section.

**Exception:** Sprinklers shall not be required in electrical equipment rooms where all of the following conditions are met:

1. The room is dedicated to electrical equipment only.
2. Only dry-type electrical equipment is used.
3. Equipment is installed in a 2-hour fire-rated enclosure including protection for penetrations.
4. No combustible storage is permitted to be stored in the room.

**903.2.1 Group A.** An automatic sprinkler system shall be provided throughout buildings and portions thereof used as Group A occupancies as provided in this section. The automatic sprinkler system shall be provided throughout the floor area where the Group A occupancy is located, and in all floors between the Group A occupancy and the level of exit discharge. In all Group A occupancies providing live entertainment, dressing rooms and property rooms used in conjunction with such assembly occupancy shall be provided with an automatic sprinkler system. Stages shall comply with Section 410.6.

**903.2.1.1 Group A-1.** An automatic sprinkler system shall be provided for Group A-1 occupancies where any one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m<sup>2</sup>).
2. The fire area has an occupant load of 300 or more.
3. The aggregate occupant load of all fire areas occupied by Group A, located on any given floor other than the level of exit discharge, is 300 or more.
4. The fire area contains a multitheater complex.

**903.2.1.2 Group A-2.** An automatic sprinkler system shall be provided for Group A-2 occupancies where any one of the following conditions exists:

1. The fire area exceeds 5,000 square feet (464.5 m<sup>2</sup>).
2. The fire area has an occupant load of 300 or more.
3. The aggregate occupant load of all fire areas occupied by Group A, located on any given floor other than the level of exit discharge, is 300 or more.
4. The A-2 occupancy is used as a cabaret.

**903.2.1.3 Group A-3.** An automatic sprinkler system shall be provided for Group A-3 occupancies where any one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m<sup>2</sup>).
2. The fire area has an occupant load of 300 or more.

3. The aggregate occupant load of all fire areas occupied by Group A, located on any given floor other than the level of exit discharge, is 300 or more.

**Exception:** Areas used exclusively as participant sports areas where the main floor area is located at the same level as the level of exit discharge of the main entrance and exit.

**903.2.1.4 Group A-4.** An automatic sprinkler system shall be provided for Group A-4 occupancies where any one of the following conditions exists:

1. The fire area exceeds 12,000 square feet (1115 m<sup>2</sup>).
2. The fire area has an occupant load of 300 or more.
3. The aggregate occupant load of all fire areas occupied by Group A, located on any given floor other than the level of exit discharge, is 300 or more.

**Exception:** Areas used exclusively as participant sports areas where the main floor area is located at the same level as the level of exit discharge of the main entrance and exit.

**903.2.1.5 Group A-5.** An automatic sprinkler system shall be provided in all enclosed areas of the structure, including but not limited to the concession concourse, concession stands, retail areas, press boxes and other accessory occupancies, in excess of 1,000 square feet (93 m<sup>2</sup>).

**903.2.2 Group E.** An automatic sprinkler system shall be provided for Group E occupancies as follows:

1. Throughout all Group E fire areas greater than 20,000 square feet (1858 m<sup>2</sup>) in area.
2. Throughout every portion of educational buildings below the level of exit discharge.

**Exception:** An automatic sprinkler system is not required in any fire area or area below the level of exit discharge where every classroom throughout the building has at least one exterior exit door at ground level without intervening corridors, passageways, or exit enclosures.

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

1. Where a Group F-1 fire area exceeds 12,000 square feet (1115 m<sup>2</sup>);
2. Where a Group F-1 fire area is located more than three stories above grade; or
3. Where the combined area of all Group F-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m<sup>2</sup>); or
4. Where required by Section 280 of the *New York State Labor Law* for “factory buildings” defined in Section 2 of such law.

**903.2.3.1 Woodworking operations.** An automatic sprinkler system shall be provided throughout any Group

F-1 occupancy fire area that contains wood working operations in excess of 2,500 square feet (232 m<sup>2</sup>) in area that generate finely divided combustible waste or use finely divided combustible materials.

**903.2.3.2 Repair garages.** An automatic sprinkler system shall be provided throughout all buildings used as repair garages in accordance with Section 406, as follows:

1. Buildings two or more stories in height, including basements, with a fire area containing a repair garage exceeding 10,000 square feet (929 m<sup>2</sup>).
2. One-story buildings with a fire area containing a repair garage exceeding 12,000 square feet (1115 m<sup>2</sup>).
3. Buildings with a repair garage servicing vehicles parked in the basement.

**903.2.3.3 Group F-1 fire areas.** An automatic sprinkler system shall be provided throughout any Group F-1 occupancy fire area where any one of the following conditions exists:

1. The fire area exceeds 7,500 square feet (697 m<sup>2</sup>).
2. The fire area of any size is located more than three stories above grade.

**903.2.4 Group H.** Automatic sprinkler systems shall be provided in high-hazard occupancies as required in Sections 903.2.4.1 through 903.2.4.3 and the *New York City Fire Code*.

**903.2.4.1 General.** An automatic sprinkler system shall be installed in Group H occupancies. An automatic sprinkler system shall be installed throughout buildings with a main use or dominant occupancy of Group H.

**903.2.4.2 Group H-5.** An automatic sprinkler system shall be installed throughout buildings containing Group H-5 occupancies. The design of the sprinkler system shall not be less than that required by this code for the occupancy hazard classifications in accordance with Table 903.2.4.2. Where the design area of the sprinkler system consists of a corridor protected by one row of sprinklers, the maximum number of sprinklers required to be calculated is 13.

[F] TABLE 903.2.4.2  
GROUP H-5 SPRINKLER DESIGN CRITERIA

LOCATION	OCCUPANCY HAZARD CLASSIFICATION
Fabrication areas	Ordinary Hazard Group 2
Service corridors	Ordinary Hazard Group 2
Storage rooms without dispensing	Ordinary Hazard Group 2
Storage rooms with dispensing	Extra Hazard Group 2
Corridors	Ordinary Hazard Group 2

**903.2.4.3 Pyroxylin plastics.** An automatic sprinkler system shall be provided in buildings, or portions thereof, where cellulose nitrate film or pyroxylin plastics are manufactured, stored or handled in quantities exceeding 100 pounds (45 kg).

**903.2.5 Group I.** An automatic sprinkler system shall be provided in Group I occupancies. An automatic sprinkler system shall be installed throughout buildings with a main use or dominant occupancy of Group I.

**Exception:** An automatic sprinkler system installed in accordance with Section 903.3.1.2 or 903.3.1.3 shall be allowed in Group I-1 facilities.

**903.2.6 Group M.** An automatic sprinkler system shall be provided throughout buildings containing a Group M occupancy where any one of the following conditions exists:

1. Where a Group M fire area exceeds 12,000 square feet (1115 m<sup>2</sup>);
2. Where the combined area of all Group M fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m<sup>2</sup>).

**903.2.6.1 High-piled storage.** An automatic sprinkler system shall be provided in accordance with the *New York City Fire Code* in all buildings of Group M where storage of merchandise is in high-piled or rack storage arrays.

**903.2.6.2 Group M fire areas.** An automatic sprinkler system shall be provided throughout any Group M occupancy fire area where any one of the following conditions exists:

1. The fire area exceeds 7,500 square feet (697 m<sup>2</sup>).
2. The fire area of any size is located more than 3 stories above grade.
3. The fire area of any size is located in a high-rise building.
4. The fire area of any size contains an unenclosed stair or escalator connecting two or more floors.

**903.2.7 Group R.** An automatic sprinkler system shall be installed in Group R fire areas. An automatic sprinkler system shall be installed throughout buildings with a main use or dominant occupancy of Group R.

**Exception:** An automatic sprinkler system shall not be required in detached one- and two-family dwellings and multiple single-family dwellings (townhouses), provided that such structures are not more than three stories above grade plane in height and have separate means of egress.

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

1. A Group S-1 fire area exceeds 12,000 square feet (1115 m<sup>2</sup>);
2. The building is greater than 1,000 square feet (92.9 m<sup>2</sup>) in area and the main use or dominant occupancy is Group S-1; or
3. The combined area of all Group S-1 fire areas on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m<sup>2</sup>).

**903.2.8.1 Group S-1 fire areas.** An automatic sprinkler system shall be provided throughout any Group S-1 occupancy fire area where any one of the following conditions exists:

1. The fire area exceeds 500 square feet (46 m<sup>2</sup>).
2. The fire area of any size is located more than 3 stories above grade.

**903.2.8.2 Bulk storage of tires.** Buildings and structures where the area for the storage of tires exceeds 500 square feet (47 m<sup>2</sup>) or 7,500 cubic feet (212 m<sup>3</sup>) shall be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

**903.2.9 Group S-2.** An automatic sprinkler system shall be installed throughout buildings greater than 5,000 square feet (465 m<sup>2</sup>) in area where the main use or dominant occupancy is Group S-2.

**903.2.9.1 Commercial parking garages.** An automatic sprinkler system shall be provided throughout buildings used for storage of commercial trucks or buses where the fire area exceeds 5,000 square feet (465 m<sup>2</sup>).

**903.2.9.2 Group S-2 fire areas.** An automatic sprinkler system shall be provided throughout any Group S-2 occupancy fire area greater than 5,000 square feet (465 m<sup>2</sup>).

**903.2.9.3 Parking garages.** An automatic sprinkler system shall be provided throughout buildings classified as enclosed parking garages in accordance with Section 406.4 or where an open or enclosed parking garage is located beneath other occupancy groups.

**Exception:** Parking garages located beneath Group R-3 occupancies.

**903.2.10 All occupancies.** An automatic sprinkler system shall be installed in the locations set forth in Sections 903.2.10.1 through 903.2.10.6.

**903.2.10.1 Above- or below-grade stories.** An automatic sprinkler system shall be installed throughout every above- or below-grade story of all buildings where the floor area exceeds 1,500 square feet (139.4 m<sup>2</sup>) and where there is not provided at least one of the following types of exterior wall openings:

1. Openings below grade that lead directly to ground level by an exterior stairway complying with Section 1009 or an outside ramp complying with Section 1010. Openings shall be located in each 50 linear feet (15 240 mm), or fraction thereof, of exterior walls facing onto a street, public way or frontage space, in the story on at least one side.
2. Openings entirely above the adjoining ground level totaling at least 20 square feet (1.86 m<sup>2</sup>) in each 50 linear feet (15 240 mm), or fraction thereof, of exterior walls facing onto a street, public way or frontage space, in the story on at least one side.

**903.2.10.1.1 Opening dimensions and access.** Such openings shall have a minimum dimension of not less

than 30 inches (762 mm). Such openings shall be accessible to the Fire Department from the exterior and shall not be obstructed in a manner that fire fighting or rescue cannot be accomplished from the exterior.

**903.2.10.1.2 Openings on one side only.** Where such openings in a story are provided on only one side and the opposite wall of such story is more than 100 feet (30 480 mm) from such openings, the story shall be equipped throughout with an approved automatic sprinkler system, or openings as specified above shall be provided on at least two sides of the story.

**903.2.10.1.3 Below-grade stories.** Where any portion of a below-grade story is located more than 75 feet (22 860 mm) from openings required by Section 903.2.10.1, the below-grade story shall be equipped throughout with an approved automatic sprinkler system.

**903.2.10.2 Rubbish and linen chutes.** An automatic sprinkler system shall be installed at the top of rubbish and linen chutes, in chute access rooms, and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Chute sprinklers shall be accessible for servicing.

**903.2.10.3 Buildings over 55 feet in height.** An automatic sprinkler system shall be installed throughout buildings with a floor level having an occupant load of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access.

**903.2.10.4 Steel-plated and vault-like occupancies.** An automatic sprinkler system shall be installed throughout all steel-plated or similarly reinforced or secured vault-like occupancies regardless of area.

**903.2.10.5 Refuse collection and disposal areas.** An automatic sprinkler system shall be installed throughout all areas used for the storage and sorting of refuse and recyclables.

**903.2.10.6 Laundry drying areas.** An automatic sprinkler system shall be installed in spaces in which two or more clothes drying machines are installed. Sprinkler heads shall be spaced to cover the areas 5 feet (1524 mm) on all sides of the drying machines.

**903.2.11 During construction.** Automatic sprinkler systems required during construction, alteration and demolition operations shall be provided in accordance with Chapter 33 and the *New York City Fire Code*.

**903.2.12 Other hazards.** Automatic sprinkler protection shall be provided for the hazards indicated in Sections 903.2.12.1 and 903.2.12.2.

**903.2.12.1 Ducts conveying hazardous exhausts.** Where required by the *New York City Mechanical Code*, automatic sprinklers shall be provided in ducts convey-

ing hazardous exhaust, or flammable or combustible materials.

**Exception:** Ducts in which the largest cross-sectional diameter of the duct is less than 10 inches (254 mm).

**903.2.12.2 Commercial cooking operations.** An automatic sprinkler system shall not be installed in a commercial kitchen exhaust hood and duct system. Fire-extinguishing systems shall be installed in commercial cooking systems in accordance with Section 904.11.

**903.2.13 Other buildings, occupancies and areas.** In addition to the requirements of Section 903.2, the provisions indicated in Table 903.2.13 also require the installation of a suppression system for certain buildings and areas. Suppression systems shall also be required as provided for in other sections of this code, the *New York City Fuel Gas Code*, and the *New York City Mechanical Code*.

[F] TABLE 903.2.13  
ADDITIONAL REQUIRED SUPPRESSION SYSTEMS

SECTION	SUBJECT
402.8	Covered malls
403.2, 403.3	High-rise buildings
404.3	Atriums
405.3	Underground structures
407.5	Group I-2
410.6	Stages
411.4	Special amusement buildings
415.7.2.4	Group H-2
416.4	Flammable finishes
417.4	Drying rooms
507	Unlimited area buildings
NYCFC	NFPA-13 as modified for NYC

**903.3 Installation requirements.** Automatic sprinkler systems shall be designed and installed in accordance with Sections 903.3.1 through 903.3.7.

**903.3.1 Standards.** Sprinkler systems shall be designed and installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.

**903.3.1.1 NFPA 13 sprinkler systems.** Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, sprinklers shall be installed throughout in accordance with NFPA 13 as modified in Appendix Q except as provided in Section 903.3.1.1.1.

**903.3.1.1.1 Exempt locations protected by other means.** 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 and an alternative extinguishing system

in accordance with Section 904. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistance-rated construction or contains electrical equipment.

1. Any room where the application of water, or flame and water, constitutes a serious life or fire hazard.
2. Any room or space where sprinklers are considered undesirable because of the nature of the contents, when approved by the commissioner.
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.

**903.3.1.2 NFPA 13R sprinkler systems.** Where allowed in buildings of Group R, up to and including six stories in height, automatic sprinkler systems shall be installed throughout in accordance with NFPA 13R as modified in Appendix Q.

**903.3.1.2.1 Balconies.** Sprinkler protection shall be provided for exterior balconies and ground-floor patios of dwelling units where the building is of Type V construction and automatic sprinkler protection is required for the Group R occupancy. Side wall sprinklers that are used to protect such areas shall be permitted to be located such that their deflectors are within 1 inch (25 mm) to 6 inches (152 mm) below the structural members, and a maximum distance of 14 inches (356 mm) below the deck of the exterior balconies that are constructed of open wood joist construction.

**903.3.1.3 NFPA 13D sprinkler systems.** Where allowed, automatic sprinkler systems in one- and two-family dwellings shall be installed throughout in accordance with NFPA 13D as modified.

**903.3.2 Quick-response and residential sprinklers.** Where automatic sprinkler systems are required by this code, quick-response or residential automatic sprinklers shall be installed in the following areas in accordance with Section 903.3.1 and their listings:

1. Throughout all spaces within a smoke compartment containing patient dwelling units in Group I-2 in accordance with this code.
2. Dwelling units in Group R and I-1 occupancies.
3. Light-hazard occupancies as defined in NFPA 13.

**903.3.3 Obstructed locations.** Automatic sprinklers shall be installed with due regard to obstructions that will delay activation or obstruct the water distribution pattern. Automatic sprinklers shall be installed in or under covered kiosks, displays, booths, concession stands, or equipment that exceeds 4 feet (1219 mm) in width. Not less than a 3-foot (914 mm) clearance shall be maintained between

automatic sprinklers and the top of piles of combustible fibers.

**Exception:** Kitchen equipment under exhaust hoods protected with a fire-extinguishing system in accordance with Section 904.

**903.3.4 Actuation.** Automatic sprinkler systems shall be automatically actuated unless otherwise specifically provided in this code.

**903.3.5 Water supplies.** Water supplies for automatic sprinkler systems shall comply with this section and the standards referenced in Section 903.3.1. The potable water supply shall be protected against back flow in accordance with the requirements of this section, the *New York City Plumbing Code*, and Rules of the New York City Department of Environmental Protection.

**903.3.5.1 Domestic services.** Where the domestic service provides the water supply for the automatic sprinkler system, the supply shall be in accordance with NFPA 13.

**903.3.5.1.1 Limited area sprinkler systems.** Limited area sprinkler systems serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available. Limited area sprinkler systems connected to domestic water supplies shall comply with NFPA 13.

The domestic service shall be capable of supplying the simultaneous domestic demand and the sprinkler demand required to be hydraulically calculated by NFPA 13, NFPA 13R or NFPA 13D.

**903.3.5.1.2 Residential combination services.** A single combination water supply shall be permitted in accordance with NFPA 13R.

**903.3.5.2 Secondary water supply.** A secondary on-site water supply equal to the hydraulically calculated sprinkler demand, including the hose stream requirement, shall be provided for high-rise buildings in Seismic Design Category C or D as determined by this code, and in any high-rise building greater than 300 feet (91 440 mm) in height. The secondary water supply shall have a duration not less than 30 minutes as determined by the occupancy hazard classification in accordance with NFPA 13.

**903.3.6 Hose threads.** Fire hose threads used in connection with automatic sprinkler systems shall be approved and compatible with Fire Department hose threads.

**903.3.7 Fire Department connections.** The location of Fire Department connections shall be installed in accordance with Section 905 of this code.

**903.4 Sprinkler system monitoring and alarms.** All valves controlling the water supply for automatic sprinkler systems, pumps, tanks, water levels and temperatures, critical air pres-



tures and water-flow switches on all sprinkler systems shall be electrically supervised by the fire alarm system.

**Exceptions:**

1. Automatic sprinkler systems protecting one- and two-family dwellings.
2. 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 systems and a separate shutoff valve for the automatic sprinkler system is not provided.
3. Jockey pump control valves that are sealed or locked in the open position.
4. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
5. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
6. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.

**903.4.1 Signals.** Alarm, supervisory and trouble signals shall be distinctly different and automatically transmitted to an approved central station, remote supervising station or proprietary supervising station as defined in NFPA 72 or, when approved by the commissioner, shall sound an audible signal at a constantly attended location.

**Exceptions:**

1. Underground key or hub valves in roadway boxes provided by the city or a public utility are not required to be monitored.
2. Back flow prevention device test valves, located in limited area sprinkler system supply piping, shall be locked in the open position. In occupancies required to be equipped with a fire alarm system, the back flow preventer valves shall be electrically supervised by a tamper switch installed in accordance with NFPA 72 and separately annunciated.

**903.4.2 Alarms.** Approved audible devices shall be connected to every automatic sprinkler system. Such sprinkler water-flow 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. Alarm devices shall be provided on the exterior of the building in an approved location. Where a fire alarm system is installed, actuation of the automatic sprinkler system shall actuate the building fire alarm system.

**903.4.3 Floor control valves.** Approved supervised indicating control valves shall be provided at the point of connection to the riser on each floor in high-rise buildings.

**903.5 Testing and maintenance.** Sprinkler systems shall be tested and maintained in accordance with the *New York City Fire Code*.

## SECTION BC 904 ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

**904.1 General.** Automatic fire-extinguishing systems, other than automatic sprinkler systems, shall be designed, installed, inspected, tested and maintained in accordance with the provisions of this section, the *New York City Fire Code*, and the applicable referenced standards.

**904.1.1 Construction documents.** Construction documents for alternative automatic fire-extinguishing systems shall be approved by the Fire Department and shall contain plans that include at least the following data and information:

1. Commercial kitchen suppression systems:
  - 1.1. Location of all surface, plenum and duct nozzles; surface dimensions and location of all cooking appliances; the location of automatic fuel shutoff and statement as to type (gas or electric); location and distance of the remote control or manual pull station;
  - 1.2. Identification of the grease filters to be used in any kitchen hood; the dimensions of all hoods and all related ducts, including termination of duct at the exterior of the building;
  - 1.3. Identification of the fire suppression piping system; the make and model of the system; the type of extinguishing agent and number and size of agent containers; size, length, and type of all piping that will be used; the number and location of all fusible links or detectors and the temperature setting; any surface, plenum and duct nozzles.
2. For extinguishing agent systems, the plan should also include type and concentration of the extinguishing agent, the method of providing power supply to smoke or heat detectors, fire rating of partitions, location of all audible/visible alarms within and outside the location involved and the details of construction of the room to contain the extinguishing agent. If the area is not sprinklered, the following information is required:
  - 2.1. The size and location of the reserve supply, and
3. The plans must note whether the proposed system is connected to the building's fire alarm system.

**Exception:** For that portion of a fire suppression piping system within an approved preengineered system, a schematic isometric diagram shall be acceptable in lieu of full plans, provided that the location and method of pressure relief must be indicated with areas and volumes to where said relief is taken.

**904.2 Where required.** Automatic fire-extinguishing systems installed as an alternative to the required automatic sprinkler systems of Section 903 shall be approved by the commissioner. Automatic fire-extinguishing systems shall not be considered

alternatives for the purposes of exceptions or reductions permitted by other requirements of this code.

**Exception:** Automatic fire-extinguishing systems installed in Group H occupancies as an alternative to the required automatic sprinkler systems of Section 903 shall be approved by the fire commissioner.

**904.2.1 Hood system suppression.** Each required commercial kitchen exhaust hood and duct system required by the *New York City Fire Code* or the *New York City Mechanical Code* to have a Type I hood shall be protected with an approved automatic fire-extinguishing system installed in accordance with this code.

**904.3 Installation.** Automatic fire-extinguishing systems shall be installed in accordance with this section.

**904.3.1 Electrical wiring.** Electrical wiring shall be in accordance with the *New York City Electrical Code*.

**904.3.2 Actuation.** Automatic fire-extinguishing systems shall be automatically actuated and provided with a manual means of actuation in accordance with Section 904.11.1.

**904.3.3 System interlocking.** Automatic equipment interlocks with fuel shutoffs, ventilation controls, door closers, window shutters, conveyor openings, smoke and heat vents and other features necessary for proper operation of the fire-extinguishing system shall be provided as required by the design and installation standard utilized for the hazard.

**904.3.4 Alarms and warning signs.** Where alarms are required to indicate the operation of automatic fire-extinguishing systems, distinctive audible and visible alarms and warning signs shall be provided to warn of pending agent discharge. Where exposure to automatic-extinguishing agents poses a hazard to persons and a delay is required to ensure the evacuation of occupants before agent discharge, a separate warning signal shall be provided to alert occupants once agent discharge has begun. Audible signals shall be in accordance with Section 907.9.2.

**904.3.5 Monitoring.** Where a building fire alarm system is installed, automatic fire-extinguishing systems shall be monitored by the building fire alarm system in accordance with NFPA 72.

**904.4 Inspection and testing.** Automatic fire-extinguishing systems shall be inspected and tested in accordance with the provisions of this section prior to acceptance.

**904.4.1 Inspection.** Prior to conducting final acceptance tests, the following items shall be inspected:

1. Hazard specification for consistency with design hazard.
2. Type, location and spacing of automatic- and manual-initiating devices.
3. Size, placement and position of nozzles or discharge orifices.
4. Location and identification of audible and visible alarm devices.
5. Identification of devices with proper designations.

6. Operating instructions.

**904.4.2 Alarm testing.** Notification appliances, connections to fire alarm systems and connections to approved supervising stations shall be tested in accordance with this section and Section 907 to verify proper operation.

**904.4.2.1 Audible and visible signals.** The audibility and visibility of notification appliances signaling agent discharge or system operation, where required, shall be verified.

**904.4.3 Monitor testing.** Connections to protected premises and supervising station fire alarm systems shall be tested to verify proper identification and retransmission of alarms from automatic fire-extinguishing systems.

**904.5 Wet-chemical systems.** Wet-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

**904.6 Dry-chemical systems.** Dry-chemical extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*. New dry-chemical extinguishing systems are not permitted for the protection of kitchen equipment.

**904.7 Foam systems.** Foam-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

**904.8 Carbon dioxide systems.** Carbon dioxide extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

**904.9 Halon systems.** Halogenated extinguishing systems shall not be permitted. However, existing systems shall be maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

**904.10 Clean-agent systems.** Clean-agent fire-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

**904.11 Commercial cooking systems.** The automatic fire-extinguishing system for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Pre-engineered automatic wet-chemical extinguishing systems shall be approved by the fire commissioner, tested in accordance with UL 300, and listed and labeled for the intended application. The protected area shall include the area under the hood and over the cooking equipment, the area above or behind the filters and the opening of the hood into the branch duct. Where a preengineered system is installed and the size of the protected area exceeds that allowed for a single preengineered system, additional preengineered systems arranged for simultaneous operation shall be provided. Other types of automatic fire-extinguishing systems shall be listed and labeled for specific use as protection for commercial cooking operations. The system shall be installed in accordance with this code, its listing and the manufacturer's installation instructions. Automatic fire-extinguishing systems of the following types shall be installed in accordance with the

*New York City Fire Code* and the referenced standard indicated, as shown:

1. Carbon dioxide extinguishing systems, in accordance with the *New York City Fire Code*.
2. Wet-chemical extinguishing systems, in accordance with the *New York City Fire Code*.

**904.11.1 Manual system operation.** A manual actuation device shall be located at or near a means of egress from the cooking areas, a minimum of 10 feet (3048 mm) and a maximum of 20 feet (6096 mm) from the kitchen exhaust system. The manual activation device shall be located at a minimum of 42 inches (1067 mm) and a maximum of 48 inches (1219 mm) above the floor at its center. The manual actuation device 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.

**904.11.2 System interconnection.** The actuation of the fire suppression system shall automatically shut down the fuel or electrical power supply to the cooking equipment. The fuel and electrical supply reset shall be manual.

**904.11.3 Carbon dioxide systems.** When carbon dioxide systems are used, there shall be a nozzle at the top of the ventilating duct. Additional nozzles that are symmetrically arranged to give uniform distribution shall be installed within vertical ducts exceeding 20 feet (6096 mm) and horizontal ducts exceeding 50 feet (15 240 mm). Dampers shall be installed at either the top or the bottom of the duct and shall be arranged to operate automatically upon activation of the fire-extinguishing system. Where the damper is installed at the top of the duct, the top nozzle shall be immediately below the damper. Automatic carbon dioxide fire-extinguishing systems shall be sufficiently sized to protect against all hazards venting through a common duct simultaneously.

**904.11.3.1 Ventilation system.** Commercial-type cooking equipment protected by an automatic carbon dioxide-extinguishing system shall be arranged to shut off the ventilation system upon activation.

**904.12 Water-mist systems.** Water-mist fire-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with the *New York City Fire Code*.

## SECTION BC 905 STANDPIPE SYSTEMS

**905.1 General.** Standpipe systems shall be provided in buildings and structures in accordance with this section. Fire hose threads used in connection with standpipe systems shall be approved by the fire commissioner. The location of Fire Department hose connections shall be approved by the fire commissioner. Standpipe systems in buildings used for high-piled combustible storage shall be in accordance with the *New York City Fire Code*. Installation of standpipe systems shall comply with the special inspection requirements of Chapter 17.

Any space or room that contains equipment of such nature that the use of water would be ineffective in fighting a fire therein, or would be otherwise hazardous, shall have a conspicuous sign on each door opening on such space or room stating the nature of the use and the warning: "IN CASE OF FIRE, USE NO WATER."

**905.1.1 Construction documents.** Construction documents for standpipe systems shall contain plans that include at least the following data and information:

1. The locations and sizes of all risers, cross-connections, hose racks, valves, siamese connections, sources of water supply, piping, and other essential features of the system;
2. A floor plan for each group of floors that have typical riser locations and no special features within such group of floor levels, with the indication in title block of such plan indicating clearly the floors to which the arrangement is applicable;
3. A riser diagram showing the essential features of the system, including the risers, cross-connections, valves, siamese connections, tanks, pumps, sources of water supply, pipe sizes, capacities, floor heights, zone pressures, and other essential data and features of the system; and
4. The available water pressure at the top and bottom floors of each zone, and at each floor where the weight pipe fittings change, shall be shown on the riser diagram;
5. For street pressure-fed systems and fire pumps, a statement from the New York City Department of Environmental Protection, giving the minimum water pressure in the main serving the building.

**905.2 Installation standards.** Standpipe systems shall be installed in accordance with this section and NFPA 14 as modified in Appendix Q.

**905.3 Required installations.** Standpipe systems shall be installed where required by Sections 905.3.1 through 905.3.6 and in the locations indicated in Sections 905.4, 905.5 and 905.6. Standpipe systems are permitted to be combined with automatic sprinkler systems.

**Exception:** Standpipe systems are not required in buildings occupied entirely by Group R-3.

**905.3.1 Applicability.** Class III standpipe systems shall be installed throughout the following buildings:

1. In buildings two stories or more in height with floor area of 10,000 square feet (929 m<sup>2</sup>) or greater on any story;
2. In buildings three stories or more in height with floor area of 7,500 square feet (697 m<sup>2</sup>) or greater on any story;
3. In buildings of any area with a floor level having an occupant load of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of Fire Department vehicle access;

4. In buildings of any area, constructed in accordance with Section 403, with occupied floors located 75 feet (22 860 mm) or more above the lowest level of Fire Department vehicle access.

**Exceptions:** The following exceptions are allowed as an alternative to the requirement of a Class III standpipe system:

1. Class I standpipes are allowed in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 provided that the following additional requirements are met:
  - 1.1. A locked storage cabinet shall be provided on the main entrance floor in a location approved by the Fire Commissioner near the standpipe riser enclosure. Such cabinet shall contain at least three open nozzles, two 1.5-inch (38 mm) spanner wrenches, two 2.5-inch (64 mm) spanner wrenches, two 2.5-inch (64 mm) by 1.5 inch (38 mm) nonswivel reducing couplings, and 375 feet (114 m) of 1.5 inch (38 mm) hose. However, the hose may be omitted when serving Group R-2 occupancies.
    - 1.1.1. A key for unlocking the storage cabinet shall be kept in a location where it is readily available to authorized persons, but not available to the general public. A sign shall be placed on the storage cabinet indicating the location of such key.
    - 1.1.2. An additional labeled key shall be kept in a locked receptacle near the storage cabinet openable by a Fire Department standard key. Such receptacle shall be labeled, "FOR FIRE DEPARTMENT USE ONLY."
    - 1.1.3. A metal sign shall be placed in each stair enclosure on the main entrance floor stating clearly where the storage cabinet is located.
  - 1.2. Hose valves are capped with a hose valve cap fastened to the valve with a chain.
2. Class I manual standpipes are allowed in open parking garages where the highest floor is located not more than 150 feet (45 720 mm) above the lowest level of fire department vehicle access.
3. Class I manual dry standpipes are allowed in open parking garages that are subject to freezing temperatures, provided that the hose connections are located as required for Class II standpipes in accordance with Section 905.5.
4. Class I standpipes are allowed in below-grade stories equipped throughout with an automatic sprinkler system.

5. Standpipe outlets may be omitted in portions of first floors or basements that are completely separated from the entrance hall or enclosed stairways leading to the upper floors, provided that portable fire extinguishers are installed, subject to the approval of the fire commissioner.

**905.3.2 Group A.** Class I automatic wet standpipes shall be provided in nonsprinklered Group A buildings having an occupant load exceeding 1,000 persons.

**Exceptions:**

1. Open-air-seating spaces without enclosed spaces.
2. Class I automatic dry and semiautomatic dry standpipes or manual wet standpipes are allowed in buildings where the highest floor surface used for human occupancy is 75 feet (22 860 mm) or less above the lowest level of fire department vehicle access. Dry standpipes are permitted only where subject to freezing temperatures.

**905.3.3 Covered mall buildings.** Covered mall buildings and buildings connected thereto shall be equipped throughout with a Class I automatic wet standpipe system, except as permitted by Sections 905.3.3.1 through 905.3.3.3.

**905.3.3.1 Covered-mall building height.** Covered-mall buildings where the highest occupied floor level is located not more than 30 feet (9144 mm) above the lowest level of the Fire Department vehicle access shall be permitted to be provided with Class I hose connections connected to the mall sprinkler system in accordance with Section 8.16.5.2 of NFPA 13 regarding hose connections for Fire Department use and under the following conditions:

1. Any individual outlet shall be capable of delivering water flow at a rate of 250 gallons per minute (946 L/m) while concurrently supplying the mall sprinkler demand; and
2. Each of the two most hydraulically remote outlets shall be capable of concurrently delivering 250 gallons per minute (946 L/m) at a pressure of 100 pounds per square inch (689.4 kPa) with no mall sprinkler demand, based on a supply pressure at the system Fire Department connection of not more than 175 pounds per square inch (1207 kPa). Adequacy of the water supply available to the Fire Department to meet the hydraulic calculations shall be demonstrated by the registered design professional.

**905.3.3.2 Location of hose connections.** Hose connections shall be provided in accordance with Section 905.4 and at each of the following locations:

1. Within the mall at the entrance to each exit passageway or exit.
2. At each floor-level landing within enclosed stairways opening directly on the mall.
3. At exterior public entrances to the mall.

**905.3.3.3 Installation standard.** Except as provided in Sections 905.3.3.1 and 905.3.3.2, the Class I hose connections and Fire Department connections shall be designed in conformance with NFPA 14.

**905.3.4 Stages.** Stages greater than 1,000 square feet in area (93 m<sup>2</sup>) shall be equipped with a Class III wet standpipe system with 1.5-inch and 2.5-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, the hose connections are allowed to be supplied from the automatic sprinkler system in accordance with NFPA 13 Section 8.16.5.2 and shall have a flow rate of not less than that required by NFPA 14 for Class III standpipes.

**905.3.4.1 Hose and cabinet.** The 1.5-inch (38 mm) hose connections shall be equipped with sufficient lengths of 1.5-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.

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

**905.3.6 Helistops and heliports.** Buildings with a helistop or heliport that are equipped with a standpipe shall extend the standpipe to the roof level on which the helistop or heliport is located in accordance with the *New York City Fire Code*. All portions of the helistop and heliport area shall be within 150 feet (45 720 mm) of a 2½-inch (64 mm) outlet on a Class I or III standpipe, in accordance with the *New York City Fire Code*.

**905.4 Location of Class I standpipe hose connections.** Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required stairway, a hose connection shall be provided for each floor level above or below grade. Hose connections shall be readily accessible and located at the riser on each floor-level landing and on the entrance floor above the standpipe riser control valve. Nonrequired enclosed stairways are not required to have hose connections. Stairways without hose connections shall have a sign on the door to the stairway stating, "No standpipe connections in stairway."
2. On each side of the wall adjacent to the exit opening of a horizontal exit.
3. In every exit passageway at the entrance from the exit passageway to the other areas of a building.
4. In covered mall buildings, in accordance with Section 905.3.3.2.
5. Where the roof has a slope of less than four units vertical in 12 units horizontal (33.3-percent slope), each standpipe shall be provided with a hose connection located either on the roof or at the highest landing of stairways with stair access to the roof. An additional hose

connection shall be provided at the top of the most hydraulically remote standpipe for testing purposes.

6. Where the most remote portion of a floor or story is more than 150 feet (45 720 mm) from a hose connection, additional hose connections shall be provided in approved locations. For the purposes of this section, a penthouse with an occupant load greater than 10 shall be considered a story.

**905.4.1 Protection.** Risers and laterals of Class I standpipe systems not located within an enclosed stairway or pressurized enclosure shall be protected by a degree of fire resistance equal to that required for vertical enclosures in the building in which they are located. No standpipe riser shall be placed in any shaft containing a gas or fuel pipeline.

**Exception:** In buildings equipped throughout with an approved automatic sprinkler system, laterals that are not located within an enclosed stairway or pressurized enclosure are not required to be enclosed in fire-resistance-rated construction.

**905.4.2 Interconnection.** In buildings where more than one standpipe is provided, the standpipes shall be interconnected in accordance with NFPA 14.

**905.5 Location of Class II standpipe hose connections.** Class II standpipe hose connections shall be accessible and located so that all portions of the building are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose.

**905.5.1 Groups A-1 and A-2.** In Group A-1 and A-2 occupancies with occupant loads of more than 1,000, hose connections shall be located on each side of any stage.

**905.5.2 Protection.** Fire-resistance-rated protection of risers and laterals of Class II standpipe systems is not required.

**905.6 Location of Class III standpipe hose connections.** Class III standpipe systems shall have hose connections located as required for Class I standpipes in Section 905.4 and shall have Class II hose connections as required in Section 905.5.

**905.6.1 Protection.** Risers and laterals of Class III standpipe systems shall be protected as required for Class I systems in accordance with Section 905.4.1.

**905.6.2 Interconnection.** In buildings where more than one standpipe is provided, the standpipes shall be interconnected in accordance with NFPA 14.

**905.7 Cabinets.** Cabinets containing fire-fighting equipment such as standpipes, fire hoses, fire extinguishers or Fire Department valves shall not be blocked from use or obscured from view.

**905.7.1 Cabinet equipment identification.** Cabinets shall be identified in an approved manner by a permanently attached sign with white letters not less than 2 inches (51 mm) high and a red background color, indicating the equipment contained therein.

**Exception:** Doors that have either an approved visual identification clear glass panel or a complete glass door panel are not required to be marked.

**905.7.2 Locking cabinet doors.** Cabinets shall be unlocked.

**Exceptions:**

1. Visual identification panels of glass or other approved transparent frangible material that is easily broken and allows access.
2. Approved locking arrangements.
3. Locking of cabinets shall be permitted in Group I-3.

**905.8 Dry standpipes.** Dry standpipes shall not be installed.

**Exception:** Where subject to freezing and in accordance with NFPA 14.

**905.9 Valve supervision.** Valves controlling water supplies shall be supervised in the open position so that a change in the normal position of the valve will generate a supervisory signal at the supervising station required by Section 903.4. Where a fire alarm system is provided, a signal shall also be transmitted to the control unit.

**Exceptions:**

1. Valves to underground key or hub valves in roadway boxes provided by the city or a public utility do not require supervision.
2. Valves locked in the normal position and inspected as provided in this code in buildings not equipped with a fire alarm system.

**905.10 During construction.** Standpipe systems required during construction, alteration and demolition operations shall be provided in accordance with Section 3303.8.

**SECTION BC 906  
PORTABLE FIRE EXTINGUISHERS**

**906.1 General.** Portable fire extinguishers shall be provided in occupancies and locations as required by the *New York City Fire Code*.

**SECTION BC 907  
FIRE ALARM AND DETECTION SYSTEMS**

**907.1 General.** This section covers the application, installation, performance and maintenance of fire alarm systems and their components. Systems shall be designed and installed in accordance with NFPA 72 as modified in Appendix Q and the *New York City Electrical Code*.

**907.1.1 Construction documents.** Construction documents for fire alarm systems shall be submitted for review and approval to the department and the Fire Department prior to system installation. Construction documents 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 and notification appliances.
3. Alarm control and trouble signaling equipment.
4. Annunciation.

5. Power connection.
6. Fire alarm riser diagram and all fire alarm devices indicated on the floor plans. Quantities of devices on the floor plans shall match the quantities indicated on the riser diagram.
7. Copies of any variances granted by the department or the Fire Department.
8. Legend of all fire alarm symbols and abbreviations used.
9. Design criteria for fire alarm audibility in various occupancies indicated on plans.
10. Fire alarm sequence of operation for the fire alarm control panel and the central station transmitter.
11. The interface of fire safety control functions.

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

**907.2 Where required.** An approved manual, automatic or manual and automatic fire alarm system shall be provided in accordance with Sections 907.2.1 through 907.2.21. Where automatic sprinkler protection, installed in accordance with Section 903.3.1.1 or 903.3.1.2, is provided and connected to the building fire alarm system, automatic heat detection required by this section shall not be required. An approved automatic fire detection system shall be installed in accordance with the provisions of this code, the *New York City Mechanical Code*, and NFPA 72. Devices, combinations of devices, appliances and equipment shall comply with Section 907.1.2. The automatic fire detectors shall be smoke detectors, except that an approved alternative type of detector shall be installed in spaces such as boiler rooms where, during normal operation, products of combustion are present in sufficient quantity to actuate a smoke detector. All initiating devices related to fire or life safety, other than smoke alarms, shall be connected to the fire alarm system.

In all occupancies where an automatic fire alarm system is required by this section, selective coverage smoke detectors shall be located as follows, unless partial or total coverage automatic detection is specified.

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, in elevator machine rooms, and in elevator lobbies.
2. In air distribution systems in accordance with Section 606 of the *New York City Mechanical Code*.

**907.2.1 Group A.** A manual and automatic fire alarm system shall be installed in accordance with NFPA 72 in Group A occupancies having an occupant load of 300 or more. 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 and the notification appliances will activate upon sprinkler water flow. This

exception shall not apply to Group A-2 occupancies used as a cabaret.

2. A Group A-2 occupancy used as a cabaret with an occupant load of 75 or more, including associated stages, dressing rooms, and property rooms, shall be equipped with a manual fire alarm system. Such a Group A-2 occupancy with an occupant load of 300 or more shall also be equipped with an automatic fire alarm system.

#### 907.2.1.1 System initiation in Group A occupancies.

Activation of the fire alarm in Group A-1 occupancies with an occupant load of 300 or more, and in all other Group A occupancies with an occupant load of 1,000 or more, shall initiate a presignal system at a constantly attended location from which the Fire Department shall be notified and live voice evacuation instructions shall be initiated using an emergency voice/alarm communications system in accordance with NFPA 72.

**907.2.1.2 Emergency power.** Emergency voice/alarm communications systems where required by Section 907.2.1.1 shall be provided with an approved emergency power source and shall be designed and installed in accordance with NFPA 72 and the *New York City Electrical Code*.

**907.2.2 Group B.** A manual and automatic fire alarm system shall be installed in Group B occupancies having an occupant load of 500 or more persons or more than 100 persons above or below the lowest level of exit discharge. Where such occupancies are not protected by an automatic sprinkler system, a manual fire alarm and partial coverage automatic smoke detection or automatic heat detection system shall be installed in accordance with NFPA 72.

**907.2.2.1 High-rise and large-area buildings.** In high-rise buildings constructed in accordance with Section 403, Group B occupied floors located more than 75 feet (22 860 mm) above the lowest level of Fire Department vehicle access or having a total gross area exceeding 100,000 square feet (9290 m<sup>2</sup>) shall comply with the requirements of Section 907.2.12.

**907.2.3 Group E.** A manual and automatic fire alarm system shall be installed in Group E occupancies. When automatic sprinkler systems or smoke detectors are installed, such systems or detectors shall be connected to the building fire alarm system.

**907.2.4 Group F.** A manual and automatic fire alarm system shall be installed in Group F occupancies that are two or more stories in height and have an occupant load of 100 or more, or when 25 persons or more are above or below the lowest level of exit discharge.

**907.2.5 Group H.** A manual and automatic fire alarm system shall be installed in Group H-5 occupancies and in occupancies used for the manufacture of organic coatings. In addition to the automatic fire alarm system requirements of Section 907.2, an automatic smoke detection system shall be installed for highly toxic gases, organic peroxides and

oxidizers in accordance with the *New York City Fire Code*, and shall be connected to a central station.

**Exceptions:** A smoke detection system shall not be required in detached storage buildings equipped throughout with an approved automatic fire-extinguishing system and used only to store the following:

1. Organic peroxides.
2. Liquid or solid oxidizers.

**907.2.6 Group I.** A manual and automatic fire alarm system and an automatic fire detection system shall be installed in Group I occupancies. An electrically supervised, automatic smoke detection system shall be provided in waiting areas that are open to corridors.

**907.2.6.1 Group I-2.** Corridors in nursing homes (both intermediate-care and skilled nursing facilities), detoxification facilities and spaces open to the corridors shall be equipped with an automatic fire detection system.

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

**907.2.6.2.1 System initiation.** Actuation of an automatic fire-extinguishing system, a manual fire alarm box or a fire detector shall initiate an approved alarm signal that automatically notifies staff. Presignal systems shall not be used.

**907.2.6.2.2 Manual fire alarm boxes.** Manual fire alarm boxes are not required to be located in accordance with Section 907.3 where the fire alarm boxes are provided at staff-attended locations having direct supervision over areas where manual fire alarm boxes have been omitted. Manual fire alarm boxes shall be permitted to be locked in areas occupied by detainees, provided that staff members are present within the subject area and have keys readily available to operate the manual fire alarm boxes.

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

#### Exceptions:

1. Other approved smoke detection arrangements providing equivalent protection including, but not limited to, placing detectors in exhaust ducts from cells or behind protective guards listed for the purpose are allowed when necessary to prevent damage or tampering.
2. Sleeping units in Use Conditions 2 and 3.
3. Smoke detectors are not required in sleeping units with four or fewer occupants in smoke compartments that are equipped throughout

with an approved automatic sprinkler system.

**907.2.7 Group M.** A manual and automatic fire alarm system shall be installed in Group M occupancies where any one of the following conditions exists:

1. Where a Group M fire area exceeds 12,000 square feet (1115 m<sup>2</sup>);
2. Where a Group M fire area is located more than three stories above grade;
3. Where the combined area of all Group M fire areas on all floors, including mezzanines, exceeds 24,000 square feet (2230 m<sup>2</sup>); or
4. Where a Group M fire area in a below-grade story exceeds 1,500 square feet (139 m<sup>2</sup>).

Where such occupancies are not protected by an automatic sprinkler system, a manual fire alarm and partial coverage automatic smoke detection or automatic heat detection system shall be installed in accordance with NFPA 72.

**907.2.8 Group R-1.** Fire alarm systems shall be installed in Group R-1 occupancies as required in Sections 907.2.8.1 through 907.2.8.3.

**907.2.8.1 Manual fire alarm system.** A manual fire alarm system shall be installed in Group R-1 occupancies.

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

**907.2.8.2 Automatic fire alarm system.** An automatic fire alarm system shall be installed in Group R-1 occupancies. In addition to the automatic fire alarm system requirements of Section 907.2, smoke detectors shall be installed in all public corridors serving dwelling units and in accordance with Section 907.2.8.3.

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

**907.2.8.3 Smoke detectors within dwelling units.** Smoke detectors and audible notification appliances shall be installed in dwelling units and shall be annunciated by dwelling unit at a constantly attended location from which the fire alarm system is capable of being manually activated. Smoke detectors are required in the following areas:

1. In sleeping areas.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the dwelling unit.

3. In each story within the unit, including below-grade stories. For dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level.

**907.2.9 Group R-2.** An automatic fire alarm system without alarm notification appliances shall be provided in accordance with this section in Group R-2 occupancies, other than student apartments, where such occupancy satisfies any one of the following conditions:

1. Any dwelling unit is located three or more stories above the lowest level of exit discharge, including dwelling units in penthouses of any area;
2. Any dwelling unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit; or
3. The building contains more than 16 dwelling units.

Actuation of smoke detectors shall not initiate a signal to alarm notification appliances. The activation of any detector required by this section shall initiate a signal at a central station or a constantly attended location. Smoke detectors shall be located as follows:

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, greater than 75 square feet (6.96 m<sup>2</sup>) in area.
2. In air distribution systems in accordance with Section 606 of the *New York City Mechanical Code*.
3. In elevator machine rooms and in elevator lobbies.

**907.2.9.1 Group R-2 student apartments.** Where the main use or dominant occupancy of a building is classified as R-2 student apartments, as defined in Section 310.2, fire alarm systems shall be installed in accordance with Section 907.2.8. Where the main use or dominant occupancy of a building is not classified as R-2 student apartments and the building is occupied partially by Group R-2 student apartments, fire alarm systems shall be installed in accordance with Sections 907.2.9.1.1 through 907.2.9.1.3.

**907.2.9.1.1 Manual fire alarm system.** A manual fire alarm system shall be installed throughout all public corridors serving student apartments and student-related uses. Student-related uses shall include common spaces such as recreation rooms, lounges, dining rooms, laundry rooms and storage rooms.

**Exceptions:**

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



2. A manual fire alarm system is not required in buildings containing fewer than 15 student apartments.

**907.2.9.1.2 Automatic fire alarm system.** An automatic fire alarm system without alarm notification appliances shall be installed in accordance with this section in Group R-2 student apartments and student-related uses. The activation of any smoke detector required by this section shall initiate a signal at a central station or a constantly attended location. Smoke detectors shall be located as follows:

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, in elevator machine rooms, and in elevator lobbies.
2. In air distribution systems in accordance with Section 606 of the *New York City Mechanical Code*.
3. Throughout all public corridors serving student apartments and student-related uses. Student-related uses shall include common spaces such as recreation rooms, lounges, dining rooms, laundry rooms and storage rooms. However, smoke detectors shall not be required in such public corridors in buildings containing fewer than 15 student apartments.

**Exception:** An automatic fire alarm system is not required in buildings not over two stories in height where all individual dwelling units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least 1-hour fire barriers and each individual dwelling unit has an exit directly to a public way, exit court or yard.

**907.2.9.1.3 Smoke alarms.** Smoke alarms shall be installed as required by Section 907.2.10.

**907.2.10 Single- and multiple-station smoke alarms.** Listed single- and multiple-station smoke alarms shall be installed in accordance with the provisions of this code and the household fire-warning equipment provisions of NFPA 72.

**907.2.10.1 Where required.** Single- or multiple-station smoke alarms shall be installed in the locations described in Sections 907.2.10.1.1.

**907.2.10.1.1 Smoke alarms in Groups R-2, R-3, and I-1.** Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, and I-1, regardless of occupant load at all of the following locations within a dwelling unit:

1. On the ceiling or wall outside of each room used for sleeping purposes within 15 feet (4572 mm) from the door to such room.
2. In each room used for sleeping purposes.

3. In each story within a dwelling unit, including below-grade stories and penthouses of any area, but not including crawl spaces and uninhabitable attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

**907.2.10.2 Power source.** Required smoke alarms shall receive their primary power from a dedicated branch circuit or the unswitched portion of a branch circuit also used for power and lighting, and shall be equipped with a battery backup. Smoke alarms shall emit a signal when the batteries are low. Wiring shall be permanent and without a disconnecting switch other than as required for over-current protection.

**907.2.10.3 Interconnection.** Where more than one smoke alarm or detector is required to be installed within an individual dwelling unit in Group R-2, R-3, or within an individual dwelling unit or sleeping unit in Group R-1, the smoke alarms or detectors shall be interconnected in such a manner that the activation of one alarm or detector will activate all of the alarms or detectors in the individual unit. The alarm or detector shall be clearly audible in all bedrooms over background noise levels with all intervening doors closed.

**907.2.10.4 Acceptance testing.** When the installation of the alarm devices is complete, each detector and interconnecting wiring for multiple-station alarm devices shall be tested in accordance with the household fire warning equipment provisions of NFPA 72.

**907.2.10.5 Group R-2 occupancy.** Smoke alarms shall be provided with the capability to support visible alarm notification appliances in accordance with ICC/ANSI A117.1.

**907.2.11 Special amusement buildings.** An approved automatic smoke detection system shall be provided in special amusement buildings in accordance with this section.

**Exception:** In areas where ambient conditions will cause a smoke detection system to alarm, an approved alternative type of automatic detector shall be installed.

**907.2.11.1 Alarm.** Activation of any single smoke detector, the automatic sprinkler system or any other automatic fire detection device shall immediately sound an alarm at the building at a constantly attended location from which emergency action can be initiated, including the capability of manual initiation of requirements in Section 907.2.11.2.

**907.2.11.2 System response.** The following minimum system actuations and responses shall be required upon approval by the department and the Fire Department. The activation of two or more smoke detectors, a single smoke detector with alarm verification, the automatic

sprinkler system or other approved fire detection device shall automatically:

1. Cause illumination of the means of egress with light of not less than 1 foot-candle (11 lux) at the walking surface level;
2. Stop any conflicting or confusing sounds and visual distractions; and
3. Activate an approved directional exit marking that will become apparent in an emergency. Such system response shall also include activation of a pre-recorded message, clearly audible throughout the special amusement building, instructing patrons to proceed to the nearest exit. Alarm signals used in conjunction with the prerecorded message shall produce a sound that is distinctive from other sounds used during normal operation. The wiring to the auxiliary devices and equipment used to accomplish the above fire safety functions shall be monitored for integrity in accordance with NFPA 72.

**907.2.11.3 Emergency voice/alarm communication system.** An emergency voice/alarm communication system, which is also allowed to serve as a public address system, shall be installed in accordance with NFPA 72, and shall be audible throughout the entire special amusement building.

**907.2.12 High-rise buildings.** Buildings constructed in accordance with Section 403 and having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access shall be provided with automatic fire detection connected to an automatic fire alarm system in accordance with Section 907.2.12.1 and an emergency voice/alarm communication system in accordance with Section 907.2.12.2.

**Exceptions:**

1. Open parking garages in accordance with Section 406.3.
2. Buildings with an occupancy in Group A-5.
3. Low-hazard special occupancies in accordance with Section 503.1.2.
4. Buildings with an occupancy in Group H-1, H-2 or H-3 in accordance with Section 415.

**907.2.12.1 Automatic fire detection.** In addition to smoke detection otherwise required by this code, smoke detectors shall be provided in accordance with this section. Smoke detectors shall be connected to an automatic fire alarm system. The activation of any detector required by this section shall operate the emergency voice/alarm communication system. Smoke detectors shall be located as follows:

1. In each mechanical equipment, electrical, transformer, telephone equipment or similar room, in elevator machine rooms and in elevator lobbies.
2. In air distribution systems in accordance with Section 606 of the *New York City Mechanical Code*.

3. In Group R-1 occupancies a listed smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm (2.4 m<sup>3</sup>/s) and serving not more than 10 air inlet openings.

**Exception for Group R-2 occupancies:** In R-2 occupancies, the activation of smoke detectors shall initiate a signal at a central station or a constantly attended location and shall not initiate a signal to an alarm notification appliance.

**907.2.12.2 Emergency voice/alarm communication system.** The operation of any automatic fire detector, sprinkler water-flow device or manual fire alarm box shall automatically sound an alarm tone followed by live voice instructions giving approved information and directions on a general or selective basis to the following areas on a minimum of the alarming floor, the floor above and the floor below in accordance with the *New York City Fire Code*.

1. Elevator lobbies.
2. Corridors.
3. Rooms and tenant spaces exceeding 1,000 square feet (93 m<sup>2</sup>) in area.
4. Dwelling units in Group R-1 occupancies.
5. Areas of rescue assistance as defined in Section 1002.

**Exceptions:**

1. **Group I-1 and I-2 occupancies.** In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.
2. **Group R-2 occupancies 125 feet or less in height.** Emergency voice/alarm communication systems shall not be required in Group R-2 occupancies in buildings 125 feet (33 100 mm) or less in height.
3. **Group R-2 occupancies greater than 125 feet in height.** In Group R-2 occupied buildings greater than 125 feet (33 100 mm) in height, activation of any smoke detector or sprinkler water flow device shall initiate a signal at a central station or constantly attended location and shall not initiate a signal to an alarm notification appliance. An emergency voice/alarm communication system shall not be required. However, a one-way voice communication shall be provided between the fire command center for use by Fire Department personnel and the following terminal areas:
  - 3.1. Within dwelling units. An intercom system may be utilized when provided with an override feature for use by Fire Department personnel. Such intercom system shall comply with rules promul-

gated by the commissioner establishing installation requirements.

- 3.2. Within required exit stairs. Annunciation devices shall be located at least on every other story. Such annunciation devices shall comply with rules promulgated by the commissioner establishing installation requirements.

**907.2.12.2.1 Manual override.** A manual override for emergency voice communication shall be provided for all paging zones with all-call capability and feature.

**907.2.12.2.2 Live voice messages.** The emergency voice/alarm communication system shall have multichannel capability to allow live voice messages via independent audio channels to the stairs, to all or selected floors without automatic interruption of the alarm tones on the floor of incidence, floor above or floor below.

**907.2.12.2.3 Standard.** The emergency voice/alarm communication system shall be designed and installed in accordance with NFPA 72 as modified in Appendix Q.

**907.2.12.3 Fire Department communication system.**

An approved two-way, fire department communication system designed and installed in accordance with NFPA 72 shall be provided for Fire Department use. It shall operate between a fire command center complying with Section 911 and elevators, elevator lobbies, emergency power rooms, fire pump rooms, areas of refuge and inside enclosed exit stairways. The Fire Department communication device shall be provided at each floor level within each enclosed stairway.

**Exceptions:**

1. Fire Department radio systems where approved by the Fire Department may be installed in lieu of a two-way Fire Department communication system.
2. Group R-2 occupancy.

**907.2.13 Atriums connecting more than two stories.** A fire alarm system shall be installed in occupancies with an atrium that connects more than two stories. The system shall be activated in accordance with Section 907.6. Such occupancies in Group A, E or M shall be provided with an emergency voice/alarm communication system complying with the requirements of Section 907.2.12.2.

**907.2.14 High-piled combustible storage areas.** An automatic fire detection system shall be installed throughout high-piled combustible storage areas where required by the *New York City Fire Code*.

**907.2.15 Delayed egress locks.** Where delayed egress locks are installed on means of egress doors in accordance with Section 1008.1.8.6, an automatic smoke or heat detection system shall be installed as required by that section.

**907.2.16 Aerosol storage uses.** Aerosol storage rooms and general-purpose warehouses containing aerosols shall be provided with an approved manual fire alarm system where required by the *New York City Fire Code*.

**907.2.17 Lumber, plywood and veneer mills.** Lumber, plywood and veneer mills shall be provided with a manual fire alarm system.

**907.2.18 Underground buildings with smoke exhaust system.** Where a smoke exhaust system is installed in an underground building as required by Section 405, automatic fire detectors shall be provided in accordance with this section.

**907.2.18.1 Smoke detectors.** A minimum of one smoke detector listed for the intended purpose shall be installed in the following areas:

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

**907.2.18.2 Alarm required.** Activation of the smoke exhaust system shall activate an audible alarm at a constantly attended location.

**907.2.19 Underground buildings.** In underground buildings complying with Section 405 where the lowest level of a structure is more than 30 feet (9 144 mm) below the lowest level of exit discharge, the structure shall be equipped throughout with a manual and automatic fire alarm system, including an emergency voice/alarm communication system installed in accordance with Section 907.2.12.2.

**907.2.19.1 Public address system.** In underground buildings complying with Section 405 where a fire alarm system is not required by Section 907.2, a public address system shall be provided that shall be capable of transmitting voice communications to the highest level of exit discharge serving the underground portions of the structure and all levels below.

**907.2.20 Covered mall buildings.** Covered mall buildings exceeding 50,000 square feet (4645 m<sup>2</sup>) in total floor area shall be provided with an emergency voice/alarm communication system. An emergency voice/alarm communication

system serving a mall, required or otherwise, shall be accessible to the Fire Department. The system shall be provided in accordance with Section 907.2.12.2.

**907.2.20.1 Battery rooms.** An approved automatic smoke detection system shall be installed in areas containing stationary lead-acid battery systems having a liquid capacity of more than 50 gallons (189.3 L). The detection system shall be supervised by an approved central, proprietary or remote station service or a local alarm that will sound an audible signal at a constantly attended location.

**907.3 Manual fire alarm boxes.** Manual fire alarm boxes shall be installed in accordance with Sections 907.3.1 through 907.3.5.

**907.3.1 Location.** Manual fire alarm boxes shall be located not more than 5 feet (1524 mm) from the entrance to each exit. Additional manual fire alarm boxes shall be located so that travel distance to the nearest box does not exceed 200 feet (60 960 mm).

**907.3.2 Height.** The height of the manual fire alarm boxes shall be a minimum of 42 inches (1067 mm) and a maximum of 48 inches (1219 mm), measured vertically, from the floor level to the activating handle or lever of the box.

**907.3.3 Color.** Manual fire alarm boxes shall be red in color.

**907.3.4 Signs.** Where fire alarm systems are not monitored by a supervising station, an approved permanent sign that reads: WHEN ALARM SOUNDS—CALL FIRE DEPARTMENT shall be installed adjacent to each manual fire alarm box.

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

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

**907.4 Power supply.** The primary and secondary power supplies for the fire alarm system shall be provided in accordance with NFPA 72.

**907.5 Wiring.** Wiring shall comply with the requirements of the *New York City Electrical Code* and NFPA 72. Wireless protection systems utilizing radio-frequency transmitting devices shall comply with the special requirements for supervision of low-power wireless systems in NFPA 72.

**907.6 Activation.** Where an alarm notification system is required by another section of this code, it shall be activated by:

1. A required automatic fire alarm system.
2. Sprinkler water-flow devices.
3. Required manual fire alarm boxes.

4. Other required types of automatic fire detection devices or suppression systems.

**907.7 Presignal system.** Presignal systems shall not be installed unless approved by the Fire Department. Where a presignal system is installed, 24-hour personnel supervision shall be provided at a location approved by the Fire Department. Where a connection to a supervising station is required, the transmission of the alarm signal to the supervising station shall activate upon the initial alarm signal.

**907.8 Zones.** Each floor shall be zoned separately and a zone shall not exceed 22,500 square feet (2090 m<sup>2</sup>). The length of any zone shall not exceed 300 feet (91 440 mm) in any direction.

**Exception:** Automatic sprinkler system zones shall not exceed the area permitted by NFPA 13.

**907.8.1 Zoning indicator panel.** A zoning indicator panel and the associated controls shall be provided at the main building entrance accessible to responding Fire Department personnel and in other locations approved by the department and the Fire Department. The visual zone indication shall lock in until the system is reset and shall not be canceled by the operation of an audible alarm-silencing switch.

**907.8.2 High-rise buildings.** In high-rise buildings constructed in accordance with Section 403 and used for human occupancy that have occupied floors located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, a separate zone by floor shall be provided for all of the following types of alarm-initiating devices where provided:

1. Smoke detectors.
2. Sprinkler water-flow devices.
3. Manual fire alarm boxes.
4. Other approved types of automatic fire detection devices or suppression systems.

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

**907.9.1 Visible alarms.** Visible alarm notification appliances shall be provided in accordance with Sections 907.9.1.1 through 907.9.1.3.

**Exception:** Visible alarm notification appliances shall not be required in exits.

**907.9.1.1 Public and common areas.** Visible alarm notification appliances shall be provided in public areas and common areas.

**907.9.1.2 Employee work areas.** Where employee work areas have audible alarm coverage, the wiring systems shall be designed so that visible alarm notification appliances can be integrated into the alarm system.

**907.9.1.3 Groups R-1.** Group R-1 dwelling units in accordance with Table 907.9.1.3 shall be provided with a visible alarm notification appliance, activated by both the in-room smoke detector and the building fire alarm system.

[F] TABLE 907.9.1.3  
VISIBLE AND AUDIBLE ALARMS

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

**907.9.2 Audible alarms.** Audible alarm notification appliances shall be provided and shall sound a distinctive sound that is not to be used for any purpose other than that of a fire alarm. The audible alarm notification appliances shall provide a sound pressure level of 15 decibels (dBA) above the average ambient sound level or 5 dBA above the maximum sound level having a duration of at least 60 seconds, whichever is greater, in every occupied space within the building. The minimum sound pressure levels shall be: 70 dBA in occupancies in Groups R and I-1; 90 dBA in mechanical equipment rooms and 60 dBA in other occupancies. The maximum sound pressure level for audible alarm notification appliances shall be 120 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than 105 dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72 and audible alarm notification appliances shall not be required to provide a maximum sound pressure level above 120 dBA.

**Exception:** Visible alarm notification appliances shall be allowed in lieu of audible alarm notification appliances in critical-care areas of Group I-2 occupancies.

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

**907.11 Duct smoke detectors.** Where a fire alarm system is provided, duct smoke detectors shall be connected to the building's fire alarm control panel. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a

constantly attended location. Duct smoke detectors shall not be used as a substitute for required open-area detection.

**Exceptions:**

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

**907.12 Access.** Access shall be provided to each detector for periodic inspection, maintenance and testing.

**907.13 Fire-extinguishing systems.** Where a fire alarm system is required by another section of this code or is otherwise installed, automatic fire-extinguishing systems shall be connected to the building fire alarm system.

**907.14 Monitoring.** Where required by this chapter or the *New York City Fire Code*, an approved supervising station in accordance with NFPA 72 shall monitor fire alarm systems.

**Exception:** Supervisory service is not required for:

1. Single- and multiple-station smoke alarms required by Section 907.2.10.
2. Smoke detectors in Group I-3 occupancies.
3. Automatic sprinkler systems in one- and two-family dwellings.

**907.15 Automatic telephone-dialing devices.** Automatic telephone-dialing devices used to transmit an emergency alarm shall not be connected to any Fire Department telephone number unless approved by the Fire Commissioner.

**907.16 Acceptance tests.** Upon completion of the installation of the fire alarm system, alarm notification appliances and circuits, alarm-initiating devices and circuits, supervisory-signal initiating devices and circuits, signaling line circuits, and primary and secondary power supplies shall be tested in accordance with NFPA 72.

**907.17 Record of completion.** A record of completion in accordance with NFPA 72 verifying that the system has been installed in accordance with the approved construction documents and specifications shall be provided.

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

**907.19 Inspection, testing and maintenance.** The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with the *New York City Fire Code*.

**SECTION BC 908  
EMERGENCY ALARM SYSTEMS**

**908.1 Group H occupancies.** Emergency alarms for the detection and notification of an emergency condition in Group H

occupancies shall be provided in accordance with Section 414.7.

**908.2 Group H-5 occupancy.** Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 415.9.4.6. A continuous gas-detection system shall be provided for HPM gases in accordance with Section 415.9.7.

**908.3 Highly toxic and toxic materials.** A gas detection system shall be provided for indoor storage and use of highly toxic and toxic gases to detect the presence of gas at or below the permissible exposure limit (PEL) or ceiling limit of the gas for which detection is provided. The system shall be capable of monitoring the discharge from the treatment system at or below one-half the immediately dangerous to life and health (IDLH) limit.

**Exception:** A gas detection system is not required for toxic gases when the physiological warning properties are at a level below the accepted PEL for the gas.

**908.3.1 Alarms.** The gas detection system shall initiate a local alarm and transmit a signal to a constantly attended control station when a short-term hazard condition is detected. The alarm shall be both visible and audible and shall provide warning both inside and outside the area where gas is detected. The audible alarm shall be distinct from all other alarms.

**Exception:** Signal transmission to a constantly attended control station is not required when not more than one cylinder of highly toxic or toxic gas is stored.

**908.3.2 Shutoff of gas supply.** The gas detection system shall automatically close the shutoff valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected.

**Exception:** Automatic shutdown is not required for reactors utilized for the production of highly toxic or toxic compressed gases where such reactors are:

1. Operated at pressures less than 15 pounds per square inch gauge (psig) (103.4 kPa).
2. Constantly attended.
3. Provided with readily accessible emergency shutoff valves.

**908.3.3 Valve closure.** The automatic closure of shutoff valves shall be in accordance with the following:

1. When the gas-detection sampling point initiating the gas detection system alarm is within a gas cabinet or exhausted enclosure, the shutoff valve in the gas cabinet or exhausted enclosure for the specific gas detected shall automatically close.
2. Where the gas-detection sampling point initiating the gas detection system alarm is within a gas room and compressed gas containers are not in gas cabinets or exhausted enclosures, the shutoff valves on all gas lines for the specific gas detected shall automatically close.
3. Where the gas-detection sampling point initiating the gas detection system alarm is within a piping distribu-

tion manifold enclosure, the shutoff valve for the compressed container of specific gas detected supplying the manifold shall automatically close.

**Exception:** When the gas-detection sampling point initiating the gas-detection system alarm is at a use location or within a gas valve enclosure of a branch line downstream of a piping distribution manifold, the shutoff valve in the gas valve enclosure for the branch line located in the piping distribution manifold enclosure shall automatically close.

**908.4 Ozone gas-generator rooms.** Ozone gas-generator rooms shall be equipped with a continuous gas-detection system that will shut off the generator and sound a local alarm when concentrations above the PEL occur.

**908.5 Repair garages.** A flammable-gas detection system shall be provided in repair garages for vehicles fueled by enumerated gases in accordance with Section 406.6.6.

**908.6 Refrigerant detector.** Machinery rooms shall contain a refrigerant detector with an audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values for the refrigerant classification indicated in the *New York City Mechanical Code*. Detectors and alarms shall be placed in approved locations. Refrigerant detectors shall initiate all functions as required by the *New York City Mechanical Code* and *New York City Fire Code*.

**Exception:** Detectors are not required in ammonia system machinery rooms equipped with a vapor detector in accordance with the *New York City Mechanical Code*.

**908.7 Carbon monoxide alarms and detectors.** Carbon monoxide alarms and detectors shall be provided and installed in accordance with Sections 908.7.1 through 908.7.3. ‡

**908.7.1 Group I-1 and R occupancies.** Listed carbon monoxide alarms or detectors shall be installed as follows:

1. **Group R-1.** Carbon monoxide detectors and audible notification appliances shall be installed in affected dwelling units as per Section 908.7.1.1 and shall be annunciated by dwelling unit at a constantly attended location from which the fire alarm system is capable of being manually activated.
2. **Groups I-1, R-2 and R-3.** Carbon monoxide alarms shall be installed in affected dwelling units as per Section 908.7.1.1.

**908.7.1.1 Affected dwelling units.** Carbon monoxide alarms or detectors shall be required within the following dwelling units:

1. Units on the same story where carbon monoxide-producing equipment or enclosed parking is located.
2. Units on the stories above and below the floor where carbon monoxide-producing equipment or enclosed parking is located.

3. Units in a building containing a carbon monoxide-producing furnace, boiler, or water heater as part of a central system.
4. Units in a building served by a carbon monoxide-producing furnace, boiler, or water heater as part of a central system that is located in an adjoining or attached building.

**908.7.1.1.1 Required locations within dwelling units.** Carbon monoxide alarms or detectors shall be located within dwelling units as follows:

1. Outside of any room used for sleeping purposes, within 15 feet (4572 mm) of the entrance to such room.
2. In any room used for sleeping purposes.
3. On any story within a dwelling unit, including below-grade stories and penthouses of any area, but not including crawl spaces and uninhabitable attics.

**908.7.1.1.2 Installation requirements.** Carbon monoxide alarms or detectors shall comply with the power source, interconnection, and acceptance testing requirements as required for smoke alarms in accordance with Sections 907.2.10.2 through 907.2.10.4.

**908.7.2 Group E, I-2 and I-4 occupancies.** Listed carbon monoxide alarms or detectors shall be installed as follows:

1. Carbon monoxide alarms shall be installed within any occupied space containing carbon monoxide-producing equipment and in all occupied spaces above and below the story where carbon monoxide-producing equipment or enclosed parking is located.
2. Carbon monoxide detectors and audible notification appliances shall be installed within any unoccupied space containing carbon monoxide-producing equipment. Such detector shall activate an audible alarm at a constantly attended location.

**908.7.3 Installation.** Carbon monoxide alarms and detectors shall be listed in accordance with UL 2034 and UL 2075.

**908.8 Medical gas.** Medical gas pressure monitoring and alarm systems shall be provided in accordance with NFPA 99 and NFPA 99C.

**908.9 Flammable gas.** Areas within buildings containing flammable gas distribution piping operating at levels above 15 pounds per square inch gauge (psig) (103.4 kPa) shall be provided with an approved flammable gas detection-alarm system.

## SECTION BC 909 SMOKE CONTROL SYSTEMS

**909.1 Scope and purpose.** This section applies to mechanical or passive smoke control systems when they are required by other provisions of this code. The purpose of this section is to establish minimum requirements for the design, installation

and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. These provisions are not intended for the preservation of contents, the timely restoration of operations or for assistance in fire suppression. Smoke control systems regulated by this section serve a different purpose than the smoke- and heat-venting provisions found in Section 910. Mechanical smoke control systems shall not be considered exhaust systems under Chapter 5 of the *New York City Mechanical Code*.

**909.1.1 Definitions.** These definitions are added for the purposes of Section 909 only.

**POST-FIRE SMOKE PURGE SYSTEM.** A mechanical or natural ventilation system intended to move smoke from the smoke zone to the exterior of the building.

**PRESSURIZATION.** Creation and maintenance of pressure levels in zones of a building, including elevator shafts and stairwells, that are higher than the pressure level at the smoke source, such pressure levels being produced by positive pressures of a supply of uncontaminated air; by exhausting air and smoke at the smoke source; or by a combination of these methods.

**SMOKE.** Air-borne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion, including the quality of air that is entrained or otherwise mixed into the mass.

**SMOKE BARRIER.** See Section 702.1.

**SMOKE CONTROL MODE.** A predefined operational configuration of a system or device for the purpose of smoke control.

**SMOKE CONTROL SYSTEM, MECHANICAL.** An engineered system that uses mechanical fans to produce pressure differences across smoke barriers or that establishes airflows to limit and direct smoke movement.

**SMOKE CONTROL SYSTEM, PASSIVE.** A system of smoke barriers arranged to limit the migration of smoke.

**SMOKE CONTROL ZONE.** A space within a building enclosed by smoke barriers.

**SMOKE DAMPER.** See Section 702.1.

**STACK EFFECT.** Vertical airflow within buildings caused by temperature differences.

**TENABLE ENVIRONMENT.** An environment in which the quality and location of smoke is limited or otherwise restricted to allow for ready evacuation through the space.

**909.2 General design requirements.** Buildings, structures or parts thereof required by this code to have a smoke control system or systems shall have such systems designed in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design. The construction documents shall include sufficient information and detail to adequately describe the elements of the design necessary for the proper implementation of the smoke control systems. These documents shall be accompanied by sufficient information and analysis to demonstrate compliance with these provisions.

**909.3 Special inspection and test requirements.** In addition to the ordinary inspection and test requirements that buildings, structures and parts thereof are required to undergo, smoke control systems subject to the provisions of Section 909 shall undergo special inspections and tests sufficient to verify the proper commissioning of the smoke control design in its final installed condition. The design submission accompanying the construction documents shall clearly detail procedures and methods to be used and the items subject to such inspections and tests. Such commissioning shall be in accordance with generally accepted engineering practice and, where possible, based on published standards for the particular testing involved. The special inspections and tests required by this section shall be conducted under the same terms in Section 1704.

**909.3.1 Periodic testing.** Smoke control systems shall be periodically tested to ensure proper operation. A record of each inspection and test shall be maintained on the premises by the owner or lessee, and the records for at least the last 2 years of operation shall be made available for inspection by the department and the fire commissioner.

**909.4 Analysis.** A rational analysis supporting the types of smoke control systems to be employed, their methods of operation, the systems supporting them and the methods of construction to be utilized shall accompany the submitted construction documents and shall include, but not be limited to, the items indicated in Sections 909.4.1 through 909.4.6. The basis of design and design analysis of the smoke control system shall be submitted to the department.

**909.4.1 Stack effect.** The system shall be designed such that the maximum probable normal or reverse stack effect will not adversely interfere with the system's capabilities. In determining the maximum probable stack effect, altitude, elevation, weather history and interior temperatures shall be used.

**909.4.2 Temperature effect of fire.** Buoyancy and expansion caused by the design fire in accordance with Section 909.9 shall be analyzed. The system shall be designed such that these effects do not adversely interfere with the system's capabilities.

**909.4.3 Wind effect.** The design shall consider the adverse effects of wind. Such consideration shall be consistent with the wind-loading provisions of Chapter 16.

**909.4.4 HVAC systems.** The design shall consider the effects of the heating, ventilating and air-conditioning (HVAC) systems on both smoke and fire transport. The analysis shall include all permutations of systems status. The design shall consider the effects of the fire on the HVAC systems.

**909.4.5 Climate.** The design shall consider the effects of low temperatures on systems, property and occupants. Air inlets and exhausts shall be located so as to prevent snow or ice blockage.

**909.4.6 Duration of operation.** All portions of active or passive smoke control systems shall be capable of continued operation after detection of the fire event for not less than 20 minutes.

**909.5 Smoke barrier construction.** Smoke barriers shall comply with Section 709, and shall be constructed and sealed to limit leakage areas exclusive of protected openings. The maximum allowable leakage area shall be the aggregate area calculated using the following leakage area ratios:

1. Walls:  $A/A_w = 0.00100$
2. Exit enclosures:  $A/A_w = 0.00035$
3. All other shafts:  $A/A_w = 0.00150$
4. Floors and roofs:  $A/A_F = 0.00050$

where:

$A$  = Total leakage area, square feet (m<sup>2</sup>).

$A_F$  = Unit floor or roof area of barrier, square feet (m<sup>2</sup>).

$A_w$  = Unit wall area of barrier, square feet (m<sup>2</sup>).

The leakage area ratios shown do not include openings due to doors, operable windows or similar gaps. These shall be included in calculating the total leakage area.

**909.5.1 Leakage area.** The total leakage area of the barrier is the product of the smoke barrier gross area multiplied by the allowable leakage area ratio, plus the area of other openings such as gaps and operable windows. Compliance shall be determined by achieving the minimum air pressure difference across the barrier with the system in the smoke control mode for mechanical smoke control systems. Passive smoke control systems tested using other approved means such as door fan testing shall be approved by the department and the fire commissioner.

**909.5.2 Opening protection.** Openings in smoke barriers shall be protected by automatic-closing devices actuated by the required controls for the mechanical smoke control system. Door openings shall be protected by door assemblies complying with Section 715.3.3.

**Exceptions:**

1. Passive smoke control systems with automatic-closing devices actuated by spot-type smoke detectors listed for releasing service installed in accordance with Section 907.10.
2. Fixed openings between smoke zones that are protected utilizing the airflow method.
3. In Group I-2, where such doors are installed across corridors, a pair of opposite-swinging doors without a center mullion shall be installed having vision panels with approved fire-rated glazing materials in approved fire-rated frames, the area of which shall not exceed that tested. The doors shall be close fitting within operational tolerances and shall not have undercuts, louvers or grilles. The doors shall have head and jamb stops, astragals or rabbets at meeting edges, and automatic-closing devices. Positive-latching devices are not required.
4. Group I-3.
5. Openings between smoke zones with clear ceiling heights of 14 feet (4267 mm) or greater and



bank-down capacity of greater than 20 minutes as determined by the design fire size.

**909.5.2.1 Ducts and air transfer openings.** Ducts and air transfer openings are required to be protected with a minimum Class II, 250°F (121°C) smoke damper complying with Section 716.

**909.6 Pressurization method.** The primary mechanical means of controlling smoke shall be by pressure differences across smoke barriers. Maintenance of a tenable environment is not required in the smoke control zone of fire origin.

**909.6.1 Minimum pressure difference.** The minimum pressure difference across a smoke barrier shall be 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 at least two times the maximum calculated pressure difference produced by the design fire, but in no case less than the values indicated in Table 909.6.1:

**TABLE 909.6.1  
MINIMUM PRESSURE DIFFERENCES  
ACROSS SMOKE BARRIERS**

CEILING HEIGHT	MINIMUM DESIGN PRESSURE DIFFERENCE
Less than 15 feet (4572 mm)	0.10-inch water gage (0.0259 kPa)
Equal to or greater than 15 feet (4572 mm), but less than 21 feet (6401 mm)	0.14-inch water gage (0.0349 kPa)
Equal to or greater than 21 feet (6401mm)	0.18-inch water gage (0.0448 kPa)

**909.6.2 Maximum pressure difference.** The maximum air pressure difference across a smoke barrier shall be determined by required door-opening or closing forces. The actual force required to open exit doors when the system is in the smoke control mode shall be in accordance with Section 1008.1.2. Opening and closing forces for other doors shall be determined by standard engineering methods for the resolution of forces and reactions. The calculated force to set a side-hinged, swinging door in motion shall be determined by:

$$F = F_{dc} + K(WA\Delta P)/2(W-d) \tag{Equation 9-1}$$

where:

- A = Door area, square feet (m<sup>2</sup>).
- d = Distance from door handle to latch edge of door, feet (m).
- F = Total door opening force, pounds (N).
- F<sub>dc</sub> = Force required to overcome closing device, pounds (N).
- K = Coefficient 5.2 (1.0).
- W = Door width, feet (m).
- ΔP = Design pressure difference, inches of water (Pa).

**909.7 Air flow design method.** When approved by the department, smoke migration through openings fixed in a permanently open position, which are located between smoke control zones by the use of the airflow method, shall be permitted. The design air flow shall be in accordance with this section. Air flow shall be directed to limit smoke migration from the fire zone. The geometry of openings shall be considered to prevent flow reversal from turbulent effects.

**909.7.1 Velocity.** The minimum average velocity through a fixed opening shall not be less than:

$$v = 217.2 [h(T_f - T_o)/(T_f + 460)]^{1/2} \tag{Equation 9-2}$$

For SI:  $v = 119.9 [h(T_f - T_o)/T_f]^{1/2}$

where:

- h = Height of opening, feet (m).
- T<sub>f</sub> = Temperature of smoke, °F (°K).
- T<sub>o</sub> = Temperature of ambient air, °F (°K).
- v = Air velocity, feet per minute (m/minute).

**909.7.2 Prohibited conditions.** This method shall not be employed where either the quantity of air or the velocity of the airflow will adversely affect other portions of the smoke control system, unduly intensify the fire, disrupt plume dynamics or interfere with exiting. In no case shall airflow toward the fire exceed 200 feet per minute (1.02 m/s). Where the formula in Section 909.7.1 requires airflow to exceed this limit, the airflow method shall not be used.

**909.8 Exhaust method.** When approved by the department, mechanical smoke control for large enclosed volumes, such as in atriums or malls, shall be permitted to utilize the exhaust method. The design exhaust volumes shall be in accordance with this section.

**909.8.1 Exhaust rate.** The height of the lowest horizontal surface of the accumulating smoke layer shall be maintained at least 6 feet (1829 mm) above any walking surface that forms a portion of a required egress system within the smoke zone. The required exhaust rate for the zone shall be the largest of the calculated plume mass flow rates for the possible plume configurations. Provisions shall be made for natural or mechanical supply of air from outside or adjacent smoke zones to make up for the air exhausted. Makeup airflow rates, when measured at the potential fire location, shall not increase the smoke production rate beyond the capacity of the smoke control system. The temperature of the makeup air shall be such that it does not expose temperature-sensitive fire protection systems beyond their limits.

**909.8.2 Axisymmetric plumes.** The plume mass flow rate (m<sub>p</sub>), in pounds per second (kg/s), shall be determined by placing the design fire center on the axis of the space being analyzed. The limiting flame height shall be determined by:

$$z_l = 0.533Q_c^{2/5} \tag{Equation 9-3}$$

For SI:  $z_l = 0.166Q_c^{2/5}$

where:

- m<sub>p</sub> = Plume mass flow rate, pounds per second (kg/s).

$Q$  = Total heat output.

$Q_c$  = Convective heat output, British thermal units per second (kW). (The value of  $Q_c$  shall not be taken as less than  $0.70Q$ ).

$z$  = Height from top of fuel surface to bottom of smoke layer, feet (m).

$z_l$  = Limiting flame height, feet (m). The  $z_l$  value must be greater than the fuel equivalent diameter (see Section 909.9).

for  $z > z_l$

$$m_p = 0.022Q_c^{1/3}z^{5/3} + 0.0042Q_c$$

For SI:  $m_p = 0.071 Q_c^{1/3}z^{5/3} + 0.0018Q_c$

for  $z = z_l$

$$m_p = 0.011 Q_c$$

For SI:  $m_p = 0.035Q_c$

for  $z < z_l$

$$m_p = 0.0208Q_c^{3/5}z$$

For SI:  $m_p = 0.032Q_c^{3/5}z$

To convert  $m_p$  from pounds per second of mass flow to a volumetric rate, the following equation shall be used:

$$V = 60 m_p / \rho \quad \text{(Equation 9-4)}$$

where:

$V$  = Volumetric flow rate, cubic feet per minute ( $m^3/s$ ).

$\rho$  = Density of air at the temperature of the smoke layer, pounds per cubic feet ( $T$ : in °F) [ $kg/m^3$  ( $T$ : in °C)].

**909.8.3 Balcony spill plumes.** The plume mass flow rate ( $m_p$ ) for spill plumes shall be determined using the geometrically probable width based on architectural elements and projections in the following equation:

$$m_p = 0.124(QW^2)^{1/3}(z_b + 0.25H) \quad \text{(Equation 9-5)}$$

For SI:  $m_p = 0.36(QW^2)^{1/3}(z_b + 0.25H)$

where:

$H$  = Height above fire to underside of balcony, feet (m).

$m_p$  = Plume mass flow rate, pounds per second (kg/s).

$Q$  = Total heat output.

$W$  = Plume width at point of spill, feet (m).

$z_b$  = Height from balcony, feet (m).

**909.8.4 Window plumes.** The plume mass flow rate ( $m_p$ ) shall be determined from:

$$m_p = 0.077(A_w H_w^{1/2})^{1/3}(z_w + a)^{5/3} + 0.18A_w H_w^{1/2} \quad \text{(Equation 9-6)}$$

For SI:  $m_p = 0.68(A_w H_w^{1/2})^{1/3}(z_w + a)^{5/3} + 1.5A_w H_w^{1/2}$

where:

$A_w$  = Area of the opening, square feet ( $m^2$ ).

$H_w$  = Height of the opening, feet (m).

$m_p$  = plume mass flow rate, pounds per second (kg/s).

$z_w$  = Height from the top of the window or opening to the bottom of the smoke layer, feet (m).

$$a = 2.4A_w^{2/5}H_w^{1/5} - 2.1H_w.$$

**909.8.5 Plume contact with walls.** When a plume contacts one or more of the surrounding walls, the mass flow rate shall be adjusted for the reduced entrainment resulting from the contact provided that the contact remains constant. Use of this provision requires calculation of the plume diameter, which shall be calculated by:

$$d = 0.48 [(T_c + 460)/(T_a + 460)]^{1/2}z \quad \text{(Equation 9-7)}$$

For SI:  $d = 0.48 (T_c/T_a)^{1/2}z$

where:

$d$  = Plume diameter, feet (m).

$T_a$  = Ambient air temperature, °F (°K).

$T_c$  = Plume centerline temperature, °F (°K).  
 $= 0.60 (T_a + 460) Q_c^{2/3} z^{-5/3} + T_a$

$z$  = Height at which  $T_c$  is determined, feet (m).

For SI:  $T_c = 0.08 T_a Q_c^{2/3} z^{-5/3} + T_a$

**909.9 Design fire.** The design fire shall be based on a  $Q$  of not less than 5,000 Btu/s (5275 kW) unless a rational analysis is performed by the registered design professional and approved by the department. The design fire shall be based on the analysis in accordance with Section 909.4 and this section.

**909.9.1 Factors considered.** The engineering analysis shall include the characteristics of the fuel, fuel load, effects included by the fire and whether the fire is likely to be steady or unsteady.

**909.9.2 Separation distance.** Determination of the design fire shall include consideration of the type of fuel, fuel spacing and configuration. The ratio of the separation distance to the fuel equivalent radius shall not be less than 4. The fuel equivalent radius shall be the radius of a circle of equal area to floor area of the fuel package. The design fire shall be increased if other combustibles are within the separation distance as determined by:

$$R = [Q/(12\pi q'')]^{1/2} \quad \text{(Equation 9-8)}$$

where:

$q''$  = Incident radiant heat flux required for nonpiloted ignition, Btu/ft<sup>2</sup> · s ( $W/m^2$ ).

$Q$  = Heat release from fire, Btu/s (kW).

$R$  = Separation distance from target to center of fuel package, feet (m).

**909.9.3 Heat-release assumptions.** The analysis shall make use of best available data from approved sources and shall not be based on excessively stringent limitations of combustible material.

**909.9.4 Sprinkler effectiveness assumptions.** A documented engineering analysis shall be provided for conditions that assume fire growth is halted at the time of sprinkler activation.

**909.10 Equipment.** Equipment such as, but not limited to, fans, ducts, automatic dampers and balance dampers, shall be suitable for its intended use, suitable for the probable exposure temperatures that the rational analysis indicates, and as approved by the department.

**909.10.1 Exhaust fans.** Components of exhaust fans shall be rated and certified by the manufacturer for the probable temperature rise to which the components will be exposed. This temperature rise shall be computed by:

**Exception:** Reduced  $T_s$  as calculated based on the assurance of adequate dilution air.

$$T_s = (Q_c/mc) + (T_a) \quad \text{(Equation 9-9)}$$

where:

$c$  = Specific heat of smoke at smoke layer temperature, Btu/lb°F (kJ/kg · K).

$m$  = Exhaust rate, pounds per second (kg/s).

$Q_c$  = Convective heat output of fire, Btu/s (kW).

$T_a$  = Ambient temperature, °F (°K).

$T_s$  = Smoke temperature, °F (°K).

**909.10.2 Ducts.** Duct materials and joints shall be capable of withstanding the probable temperatures and pressures to which they are exposed as determined in accordance with Section 909.10.1. Ducts shall be constructed and supported in accordance with the *New York City Mechanical Code*. Ducts shall be leak tested to 1.5 times the maximum design pressure in accordance with nationally accepted practices. Measured leakage shall not exceed 5 percent of design flow. Results of such testing shall be a part of the documentation procedure. Ducts shall be supported directly from fire-resistance-rated structural elements of the building by substantial, noncombustible supports.

**Exception:** Flexible connections (for the purpose of vibration isolation) complying with the *New York City Mechanical Code*, that are constructed of approved fire-resistance-rated materials.

**909.10.3 Equipment, inlets and outlets.** Equipment shall be located so as not to expose uninvolved portions of the building to an additional fire hazard. Outside air inlets shall be located so as to minimize the potential for introducing smoke or flame into the building. Exhaust outlets shall be located so as to minimize reintroduction of smoke into the building and to limit exposure of the building or adjacent buildings to an additional fire hazard.

**909.10.4 Automatic dampers.** Automatic dampers, regardless of the purpose for which they are installed within the smoke control system, shall be listed for their use.

**909.10.5 Fans.** In addition to other requirements, belt-driven fans shall have 1.5 times the number of belts required for the design duty, but not less than two. Fans shall be selected for stable performance based on normal temperature and, where applicable, elevated temperature. Calculations and manufacturer's fan curves shall be part of the documentation procedures. Fans shall be supported and restrained by noncombustible devices in accordance with the requirements of Chapter 16. Motors driving fans shall not be operated beyond their nameplate horsepower (kilowatts), as determined from measurement of actual current draw, and shall have a minimum service factor of 1.15.

**909.11 Power systems.** The smoke control system shall be supplied with two sources of power. Primary power shall be the normal building power systems. Secondary power shall be from an emergency source complying with the *New York City Electrical Code*. The emergency power source and its transfer switches shall be in a separate room from the normal power transformers and switch gear and shall be enclosed in a room constructed of not less than 1-hour fire-resistance-rated fire barriers ventilated directly to and from the exterior. Power distribution from the two sources shall be by independent routes. Transfer to full emergency power shall be automatic and within 60 seconds of failure of the primary power. The systems shall comply with the *New York City Electrical Code*.

**909.11.1 Power sources and power surges.** Elements of the smoke management system relying on volatile memories or similar systems shall be supplied with uninterruptible power sources of sufficient duration to span a 15-minute primary power interruption. Elements of the smoke management system susceptible to power surges shall be suitably protected by conditioners, suppressors or other approved means.

**909.12 Detection and control systems.** Fire detection systems providing control input or output signals to mechanical smoke control systems or elements thereof shall comply with the requirements of Chapter 9 and NFPA 72. Such systems shall be equipped with a control unit complying with UL 864 and listed as smoke control equipment.

Control systems for mechanical smoke control systems shall include provisions for verification. Verification shall include positive confirmation of actuation, testing, manual override, the presence of power downstream of all disconnects and, through a preprogrammed weekly test sequence report, abnormal conditions audibly, visually and by printed report.

**909.12.1 Wiring.** In addition to meeting requirements of the *New York City Electrical Code*, all wiring, regardless of voltage, shall be fully enclosed within continuous raceways.

**909.12.2 Activation.** Smoke control systems shall be activated in accordance with this section.

**909.12.2.1 Pressurization, airflow or exhaust method.** Mechanical smoke control systems using the pressurization, airflow or exhaust method shall have completely automatic control.

**909.12.2.2 Passive method.** Passive smoke control systems actuated by spot-type detectors listed for releasing service shall be permitted.

**909.12.3 Automatic control.** Where completely automatic control is required or used, the automatic-control sequences shall be initiated from an appropriately zoned automatic sprinkler system complying with Section 903.3.1.1, manual controls that are readily accessible to the Fire Department and any smoke detectors required by engineering analysis. See Section 909.16 for manual control requirements.

**909.13 Control air tubing.** Control air tubing shall be of sufficient size to meet the required response times. Tubing shall be flushed clean and dry prior to final connections and shall be adequately supported and protected from damage. Tubing passing through concrete or masonry shall be sleeved and protected from abrasion and electrolytic action.

**909.13.1 Materials.** Control air tubing shall be hard drawn copper, Type L, ACR in accordance with ASTM B 42, ASTM B 43, ASTM B 68, ASTM B 88, ASTM B 251 and ASTM B 280. Fittings shall be wrought copper or brass, solder type, in accordance with ASME B 16.18 or ASME B 16.22. Changes in direction shall be made with appropriate tool bends. Brass compression-type fittings shall be used at final connection to devices; other joints shall be brazed using a BCuP5 brazing alloy with solidus above 1,100°F (593°C) and liquids below 1,500°F (816°C). Brazing flux shall be used on copper-to-brass joints only.

**Exception:** Nonmetallic tubing used within control panels and at the final connection to devices, providing all of the following conditions are met:

1. Tubing shall be listed by an approved agency for flame and smoke characteristics.
2. Tubing and connected devices shall be completely enclosed within galvanized or paint-grade steel enclosure of not less than 0.030 inch (0.76 mm) (No. 22 galvanized sheet gage) thickness. Entry to the enclosure shall be by copper tubing with a protective grommet of neoprene or teflon or by suitable brass compression to male-barbed adapter.
3. Tubing shall be identified by appropriately documented coding.
4. Tubing shall be neatly tied and supported within enclosure. Tubing bridging cabinet and door or moveable device shall be of sufficient length to avoid tension and excessive stress. Tubing shall be protected against abrasion. Tubing serving devices on doors shall be fastened along hinges.

**909.13.2 Isolation from other functions.** Control tubing serving other than smoke control functions shall be isolated by automatic isolation valves or shall be an independent system.

**909.13.3 Testing.** Control air tubing shall be tested at three times the operating pressure for not less than 30 minutes without any noticeable loss in gauge pressure prior to final connection to devices.

**909.14 Marking and identification.** The detection and control systems shall be clearly marked at all junctions, accesses and terminations.

**909.15 Control diagrams.** Identical control diagrams showing all devices in the system and identifying their location and function shall be maintained current and kept on file with the department, the Fire Department and in the fire command center in format and manner approved by the Fire Commissioner.

**909.16 Fire-fighter's smoke control panel.** A fire-fighter's smoke control panel for Fire Department emergency response purposes only shall be provided and shall include manual control or override of automatic control for mechanical smoke control systems. The panel shall be located in a fire command center complying with Section 911, and shall comply with Sections 909.16.1 through 909.16.3. Where required in Section 912, the post-fire smoke purge system shall be manually activated from the fire-fighter's control panel.

**909.16.1 Panel indicators.** Fans within the building shall be shown on the fire-fighter's control panel. A clear indication of the direction of airflow and the relationship of components shall be displayed. Status indicators shall be provided for all smoke control equipment, annunciated by fan and zone, and by pilot-lamp-type indicators as follows:

1. Fans, dampers and other operating equipment in their normal status—WHITE.
2. Fans, dampers and other operating equipment in their off or closed status—RED.
3. Fans, dampers and other operating equipment in their on or open status—GREEN.
4. Fans, dampers and other operating equipment in a fault status—YELLOW/AMBER.

**909.16.2 Panel controls.** The fire fighter's control panel shall provide control capability over the complete smoke-control system equipment within the building as follows:

1. ON-AUTO-OFF control over each individual piece of operating smoke control equipment that can also be controlled from other sources within the building. This includes stairway pressurization fans; smoke exhaust fans; supply, return and exhaust fans; elevator shaft fans and other operating equipment used or intended for smoke control purposes.
2. OPEN-AUTO-CLOSE control over individual dampers relating to smoke control and that are also controlled from other sources within the building.
3. ON-OFF or OPEN-CLOSE control over smoke control and other critical equipment associated with a fire or smoke emergency and that can only be controlled from the fire-fighter's control panel. The fire-fighter's control panel shall be configured as described in Section 911.

**Exceptions:**

1. Complex systems, where approved, where the controls and indicators are combined to

control and indicate all elements of a single smoke zone as a unit.

2. Complex systems, where approved, where the control is accomplished by computer interface using approved, plain English commands.

**909.16.3 Control action and priorities.** The fire-fighter's control panel actions shall be as follows:

1. ON-OFF, OPEN-CLOSE control actions shall have the highest priority of any control point within the building. Once issued from the fire-fighter's control panel, no automatic or manual control from any other control point within the building shall contradict the control action. Where automatic means are provided to interrupt normal, nonemergency equipment operation or produce a specific result to safeguard the building or equipment (i.e., duct freezestats, duct smoke detectors, high-temperature cutouts, temperature-actuated linkage and similar devices), such means shall be capable of being overridden by the fire-fighter's control panel. The last control action as indicated by each fire-fighter's control panel switch position shall prevail. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.

**Exception:** Power disconnects required by the *New York City Electrical Code*.

2. Only the AUTO position of each three-position fire-fighter's control panel switch shall allow automatic or manual control action from other control points within the building. The AUTO position shall be the NORMAL, nonemergency, building control position. Where a fire-fighter's control panel is in the AUTO position, the actual status of the device (on, off, open, closed) shall continue to be indicated by the status indicator described above. When directed by an automatic signal to assume an emergency condition, the NORMAL position shall become the emergency condition for that device or group of devices within the zone. In no case shall control actions require the smoke control system to assume more than one configuration at any one time.

**909.17 System response time.** Smoke-control system activation shall be initiated immediately after receipt of an appropriate automatic or manual activation command. Smoke control systems shall activate individual components (such as dampers and fans) in the sequence necessary to prevent physical damage to the fans, dampers, ducts and other equipment. For purposes of smoke control, the fire-fighter's control panel response time shall be the same for automatic or manual smoke control action initiated from any other building control point. The total response time, including that necessary for detection, shutdown of operating equipment and smoke control system startup, shall allow for full operational mode to be achieved before the conditions in the space exceed the design smoke condition. The system response time for each component and their sequential relationships shall be detailed in the required

rational analysis and verification of their installed condition reported in the required final report.

**909.18 Acceptance testing.** Devices, equipment, components and sequences shall be individually tested. These tests, in addition to those required by other provisions of this code, shall consist of determination of function, sequence and, where applicable, capacity of their installed condition.

**909.18.1 Detection devices.** Smoke or fire detectors that are a part of a smoke control system shall be tested in accordance with Chapter 9 in their installed condition. When applicable, this testing shall include verification of airflow in both minimum and maximum conditions.

**909.18.2 Ducts.** Ducts that are part of a smoke control system shall be traversed using generally accepted practices to determine actual air quantities.

**909.18.3 Dampers.** Dampers shall be tested for function in their installed condition.

**909.18.4 Inlets and outlets.** Inlets and outlets shall be read using generally accepted practices to determine air quantities.

**909.18.5 Fans.** Fans shall be examined for correct rotation. Measurements of voltage, amperage, revolutions per minute (rpm) and belt tension shall be made.

**909.18.6 Smoke barriers.** Measurements using inclined manometers or other approved calibrated measuring devices shall be made of the pressure differences across smoke barriers. Such measurements shall be conducted for each possible smoke control condition.

**909.18.7 Controls.** Each smoke zone, equipped with an automatic-initiation device, shall be put into operation by the actuation of one such device. Each additional device within the zone shall be verified to cause the same sequence without requiring the operation of fan motors in order to prevent damage. Control sequences shall be verified throughout the system, including verification of override from the fire-fighter's control panel and simulation of emergency power conditions.

**909.18.8 Special inspections for smoke control.** Smoke control systems shall be tested by a special inspector in accordance with Chapter 17.

**909.18.8.1 Scope of testing.** Special inspections shall be conducted in accordance with the following:

1. During erection of ductwork and prior to concealment for the purposes of leakage testing and recording of device location.
2. Prior to occupancy and after sufficient completion for the purposes of pressure-difference testing, flow measurements, and detection and control verification.

**909.18.8.2 Qualifications.** Special inspectors for smoke control shall have a certification as air balancers and expertise in fire protection engineering or mechanical engineering.

**909.18.8.3 Reports.** A complete report of testing shall be prepared by the special inspector or approved agency.

The report shall include identification of all devices by manufacturer, nameplate data, design values, measured values and identification tag or mark. The report shall be reviewed by the responsible engineer and, when satisfied that the design intent has been achieved, the engineer shall seal, sign and date the report.

**909.18.8.3.1 Report filing.** A copy of the final report and each inspection report shall be filed with the department and Fire Commissioner, and an identical copy shall be maintained in an approved location at the building.

**909.18.9 Identification and documentation.** Charts, drawings and other documents identifying and locating each component of the smoke control system, and describing its proper function and maintenance requirements, shall be maintained on file at the building as an attachment to the report required by Section 909.18.8.3. Devices shall have an approved identifying tag or mark on them consistent with the other required documentation and shall be dated indicating the last time they were successfully tested and by whom.

**909.18.10 Reacceptance testing.** The smoke control system shall require a reacceptance test after any modifications to the system or physical changes to the building that may affect system performance.

**909.19 System acceptance.** Buildings, or portions thereof, required by this code to comply with this section shall not be issued a certificate of occupancy until such time that the department determines that the provisions of this section have been fully complied with, and that the Fire Department has received satisfactory instruction on the operation, both automatic and manual, of the system.

**Exception:** In buildings of phased construction, the department may issue a temporary certificate of occupancy provided that those portions of the building to be occupied meet the requirements of this section and that the remainder does not pose a significant hazard to the safety of the proposed occupants or adjacent buildings.

**909.20 Smokeproof enclosures.** Where required by Section 1019.1.8, a smoke proof enclosure shall be constructed in accordance with this section. Where access to the roof is required by the *New York City Fire Code*, such access shall be from the smoke proof enclosure where a smoke proof enclosure is required. Smokeproof enclosures shall consist of one of the following systems:

1. An enclosed interior exit stairway constructed in accordance with Section 1019.1 and accessed through an open exterior balcony.
2. An enclosed interior exit stairway constructed in accordance with Section 1019.1 and accessed through a naturally ventilated vestibule.
3. An enclosed interior exit stairway constructed in accordance with Section 1019.1 and accessed through a mechanically ventilated vestibule.
4. A pressurized interior exit stairway constructed in accordance with Section 1019.1.

**909.20.1 Access.** Access to the interior exit stairway shall be by way of a vestibule or an open exterior balcony, unless such stairway is pressurized in accordance with Section 909.20.5. The minimum dimension of the vestibule or open exterior balcony shall not be less than the required width of the corridor leading to the vestibule or open exterior balcony 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.

**909.20.2 Construction.** The smoke proof enclosure shall be separated from the remainder of the building by not less than a 2-hour fire-resistance-rated fire barrier without openings other than the required means of egress doors. The vestibule shall be separated from the stairway by not less than a 2-hour fire-resistance-rated fire barrier. The open exterior balcony shall be constructed in accordance with the fire-resistance-rating requirements for floor construction.

**909.20.2.1 Door closers.** Doors in a smoke proof enclosure shall be self-closing or shall be automatic-closing by actuation of a smoke detector installed at the floor-side entrance to the smoke proof enclosure in accordance with Section 715.3.7. The actuation of the smoke detector on any door shall activate the closing devices on all doors in the smoke proof enclosure at all levels. Smoke detectors shall be installed in accordance with Section 907.10.

**909.20.3 Natural ventilation alternative.** The provisions of Sections 909.20.3.1 through 909.20.3.3 shall apply to ventilation of smoke proof enclosures by natural means.

**909.20.3.1 Balcony doors.** Where access to the stairway is by way of an open exterior balcony, the door assembly into the enclosure shall be a fire door in accordance with Section 715.3.

**909.20.3.2 Vestibule doors.** Where access to the stairway is by way of a vestibule, the door assembly into the vestibule shall be a fire door complying with Section 715.3. The door assembly from the vestibule to the stairway shall have not less than a 90-minute fire protection rating complying with Section 715.3.

**909.20.3.3 Vestibule ventilation.** Each vestibule shall have a minimum net area of 16 square feet (1.5 m<sup>2</sup>) of opening in a wall facing an outer court, yard or public way that is at least 20 feet (6096 mm) in width.

**909.20.4 Mechanical ventilation alternative.** The provisions of Sections 909.20.4.1 through 909.20.4.4 shall apply to ventilation of smoke proof enclosures by mechanical means.

**909.20.4.1 Vestibule doors.** The door assembly from the building into the vestibule shall be a fire door complying with Section 715.3. The door assembly from the vestibule to the stairway shall have not less than a 90-minute fire protection rating in accordance with Section 715.3. The door from the building into the vestibule shall be provided with gaskets or other provisions to minimize air leakage.

**909.20.4.2 Vestibule ventilation.** The vestibule shall be supplied with not less than one air change per minute and

the exhaust shall not be less than 150 percent of supply. Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose. Supply air shall enter the vestibule within 6 inches (152 mm) of the floor level. The top of the exhaust register shall be located at the top of the smoke trap but not more than 6 inches (152 mm) down from the top of the trap, and shall be entirely within the smoke trap area. Doors in the open position shall not obstruct duct openings. Duct openings with controlling dampers are permitted where necessary to meet the design requirements, but dampers are not otherwise required.

**909.20.4.2.1 Engineered ventilation system.** Where a specially engineered system is used, the system shall exhaust a quantity of air equal to not less than 90 air changes per hour from any vestibule in the emergency operation mode and shall be sized to handle three vestibules simultaneously. Smoke detectors shall be located at the floor-side entrance to each vestibule and shall activate the system for the affected vestibule. Smoke detectors shall be installed in accordance with Section 907.10.

**909.20.4.3 Smoke trap.** The vestibule ceiling shall be at least 20 inches (508 mm) higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward-moving air column. The height shall not be decreased unless approved and justified by design and test.

**909.20.4.4 Stair shaft air movement system.** The stair 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. The system shall maintain a maximum of 0.35 inch of water (87 Pa) in the shaft relative to the building measured with all stairway doors closed under maximum anticipated stack pressures.

**909.20.4.5 Door opening force.** Door opening force shall not exceed limits in Section 1008.1.2.

**909.20.5 Stair 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 interior exit stairways are pressurized to a minimum of 0.15 inch of water (37 Pa) and a maximum of 0.35 inch of water (87 Pa) in the shaft relative to the building measured with all stairway doors closed under maximum anticipated stack pressures.

**909.20.6 Ventilating equipment.** The activation of ventilating equipment required by the alternatives in Sections 909.20.4 and 909.20.5 shall be by smoke detectors installed at each floor level at an approved location at the entrance to the smokeproof enclosure. When the closing device for the stair shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall activate and operate at the required performance levels. Smoke

detectors shall be installed in accordance with Section 907.10.

**909.20.6.1 Ventilation systems.** Smokeproof enclosure ventilation systems shall be independent of other building ventilation systems. The equipment and ductwork shall comply with one of the following:

1. Equipment and ductwork shall be located exterior to the building and directly connected to the smokeproof enclosure or connected to the smokeproof enclosure by ductwork enclosed by 2-hour fire-resistance-rated fire barriers.
2. Equipment and ductwork shall be located within the smokeproof enclosure with intake or exhaust directly from and to the outside or through ductwork enclosed by 2-hour fire-resistance-rated fire barriers.
3. Equipment and ductwork shall be located within the building if separated from the remainder of the building, including other mechanical equipment, by 2-hour fire-resistance-rated fire barriers.

**909.20.6.2 Emergency power.** Mechanical vestibule and stair shaft ventilation systems and automatic fire detection systems shall be powered by an emergency power system conforming to Section 403.11 and Chapter 27.

**909.20.6.3 Acceptance and testing.** Before the mechanical equipment is approved, the system shall be tested in the presence of the department or approved agency to confirm that the system is operating in compliance with these requirements.

**909.21 Underground building smoke exhaust system.** Where required in accordance with Section 405.5 for underground buildings, a smoke exhaust system shall be provided in accordance with this section.

**909.21.1 Exhaust capability.** Where compartmentation is required, each compartment shall have an independent, automatically activated smoke exhaust system capable of manual operation. The system shall have an air supply and smoke exhaust capability that will provide a minimum of six air changes per hour.

**909.21.2 Operation.** The smoke exhaust system shall be operated in the compartment of origin by the following, independently of each other:

1. Two cross-zoned smoke detectors within a single protected area of a single smoke detector monitored by an alarm verification zone or an approved equivalent method.
2. The automatic sprinkler system.
3. Manual controls that are readily accessible to the Fire Department.

**909.21.3 Alarm required.** Activation of the smoke exhaust system shall activate an audible alarm at a constantly attended location.

**SECTION BC 910  
SMOKE AND HEAT VENTS**

**910.1 General.** Where required by this code or otherwise installed, smoke and heat vents or mechanical smoke exhaust systems and draft curtains shall conform to the requirements of this section.

**Exception:** Frozen-food warehouses used solely for storage of Class I and II commodities where protected by an automatic sprinkler system in accordance with Section 903.3.1.1.

**910.2 Where required.** Smoke and heat vents designed in accordance with Section 910.3 shall be installed in the roofs of buildings or portions thereof occupied for the uses set forth in Sections 910.2.1 through 910.2.3. Vents shall be installed at the top of a closed shaft in accordance with Section 910.5.

**910.2.1 Groups F-1 and S-1.** Buildings and portions thereof used as a Group F-1 or S-1 occupancy having more than 50,000 square feet (4645 m<sup>2</sup>) in undivided area.

**Exception:** Group S-1 aircraft repair hangars.

**910.2.2 Group H.** Buildings and portions thereof used as a Group H occupancy as shown:

1. In occupancies classified as Group H-2 or H-3, any of which are over 15,000 square feet (1394 m<sup>2</sup>) in undivided area or area greater in depth than 100 feet (30 480 mm) from Fire Department apparatus access.

**Exception:** Buildings of noncombustible construction containing only noncombustible materials.

2. In areas of buildings in Group H used for storing Class 2, 3, and 4 liquid and solid oxidizers, Class 1 and unclassified detonable organic peroxides, Class 3 and 4 unstable (reactive) materials, or Class 2 or 3 water-reactive materials as required for a high-hazard commodity classification.

**Exception:** Buildings of noncombustible construction containing only noncombustible materials.

**910.2.3 High-piled combustible storage.** Buildings and portions thereof containing high-piled combustible stock or rack storage in any occupancy group in accordance with Section 413 and the *New York City Fire Code*.

**910.3 Design and installation.** The design and installation of smoke and heat vents and draft curtains shall be as specified in this section and Table 910.3.

**910.3.1 Vent operation.** Smoke and heat vents shall be listed and labeled and shall be capable of being operated by approved automatic and manual means. Automatic operation of smoke and heat vents shall conform to the provisions of this section.

**910.3.1.1 Gravity-operated drop-out vents.** Automatic smoke and heat vents containing heat-sensitive glazing designed to shrink and drop out of the vent opening when exposed to fire shall fully open within 5 minutes after the vent cavity is exposed to a simulated fire, represented by a time-temperature gradient that reaches an air temperature of 500°F (260°C) within 5 minutes.

**TABLE 910.3  
REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS<sup>a</sup>**

OCCUPANCY GROUP AND COMMODITY CLASSIFICATION	DESIGNATED STORAGE HEIGHT (feet)	MINIMUM DRAFT CURTAIN DEPTH (feet)	MAXIMUM AREA FORMED BY DRAFT CURTAINS (square feet)	VENT AREA TO FLOOR AREA RATIO	MAXIMUM SPACING OF VENT CENTERS (feet)	MAXIMUM DISTANCE TO VENTS FROM WALL OR DRAFT CURTAINS <sup>b</sup> (feet)
Group F-1	—	0.2 × H <sup>c</sup> but ≥ 4	50,000	1:100	120	60
Group S-1 I-IV (Option 1)	≤ 20	6	10,000	1:100	100	60
	> 20 ≤ 40	6	8,000	1:75	100	55
Group S-1 I-IV (Option 2)	≤ 20	4	3,000	1:75	100	55
	> 20 ≤ 40	4	3,000	1:50	100	50
Group S-1 High hazard (Option 1)	≤ 20	6	6,000	1:50	100	50
	> 20 ≤ 30	6	6,000	1:40	90	45
Group S-1 High hazard (Option 2)	≤ 20	4	4,000	1:50	100	50
	> 20 ≤ 30	4	2,000	1:30	75	40

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m<sup>2</sup>.

- Requirements for rack storage heights in excess of those indicated shall be in accordance with the *New York City Fire Code*. For solid-piled storage heights in excess of those indicated, an approved engineered design shall be used.
- The distance specified is the maximum distance from any vent in a particular draft curtained area to walls or draft curtains which form the perimeter of the draft curtained area.
- H is the height of the vent, in feet, above the floor.



**910.3.1.2 Sprinklered buildings.** Where installed in buildings provided with an automatic sprinkler system in accordance with Section 903.3.1.1, smoke and heat vents shall be designed to operate automatically.

**910.3.1.3 Nonsprinklered buildings.** Where installed in buildings not provided with an automatic sprinkler system, smoke and heat vents shall operate automatically by actuation of a heat-responsive device rated at between 100°F (38°C) and 220°F (104°C) above ambient.

**Exception:** Gravity-operated drop-out vents complying with Section 910.3.1.1

**910.3.2 Vent dimensions.** The effective venting area shall not be less than 16 square feet (1.5 m<sup>2</sup>) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters having a total width not exceeding 6 inches (152 mm).

**910.3.3 Vent locations.** Smoke and heat vents shall be located 20 feet (6096 mm) or more from adjacent lot lines and fire walls and 10 feet (3048 mm) or more from fire barrier walls. Vents shall be uniformly located within the roof area above high-piled storage areas, with consideration given to roof pitch, draft curtain location, sprinkler location and structural members.

**910.3.4 Draft curtains.** Where required, draft curtains shall be provided in accordance with this section.

**Exception:** Where areas of buildings are equipped with early suppression fast-response (ESFR) sprinklers, draft curtains need not be provided within these areas. Draft curtains shall only be provided at the separation between the ESFR sprinklers and the conventional sprinklers.

**910.3.4.1 Construction.** Draft curtains shall be constructed of sheet metal, lath and plaster, gypsum board or other approved materials that provide equivalent performance to resist the passage of smoke. Joints and connections shall be smoke tight.

**910.3.4.2 Location and depth.** The location and minimum depth of draft curtains shall be in accordance with Table 910.3.

**910.4 Mechanical smoke exhaust.** Where approved by the department, engineered mechanical smoke exhaust shall be an acceptable alternate to smoke and heat vents.

**910.4.1 Location.** Exhaust fans shall be uniformly spaced within each draft-curtained area and the maximum distance between fans shall not be greater than 100 feet (30 480 mm).

**910.4.2 Size.** Fans shall have a maximum individual capacity of 30,000 cfm (14.2 m<sup>3</sup>/s). The aggregate capacity of smoke exhaust fans shall be determined by the equation:

$$C = A \times 300 \quad \text{(Equation 9-10)}$$

where:

$C$  = Capacity of mechanical ventilation required, in cubic feet per minute (m<sup>3</sup>/s).

$A$  = Area of roof vents provided in square feet (m<sup>2</sup>) in accordance with Table 910.3.

**910.4.3 Operation.** Mechanical smoke exhaust fans shall be automatically activated by the automatic sprinkler system or by heat detectors having operating characteristics equivalent to those described in Section 910.3.1. Individual manual controls of each fan unit shall also be provided.

**910.4.4 Wiring and control.** Wiring for operation and control of smoke exhaust fans shall be connected ahead of the main disconnect and protected against exposure to temperatures in excess of 1,000°F (538°C) for a period of not less than 15 minutes. Controls shall be located so as to be immediately accessible to the fire service from the exterior of the building and protected against interior fire exposure by fire barriers having a fire-resistance rating not less than one hour. The location of manual controls is subject to the approval of the Fire Commissioner.

**910.4.5 Supply air.** Supply air for exhaust fans shall be provided at or near the floor level and shall be sized to provide a minimum of 50 percent of required exhaust. Openings for supply air shall be uniformly distributed around the periphery of the area served.

**910.4.6 Interlocks.** In combination comfort air-handling/smoke removal systems or independent comfort air-handling systems, fans shall be controlled to shut down in accordance with the approved smoke control sequence.

**910.5 Smoke venting of closed shafts.** All closed shafts having a floor area exceeding 4 square feet (0.37 m<sup>2</sup>) shall be provided with a smoke vent in accordance with Sections 910.5.1 through 910.5.3.

**Exception:** Elevator and dumbwaiter shafts in accordance with Chapter 30.

**910.5.1 Smoke vent construction.** Smoke vents may be constructed as windows, louvers, skylights, vent ducts, or similar devices. Where a vent duct is installed, such vent ducts shall be enclosed by construction having the same fire-resistance rating as required for the shaft enclosure.

**910.5.2 Smoke vent dimensions.** The effective venting area shall not be less than 3<sup>1</sup>/<sub>2</sub> percent of the maximum shaft area at any floor, but in no event less than 72 square inches (0.05 m<sup>2</sup>). Of the total required vent area, at least one-third shall be clear opening to the exterior in the form of fixed louvers, ridge vents, or hooded or goosenecked openings. The remaining portion of the required vent area may be a window or skylight glazed with plain glass not more than 0.125-inch (3.2 mm) thick or with plastic glazing.

**Exception:** The clear opening to the exterior may be constructed as a skylight or trapdoor arranged to open automatically by fusible link or other mechanical device when subjected to a temperature of 160°F (71°C) or to a rapid rise in temperature at a rate of 15°F (-9.4°C) to 20°F (-6.7°C) per minute.

**910.5.3 Smoke vent location.** Smoke vents shall be located in accordance with Section 910.5.3.1 or 910.5.3.2, as applicable.

**910.5.3.1 Smoke vents located above the roof line.** Where a closed shaft or smoke vent duct penetrates

through the roof of the building, the vent shall be located as follows:

1. The vent shall be located at least 8 inches (203 mm) above a noncombustible roof assembly or at least 36 inches (914 mm)‡ above a combustible roof assembly.
2. The vent shall be located at least 10 feet (3048 mm) from any window, door, exterior stairway, or interior lot line. The vent may be located no less than 5 feet (1524 mm) from any window or door provided that the vent is located at a point higher than the top of such window or door.
3. Where the vent is constructed as a window or louver, the sill of the window or louver shall be located at least 36 inches (914 mm) (above the roof assembly).

**910.5.3.2 Smoke vents located in an exterior wall.**

Where the exterior wall serves as part of a shaft enclosure or where a smoke vent duct penetrates the exterior wall of the building, the vent shall be located at least 30 feet (9144 mm)‡ above and 5 feet (1524 mm) to the side of any other openings in the exterior wall.

**SECTION BC 911  
FIRE COMMAND CENTER**

**911.1 Features.** Where required by other sections of this code, a fire command center for Fire Department operations shall be provided. The fire command center shall be located in the lobby of the building on the entrance floor as part of the fire alarm control panel, elevator control panel or immediately adjacent thereto. The fire command center shall comply with NFPA 72 and shall contain the following features as applicable:

1. The emergency voice/alarm communication system unit.
2. The Fire Department communications unit.
3. Fire detection and alarm system annunciator unit.
4. Annunciator visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air-handling systems.
6. The fire-fighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Controls for unlocking stairway doors simultaneously.
8. Sprinkler valve and water-flow detector display panels.
9. Emergency power status indicators.
10. A telephone for Fire Department use with controlled access to the public telephone system.
11. Fire pump status indicators.
12. Generator supervision devices, manual start and transfer features.
13. Public address system, where specifically required by other sections of this code.

14. Manual controls of postfire smoke purge system in accordance with Section 912.2.3.

**SECTION 912  
POSTFIRE SMOKE PURGE SYSTEMS**

**912.1 Scope and purpose.** The purpose of this section is to establish minimum requirements for the design and installation of postfire smoke purge systems, which are intended for the timely restoration of operations and overhaul activities once a fire is extinguished. Postfire smoke purge systems are not intended or designed as life safety systems and are not required to meet the provisions of Section 909. Postfire smoke purge systems shall be required in:

1. High-rise buildings subject to Section 403.
2. Buildings with any story exceeding 50,000 square feet (4645 m<sup>2</sup>) in floor area.
3. Building with spaces exceeding 100 feet (30 480 mm) from natural ventilation openings. Natural ventilation openings shall consist of operable windows and doors of at least 5 percent of the floor area or roof vents per Section 910.
4. High-piled stock or rack storage in accordance with the *New York City Fire Code*.

**Exceptions:** A postfire smoke purge system is not required in R-2 occupancies where either of the following conditions exists:

1. **Openable windows.** A postfire smoke purge system is not required where every habitable room located in dwelling units is provided with windows complying with Chapter 12 and all of the following:
  - 1.1. **Minimum window area.** Each required window shall provide at least 12 square feet (1.1 m<sup>2</sup>) of glazed area. The total area of all such windows shall not be less than 10 percent of the floor area of the room or space served.
  - 1.2. **Minimum openable area.** Each required window shall provide a minimum of 6 square feet (0.56 m<sup>2</sup>) of openable area. The total area of all such openings shall not be less than 5 percent of the floor area of the room or space served. In addition, each required openable area shall be:
    - 1.2.1. Located wholly at least 30 inches (762 mm) above the finished floor; and
    - 1.2.2. Fully openable to the minimum 6 square feet (0.56 m<sup>2</sup>), at all times and without limiting stops or devices. Such openings may be achieved through the use of double-hung, sliding, or similar

types of windows. However, in the event of the use of casement-, hopper-, pivot-, or awning-type windows, such windows shall satisfy the requirements of this section only when they open to at least 75 degrees (1.22 rad)‡.

2. **Smokeproof enclosures.** A postfire smoke purge system is not required where all exits are constructed as smokeproof enclosures in accordance with Section 1019.1.8.

## 912.2 Postfire smoke purge systems in occupancy groups other than R-2.

**912.2.1 General design requirements.** Postfire smoke purge systems are permitted to use dedicated equipment, the normal building HVAC system or other openings and shall have the capability to exhaust smoke from occupied spaces. Smoke removal may be by either mechanical or natural ventilation, but shall be capable of removing cold smoke. Smoke removed from a space must be discharged to a safe location outside the building and shall not be recirculated into the building in accordance with the *New York City Mechanical Code*.

**912.2.2 Exhaust capability.** The system shall have an air supply and smoke exhaust capability that will provide a minimum of 6 air changes per hour or 1 cubic foot per minute per square foot (cfm/ft<sup>2</sup>) [0.00508<sup>3</sup>/(s · m<sup>2</sup>)], whichever is greater. The system need not exhaust from all areas at the same time, but is permitted to be zoned based on the largest fire area served. For the purpose of calculating system size, the height of a compartment shall be considered to run from slab to slab and include the volume above suspended ceilings. Provisions shall be made for sufficient make-up air. The provisions may include operable windows, doors, building leakage, or mechanical systems. In buildings having occupied floors located less than 75 feet (22 860 mm) above the lowest level of Fire Department vehicle access, breakable windows may be utilized.

**912.2.3 Operation.** The postfire smoke purge system shall be operated by manual controls that are part of the fire command center, in accordance with Section 911, or fire alarm panel when a fire command center is not required. Such control center or panel shall display a graphic indicating the portions of the building served by each postfire smoke purge system. When a system is zoned into areas of operation less than the entire building, each zone shall have an individual control. Fire Department manual controls of postfire smoke purge systems shall not override the manual or automatic operation of the smoke control system. Such Fire Department manual controls shall override the fire shutdown signal from the fire alarm system.

**912.3 Postfire smoke purge systems in occupancy Group R-2.** Postfire smoke purge systems in R-2 occupancies shall comply with either Section 912.3.1 or 912.3.2. Smoke removed must be discharged to a safe location outside the building and shall not be recirculated into the building in accordance with the *New York City Mechanical Code*.

**912.3.1 Stair ventilation.** The top of all enclosed exit stairs shall be provided with a reversible fan system capable of introducing fresh air or exhausting air at a rate of 6 air changes per hour or 1 cubic foot per minute per square foot (cfm/ft<sup>2</sup>) [0.00508 m<sup>3</sup>/(s·m<sup>2</sup>)], whichever is greater, based on the area of the largest floor. Such system shall be operated by manual controls that are part of the fire command center, as per Section 911, or fire alarm panel when a fire command center is not required. Such control center or panel shall display a graphic indicating the portions of the building served by each post-fire smoke purge system. The operation of such system shall be controlled by Fire Department personnel by manually opening stair doors at the appropriate story.

**912.3.2 Corridor ventilation.** The ducts and fans that provide fresh air supply to the public corridors in accordance with the *New York City Mechanical Code* shall be provided with reversible fans and duct sizes capable of introducing fresh air to or exhausting air from the corridor at a rate of 6 air changes per hour or 1 cubic foot per minute per square foot (cfm/ft<sup>2</sup>) [0.00508 m<sup>3</sup>/(s·m<sup>2</sup>)], whichever is greater, based on the area of the largest apartment plus the area of the public corridor. Such system shall be operated by manual controls that are part of the fire command center, as per Section 911, or fire alarm panel when a fire command center is not required. Each floor to be ventilated shall be by individual controls. Such control center or panel shall display a graphic indicating the portions of the building served by each postfire smoke purge system.

**912.4 Maintenance.** The building owner shall maintain postfire smoke exhaust systems in good operational condition. Records of testing shall be maintained on the premises for inspection by the department and Fire Department personnel.

