

# Chapter 9

# Fire Protection Systems

**BE SAFE.**



# Introduction

**Keith Glaunert, P.E.**  
**(262) 548-8604**  
**Keith.glaunert@wi.gov**

**Lynne LeCount**  
**(262) 262-8621**  
**Lynne.lecount@wi.gov**

**Mark Gardetto**  
**(262)523-3044**  
**Mark.gardetto@wi.gov**

**Dan Meneguín**  
**(608)266-0056**  
**Dan.meneguín@wi.gov**

# Course Outline

- **Section 901 - General**
- **Section 902 - Definitions**
- **Section 903 - Automatic Sprinkler Systems**
- **Section 904 - Alt Fire-Extinguishing Systems**
- **Section 905 – Standpipe Systems**
- **Section 907 - Fire Alarm & Detection Systems**

# Chapter 9 Fire Protection Requirements



# 901.2 Fire Protection Systems

- Fire protection systems shall be installed, repaired, operated and maintained in accordance with this code and the *International Fire Code*



## **901.2 Fire Protection Systems**

- Any fire protection system for which an exception or reduction to the provisions of this code has been granted shall be considered a required system**

## 901.2 Fire Protection Systems Cont.

- Exception: Any fire protection system or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of this code.
- Voluntary installation of a fire protection system can be partial or complete.

## **901.5 Acceptance Tests**

**Fire protection systems shall be tested in accordance with the installation standards.**

- NFPA 13 (2002) for sprinkler systems.**
- NFPA 72 (2002) for fire alarms**
- NFPA 14 (1996) for standpipe systems.  
(2003 in '06 IBC)**
- NFPA 20 (1999) for fire pumps.**

# 901.6 Supervisory Service

- **Required** fire protection systems shall be monitored by an approved supervising station per NFPA 72



## 901.6.2 Fire Alarm Systems

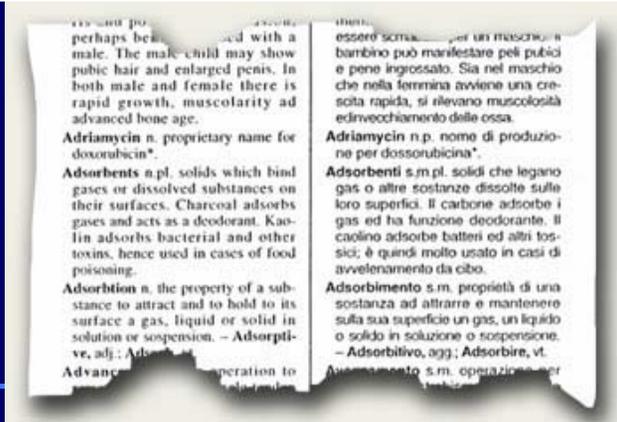


- **Fire alarm systems shall be monitored by an approved supervising station.**

# **901.6 Supervisory Service Interpretation:**

## **Existing Buildings**

- Remodel or alteration to an existing system will not require supervision.**
- Adding a new system will require the systems to be monitored.**



# Section 902

## Definitions

- **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.

## Definitions Continued

**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.**

# Definitions Continued

**Fire Area - The floor area enclosed and bounded by fire walls, fire barriers, exterior walls or fire-resistance rated horizontal assemblies of a building.**

## Section 903

# Automatic Sprinkler Systems



# Sprinkler Types

- **Standard Spray**
  - Upright**
  - Pendent**
  - Sidewall**
- **Extended Coverage**
- **Large Drop**
- **ESFR**
- **Special application**

# Sprinklers

- **Several thousand different sprinklers available**
- **Only new sprinklers allowed**
- **Specific application sprinklers used per listing**
- **Coatings or finishes must be factory applied**
- **Frame arms must be parallel to pipe**
- **Deflectors must be parallel to ceiling or deck**
- **Distance between deflector and storage minimum 18 inches**
- **Area per sprinkler per NFPA 13 or listing**

# Temperature of Sprinklers

- **Temperature characteristics:**

  - **See NFPA 13 Table 6.2.3.1**

  - **Noted by glass bulb color or frame arm color**

- **Temperature ratings:**

  - **Ordinary temperature to be used throughout bldgs**

  - **If ceiling temperature > 100° F based on actual temp**

  - **Misc heat sources see NFPA 13 Table 8.3.2.5(a)**

- **Unventilated attic use intermediate temperature**

# Temperature of Head



- Color Code
  - ↘ Red
- Temperature Classification
  - ↘ Ordinary
- Temperature Rating
  - ↘ **135° to 170°**
- Max. Ceiling Temp.
  - ↘ 100°

# Temperature of Head

- Color Code
  - ↘ Green (White)
- Temperature Classification
  - ↘ Intermediate
- Temperature Rating
  - ↘ 175° to 225°
- Max. Ceiling Temp.
  - ↘ 150°

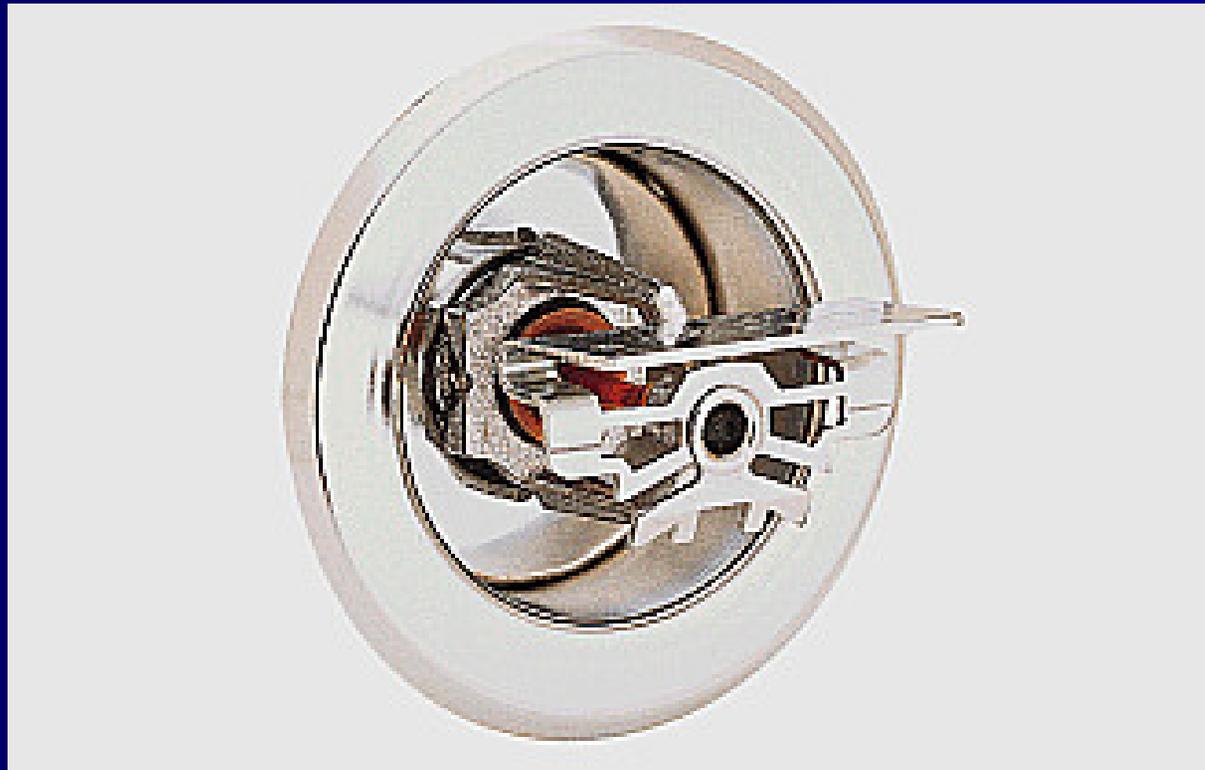


# Temperature of Head

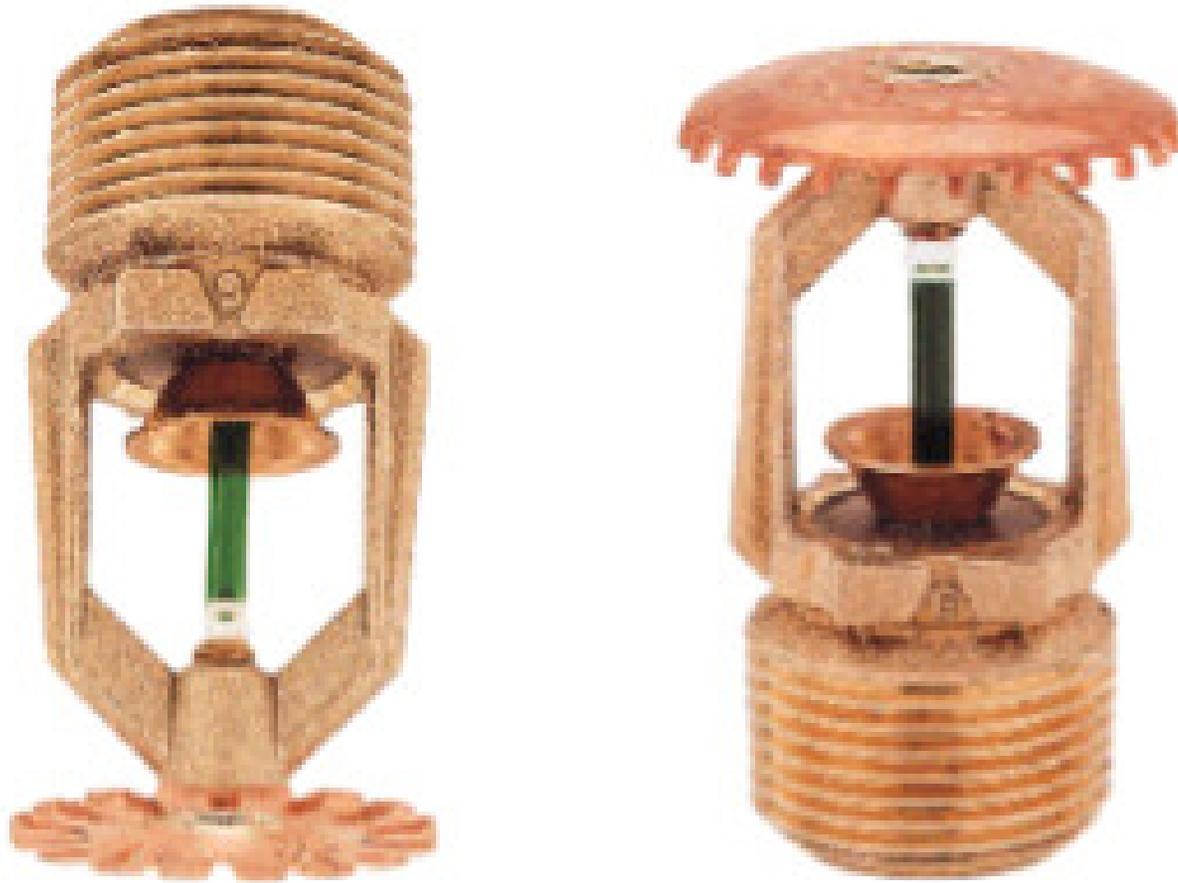


- Color Code  
Blue
- Temperature Classification  
High
- Temperature Rating  
250° to 300°
- Max. Ceiling Temp.  
225°

# Horizontal Sidewall Sprinkler



# Upright or Pendent Sprinkler



# Special Sprinklers



# Quick Response



Required in Light Hazard  
Occupancies

# Sprinkler Spacing Requirements

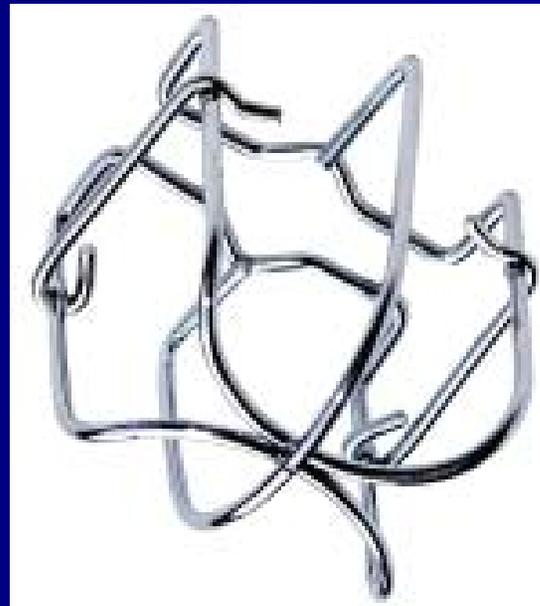
- **Standard spray sprinklers**
- **(NFPA 13 Table 8.6.2.2.1(a))**
- **Light hazard calculated - 225 sq. ft.  
Combustible attic areas 130 sq. ft.**
- **Ordinary hazard - 130 sq. ft.**

# Sprinkler Spacing Requirements Cont

- Extra hazard (density  $\geq .25$ ) - 100 sq. ft. (density  $< .25$ ) - 130 sq. ft. Maximum spacing for special sprinklers is 400 sq. ft.
- Maximum spacing for retail and storage with special sprinklers is 196 sq. ft.
- Extended coverage sidewalls for residential is 24 ft throw

# Head Guards

- **NFPA 13 6.2.8 Sprinklers subject to mechanical injury shall be protected with listed guards'**



# Painted Sprinklers

- **Sprinkler heads can only be factory painted.**
- **Ensure sprinklers are free of paint.**
  - ↘ **Replace when painted.**
  - ↘ **Ensure they are not still taped or covered**

# Sprinklers Checklist

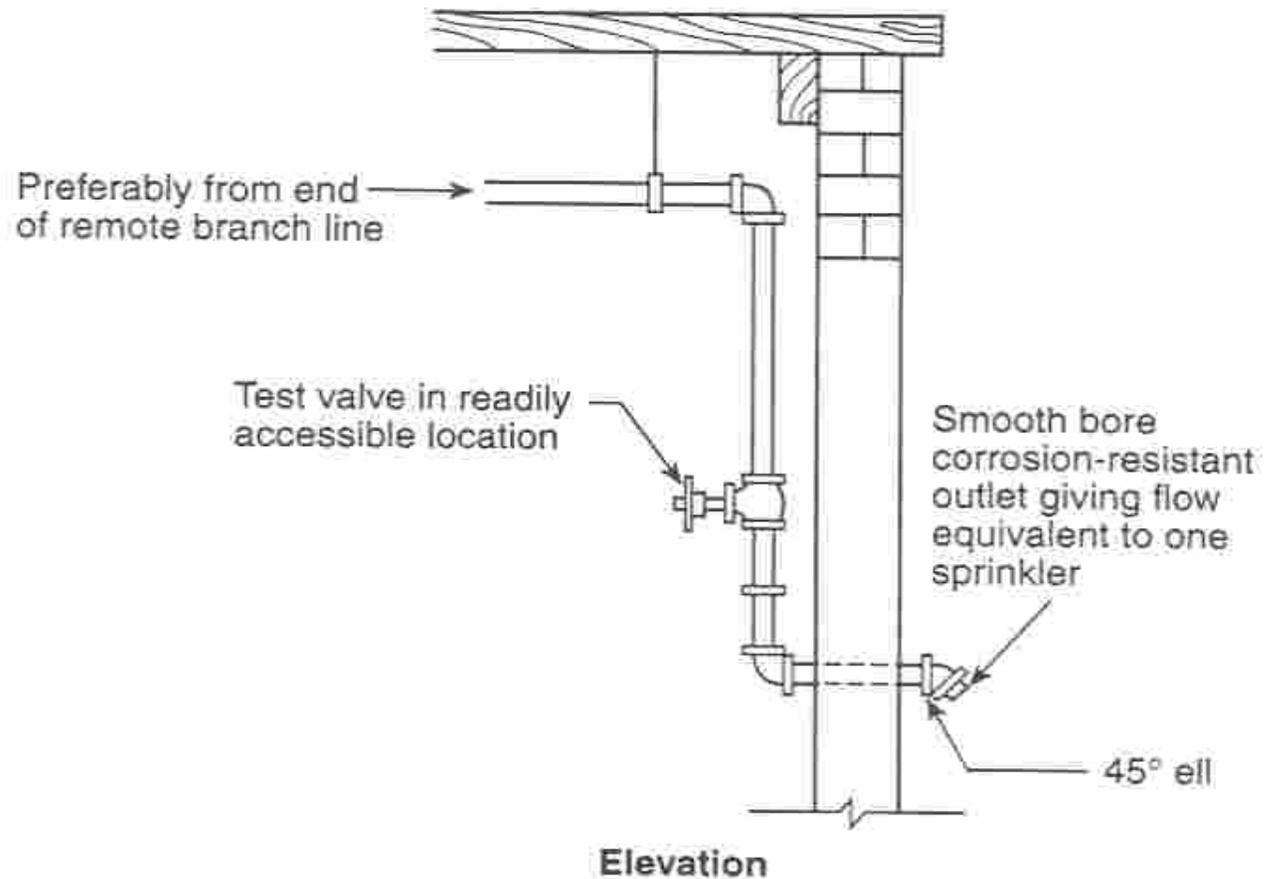
- **Right sprinkler for the application?**
- **Are quick response sprinklers required?**
- **Are sprinklers of proper temperature rating?**
- **Are all areas protected?**
- **Sprinklers not obstructed?**

# Hangers

- **Must be ferrous material unless specifically listed for FP**
- **Cannot be used to support non-system components**
- **Must conform to spacing requirements of NFPA 13 Chap 9**
- **Max distance between hangers per NFPA 13 Table 9.2.2.1**

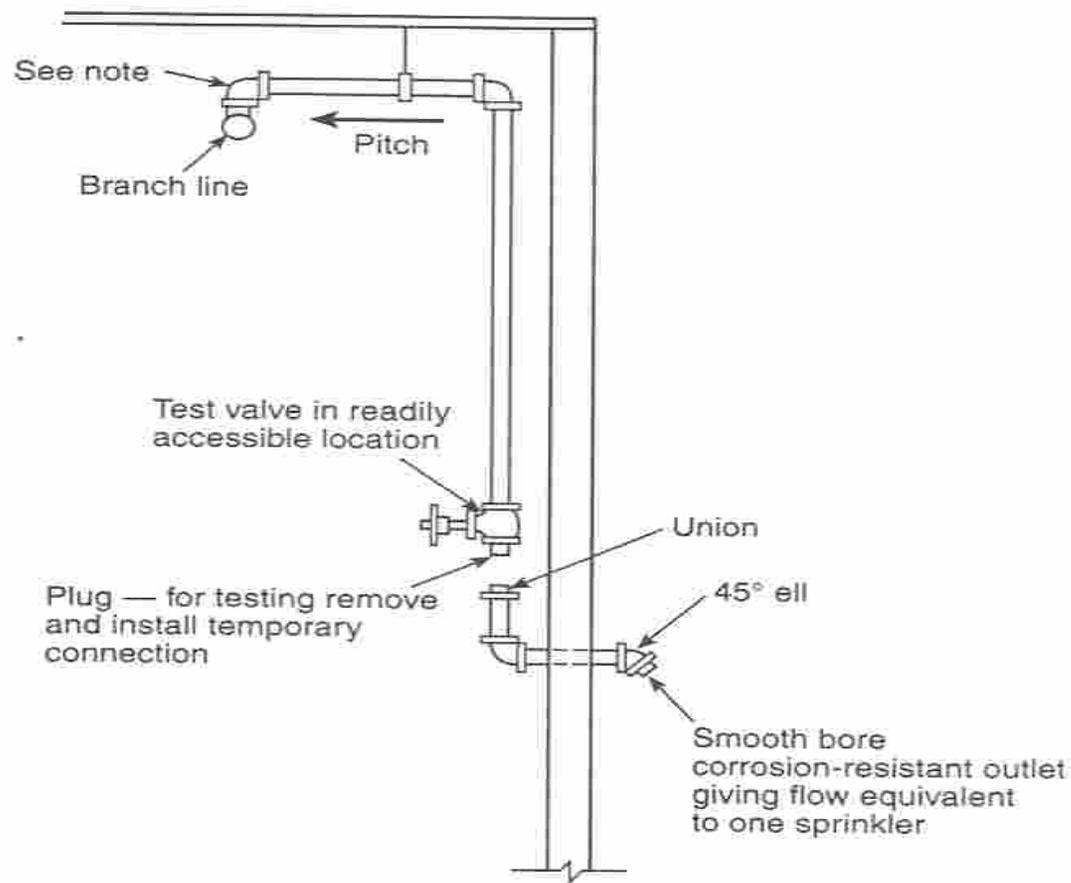
# Test Connections

- Details as shown in -
- NFPA 13 Figure A-8.16.4.2(a) and Location: Wet system can be anywhere Dry system must be most distant from DPV
- Connection must terminate in a sprinkler of smallest orifice on system
- Figure A-8.16.4.3
- Terminates to outside or a drain capable of handling flow



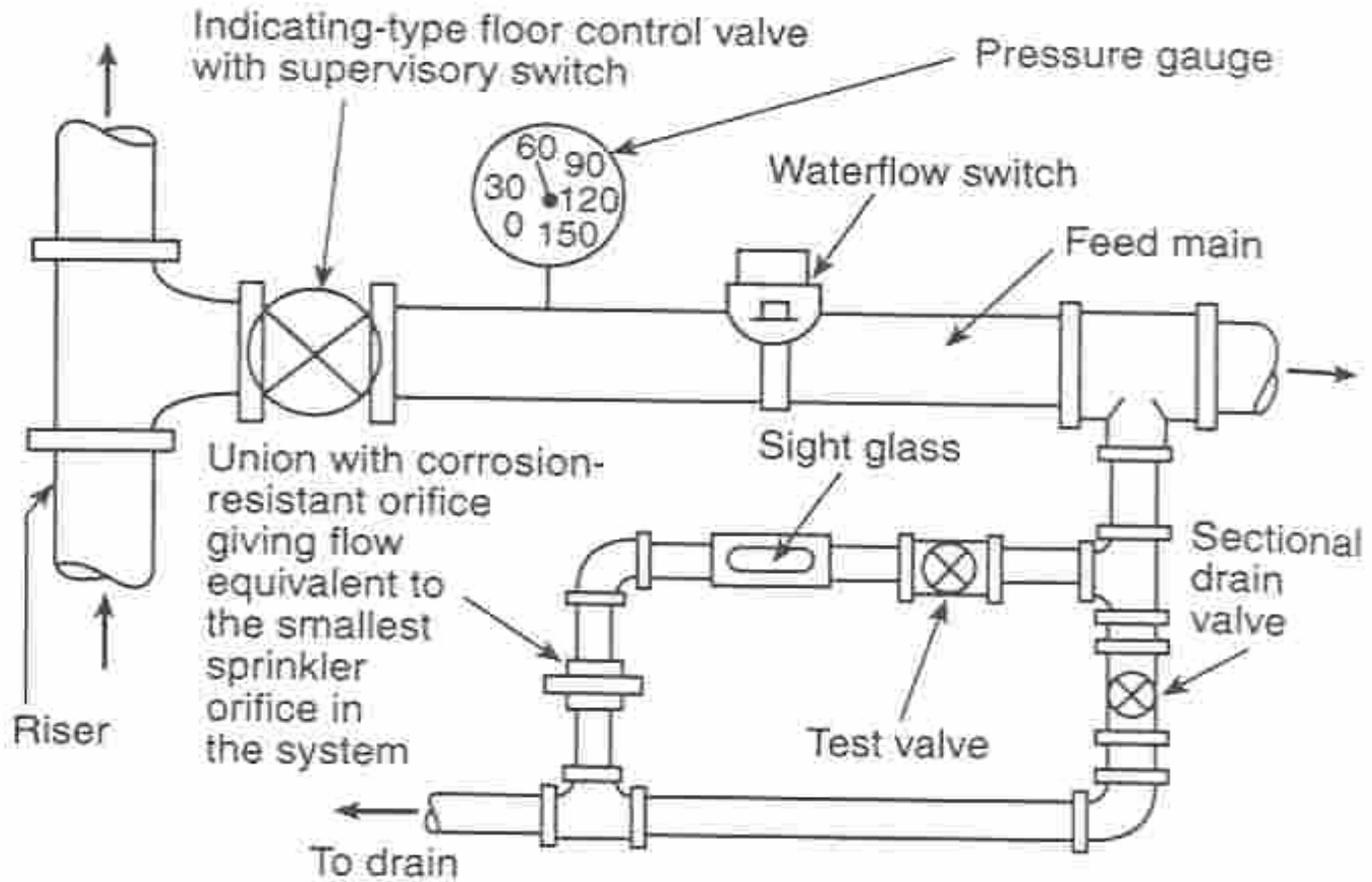
Note: Not less than 4 ft (1.2 m) of exposed test pipe in warm room beyond valve where pipe extends through wall to outside.

**FIGURE A.8.16.4.2(a) System Test Connection on Wet Pipe System.**



Note: To minimize condensation of water in the drop to the test connection, provide a nipple-up off of the branch line.

**FIGURE A.8.16.4.3 System Test Connection on Dry Pipe System.**



**FIGURE A.8.16.4.2(b) Floor Control Valve.**

# Special Situations

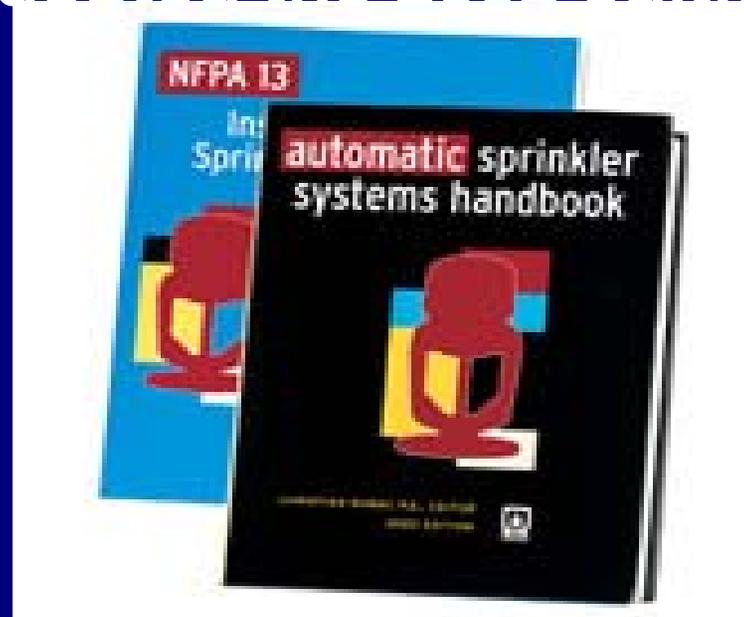
- **Concealed spaces NFPA 13 8.14.1.2 must have sprinklers (15 Sub-sections)**
- **Vertical openings NFPA 13 8.14.4  
Require 18" draft stops and close spr.**
- **Linen and trash chutes IBC 903.2.10.2**
- **Elevator hoistways and machine rooms NFPA 13 8.14.5**
- **Exterior roofs and canopies NFPA 13 8.14.7**
- **Dwelling units NFPA 13 8.14.8**
- **Electrical equipment rooms NFPA 13 8.14.10**

# Which NFPA Standard?

**903.3.1.1 Refers to an NFPA 13 sprinkler system.**

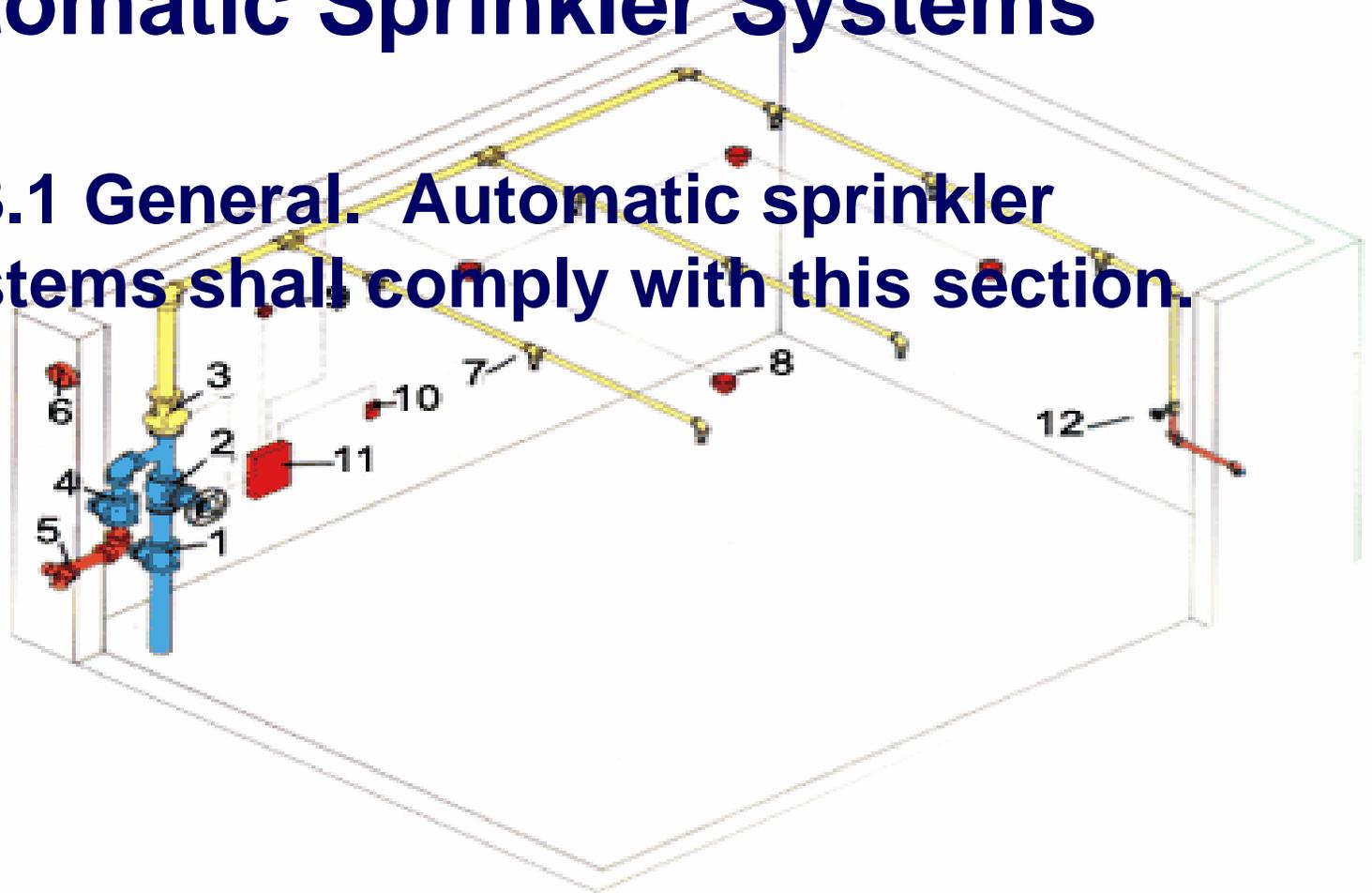
**903.3.1.2 Refers to an NFPA 13R sprinkler system.**

**Wisconsin has adopted the 2002 edition of both.**



# Section 903 Automatic Sprinkler Systems

**903.1 General. Automatic sprinkler systems shall comply with this section.**



## 903.1.1 Alternative protection

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 building official.**



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



## 903.3.1.2 Residential systems.

Unless specifically allowed by this code, residential sprinkler systems installed in accordance with NFPA 13R **shall not** be recognized for the purposes of exceptions or reductions permitted by other requirements of this code.

A prime example is the area increases allowed by Section 506.3. (area increase)

## **903 .3.3.2.1 Sprinklers Balconies and decks**

**New**

- **IBC 903.3.1.2.1 sprinklers are required for exterior balconies, decks and ground floor dwelling units in building of Type V const.**

## **903.2.1 Groups A-1, A-2, A-3 and A-4,** Throughout each fire area, and in all floors between the Group A and the level of exit discharge, where the fire area:

- **Exceeds 12,000 sqft. (5,000 sqft in Group A-2)**
- **Occupant load is 300 or more (100 in group A-2)**
- **Is located on a floor other than the level of exit discharge**
- **Contains a multi-theater complex**

**Sprinkler**

**Group A**

**Sprinkler**

**Group B**

**Sprinkler**

**Group B**

903.2.1.5 Group A-5. An automatic sprinkler system shall be provided in concession stands, retail areas, press boxes and other accessory use areas in excess of 1,000 square feet.



## 903.2.2 Group E

An automatic sprinkler system shall be provided throughout all Group E **fire areas** where:

- Each **fire area** that exceeds 20,000 square feet, and
- Every portion of buildings located below level of exit discharge.
- Exception: classrooms with at least one exterior exit door at ground level.

## 903.2.3 Group F-1

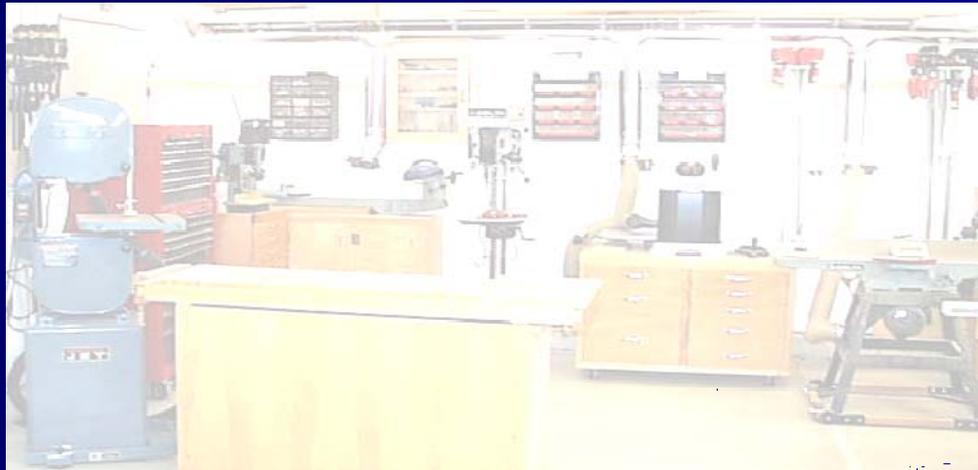
- Throughout the **entire building**, where:
  - A **fire area** exceeds 12,000 square feet, A **fire area** exceeds three stories in height, or
  - The combined **fire area** on all floors exceeds 24,000 square feet.

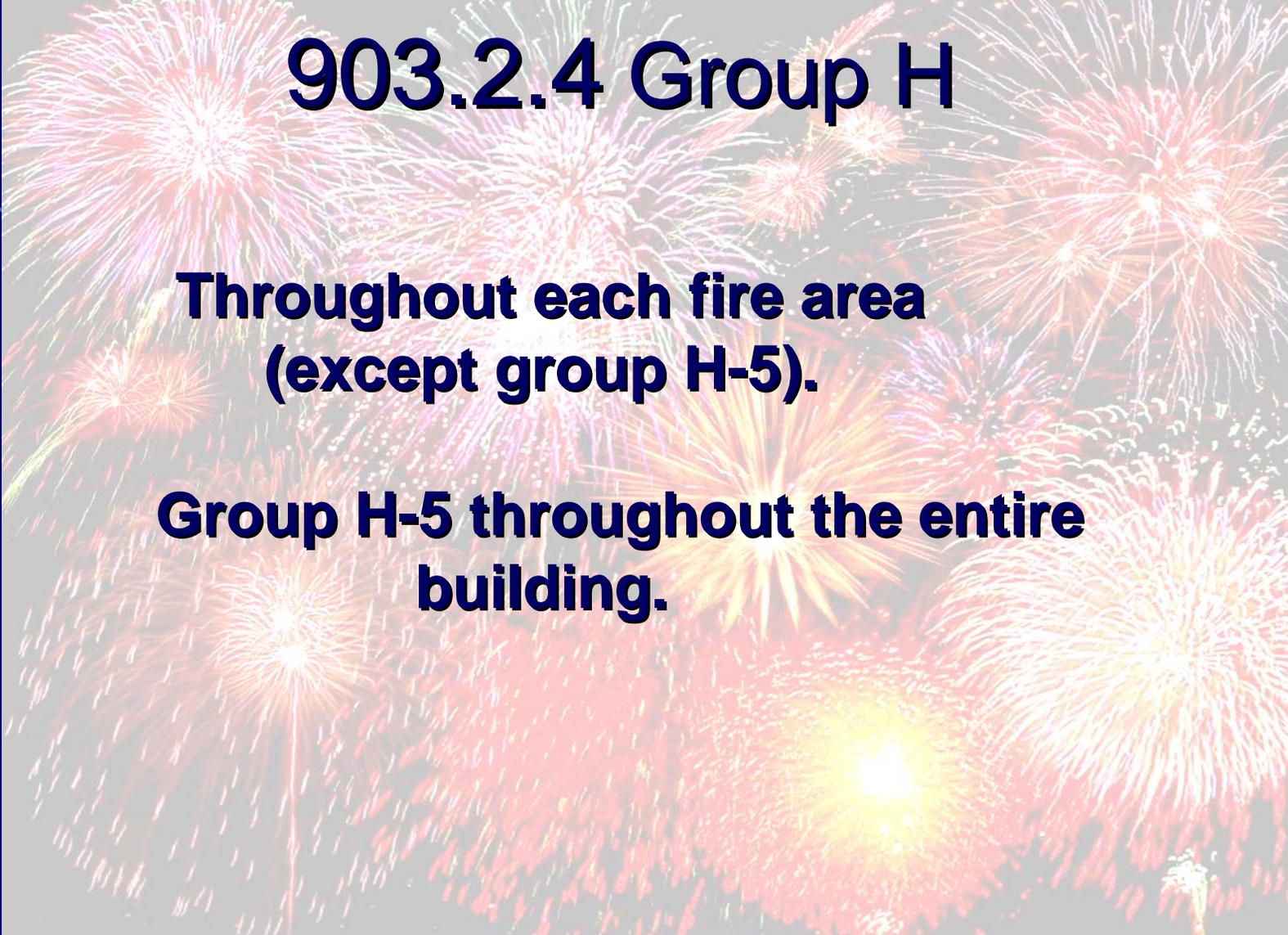
10,000 sq. ft

13,000 sq. ft

## 903.2.3.1 Woodworking operations

- Throughout all Group F-1 **fire areas** that contain woodworking operations in excess of 2,500 square feet that generate or use finely divided combustible material





## **903.2.4 Group H**

**Throughout each fire area  
(except group H-5).**

**Group H-5 throughout the entire  
building.**

## 903.2.5 Group I

- An automatic sprinkler system shall be provided **throughout** buildings with a Group I fire area.



## 903.2.6 Group M

Throughout the **entire building**, where:

- A **fire area** exceeds 12,000 square feet,
- A **fire area** exceeds three stories in height, above grade plane or
- The combined **fire area** on all floors exceeds 24,000 square feet.

## 903.2.6.1 High-piled Storage.

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

## 903.2.7 Group R

- Throughout the building unless;
  - The maximum number of stories above the lowest level of exit discharge is three, and
  - Each guest room has at least one door leading directly to an exterior exit access that leads directly to approved exits.
  - A residential sprinkler system installed in accordance with NFPA 13R shall be

**New**

## 903.2.7 Group R

**An automatic sprinkler system installed accordance with 903.3, shall be provided throughout all buildings with group R fire area.**

**New**

## 903.2.7 Group R

**NFPA 13 Sprinkler system may be installed in all buildings**

**NFPA 13R sprinkler system may be only installed in R buildings up to and including 4 stories in height.**

## NFPA 13R (2002)

**Section 6-8 Location of Sprinklers. Sprinklers shall be installed in all areas.**

**There are five exceptions but **garages** are not one of them.**



## **903.2.8 Group S-1 (except repair garages)**

**Throughout the entire building, where:**

- A fire area exceeds 12,000 square feet,**
- A fire area exceeds three stories in height,**  
**or**
- The combined fire area on all floors exceeds 24,000 square feet.**

# Group F-1, M, S-1 (Note: Same Requirements)

Throughout the **entire building**, where:

- A **fire area** exceeds 12,000 square feet,
- A **fire area** exceeds three stories in height,  
or
- The combined **fire area** on all floors exceeds 24,000 square feet.

# **903.2.1.8.1 Group S-1 Repair Garage**

**Throughout the entire building, where:**

- The building is two stories in height, and a fire area with repair garage contains a minimum of 10,000 square feet,**
- The building is one story in height, and a fire area with repair garage contains a minimum of 12,000 square feet, or**
- The building contains a repair garage in the basement.**

## 903.2.8.2 Bulk Storage of Tires

Buildings where the area of tire storage exceeds 20,000 cubic feet shall have an NFPA 13 automatic fire sprinkler system.



## **903.2.9 Group S-2 enclosed parking garage**

- **Throughout the building, including where located under other groups.**
- **903.2.11.1 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.**

## **903.2.10.1**

### **•Stories & Basements Without Openings.**

**An automatic sprinkler system shall be installed throughout every story or basement of all buildings where the floor area exceeds 1,500 square feet and where there is not provided at least one of the following types of exterior wall openings:**

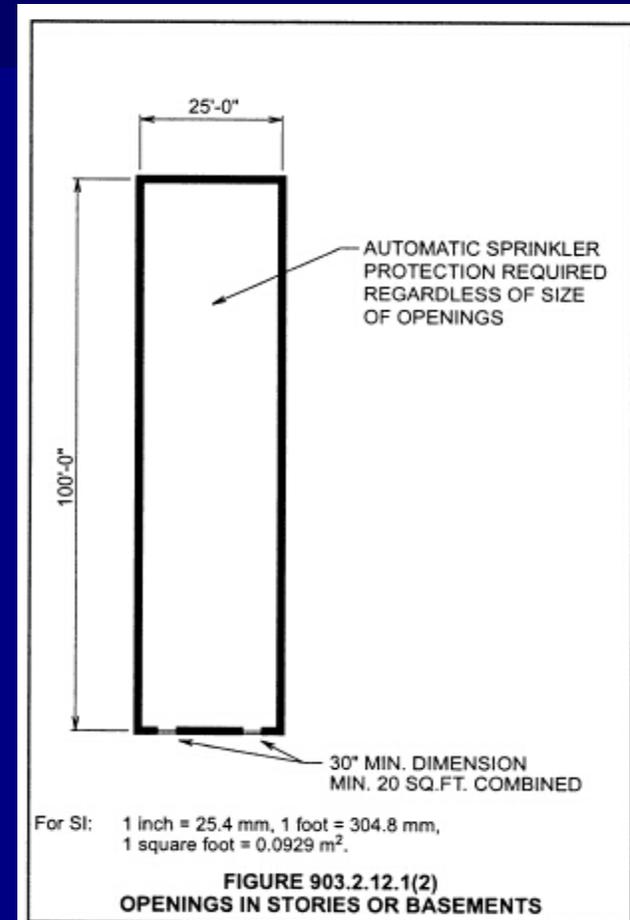
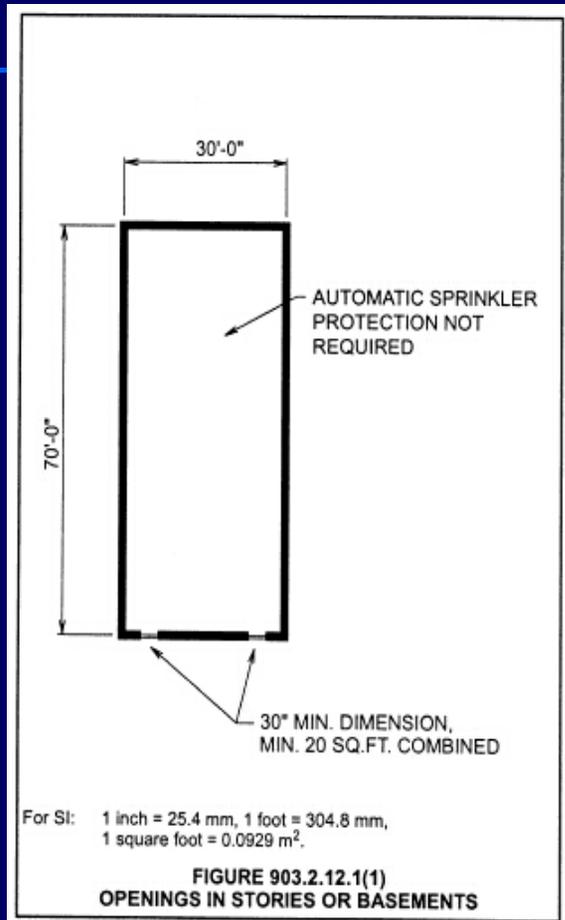
- 1. Opening below grade that lead directly to ground level by exterior stairway or an outside ramp.**
- 2. Openings entirely above the adjoining ground level totaling at least 20 square feet in each 50 linear feet.**

**See code for exact wording and opening requirements.**

## **903.2.10.1.2 Openings on one side only.**

**Where openings on a story are provided on only one side and the opposite wall of such story is more than 75 feet 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.**

# 903.2.10.1.2 Openings on one side only cont.

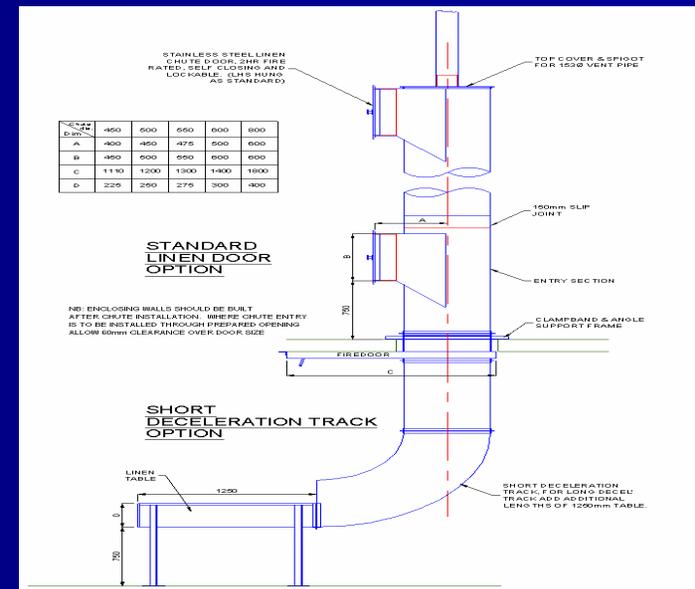


## **903.2.10.1.3 Basements.**

**Where any portion of a basement is located more than 75 feet from openings required by Section 903.2.12.1, the basement shall be equipped throughout with an approved automatic sprinkler system.**

## 903.2.10.2 Rubbish and linen chutes.

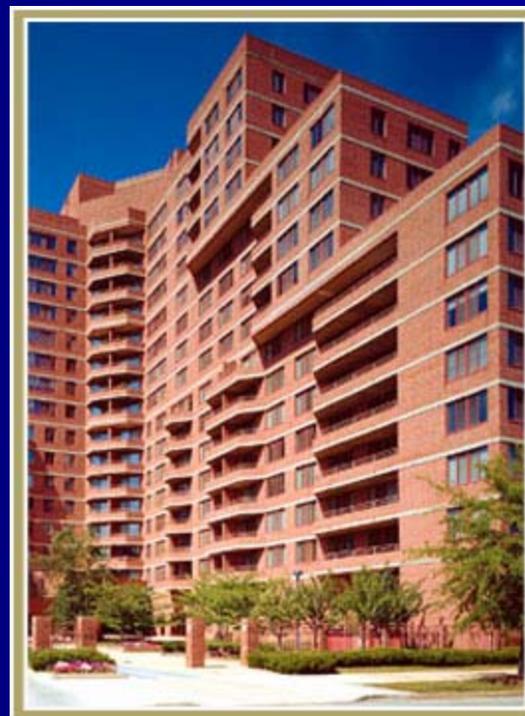
An automatic sprinkler system shall be installed at the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors.



### **903.2.10.3 Buildings over 55 feet in height.**

**An automatic sprinkler system shall be installed throughout building with a floor level having an occupant load of 30 or more that is located 55 feet or more above the lowest level of fire department vehicle access.**

**See exceptions.**



## **State stats 101.14(4)(b)1**

**An automatic sprinkler system must be installed throughout every building that is more than 60 feet in height, except this requirement does not apply to open parking structures.**



# Tall Building & Sprinklers-Exceptions Recognized

**NEW**

**Allowance of omitting sprinkler protection in some types of buildings is also supported by current code under adopted IBC section 503.1.2 and 903.2 These sections are not limited in height or area when the building requires large areas and unusual heights to accommodate crane ways or special machinery and equipment See handout**

# Section 403.1 High-Rise Buildings

**Applicability:** Applies to buildings having occupied floors located more than 75 feet above the lowest level of fire dept vehicle access.

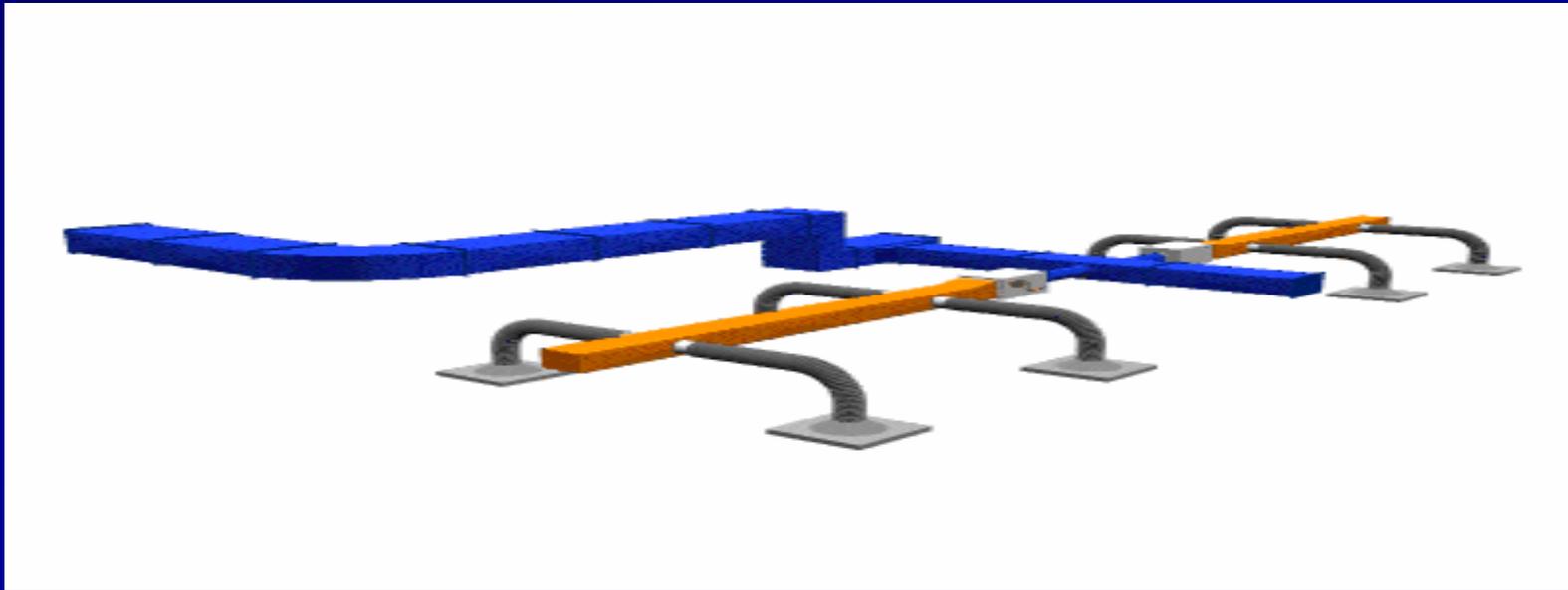
**403.2 Automatic sprinkler system throughout building per NFPA 13**

**403.5 Automatic fire detection/907.2.12.1 provided throughout all high-rise buildings**

## **903.2.12.1 Ducts conveying hazardous exhausts.**

**Where required by the IMC automatic sprinklers shall be provided in ducts conveying hazardous exhaust, or flammable or combustible materials.**

**See Section 606 of IMC**



## **903.2.12.2 Commercial cooking operations.**

**An automatic sprinkler system shall be installed in commercial kitchen exhaust hood and duct system where an automatic sprinkler system is used to comply with Section 904.**

**Also see Section 904**



## 903.2.13 Other required suppression systems.

In addition to the requirements of Section 903.2, the provisions indicated in Table 903.2.15 also require the installation of a suppression system for certain buildings and areas.



# Table 903.2.13 references additional sections with automatic suppression requirements.

[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
412.2.5, 412.2.6	Aircraft hangars
415.6.2.4	Group H-2
416.4	Flammable finishes
417.4	Drying rooms
507	Unlimited area buildings
508.2	Incidental use areas
1025.6.2.3	Smoke-protected assembly seating
IFC	Sprinkler system requirements as set forth in Section 903.2.13 of the <i>International Fire Code</i>

## **Covered Malls**

### **402.8 Automatic sprinkler system.**

**The covered mall building and buildings connected shall be provided throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, which shall comply with the following:**

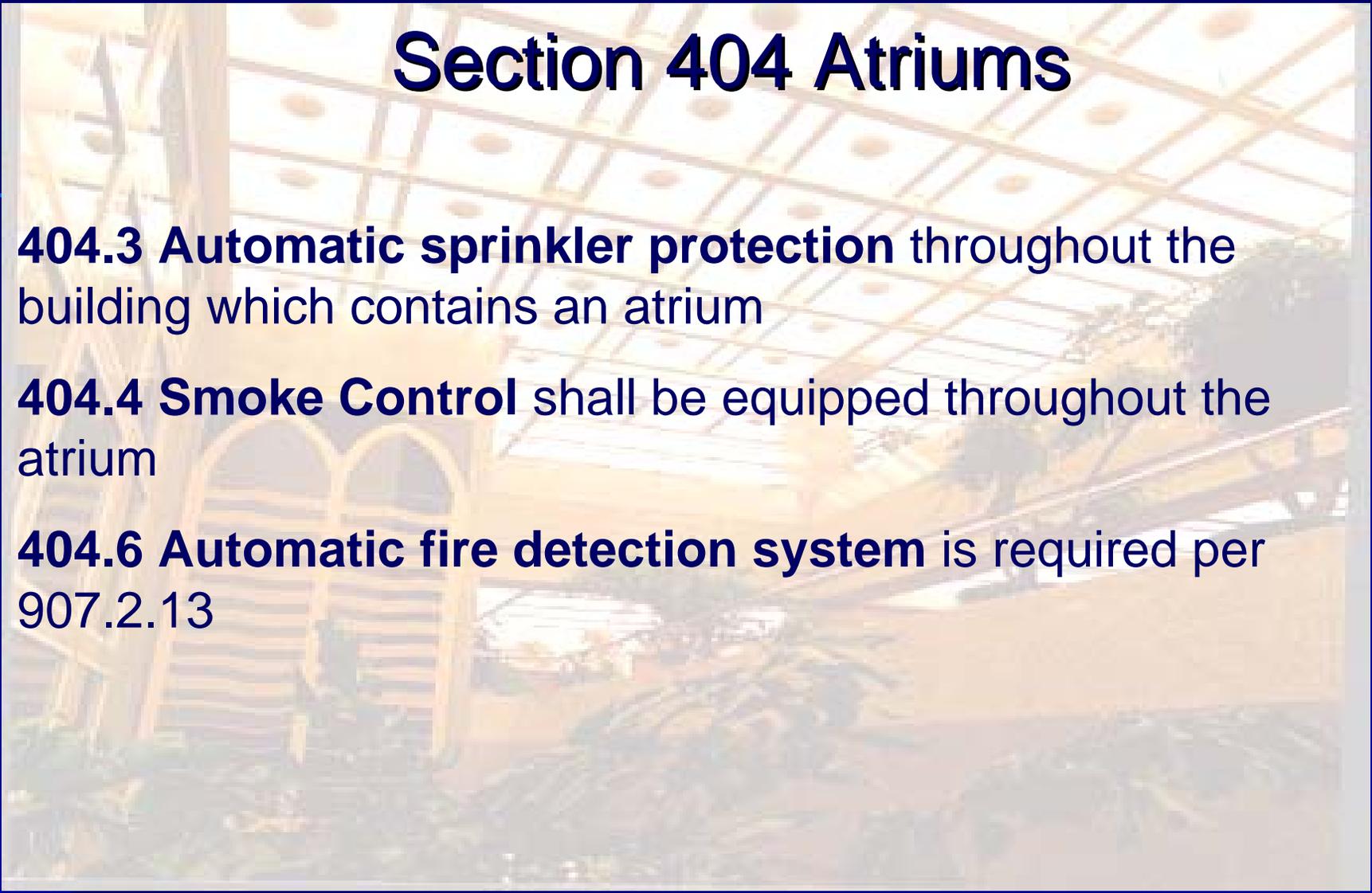
- 1. The automatic sprinkler system shall be complete and operative throughout occupied space in the covered mall building prior to occupancy of any of the tenant spaces. Unoccupied tenant spaces shall be similarly protected unless provided with approved alternate protection.**

**2. Sprinkler protection for the mall shall be independent from that provided for tenant spaces or anchors. Where tenant spaces are supplied by the same system, they shall be independently controlled.**

**Exception: An automatic sprinkler system shall not be required in spaces or areas of open parking garages constructed in accordance with Section 406.2.**

#### **402.8.1 Standpipe system.**

**The covered mall building and other buildings connected shall be provided throughout with a standpipe system in accordance with Section 905.**



## Section 404 Atriums

**404.3 Automatic sprinkler protection** throughout the building which contains an atrium

**404.4 Smoke Control** shall be equipped throughout the atrium

**404.6 Automatic fire detection system** is required per 907.2.13

## Section 410 Stages

**410.3.5 Proscenium curtain** approved material or a water curtain

**410.3.7 Stage ventilation** Smoke control & roof vents are required for stages >1,000 sqft in area

**410.6 Automatic sprinkler protection** is required under the roof, gridiron and fly galleries & in dressing rooms, lounges, workshops and storerooms accessory to the stage.

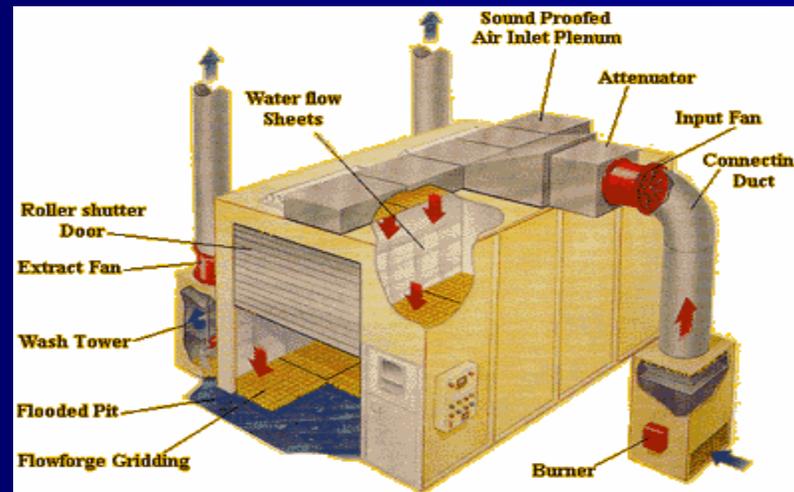
**410.7 Standpipes**

**905.3.4 Stages** >1,000 sqft shall have Class III standpipes on each side of the stage

## Section 416.2 Spray Rooms

**416.4 Fire Protection.** An automatic fire-extinguishing system shall be provided in all spray, dip and immersing spaces and storage rooms, and shall be installed in accordance with Chapter 9.

This could be a Limited Area Sprinkler System per 903.3.5.1.1 if the rest of the building is not sprinklered.



## Section 416.4 Spray Rooms Con't.

**Spray Room:** A room designed to accommodate spraying operations constructed in accordance with the IBC and separated from the remainder of the building by a minimum 1-hour fire barrier.

**Spray Booth:** A mechanically ventilated appliance of varying dimensions and construction provided to enclose or accommodate a spraying operation and to confine and limit the escape of spray vapor and residue and to exhaust it safely.



## 505 Industrial Equipment Platforms

**505.5.2 Fire Suppression.** \*Industrial equipment platforms shall be fully protected by an automatic sprinkler system above and below the platform, installed in accordance with Section 903.3.

\*If the building is required to be sprinklered.



## **903.3.1.1.1 Exempt Locations**

- 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, where approved by the department.**
  - 3. Generator and transformer rooms if separated by not less than 2 hour fire-resistance rating.**
  - 4. Rooms or areas that are of noncombustible construction with wholly noncombustible contents.**
- This does not include electrical equipment rooms.**

## **903.2. Quick response and residential sprinklers.**

**Where automatic sprinkler systems are required by this code quick-response or residential sprinklers shall be installed in the following area according to their listings:**

- 1. Throughout all spaces within a smoke compartments in I-2 sleeping units**
- 2. Dwelling units and sleeping units in R and I-1 occupancies**
- 3. Light –hazard occupancies per 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

## **903.3.4 Actuation**

**Automatic sprinklers systems shall be automatically actuated unless specifically provided for in this code**

## FIRE HOSE THREADS.

**Note: Section 213.15, Stats., regulates fire hose threads and fittings and reads as follows: "All fire hose fittings, apparatus fittings, 1.5 and 2.5 inches in diameter purchased or procured by a fire department or fire company shall be of the national standard hose thread as adopted by the national fire protection association. No fire department shall utilize hose and equipment not in conformance with the requirement that all threads shall be national standard hose thread as adopted by the national fire protection association. Any person offering for sale nonstandard hose couplings, fittings or apparatus fittings may be fined not less than \$100 nor more than \$500."**

**Note: NFPA 1963 contains the specifications for national standard hose thread.**



## **903.3.5 Water Supplies**

**Water supplies for sprinklers shall comply with this section and the standards referenced in Section 903 .3.1. Potable water supplies shall be protected against backflow in accordance with the Plumbing code**

## **903.3.5.1.2 Residential combination services**

A single combination water supply shall be allowed provided that the domestic demand is added to the sprinkler demand.

## **903.3.5.2 Secondary water supply**

**A secondary water supply equal to the hydraulically calculated sprinkler demand shall be provided in high rise buildings in Seismic Design Category C,D,E or F  
See section for code language.**

**Exception: Existing buildings**

**New**

## 903.3.6 Hose threads

**A Fire hose threads and fittings used in connection with automatic sprinkler systems shall be as prescribed by the fire code official. See stats section 213.15.**

## **Section 903.4 Sprinkler monitoring**

**Sprinkler system monitoring and alarms.**

**All valves controlling the water supply for automatic sprinkler systems and water-flow switches on all sprinkler systems shall be electrically supervised.**

**See exceptions**

## **903.4.2 Alarms for sprinklers**

**Approved audible devices shall be connected to every automatic sprinkler system. Such flow switches shall be activated by water flow equivalent to one 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.**

## **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 IFC**

## **903.3.5.1.1 Limited area sprinkler systems.**

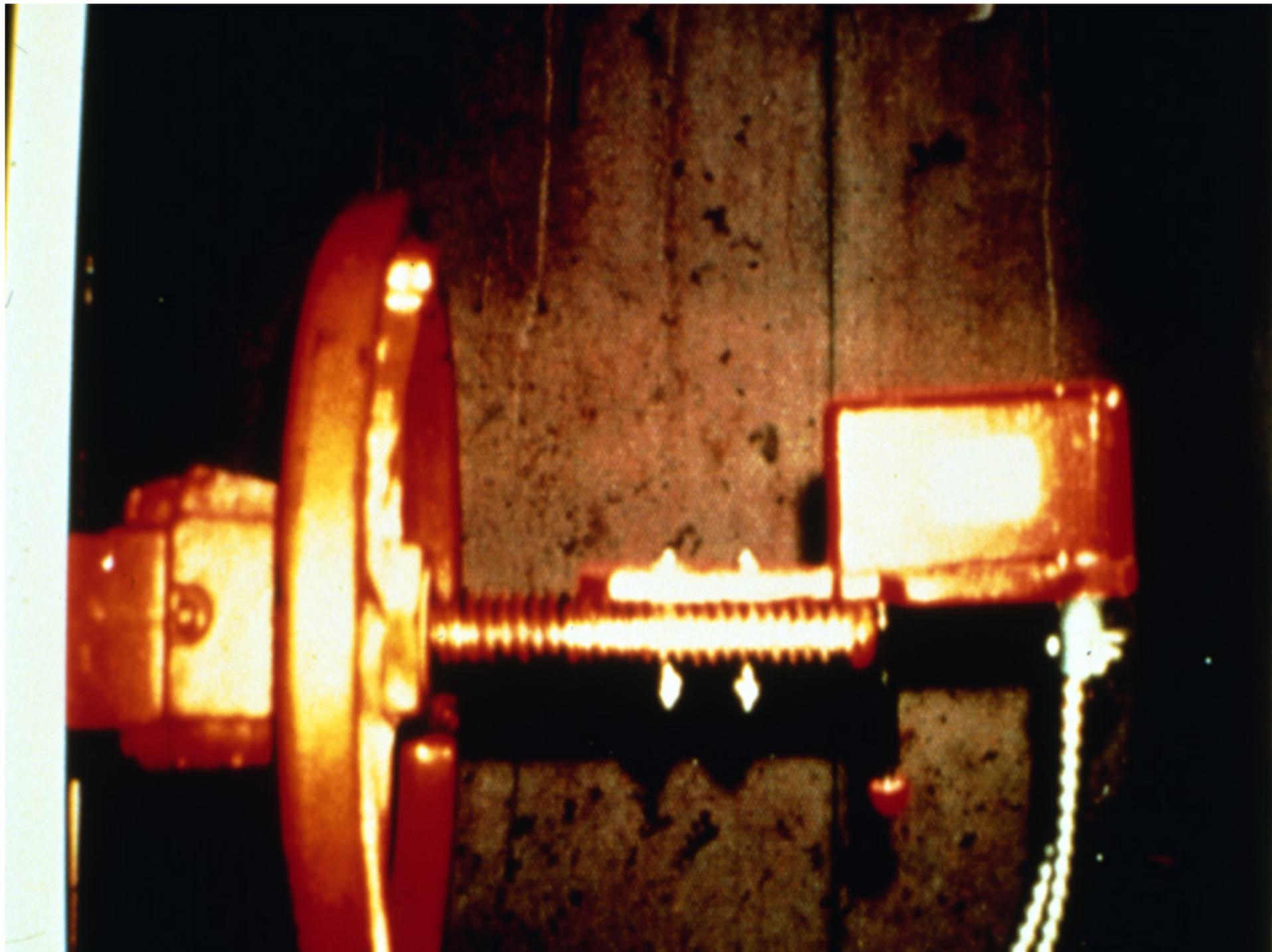
**Limited area sprinkler systems** serving fewer than 20 sprinklers on any single connection are permitted to be connected to the domestic service where a wet automatic standpipe is not available.

**A fire department connection is not required for these systems**

The image shows three industrial valves in a control room. On the left is a tall, vertical valve with a large handwheel. In the center is a valve with a circular window and a handwheel. On the right is another vertical valve with a handwheel. The background is dark with some greenish light. The text 'INDICATING CONTROL VALVES' is overlaid in the center in white, bold, sans-serif font.

# INDICATING CONTROL VALVES





## Section 904

# Alternative Automatic Fire-extinguishing Systems

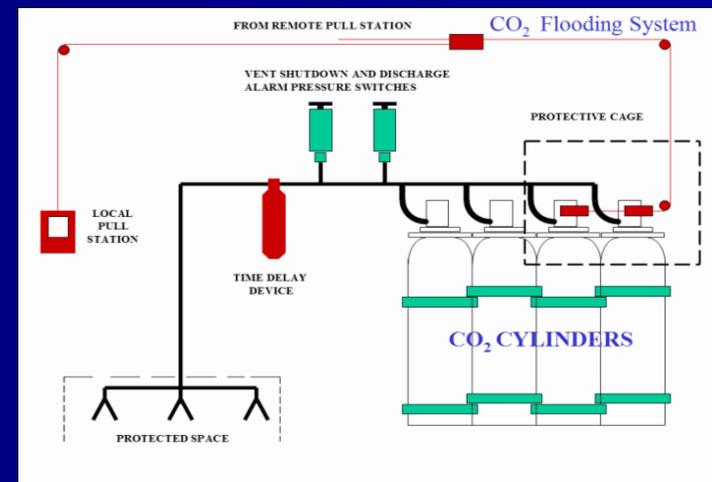


## 904.2.1 Hood system suppression.

Each required commercial kitchen exhaust hood and duct system required by the IFC or the IMC to have a Type I hood shall be protected with an approved automatic fire-extinguishing system installed in accordance with this code.

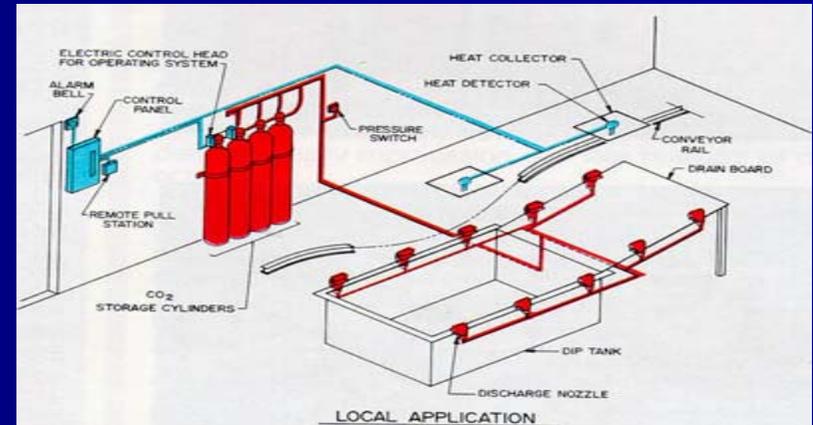
See IMC 507.2.1 for the definition of a Type I hood.

Although not in the code, the dept. does not require a Type I kitchen hood where the grease laden area is less than 4 sq. ft.



# Alternative automatic fire-extinguishing systems you may encounter.

- 904.5 Wet-chemical
- 904.6 Dry-chemical
- 904.7 Foam systems
- 904.8 Carbon dioxide systems
- 904.9 Halon systems
- 904.10 Clean-agent systems



## **904.3.2 Alternate fire extinguishing systems**

**Alternate fire extinguishing systems in place of the required sprinkler system of Section 903 shall be approved by the fire code official. Alternate systems shall not be considered alternatives for the purposes of exceptions or reductions allowed by other requirements of this code**

## **904.3.5 Monitored alternate fire extinguishing systems**

**When a building fire alarm system is installed, automatic fire extinguishing systems shall be monitored by the fire alarm system in accordance with NFPA 72**

## 904.11 Commercial cooking systems.

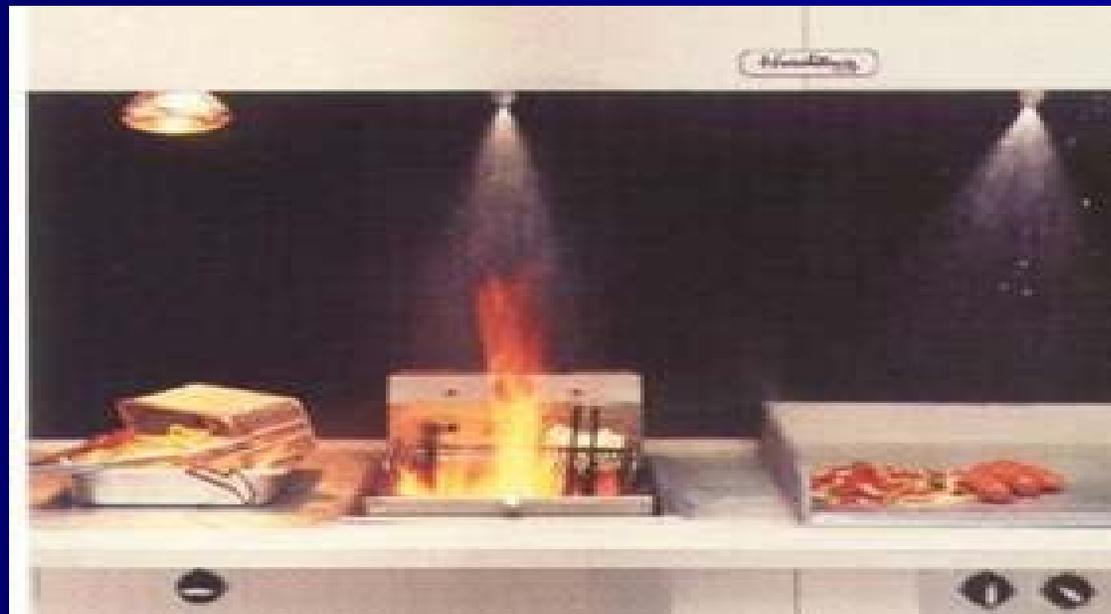
The automatic fire-extinguishing system for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Pre-engineered automatic wet-chemical extinguishing systems shall be tested in accordance with UL 300.

1. Carbon dioxide extinguishing systems, NFPA 12
2. Automatic sprinkler system, NFPA 13
3. Foam-water sprinkler system or foam-water spray, NFPA 16
4. Wet-chemical extinguishing systems, NFPA 17A

**Note: Dry-chemical extinguishing systems do not meet UL 300**

## 904.11 Commercial cooking systems con't.

Existing dry chemical systems that use the same cooking medium that they were designed for are still code compliant.



**New**

## 904.11.1 Manual system operation

A device shall be located shall be located at or near a means of egress from the cooking area a min of 10 ft. and max. of 20 ft. from the kitchen exhaust system. It shall be installed 42-48 inches above the floor and shall clearly identify the hazard protected.

Exception: An automatic sprinkler system does not required a manual actuation device.

## **904.11.2 System interconnection**

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

## **904.11.4 Special provisions for automatic sprinklers**

**Sprinkler system protection for commercial-type cooking equipment shall have a separate supply with a readily accessible control valve**

# Section 905

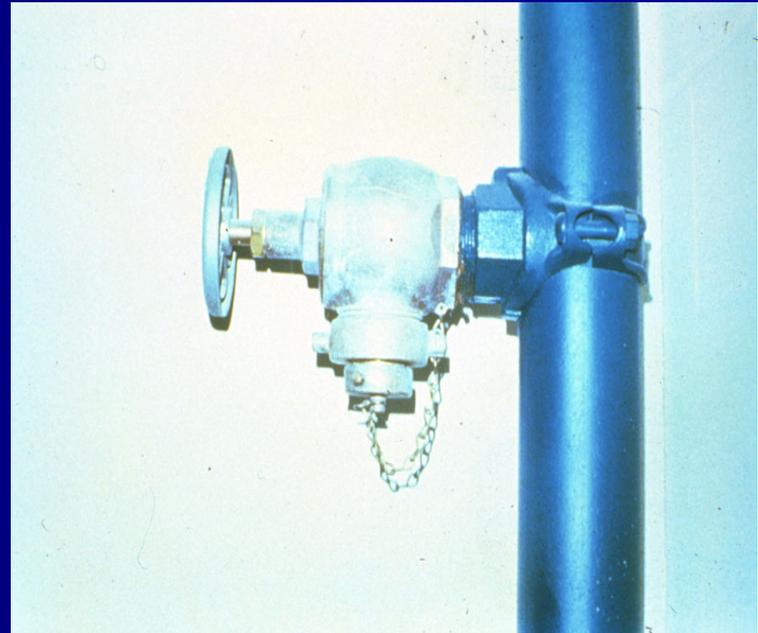
## Standpipe Systems

Proposed 2006 IBC ref. NFPA 14 2003 ed.



## Section 905 Standpipe Systems

**905.1 General.** Standpipe systems shall be provided in new buildings and structures in accordance with this section.



# Classes of Standpipes

- **Class I system.** A system providing 2.5-inch hose connections to supply water for use mainly by fire departments.
- **Class II system.** A system providing 1.5-inch hose stations to supply water for use primarily by building occupants or by fire departments during initial response.
- **Class III system.** A system providing 1.5-inch hose stations to supply water for use by building occupants **and** 2.5-inch hose connections to supply water for use mainly by fire departments.

## Types of Standpipes

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

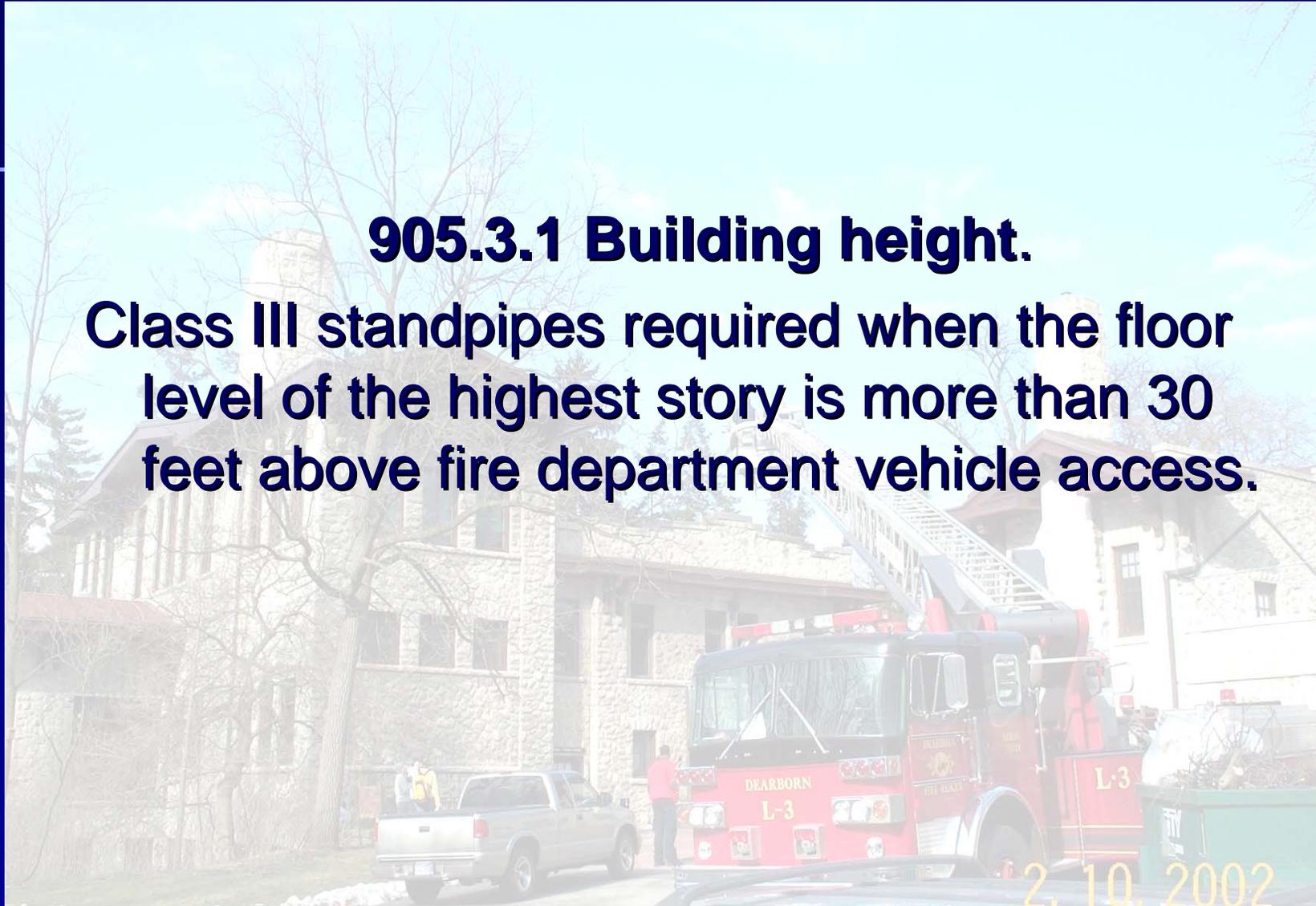
**Manual dry.** A dry standpipe system that does not have a permanent water supply attached to the system. They require water from a fire department pumper to be pumped into the system.

**Manual wet.** A wet standpipe system connected to a water supply for the purpose of maintaining water within the system, but does not have a water supply capable of delivering the system demand. They require water from a fire department pumper to be pumped into the system.

# Standpipe Requirements

## **905.3.1 Building height.**

**Class III standpipes required when the floor level of the highest story is more than 30 feet above fire department vehicle access.**



## 905.3.1 Exceptions:

- 1. Class I standpipes are allowed in buildings equipped throughout with an automatic sprinkler system per NFPA 13 or 13R.**
- 2. Class I manual standpipes are allowed in open parking garages where the highest floor is located not more than 150 feet above the lowest level of fire department vehicle access.**
- 3. Class I manual dry standpipes are allowed in open parking garages.**
- 4. Class I standpipes are allowed in basements equipped throughout with an automatic sprinkler systems.**

**NEW**

## Standpipe Requirements

**905.3.2 Group A** Class I standpipes required for nonsprinklered Group A buildings with an occupancy load greater than 1,000 people. (See exceptions)

**905.3.3 Covered malls** shall be equipped throughout with Class I standpipes.

# Standpipe Requirements

**905.3.4 Stages** greater than 1,000 sq ft shall be equipped with Class III standpipes.

**905.3.5 Underground buildings** shall be equipped with Class I standpipes.



# Standpipe Requirements

**905.3.6 Helistops and heliports buildings with a helistop or heliport that are equipped with Class I a standpipe shall extend the standpipe to the roof level on which the helistop or heliport is located in accordance with section 1107.5 of the IFC**

**New**

## **Standpipe Requirements**

**905.3.7 Marinas and boatyards.**

**Marinas and boatyards shall be equipped  
Throughout with standpipe systems in  
accordance with NFPA 303**

# Standpipe Requirements

## 905.4 Location of Class I standpipe hose connections.

1. In every required stairway at each floor. Connections shall be located at an intermediate floor level landing between floors.

Six additional locations designated in this section.



# Standpipe Requirements

**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.**

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

# Standpipe Requirements

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

# Standpipe Requirements

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

# Standpipe Requirements

**905.5.1 Groups A-1 and A-2.** With occupant loads of more than 1,000, hose connections shall be located on each side of any stage, each side of the rear of the auditorium, on each side of the balcony and on each tier of dressing rooms.

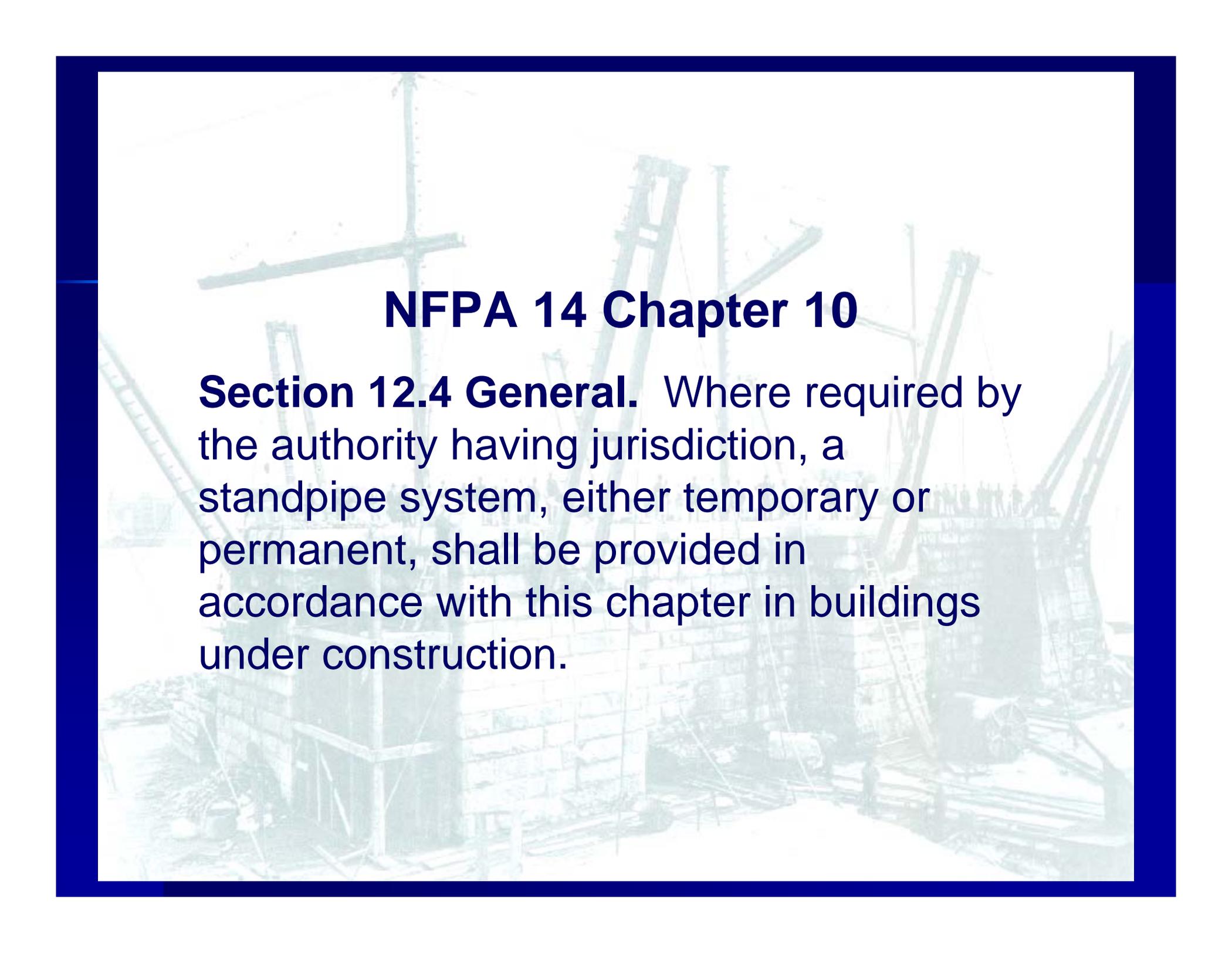
# Standpipe Requirements

- 905.5.3 Class II standpipe 1" hose connections. A min of 1" hose shall be permitted to be used in light hazard occupancies where investigated and listed for this service and where approved by the fire code official

# Standpipe Requirements

## **905.6 Location of Class III standpipe hose connections.**

Class III standpipe systems shall have hose connections located as required for Class I standpipes.

The background of the slide is a faded, light blue image of a construction site. It shows several tall cranes and a complex network of scaffolding and structural steel beams, suggesting a large-scale building project in progress.

## **NFPA 14 Chapter 10**

**Section 12.4 General.** Where required by the authority having jurisdiction, a standpipe system, either temporary or permanent, shall be provided in accordance with this chapter in buildings under construction.

## Section 906

### Portable Fire Extinguishers

**906.1 General.** Portable fire extinguishers shall be provided in occupancies and locations as required by the **IFC**. (See Section 906 of IFC)

# Fire Alarm Requirements



# Fire Alarms

## Definitions:

- **Multiple-Station Smoke Alarm.** 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.
- **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 in a separate unit, and installed at the point of installation.



## Definitions continued

- **Fire Alarm System.** A system or portion of a combination system consisting of components and circuits and arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals.
- **Manual alarm System.** A fire alarm system consisting of manual pull stations and notification devices.
- **Interconnection.** Where more than one smoke alarm is required to be installed within an individual dwelling unit, the smoke alarms shall be interconnected in such a manner that the activation of one alarm will activate all of the alarms in the individual unit.

# Fire Alarms

## 907.2 Where required



Where required in Sections 907.2.1 through Section 907.2.23 and provide occupant notification as per Section 907.9

Where automatic sprinkler protection per NFPA 13 or 13R is installed, and connected to the building fire alarm system, automatic heat detection required by this section shall not be required.

# Fire Alarms

## 907.2.1 Group A

- Occupant load is 300 or more
- Portions of Group E occupied for assembly purposes, shall follow Group E requirements

Exception: Manual fire alarm boxes are not required if building is equipped throughout with an automatic sprinkler system and water flow activates the notification appliances

- Occupant load of 1000 or more requires an emergency voice/alarm communications system

## 907.2.1.2 Emergency power

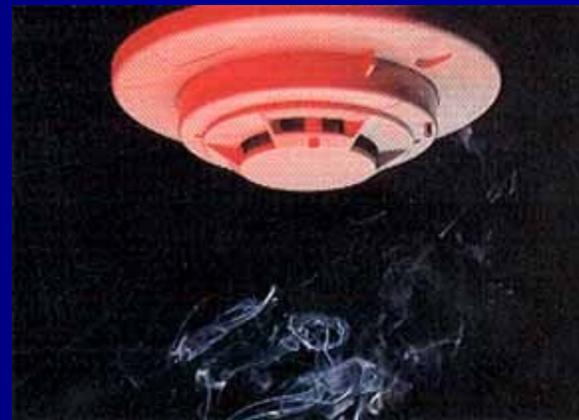
Emergency voice/alarm communications systems shall be provided with an approved emergency power source.



## Fire Alarm 907.2.2 Group B

- Occupant load of 500 or more
- More than 100 persons above or below the lowest level of exit discharge

Exception: Pull stations not required if the building is sprinklered.



# Fire Alarm

## 907.2.3 Group E

- All Group E Occupancies

Exceptions:

1. Occupant load is less than 50
2. Manual pull stations not required if all seven conditions are met.....



# Fire Alarm

## 907.2.4 Group F

- Two or more stories in height and an occupant load of 500 or more above or below the lowest level of exit discharge.

Exception: Pull stations not required if the building is sprinklered.



# Fire Alarm

## 907.2.5 Group H

- All Group H-5 occupancies
- Occupancies used for the manufacture of organic coatings. See Chap 20 of the IFC for a definition of organic coatings.
- Automatic smoke detection required for highly toxic gases, organic peroxides and oxidizers.

**NEW**

## Fire Alarm 907.2.6 Group I

- A manual fire alarm and an automatic fire detection system shall be provided in all Group I occupancies. An electronically supervised automatic smoke detection system shall be provided in accordance with section 907.2.6.1 & 907.2.6.2.

Exception: Pull stations for patient sleeping areas of I-1 and I-2 may be located at all nurse's control stations.

**NEW**

## Fire Alarm 907.2.6.1 Group I-1

- Corridors, habitable spaces other than sleeping units and kitchens and waiting rooms that are open to corridors shall be equipped with an automatic smoke detection system.

Exceptions:

1. Smoke detection in habitable spaces is not required where the facility is equipped throughout with a sprinkler system.
2. Smoke detection is not required for exterior balconies

**NEW**

## Fire Alarm 907.2.6.2 Group I-2

- Automatic fire detection is required in corridors and spaces open to the corridors of nursing homes and detoxification facilities. Hospitals shall be equipped w/smoke detectors as per Section 407.2

See exceptions

## Fire Alarm

### 907.2.6.3 Group I-3

- Manual and automatic fire alarms required to alert staff
- May not have a presignal
- Pull stations may be located at staff-attended locations
- Smoke detection throughout resident housing areas.

# Fire Alarm

**907.7 Presignal system.** Presignal systems shall not be installed unless approved by the building official and the fire department.

# Fire Alarm

**Presignal Feature.** This is a feature that allows initial fire alarm signals to sound only in certain areas (such as a nurses station) and for which human action is required to activate a general alarm or allows a delay of more than 1 minute in the general alarm.



# Fire Alarm

## 907.2.7 Group M

- Occupant load of 500 or more
- More than 100 persons above or below the lowest the lowest level of exit discharge The initiation a a signal from pull stations shall initiate alarm notification appliances as per Section 907.9

Exception: Pull stations not required if the building is sprinklered.

Note: See 907.2.7.1 Occupant notification

# **Fire Alarm**

## **907.2.7.1 Occupant notification**

**During times that the building is occupied, the initiation of a signal from a manual fire alarm box or from a water flow switch shall not be required to activate the alarm notification appliances when an alarm is activated at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communication system installed as per Section 907.2.12.2 the manual fire alarm shall take precedence over any other use.**

**New**

## Fire Alarm 907.2.8 Group R-1



- A manual fire alarm shall be provided in all Group R-1 occupancies
  - an automatic fire detection system is required in interior corridors' serving sleeping rooms
- See list of exceptions.

# Fire Alarm

## 907.2.9 Group R-2

- A dwelling unit is located 3 or more stories above the lowest level of exit discharge
- A dwelling unit is located more than one story below the highest level of exit discharge of exits serving the dwelling unit
- Building contains more than 16 dwelling units

See Exceptions

# Fire Alarm Additional Requirements

907.2.10 Single & multi-station smoke alarms

907.2.11 Special amusement buildings

907.2.12 High-rise buildings

907.2.13 Buildings with an atrium

907.2.17 Lumber, plywood & veneer mills

907.2.19 Underground buildings

907.2.20 Covered mall buildings

907.2.23 Battery rooms

# Fire Alarm

## 907.2.11 Special amusement buildings.



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

# Fire alarms

## 907.2.11.2

System response. 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 fo the means of egress with light of not less that 1 foot-candle at the walking surface level
2. Stop any conflicting or confuseing sounds and visual distractions.

## Fire alarms

### 907.2.11.2 cont.

3. Activate an approved derirectional exit marking that will become apparent in an emergency  
Such system response shall also include a prerecorded message.

Wiring to the auxiliary devices and equipment used to accomplish the above fire safety functions shall be monitory as per NFPA 72

## Fire alarms

### 907.2.11.3

Emergency voice/alarm communication system , which is also allowed to serve as a public address system, shall be installed as per NFPA 72 and shall be audible throughout the entire special amusement building.

# Fire Alarm

## 907.2.12 High-rise buildings.

Buildings having floors used for human occupancy located more than 75 feet above the lowest level of fire department vehicle access shall be provided with an automatic fire alarm system and an emergency voice/alarm communications system in accordance with Section 907.2.12.2.



# Fire Alarm

## 907.2.12.1 Automatic fire detection

**Smoke detector shall be connected to the automatic fire alarm system. Activation of any detector shall operate the emergency voice/alarm communication system.**

**Smoke detectors shall be:**

- 1. In each mechanical equipment , electrical, transformer, telephone equipment or similar room which is not provided with sprinkler protection, elevator machine rooms and elevator lobbies.**

# Fire Alarm

## 907.2.12.1 Automatic fire detection cont.

3. At each connection to a vertical duct or riser serving two or more stories from a return air duct or plenum of an air conditioning system. In R-1 & R-2 occupancies a listed smoke detector is allowed to be used in each return air riser carrying not more than 5,000 cfm and serving not more than 10 air inlet openings

# Fire Alarm

**NEW**

## 907.2.12.2 Emergency voice/alarm communication system.

The operation of any fire detector, sprinkler water flow, device or manual fire alarm box shall sound an alert tone followed by voice instructions giving approved information and direction for a general or staged evacuation on a min. of the alarming floor, the floor above and below as per the building's fire safety and evacuation plans required by Section 404 of the **IFC**. Speakers shall be provided as follows

# Fire Alarm

**NEW**

## 907.2.12.2 Emergency voice/alarm communication system. Cont.

1. Elevator groups
2. Exit stairways
3. Each floor
4. Areas of refuge as per Section 1002.1

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

**NEW**

## Fire Alarm

### 907.2.12.2.1 Manual override.

The manual override for emergency voice shall be provided on a selective and all- basis. For all paging zones

**New**

## Fire Alarm

### 907.2.12.2.2 Live voice messages

The emergency voice alarm shall have the capability to broadcast live voice messages through paging zone as per NFPA 72

# Fire Alarm

## 907.2.12. Fire department communication system

A approved two way, fire department communication system shall be design and installed as per NFPA 72 It shall operate betwee a fire command complying with section 911 and elevators, elevator lobbies, standby power rooms areas or refuge and inside enclosed stairways at each floor level.

Exception: fire department radio systems where approved by the fire department.

# Fire Alarm

## **907.2.13 Atriums connecting more than two stories.**

**A fire alarm system shall be install in occupancies with a atrium that connects more than two stories. The system shall be activated in accordance with Section 907.6. Group A, E or M shall be provided with an emergency voice /alarm system complying with Section 907.2.12.2**

# Fire Alarm

## 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 **IFC**.



# Fire Alarm

**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 **IFC**.



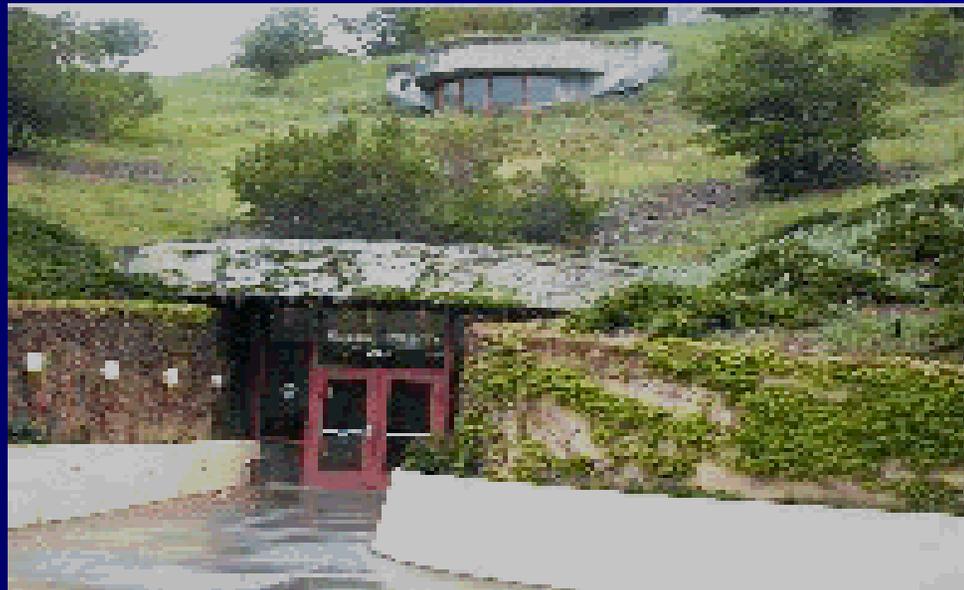
# Fire Alarm

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



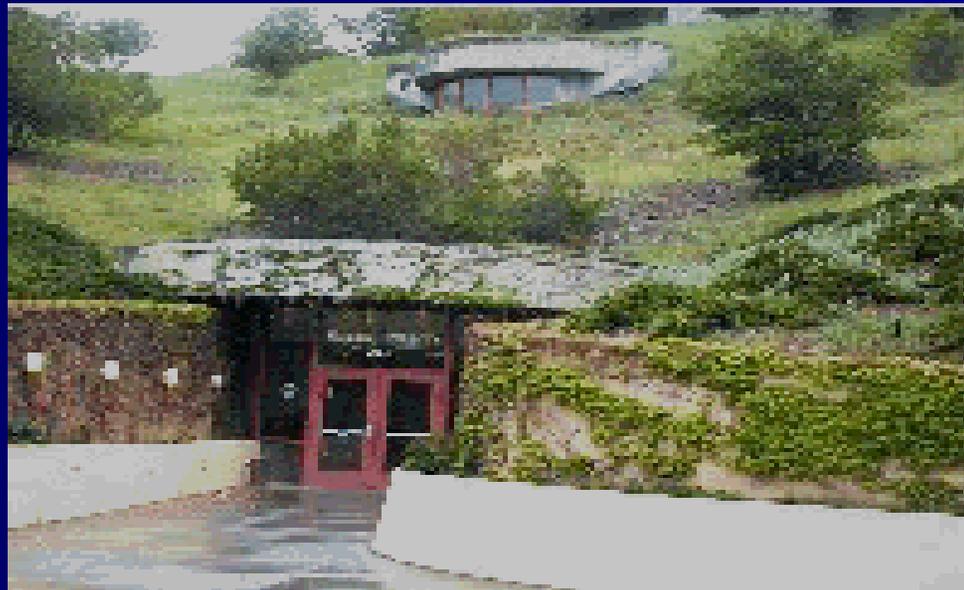
# Fire Alarm

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



# Fire Alarm

**907.2.19 Underground buildings where the lowest level is more than 60 ft. below the lowest level of exit discharge shall be equipped throughout with a manual fire alarm system including an emergency voice/alarm system as per Section 907.12.2..**



# Fire Alarm

**907.2.20 Covered mall buildings.** Covered mall buildings exceeding 50,000 square feet in total floor area shall be provided with an emergency voice/alarm communication system.



# Fire Alarm

**907.2.22 Airport traffic control towers.** An automatic fire detection system shall be provided in airport traffic control towers.



# Fire Alarm

**907.2.23 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. System must be supervised remotely or a local alarm at a constantly attended location.



# Fire Alarm

## 907.3 Manual fire alarm boxes.

**907.3.1 Location.** Manual fire alarm boxes shall be located not more than 5 feet from the entrance to each exit. Travel distance to the nearest box cannot exceed 200 feet.



# Fire Alarm

## 907.3 Manual fire alarm boxes (continued).

**907.3.2 Height.** The height of the manual fire alarm boxes shall be a minimum of 42 inches and a maximum of 48 inches from finished floor to activating lever.

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



# Fire Alarm

## 907.3 Manual fire alarm boxes (continued).

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



# Fire Alarm

## 907.6 Activation

- Where a 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 flow switches
  3. Required manual fire alarm boxes

# Fire Alarm

## 907.3 Manual fire alarm boxes-cont.

**907.3.5 Protective covers.** The building official 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.

# Fire Alarm

**907.9.1 Visible alarms.** Visible alarm notification appliances shall be provided as follows:

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

**907.9.1.2 Employee work areas.** Appliance circuits serving the work areas shall be initially designed with a min. of 20% spare capacity for the potential of adding visible notification appliance in the future.



## Fire alarm

- **907.9.1.3 Groups I-1 and R-1.** Sleeping accommodations shall be provided with a visible alarm notification appliance.
- **907.9.1.4 Group R-2.** If required to have an alarm system, dwelling units shall have capability to support visible alarm notification appliances.



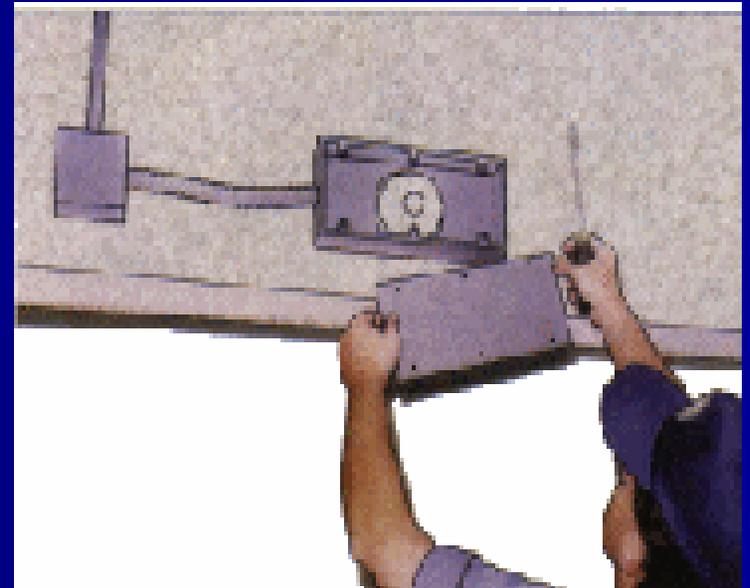
# Fire Alarm

**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 other purpose. It shall provide a sound level of 15 dBA above the average ambient sound level or 5 dBA above the maximum sound level, in every occupied space within the building. Min sound levels 70 dBA in R & I-1, 90 dBA in mechanical equipment rooms and 60dBA everywhere else.**



# Fire Alarm

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



## Fire Alarm

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

# Fire Alarm

**907.2.13 Fire-extinguishing systems.** Automatic fire-extinguishing systems shall be connected to the building fire alarm system where a fire alarm system is required by another section of this code or is otherwise installed.

# Fire Alarm

## 907.14 Monitoring

Fire alarm systems required by this chapter or by the **International Fire Alarm Code** shall be monitored by an approved supervising station in accordance with NFPA 72

Exception: Supervisory service is not required for

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

# Fire Alarm

## 907.16 Acceptance tests

Upon the completion of the fire alarm system, notification appliances, 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

# Fire Alarm

## 907.17 Record of completion

A record of completion as per NFPA 72 verifying the system has been installed in accordance with the approved plans and specification shall be provided at the approved location. The record of completion shall remain with the building for the life of the system.

# Fire Alarm

## **907.19 Inspection testing and maintenance.**

**The maintenance and testing schedules and procedures for the fire alarm and fire detection system shall be in accordance with Comm 14.**



**See Handout.**

## **Emergency Rule Relating To Student Housing**

**1. An automatic fire sprinkler system shall be provided by January 1, 2014**

**throughout every residence hall and dormitory greater than 60 feet in height, the initial construction of which was begun before January 7, 2006, that is owned or operated by an institution of higher education.**

**2 An automatic fire sprinkler system shall be provided by January 1, 2014**

**throughout every private student residential building greater than 60 feet in height, the initial construction of which was begun before January 7, 2006.**

## **Emergency rule cont**

**3. An automatic fire sprinkler system shall be provided by January 1, 2014 throughout every fraternity, sorority or student residential facility operated by an organization authorized or sponsored by an institution of higher education, the initial construction of which was begun before January 7, 2006.**

## **Emergency rule cont.**

- 4. An automatic fire sprinkler system shall be provided throughout every residence hall, dormitory, fraternity, sorority, or student residential facility operated by an organization authorized or sponsored by an institution of higher education, the initial construction of which is begun on or after January 7, 2006.**
- 5. An automatic fire sprinkler system shall be provided throughout every private student residential building, the initial construction of which is begun on or after January 7, 2006.**

**Thank You!**