CHAPTER 9 FIRE PROTECTION AND LIFE SAFETY SYSTEMS

Prescribes the minimum requirements for active fire protection equipment systems

Perform the functions of detecting a fire, alerting occupants or fire department of a fire emergency, mass notification, gas detection, controlling smoke and con-trolling or extinguishing the fire.

Requirements are based on the occupancy, height and area of the building, these are the factors that most affect fire-fighting capabilities.

This chapter parallels Chapter 9 of the International fire code

901 .6 fire protection systems shall be monitored by an approved supervising station.

Exceptions:

1 . Single- and multiple- station smoke alarms required by Section 907 . 2. 1 0.

2. Smoke detectors in Group I- 3 occupancies.

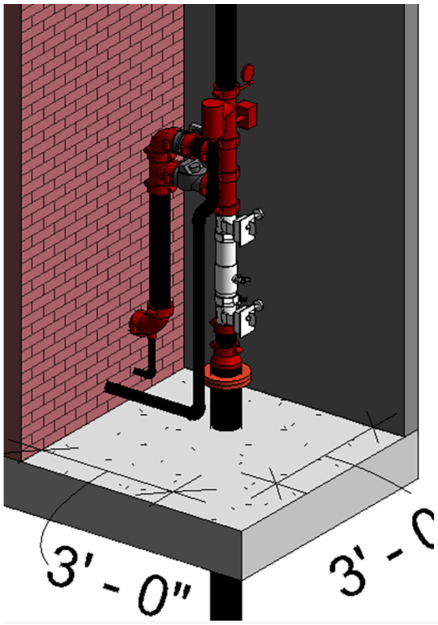
3. Supervisory service is not required for automatic sprinkler systems in one- & two-family dwelling

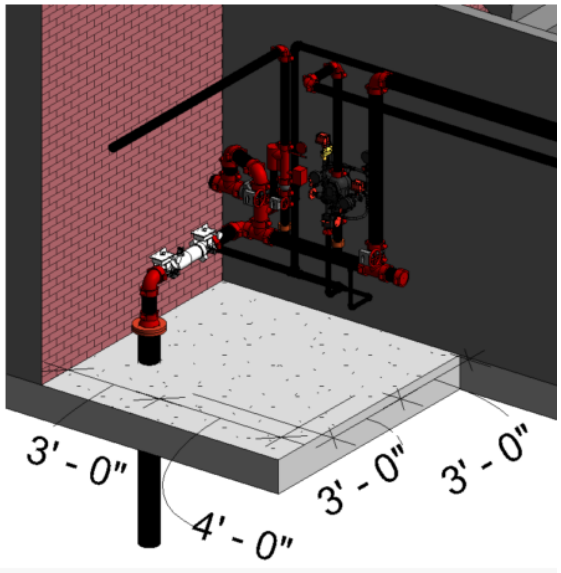
901 .7 Fire areas shall be separated by fire walls , fire barriers, or horizontal

902 FIRE PUMP AND RISER ROOM SIZE

FIRE PUMP ROOMS - Flow test required, water pressure determines if needed

FIRE RISER ROMS - Verify size & location with AHJ.





FIRE RYSER COMPONENTS

Serves as a bridge between the water supply and sprinkler pipes in a building, and contains the following devices:

Valves; for draining, isolating, and testing the system

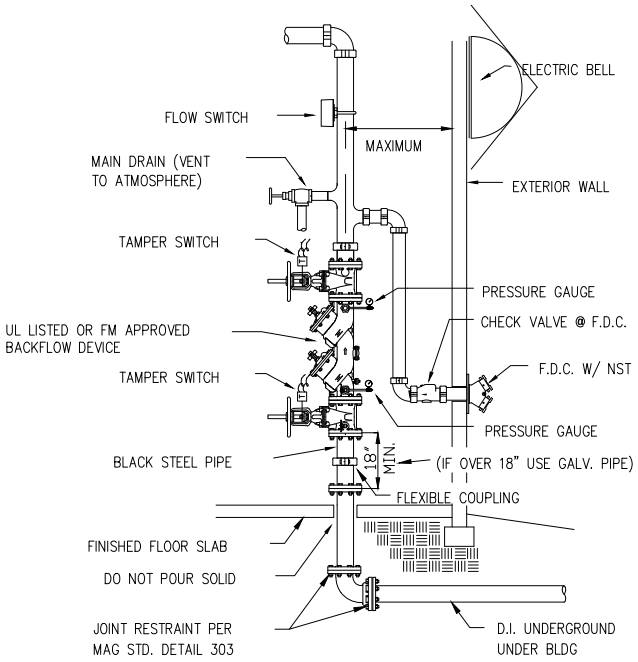
Pressure gauges; measure water pressure (NFPA 13), or air pressure in dry sprinkler systems (NFPA 13-R.

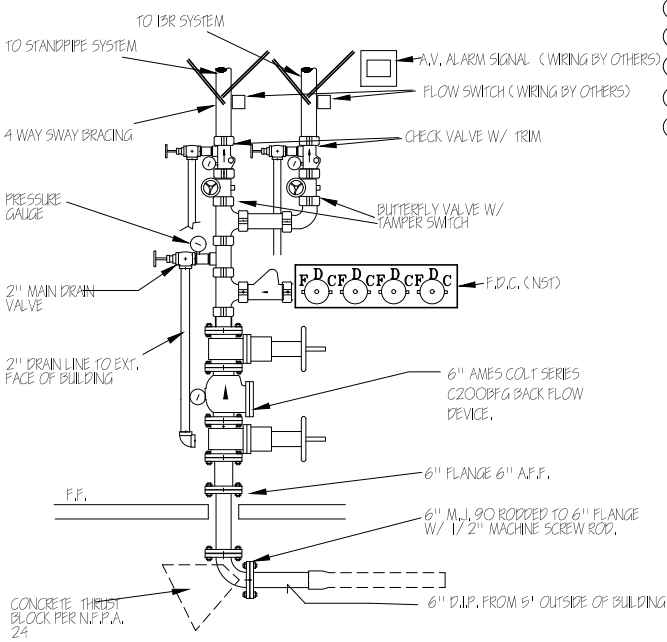
Backflow prevention; protects water supply from contamination by allowing water to flow in one direction

Water flow switch; activates an alarm(s)

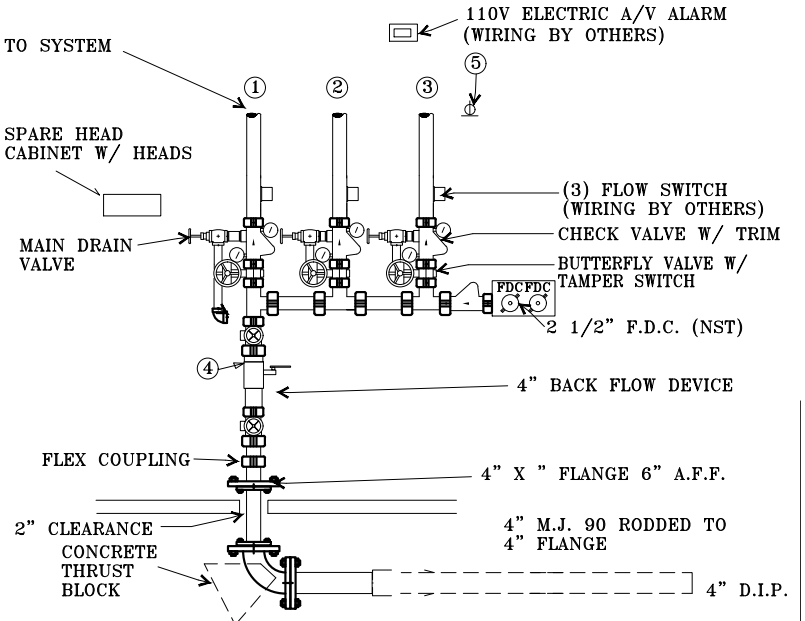
Bell; sounds when water flows through the sprinkler system, often installed on the outside wall

Piping; that connects the system riser to the fire department connection





RISER DIAGRAM
NTS



FIRE SPRINKLER RISER DIAGRAM
NTS

① 2 1/2" UP TO 3RD FLOOR PIPING.
② 2 1/2" UP TO 2ND FLOOR PIPING.
③ 3" UP TO 1ST FLOOR PIPING.
④ 4" BACKFLOW DEVICE.
⑤ FIRE SPRINKLER IN RISER ROOM

903 AUTOMATIC SPRINKLER SYSTEMS

	NFPA 13	NFPA 13R	NFPA 13D
Extent of protection	Equip throughout (Section 903.3.1.1)	Occupied spaces (Section 903.3.1.2)	Occupied spaces (Section 903.3.1.3)
Scope	All occupancies	Low-rise residential	One- and two-family dwellings
Sprinkler design	Density/area concept	4-head design	2-head design
Sprinklers	All types	Residential only	Residential only
Duration	30 minutes (minimum)	30 minutes	10 minutes
Advantages	Property and life protection	Life safety/tenability	Life safety/tenability

Commentary Figure 903.3.1
NFPA 13, NFPA 13R AND NFPA 13D SYSTEMS

Exterior openings % (15' separation 25 vs 45)

Dead end 20' vs 50'

Stairs width factor - .03 / .02 per occupant

SUMMARY OF DIFFERENCES

CODE PLANNING

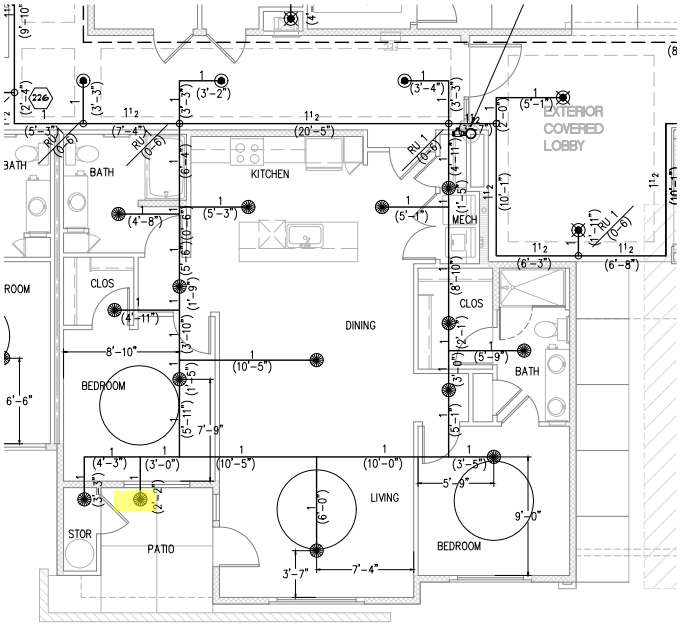
	NFPA 13	NFPA 13R	NFPA 13D
Objective	Life Safety + Property Protection [NFPA 13 2002-2019 1.2.1]	Life Safety Only [NFPA 13R 2002-2019 1.2]	Life Safety Only [NFPA 13D 2002-2019 1.2.1]
Considered "Fully-Sprinklered" for Code Purposes?	Yes [IBC ref. section 903.1.1 as fully-sprinklered]	No	No
Building Height Increases Permitted?	Yes [IBC Table 504]	Only for R-Occupancy [IBC Table 504]	No
Permitted in One & Two-Family, or Group R-3 & R-4 Condition 1 and townhouse R-Occupancies?	Yes [IBC 903.1.1]	Yes [IBC 903.1.2]	Yes [IBC 903.3.1.3]
Permitted in R-Occupancies up to 4 stories?	Yes [IBC 903.1.1]	Yes [IBC 903.1.2]	No
Permitted in Mixed Use / Non-Residential Occupancies?	Yes [IBC Table 508.4, 508.3.1]	No [IBC 903.1.2]	No

Advantages - roof attic filled w/non combustible insul.
Thermal bldg. envelope calcs.
Attic ventilation

OMITTED AREAS

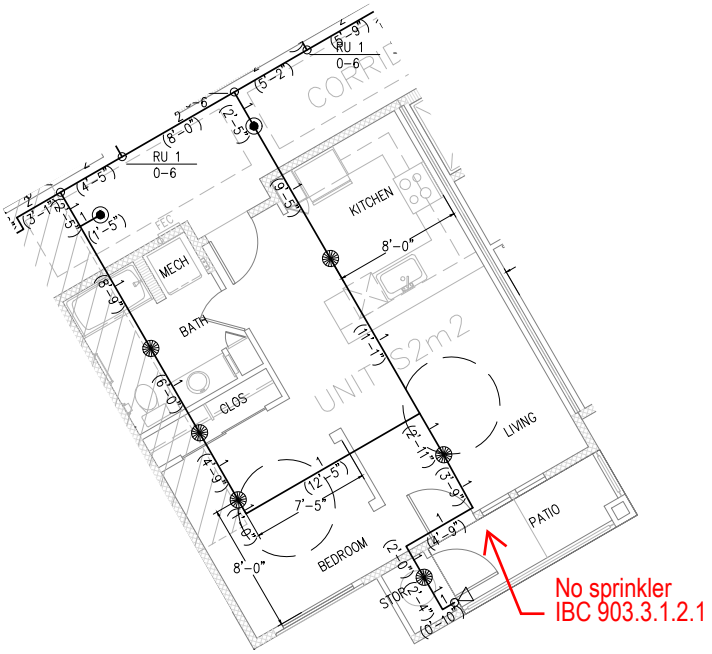
Depends on NFPA or AHJ code amendments

	NFPA 13	NFPA 13R	NFPA 13D
Omit in Attics?	If non-comb., or filled with non-comb. insulation [NFPA 13 2002 8.14.1.2, 2007-2016 8.15.1.2]	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.5, 2019 8.3.5]
Bathrooms in Units less than 55 sqft w/ 15-min. Non-Combustible Lining?	Yes [NFPA 13 2002 8.14.8.1, 2007-16 8.15.8.1.1]	Yes [NFPA 13R 2002 6.8.2, 2007 6.9.2, 2010-19 6.6.2]	Yes [NFPA 13D 2007-10 8.6.2, 2013-19 8.3.2]
Closets in Hotel or Motel w/ Non-Combustible Surface less than 24 sqft, or Hospital Less than 6 sqft?[1]	Yes [NFPA 13 2002 8.14.8.2, 2007-16 8.15.8.2]	Yes [NFPA 13R 2002 6.8.3, 2007 6.9.3, 2010-19 6.6.3]	N/A
Closets w/ Non-Combustible Surface less than 24 sqft?[1]	No, Required	Yes [NFPA 13R 2002 6.8.3, 2007 6.9.3, 2010-19 6.6.3]	Yes [NFPA 13D 2007-10 8.6.3, 2013-19 8.3.3]
Closets on Exterior Balconies or Breezeways & Exterior Access?[1]	No, Required	Yes [NFPA 13R 2002 6.8.6, 2007 6.9.7, 2010-19 6.6.7]	Yes [NFPA 13D 2013-19 8.3.8]
Concealed Spaces?	Yes if non-comb., filled with non-comb. insulation[1] [NFPA 13 2002 8.14.1.2, 2007-2016 8.15.1.2]	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.5, 2013-19 8.3.5]
Concealed Spaces with only Ventilation Equipment?[1]	No, Required	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.5, 2013-19 8.3.5]
Elevator Machine Rooms?	No, Required	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.5, 2013-19 8.3.5]
Garages, Carports?	No, Required	No, Required	Yes [NFPA 13D 2007-10 8.6.3, 2013-19 8.3.4]
Penthouse Equipment Rooms?	No, Required	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.5, 2013-19 8.3.5]
Porches?	No, Required	Yes [NFPA 13R 2002 6.8.5, 2007 6.9.6, 2010-19 6.6.6]	Yes [NFPA 13D 2007-10 8.6.3, 2013-19 8.3.4]



BLDG. 2, FIRST FLOOR

FIRE SPRINKLER PLAN-(NFPA 13R)

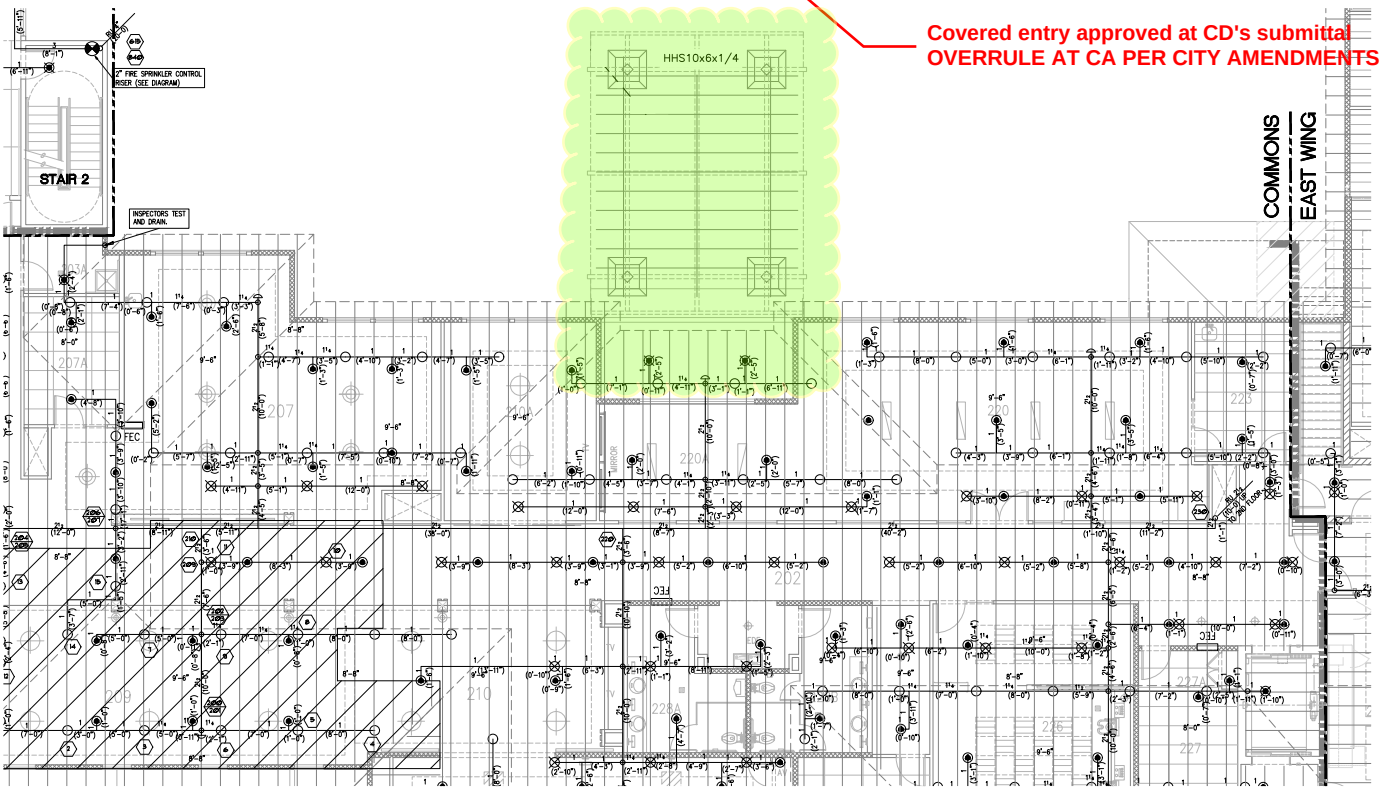


BLDG. 1, SECOND

FIRE SPRINKLER PLAN-(NFPA 13)

9.2.3.2* Sprinklers shall be permitted to be omitted where the exterior canopies, roofs, porte-cocheres, balconies, decks, and similar projections are constructed with materials that are non-combustible, limited-combustible, or fire retardant–treated wood as defined in NFPA 703, or where the projections are constructed utilizing a noncombustible frame, limited-combustibles, or fire retardant–treated wood with an inherently flame-resistant fabric overlay as demonstrated by Test Method 2 in accordance with NFPA 701.

Covered entry approved at CD's submittal
OVERRULE AT CA PER CITY AMENDMENTS



SECTION 904

ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

Commercial cooking system

Carbon dioxide extinguishing systems, NFPA 12.

Automatic sprinkler systems, NFPA 13.

Automatic water mist systems, NFPA 750.

Foam-water sprinkler system or foam-water spray systems, NFPA 16.

Dry-chemical extinguishing systems, NFPA 17.

Wet-chemical extinguishing systems, NFPA 17A.

Data Centers Electrical Equipment Telecommunications
Libraries and Museums Historical Buildings
Chemical Storage, Record Storage
Equipment Woodworking / Where water is not desirable

SEVO® Systems “pre-engineered Clean Agent Extinguishing System Unit” concept utilizing 3M™ Novec™.

Novec 1230 Fire Protection Fluid is a colorless, non-toxic fluid. It is stored as a pressurized liquid and injected into a room,. Novec 1230 Fire Protection Fluid is dispensed as an odorless, electrically non-conductive vapor. It leaves no residue, t can be used on types A, B, or C fires. It is a very stable, and electrically non-conductive gas.

905 STANDPIPE SYSTEMS

Types of standpipe systems

Automatic standpipe systems provide needed pressure and water supply when the valve is opened.

Automatic dry standpipes are not filled with water until needed in firefighting.

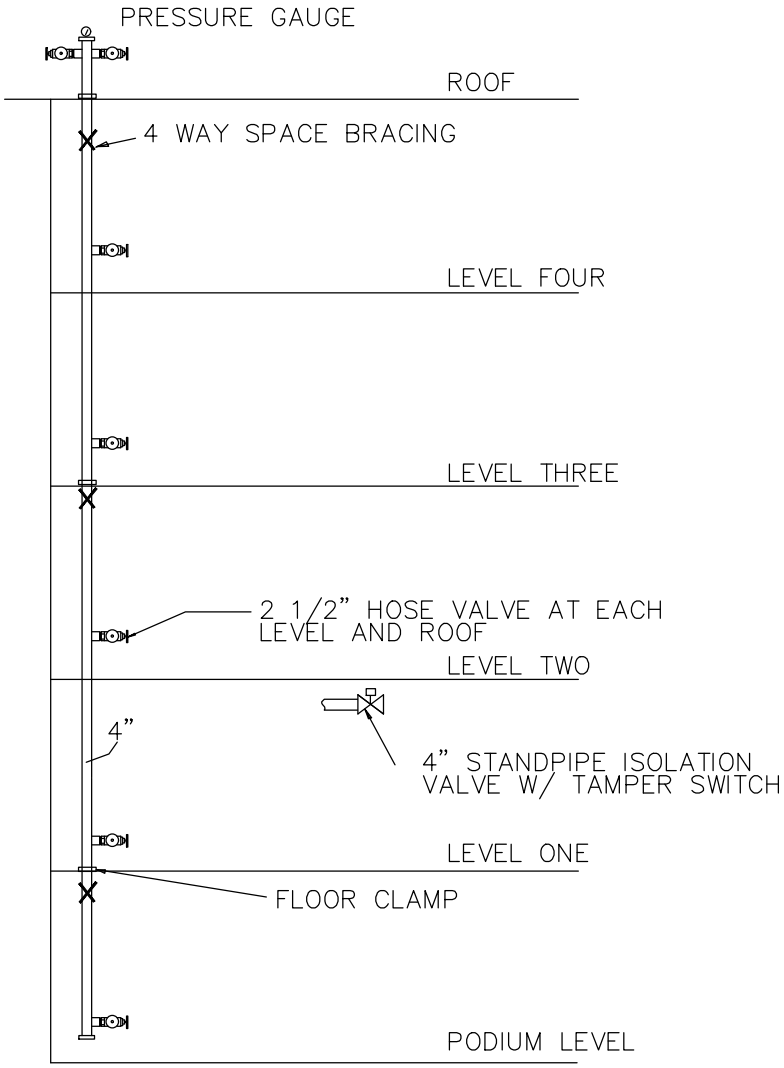
Semi-automatic standpipe systems provide the needed pressure and water supply after the activation of a control device or fire pump.

Wet standpipes are filled with water and are always pressurized.

Class I System - provides 2 ½ in. hose connections to supply water for use by fire departments.

Class II System - provides 1 ½ in. hose stations to supply water for use by trained personnel or fire dept.

Class III System - provides 1 ½ in hose station to supply water for use by trained personnel and 2 ½ in hose connections for use by fire departments.

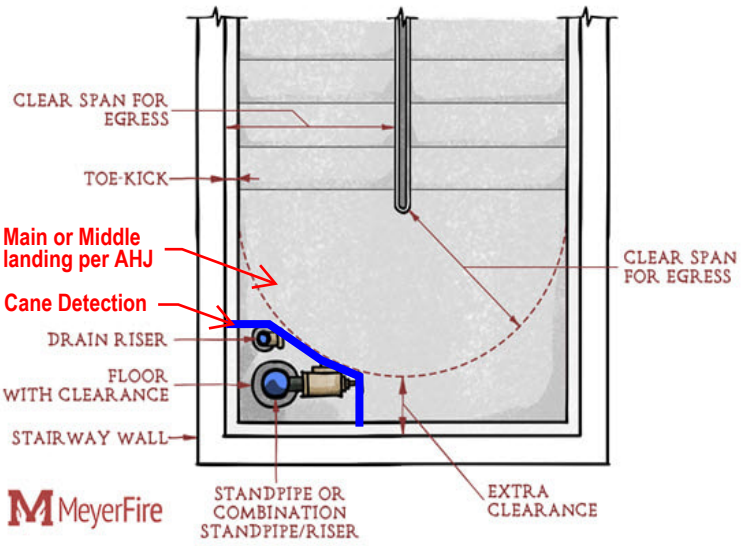


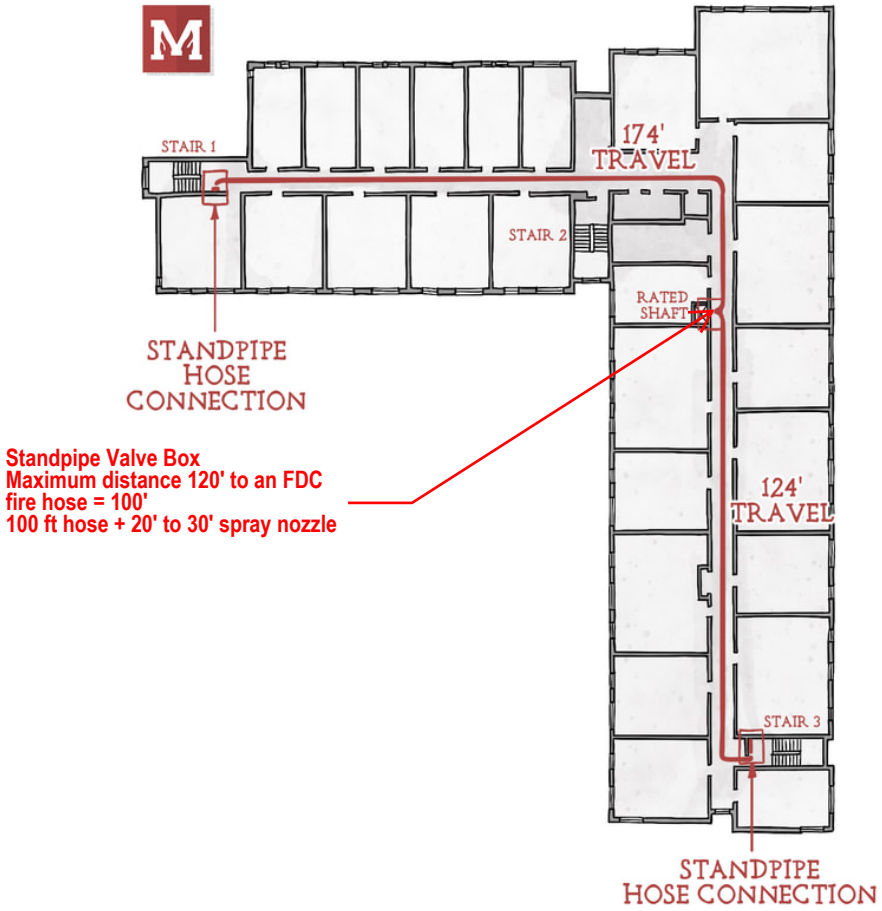
B STAND-PIPE DETAIL

14. ALL STANDPIPES SHALL BE LOCATED AT THE MAIN FLOOR LANDING AT EACH STAIR PER THE 2018 I.F.C. 905.4 (1).

Class III standpipe systems shall be installed throughout buildings where any of the following occurs :

1. Four or more stories are above or below grade.
2. The floor level of the highest story is located more than 30' above the lowest level of fire department vehicle access.
3. The floor level of the lowest story is located more than 30 ' below the highest level of fire department vehicle access





Requirements of sprinklers installations in concealed spaces

Section 718.3.2 Groups R-1, R-2, R-3 and R-4.

Draft stopping shall be provided in floor/ceiling spaces in Group R-1 buildings, in Group R-2 buildings with three or more dwelling units, in Group R-3 buildings with two dwelling units and in Group R-4 buildings - townhouse. Draft stopping shall be located above and in line with the dwelling unit and sleeping unit separations.

NFPA 13 Sprinkler System (Section 903.3.1.1):

Provide sprinklers in concealed spaces; no draft stopping is required

No sprinklers in concealed spaces required if one of the following is met:

Fire stopping installed to compartments concealed spaces to max. 160 ft3; provide draft stopping above and in line with dwelling unit and sleeping unit separations per 718.3.2 (may utilize draft stopping to work toward compartments)

Fill concealed spaces (2-in air gap at top permitted) with noncombustible insulation; provide draft stopping above and in line with dwelling unit and sleeping unit separations per 718.3.2

NFPA 13R Sprinkler System (Section 903.3.1.2):

No sprinklers required in concealed spaces; provide draft stopping above and in line with dwelling unit and sleeping unit separations per IBC 718.3.2

Section 718.2.3 Connections between horizontal and vertical spaces.

Fire blocking shall be provided at interconnections between concealed vertical stud wall or partition spaces and concealed horizontal spaces created by an assembly of floor joists or trusses, and between concealed vertical and horizontal spaces such as occur at soffit, drop ceilings, cove ceilings and similar locations.

Standard wood-frame wall construction utilizes a double top plate, where gypsum wallboard is continued to the top plate, typically either the gypsum board or the top plate will serve to cut off the connection between the vertical and horizontal construction, no additional fire blocking is needed at this location .

Other options per NFPA 8.15

8.15.1.1 Concealed Spaces Requiring Sprinkler Protection. Concealed spaces of exposed combustible construction shall be protected by sprinklers except in concealed spaces where sprinklers are not required to be installed by 8.15.1.2.1 through 8.15.1.2.18 and 8.15.6.

Exceptions that allow the elimination of sprinklers in concealed spaces include the following:

8.15.1.2.3 Concealed spaces formed by studs or joists with less than 6in. between the inside pr near edges of the studs or joists shall not require sprinkler protection (see figure 8.6.4.1.5.1)

8.15.1.2.6 Concealed spaces formed by ceilings attached to composite wood joist construction either directly or onto metal channels not exceeding 1" in depth, provided the joist channels are fire stopped into **volumes each not exceeding 160 ft3** using materials equivalent to the web construction and at least 3-1/2 in. of batt insulation is installed at the bottom of the joist channels when the ceiling is attached utilizing metal channels, shall not require sprinkler protection.

8.15.1.2.7 Concealed spaces filled with noncombustible insulation shall not require sprinkler protection.

8.15.1.2.7.1 A maximum 2 in. air gap at the top of the space shall be permitted.

8.15.1.2.8 Concealed spaces within wood joist construction and composite wood joist construction having noncombustible insulation filling the space from the ceiling up to the bottom edge of the joist of the roof or floor deck, provided that in composite wood joist construction the joist channels separated into **volumes each not exceeding 160 ft3** to the full depth of the composite wood joist with material equivalent to the web construction, shall not require sprinkler protection.

NFPR 13-R 6.6.6 Sprinklers shall not be required in attics, penthouse equipment rooms, elevator machine rooms, concealed spaces dedicated exclusively to and containing only dwelling unit ventilation equipment, crawl spaces, floor/ceiling spaces, elevator shafts where the elevator installation complies with ANSI A17.1, Safety Code, and other concealed spaces that are not intended for living purposes or storage and do not contain fuel-fire equipment.

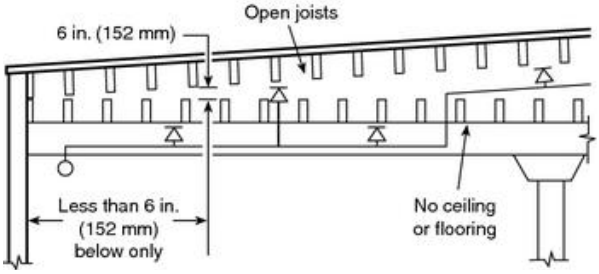


FIGURE 8.6.4.1.5.1 Arrangement of Sprinklers Under Two Sets of Open Joists — No Sheathing on Lower Joists.

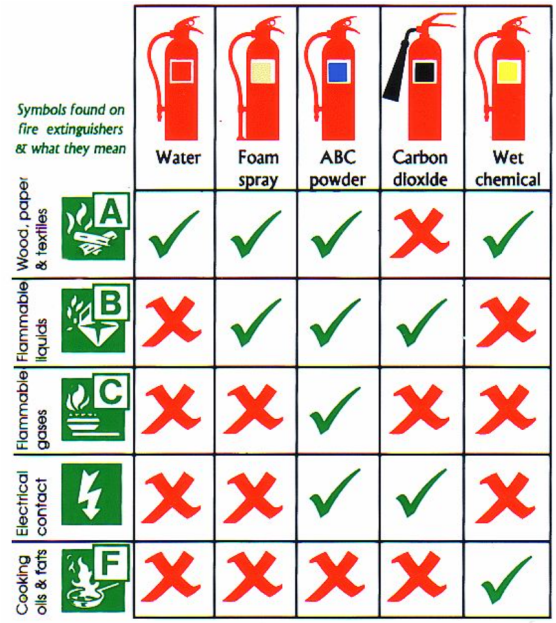
906 PORTABLE FIRE EXTINGUISHERS

Portable fire extinguishers are required in all buildings under construction

906 COMMENTARY From 2003 through 2007, NFPA reported 38,000 fires occurred annually in apartment buildings. 60% of these fires occurred inside of dwelling units versus 14% that occurred in common areas covered by Items 3 and 6 of Section 906.1.
It is more logical to place PFEs inside dwelling units versus common areas because it locates the extinguisher in an area where most fires occur.

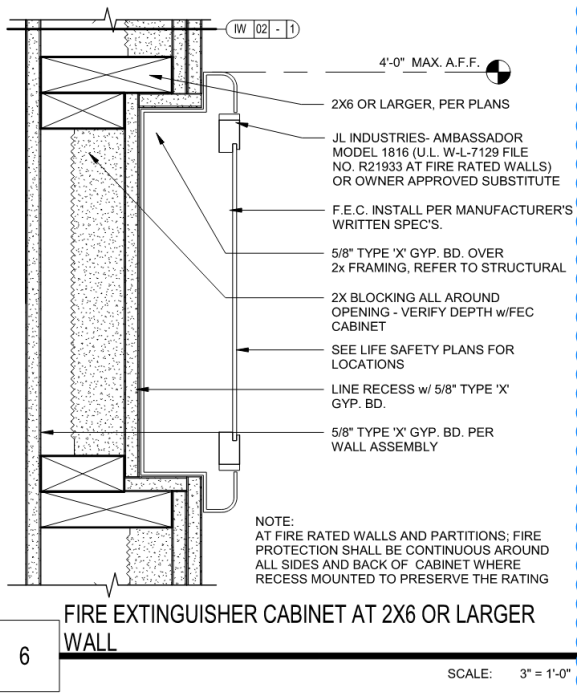
906.3. Class fire hazard

Class A fire caused by combustible carbon-based solids such as paper, wood or textiles
Class B fire caused by flammable liquids eg paraffin, petrol, diesel or oil (but not cooking oil)
Class C fire caused by flammable gases, eg butane, propane or methane
Class D fire caused by burning metals, eg aluminium, lithium or magnesium
Fires caused by electrical equipment (indicated by an electric spark symbol and no letter E)
Class F fire caused by fats and cooking oils.



[F] TABLE 906.3(1)
FIRE EXTINGUISHERS FOR CLASS A FIRE HAZARDS

	LIGHT (Low) HAZARD OCCUPANCY	ORDINARY (Moderate) HAZARD OCCUPANCY	EXTRA (High) HAZARD OCCUPANCY
Minimum-rated single extinguisher	2-A[c]	2-A	4-A[a]
Maximum floor area per unit of A	3,000 square feet	1,500 square feet	1,000 square feet
Maximum floor area for extinguisher[b]	11,250 square feet	11,250 square feet	11,250 square feet
Maximum distance of travel to extinguisher	75 feet	75 feet	75 feet



[JL Ambassador 8116F10 Semi-Recessed 5 lbs. Fire Extinguisher Cabinet]

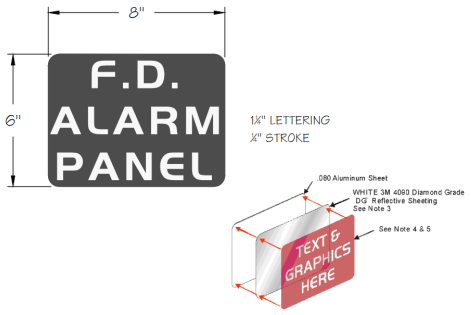
1 1/2" Square Trim Semi-Recessed Steel Fire Extinguisher Cabinet. Holds 5 lb. Fire Extinguisher, Full Glass Door Glazing. The Ambassador 8116 series is a durable, attractive steel cabinet with powder-coat finish that stands up to conditions in commercial buildings. Door and Trim are cold rolled steel with white...

SECTION 907 FIRE ALARM AND DETECTION SYSTEMS

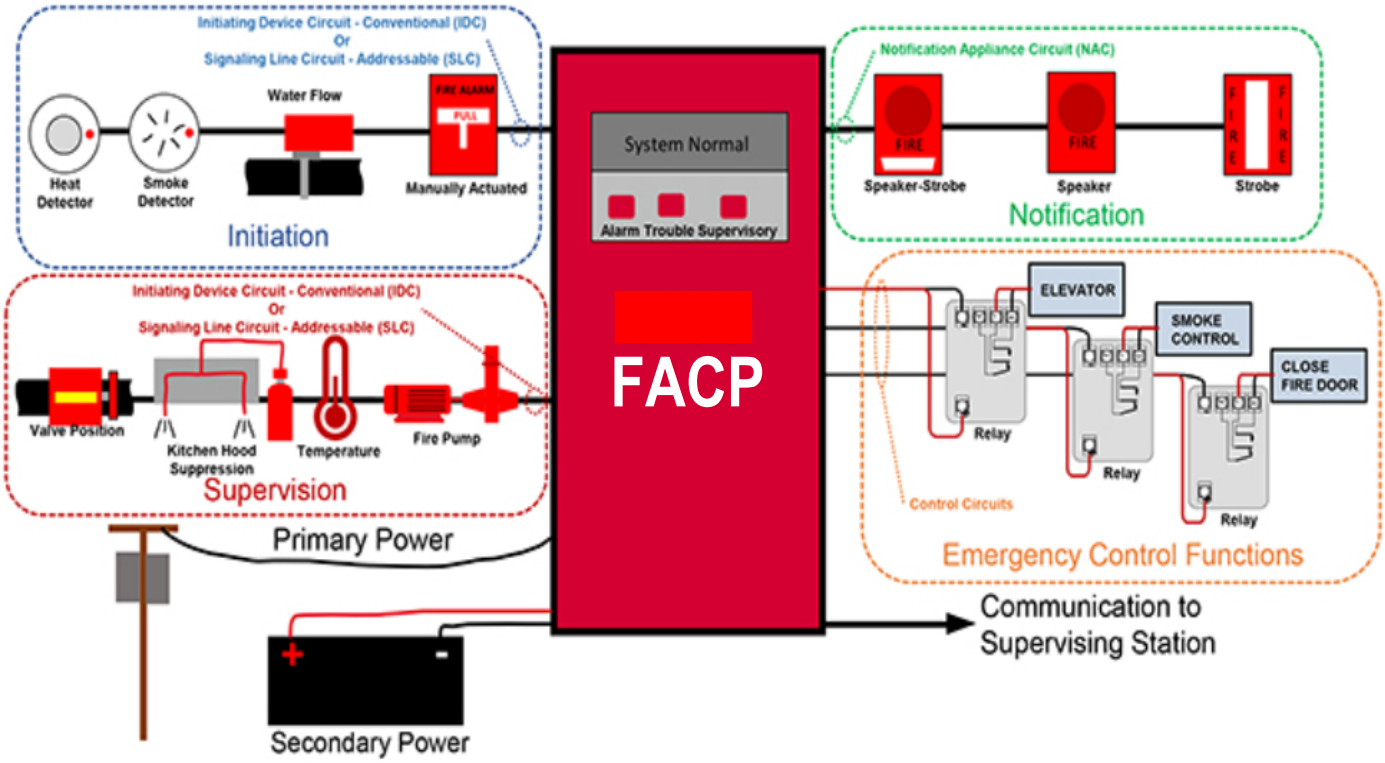
Fire alarm control panel unit abbreviated as FACP, is the system's "brain." It receives messages from the initiating devices known as inputs.

Turning on notifications: Upon receiving inputs, FACP will turn on notification devices, known as outputs. It alerts people that an issue has occurred.
Elevator recall: FACP recalls elevators, which eliminates the possibility of an elevator delivering people to a flame- or smoke-filled area.
HVAC system shutdown: Upon smoke detection in an air duct, FACP will shut the air handling unit down, preventing smoke from spreading .
Notifying alarm monitoring center: The FACP will alert a remote alarm monitoring station, which will notify emergency services.

APPROVED PHOENIX FIRE DEPARTMENT
ALARM PANEL SIGN



Deferred submittal 907.1.2 Fire alarm shop drawings for fire alarm systems shall be prepared in accordance with NFPA 72 and submitted for review and approval prior to sys-tem installation



FACP location NFPA 72 the system must be installed in accordance with standards approved by the authority having jurisdiction.
Many jurisdictions specify that the FACP must be located near the main entrance or it will require approval if located elsewhere.

SECTION 918 EMERGENCY RESPONDER RADIO COVERAGE

ERRCS - Emergency Responder Radio Communications System, ensures reliable two-way communication for first responders within building structures.

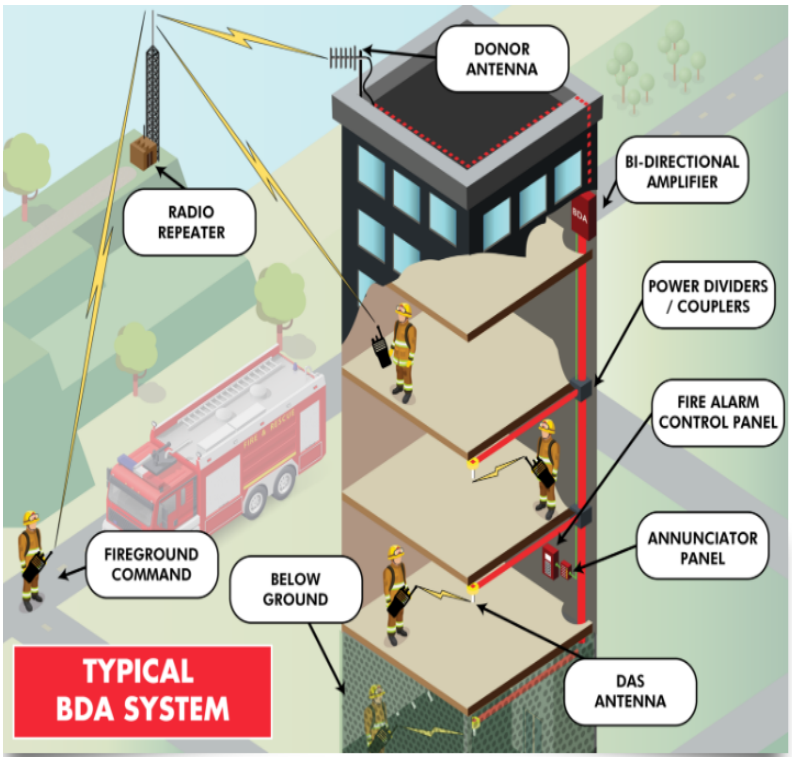
These systems use communications compatible with existing public safety radio frequencies to ensure that first responders, paramedical professionals, and public safety personnel communicate safely.

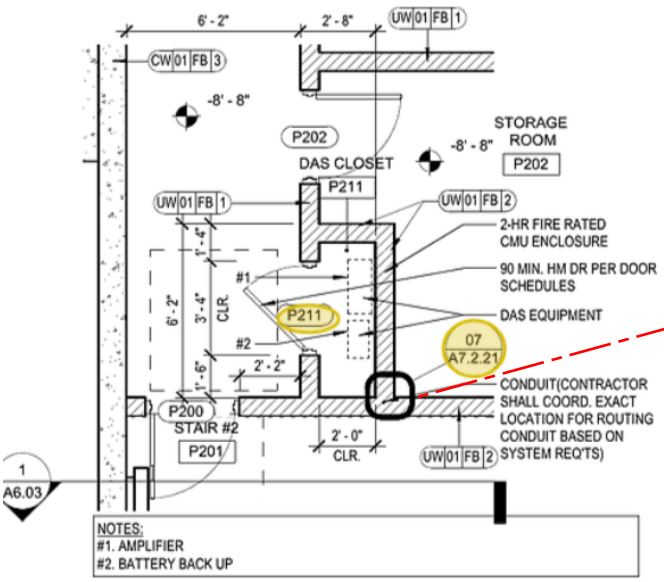
DAS - Distributed Antenna System is a system of antennas installed in a building to enhance and enable carrier services throughout a structure.

DAS systems are most commonly installed indoors and typically consist of multiple antenna nodes connected by a fiber optic cable network, they may also be installed at outdoor stadiums, arenas, or malls with limited cell tower coverage.

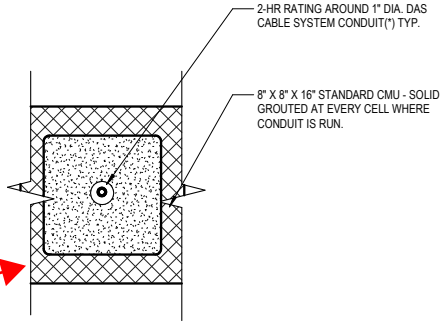
THE SCOPE OF WORK INCLUDES: INITIAL TESTING AND EVALUATION OF THE BUILDING TO DETERMINE IF THE EMERGENCY PUBLIC SAFETY COMMUNICATION SYSTEM MEETS THE REQUIREMENTS OF SECTION 510 WITHIN THE FIRE CODE OF THE AHJ.

BDA - Bi-Directional Amplifier





DAS [DISTRIBUTED ANTENNA SYSTEM AND EMERGENCY RADIO RESPONDER COVER (ERRC) PER IBC 918.1 & IFC 510, 2018 PBC 403.4.5. WIRED PATHWAY SURVIVABILITY LEVEL 2, PER NFPA 72 SECTION 24.3.13.7 &12.4



EMERGENCY RADIO RESPONDER COVERAGE (ERRC) / DAS (DISTRIBUTED ANTENNA SYSTEM) SYSTEM CONDUIT PROTECTION, PER IBC 918 & IFC 510 EMERGENCY RADIO RESPONDER COVERAGE WITH WIRED PATHWAY SURVIVABILITY LEVEL 2 PER NFPA 72 SECTION 24.3, 24.4 AND 12.4

2

07 2-HR RATED WALL PROTECTION FOR DAS CONDUIT

REFERENCED IN : 8 /A6.02 SCALE: 3" = 1'-0"

REVERSE REFERENCE DOESN'T REFER BACK TO ALL CONDITIONS WHERE THE DETAIL OCCURS