NFSA
NATIONAL FIRE SPRINKLER ASSOCIATION
The Voice of the Fire Sprinkler Industry

STANDPIPE SYSTEMS & NFPA 14

MAINE BUILDING OFFICIALS INSPECTORS ASSOCIATION
MBOIA
FOUNDED IN 1972

Maine Fire Chiefs' Association

1

COPYRIGHT

This presentation is protected by US and international copyright laws. Any reproduction, recording, distribution, display, or use of the presentation without written permission of the **National Fire Sprinkler Association (NFSA)** is prohibited.

©National Fire Sprinkler Association 2022

NFSA

2

INTRODUCTIONS

NFSA Michael Joanis, PE

- NFSA's Chief Engineer
- Responsible for delivery of technical services to our members
- University of Maryland, College Park
- Registered professional engineer
- NFPA 13 (discharge, hanging & bracing), 20, 200, 232, 241, 909/914
- NFSA Contractors and Manufacturers Councils
- Engineering & Standards, Quality Assurance, UL/FM Committees
- 28 years of experience as a sprinkler contractor and consulting engineer.
- Licensed sprinkler & special hazards contractor
- Fire Sprinkler Institute

NFSA

- joanis@nfsa.org

3

MODULES

1. Introduction to Standpipe Systems
2. Referenced Standards, Definitions, System Components, and Hardware
3. System Requirements
4. Installation Requirements
5. Design
6. Plans, Calculations, & Water Supply Testing
7. Acceptance Testing

NFSA

4

4

MODULE 1

- Introduction to Standpipe Systems

NFSA

5

5

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. **Explain the scope of NFPA 14**
2. **Discuss the history of standpipes**
3. **Recognize where standpipe systems are required**
4. **Discuss the hierarchy of codes and standards**

NFSA

6

WHAT ARE STANDPIPES

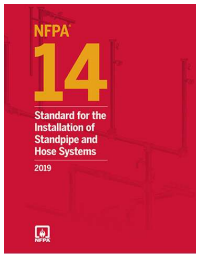
- System of piping that delivers the water supply for hose connections, and for sprinklers on combined systems.

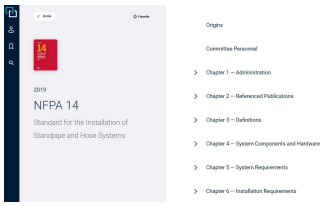
NFSA

7

7

NFPA 14





Scope and Layout of NFPA 14???

NFSA

8

8

HISTORY OF NFPA 14

- 1912
- 1993 changes to flows and pressures
- 1991 One Meridian Plaza, Philadelphia, PA (3 FF, PRV issues, 22-20 floors, 10 sprinklers)
- 2007 pressure regulating devices
- 2016 protection of piping
- 2019 distance monitoring, remote inspection, maximum pressure to 400 psi.

NFSA

9

9

WHERE SYSTEMS ARE REQUIRED

- As per the building code
  - IBC
  - NFPA 5000
  - State and local building codes
- Tall buildings
- Large buildings

NFSA

10

10

IBC

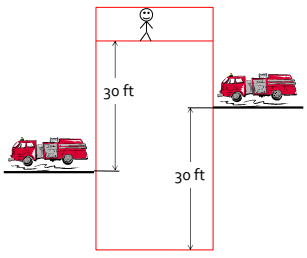
- A Class III Standpipe system shall be installed throughout the building where the floor level of the highest story is located more than 30 feet above the lowest level of fire department vehicle access or where the lowest story is located more than 30 feet below the highest level of fire department vehicle access

NFSA

11

11

IBC



NFSA

12

12

EXCEPTIONS

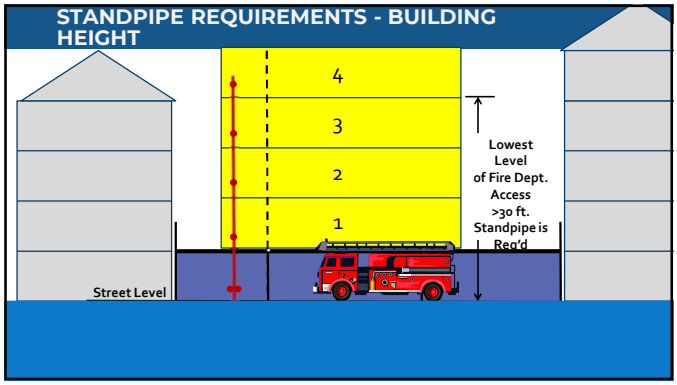
- Sprinklered buildings – Class I
- Open parking garages where the highest level is not more than 150 above lowest level of fire department access – Class I
- Open parking garages that are subject to freezing – Class I

NFSA

13

13

STANDPIPE REQUIREMENTS - BUILDING HEIGHT



14

STANDPIPE REQUIREMENTS BUILDING HEIGHT – IBC 905.3.1

- When height of the building requires standpipes:
  - Class III
- When fully sprinklered per NFPA 13 or NFPA 13R:
  - Class I
- Open parking garages:
  - Class I

NFSA

15

15

STANDPIPE REQUIREMENTS OCCUPANCY OR USE

- Group A (Assembly Occupancies > 1,000 persons) – Class I
- Underground – Class I
- Helistops and Heliports – Class I or III
- Marinas & Boatyards – Class I
- Rooftop gardens and landscaped roofs (new 2012 IBC)
- Covered and open mall buildings…
- Stages…

16

16

STANDPIPE REQUIREMENTS - COVERED AND OPEN MALL BUILDINGS

- Covered and open mall buildings require standpipes: by height, or by 905.3.3:
  - Class I
  - Combined/Calculated with Sprinkler System
    - 250 gpm @ remote hose connection
      - Concurrent w/sprinkler calc
    - 50 psi loss max while flowing 250 gpm
  - Hose connection locations
    - Place outlet at entrance to each exit passageway/corridor
    - Place outlet at each floor landing of enclosed stairs opening directly into mall.
    - Place outlet on interior side of public entrances to the mall.
    - To reach into tenant space not exceeding 200 ft. from outlet.

17

17

STANDPIPE REQUIREMENTS - STAGES

- Stages > 1,000 sq. ft
  - Class III: 2 ½ in. & 1 ½ in. hose connection on each side of stage.

- When in Sprinklered Bldgs:
  - 1 ½ in. hose connection:
    - According to NFPA 13, or
    - NFPA 14 for Class II or III
  - 1 ½" hose connections must be equipped with hose and cabinet with adjustable fog nozzle

18

18

HIERARCHY OF CODES AND REFERENCED STANDARDS

- IBC Section 905.2: Standpipe systems shall be installed in accordance with this section (905) and NFPA 14.
- Building Code/Fire Code requirements
- NFPA 14

19

19

STANDPIPE REQUIREMENTS

- Building Code, Fire Code, Life Safety Code
- Based On:
  - Building Height (IBC 905.3)
  - Occupancy or Use (IBC 905.3.2 – 905.3.8)

20

20

MODULE 2

- Referenced Standards, Definitions, System Components, and Hardware

21

21

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. Review the referenced standards.
2. Explain the various definitions related to standpipe systems
3. Explain the various components used in standpipe systems
4. Discuss the similarity of system components with sprinkler systems

NFSA

22

22

REFERENCED STANDARDS

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, 2019 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2019 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2018 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2017 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition.

NFPA 72®, National Fire Alarm and Signaling Code®, 2019 edition.

NFPA *101®, Life Safety Code®*, 2018 edition.

NFPA 170, *Standard for Fire Safety and Emergency Symbols*, 2018 edition.

NFPA 1963, *Standard for Fire Hose Connections*, 2019 edition.

NFSA

23

23

DEFINITIONS

3.1 General.

The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

NFSA

24

24

SYSTEM COMPONENTS AND HARDWARE

- General rules
- Pipe & fittings
- Control valves
- Pressure-regulating devices
- Fire department connections
- Signs
- Hose stations/connections

25

25

SYSTEM COMPONENTS AND HARDWARE

- General rules
  - All devices & materials shall be listed
    - Except for components not affecting system performance
      - Drain piping, drain valves & signs
- Pipe & fittings
  - Selected from list in NFPA 14 or specifically listed
- Pressure regulating devices
  - Shall be listed

26

26

SYSTEM COMPONENTS AND HARDWARE

- Valves
  - All connections to water supplies & standpipes shall be listed indicating valves
  - Post indicating valves are permitted
  - Slow close feature
    - Non indicating valves permitted if acceptable to the AHJ
- Signs
  - Shall be permanently marked weather resistant metal or rigid plastic

27

27

SYSTEM COMPONENTS AND HARDWARE

- Hose stations
  - Cabinets & closets
    - 2" clearance from any part of the cabinet to the valve, except for the door
    - Break glass type must have device attached in the immediate vicinity
    - Must maintain fire resistive rating if penetrated
    - Marked to indicate contents
  - Hose
    - When supplied, no more than 100' 1 ½" listed hose
    - If < 1 ½", hose must be non collapsible

NFSA

28

28

2" CLEARANCE FROM THE VALVE TO ANY PART OF THE CABINET

NFSA

29

29

SYSTEM COMPONENTS AND HARDWARE

- Hose racks
  - Each hose station shall be equipped with a rack or approved storage method
  - For hose < 1 ½", must be a continuous flow reel
  - Nozzles for Class II service shall be listed
  - Racks or storage facilities shall be labeled including "FIRE HOSE FOR USE BY TRAINED PERSONNEL" and operating instructions

NFSA

30

30

SYSTEM COMPONENTS AND HARDWARE

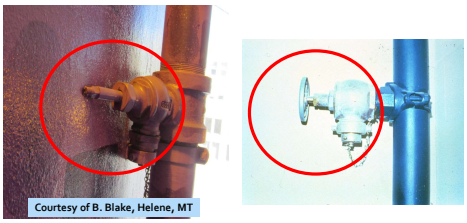
- Hose connections
  - All valves shall be listed with external NHS threads and caps
  - Local fire departments having different threads shall designate the hose threads used
  - Must be at least 3" clearance between the handle of the valve and any adjacent object when the valve is in any position

NFSA

31

31

AT LEAST 3" CLEARANCE BETWEEN THE HANDLE OF THE VALVE AND ANY ADJACENT OBJECT WHEN THE VALVE IS IN ANY POSITION



NFSA

32

32

SYSTEM COMPONENTS AND HARDWARE

- Fire department connections
  - Listed for system demand pressure or greater
  - Must have at least 2- 2 ½" internal threaded swivel fittings with NHS threads
    - Must be equipped with protective caps
    - Local fire departments having different threads shall have comparable fittings with minimum 2 ½" size

NFSA

33

33

MODULE 3

- System Requirements

NFSA

34

34

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. Identify the various types of standpipe systems
2. Identify the various classes of standpipe systems
3. Discuss specific rules for automatic/ semi-automatic dry systems
4. Discuss specific limits to the use of some systems
5. Explain the requirements for gauges & waterflow alarms

NFSA

35

35

SYSTEM REQUIREMENTS

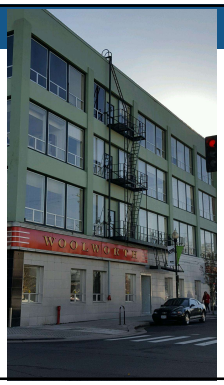
- General
- Types of standpipes
- Classes of standpipes
- Specific rules for Automatic/ semi-automatic dry systems
- Limits to the use of systems
- Gauges
- Waterflow alarms

NFSA

36

36

THE ORIGINAL



37

STANDPIPE SYSTEM CLASSIFICATION

- Types of Standpipes

38

TYPES OF STANDPIPE SYSTEMS

- Automatic-wet
- Automatic-dry
- Semi-automatic dry
- Combined system
- Manual wet
- Manual dry

39

TYPES OF STANDPIPE SYSTEMS

- Automatic-Wet Systems
  - Contain water at all times
  - Permanently attached to an automatic water supply that is capable of supplying the whole system
- Automatic-Dry Systems
  - Filled with air or nitrogen until a valve is opened
  - Permanently attached to an automatic water supply that is capable of supplying the whole system

NFSA

40

40

TYPES OF STANDPIPE SYSTEMS

- Semiautomatic Dry Systems
  - Permanently attached to a water supply that is capable of supplying the whole system
  - Water supply must be remotely activated
- Manual Wet System
  - Contains water at all times
  - Required to be supplied through a fire department connection

NFSA

41

41

TYPES OF STANDPIPE SYSTEMS

- Manual Dry System
  - No water in pipe
  - Required to be supplied through a fire department connection
- Combined System
  - A standpipe system that supplies both hose connections & automatic sprinklers

NFSA

42

42

STANDPIPE SYSTEM CLASSIFICATION

- Classes of Standpipes

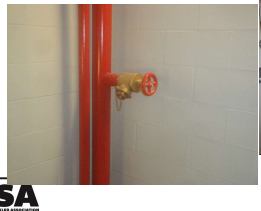
NFSA

43

43

CLASS I

- System that provides 2 ½ inch hose connections to supply water for fire department use only



NFSA

44

44

CLASS II

- System that provides 1 ½ inch hose stations for trained personnel or hose connections for fire department use during initial response

- Minimum of 1" may be allowed in light hazard where approved by the AHJ

NFSA

45

45

CLASS III

- 1 ½ inch hose stations for use by trained personnel
- 2 ½ inch hose connection for use by the fire department

NFSA

46

46

CLASS III CONT

- May use minimum 1" hose for light hazard where listed for such and approved by the AHJ
- Where fully protected by an approved automatic sprinkler system
  - Class II hose stations, upon AHJ approval, may be replaced with a 2 ½" x 1 ½" reducer with a cap and chain on each 2 ½" Class I hose connection
  - Do not have to meet the normal pressure & travel requirements for Class II systems

NFSA

47

47

SYSTEM REQUIREMENTS

- General rules
  - The AHJ shall be consulted regarding the type & class of system and any special requirements
  - Standpipe & hose systems not required by the AHJ & not meeting the requirements of NFPA 14 shall be marked with a sign reading "FOR FIRE BRIGADE USE ONLY"

NFSA

48

48

SYSTEM REQUIREMENTS AUTOMATIC & SEMIAUTOMATIC DRY SYSTEMS

- Automatic dry systems
  - Pressure gages
    - Water & air side of the dry pipe valve
    - At the air pump if one is provided
    - In each independent pipe from air supply to dry pipe system
    - At QOD's
  - Size limited to 750 gal. per dry pipe valve
    - Larger if water delivery is no more than 3 minutes
    - May use QOD's to meet the requirement

NFSA

49

49

SYSTEM REQUIREMENTS AUTOMATIC & SEMIAUTOMATIC DRY SYSTEMS

- Dry valve & supply pipe shall be protected against freezing & mechanical injury
- Valve room must be lighted & heated
  - Heat must be a permanent type- no heat tape
- Protect against high water in clapper
- Air supply shall be capable of restoring pressure within 30 minutes

NFSA

50

50

AIR COMPRESSORS

- An annex note states that the use of a single air compressor in multiple dry systems
  - Where a single compressor multiple dry pipe systems, the 30 minute fill time is based on the single largest system.

NFSA

51

51

HIGH WATER LEVEL PROTECTION

- Where possible to reseat the dry valve after actuation without draining the system, it is permissible to protect against occurrence of water above the clapper by use of an automatic high water level signaling device or an automatic drain device
- This similar method is required for protection against accumulation of water above the clapper in Low Differential Dry Pipe Valves

NFSA

52

52

SYSTEM REQUIREMENTS AUTOMATIC & SEMIAUTOMATIC DRY SYSTEMS

- Semiautomatic dry systems (single, double or non-interlock)
  - Remote control device must be within 3', visible & identified
  - Pressure gages
    - Above/below preaction valves & below deluge valves
    - On air supply to preaction & deluge valves
  - Valve room must be lighted & heated
    - Heat must be a permanent type- no heat tape

NFSA

53

53

LIMITS TO THE USE OF SYSTEMS

- Class I systems
  - In non high rise buildings
    - Class 1 may be automatic wet, automatic dry, manual dry or manual wet
    - The Class 1 portion of a Class III system may be manual
  - In high rise buildings
    - All required standpipes shall be automatic or semi-automatic, including partial height & horizontal standpipes serving a limited number of floors or a portion of floors
  - All Class I's must be wet except where subject to freezing

NFSA

54

54

LIMITS TO THE USE OF SYSTEMS CONT

- Class II & III systems
  - Shall be wet systems
    - May be automatic or semi automatic dry IF
      - Piping is subject to freezing
      - Fire brigade is trained to operate without FD help
      - The automatic portion of a Class III only has to supply the Class II portion unless the Class I portion requires an automatic water supply

NFSA

55

55

SYSTEM REQUIREMENTS

- Gauges

NFSA

56

56

GAUGES

- A listed pressure gauge with a minimum 3 ½" face is required:
  - At each discharge pipe from the fire pump
  - At the pressure tank
  - Air pump supplying a pressure tank
  - At the top of each standpipe
    - Where several standpipes are interconnected at the top, a single gage is permitted
  - At each main drain connection
  - Above & below each alarm check valve, dry, deluge valve, backflow preventer or system riser check valve where such devices are present

NFSA

57

57

GAUGES

- Pressure regulating devices
  - A valved outlet for a pressure gauge shall be installed on the upstream side of every PRV
  - Pressure gauges shall be installed on the upstream & downstream side of master pressure regulating device assemblies

NFSA

58

58

SYSTEM REQUIREMENTS

- Waterflow Alarms

NFSA

59

59

WATERFLOW ALARMS

- Listed waterflow alarms are required on all systems
  - Not required on manual dry systems
- Shall utilize a sensing mechanism appropriate to the type of standpipe.
- Paddle-type waterflow alarms shall be used on wet standpipe systems only.

NFSA

60

60

WATERFLOW ALARMS

- An annex note clarifies that it is acceptable to use a hose valve as a means to test a water flow device. This includes the use of a hose valve on the roof.
- Clarification was extended that this method was predicated on the hose valve discharging to an suitable location.

61

61

MODULE 4

- Installation Requirements

62

62

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. Explain & discuss the location and protection of both underground & above ground piping
2. Discuss the requirements for the installation & supervision of control valves & check valves
3. Explain the requirements for fire department connections
4. Discuss the various requirements for specific signs

63

63

LOCATION/ PROTECTION OF PIPING

- Location of Dry standpipes
  - Dry standpipes shall not be concealed without supervised air monitoring in the pipe in accordance with NFPA 72
- Above ground pipe
  - Protected from mechanical and fire damage
    - Protection based on Table for high rise or non high rise buildings
  - Feed mains, standpipes, horizontal standpipes & branch lines protected comparable to enclosed exit stairs

NFSA

64

64

Location/ Protection of Piping cont.

- Above ground pipe cont.
  - Piping not requiring protection
    - Horizontal standpipes, feed mains & branch lines do not require protection if building is equipped with approved auto sprinkler system
    - Piping for 1 ½" connections
    - Standpipes where exit stairways are not required to be fire rated enclosures
    - Additional standpipes needed to meet travel distances in non high rise buildings

NFSA

65

65

LOCATION/ PROTECTION OF PIPING CONT.

- Above ground pipe cont
  - Piping in areas subject to freezing shall maintain water temp. between 40-1200F
    - Anti freeze not allowed
  - May us heat tracing if:
    - Listed
    - Installed according to mfgr. specs.
    - Supervised by one of the following
      - Central station, proprietary or remote signaling service
      - Local signaling service to a constantly attended location

NFSA

66

66

LOCATION/ PROTECTION OF PIPING CONT.

- Above ground pipe cont
  - Corrosion resistant types or coatings of pipe, tube fittings & hangars shall be used in corrosive atmospheres or where exposed to weather
  - Where subject to earthquakes, use requirements of NFPA 13
- Above ground pipe cont
  - All piping for dry standpipes, manual dry standpipes, & semi automatic standpipes shall be pitched at least ¼" per 10'
    - In refrigerated areas, must be ½" per 10'

NFSA

67

67

UNDERGROUND PIPING

- Shall be in accordance with NFPA 24

NFSA

68

68

GATE VALVES & CHECK VALVES

- Each connection to a automatic water supply shall have approved control valve & check valve
  - May be located in the building
  - Not required for auto & semi-auto systems supplied by fire pumps
  - Backflow preventers may meet this requirement
  - Valves not required on manual dry systems
  - Valves shall be required on all standpipes, including manual dry to allow isolation without interrupting flow to other standpipes from the same source of supply
  - Approved valves shall be provided in the water supply for manual wet systems

NFSA

69

69

FIRE DEPARTMENT CONNECTIONS

- Clarifies that a listed check valve shall be installed in each fire department connection, including the connection in manual-dry systems.

NFSA

70

70

GATE VALVES & CHECK VALVES CONT.

- FDC shall not be provided with isolation valves
- Valves shall be located at the standpipe for controlling branch lines for remote hose stations where the distance to the hose station exceeds 40'

- Control/check valves on combination systems
  - Each connection to a sprinkler system from a combined standpipe system shall have an additional control/check valve
  - Listed PRV's shall be considered check valves

NFSA

71

71

GATE VALVES & CHECK VALVES CONT.

- Valves on water supply connections
  - On each connection to a water supply (except in FDC)
  - Plainly marked to indicate the service they control
  - If not 40' from building, in an approved location (wall post indicators if approved by AHJ)
  - Where PI's can't be used, underground valves with an approved roadway box & T-wrench are permitted
  - Buildings served shall be marked to indicate the location of the valve that controls them
  - If supplied by a yard main or header in another building, standpipes shall have a valve at a safe distance or at the header

NFSA

72

72

GATE VALVES & CHECK VALVES CONT.

- Valve supervision
  - Same as NFPA 13
- Bypass valves for master PRV's shall be supervised in the closed position
  - Must be electrically supervised

NFSA

73

73

GATE VALVES & CHECK VALVES CONT.

- Signs for rooms, valves & hose connections
  - Required for all main & sectional control valves indicating the portion of the system they control
  - All control, drain & test connections require signs
  - Where sprinkler system piping is fed by a dual feed design, signs indicating other valves needed to be shut off to isolate the system are required
  - Valves located in rooms or concealed spaces require signs at approved locations outside the space/ room
  - Hose connections not in stairways require signs posted in an approved manner
  - Valve cabinets must be marked (red on white min. 2 ½")

NFSA

74

74

FIRE DEPARTMENT CONNECTIONS

- No shutoff valves between FDC & the system (except to isolate standpipes from others)
- Installed similar to the requirements for sprinkler systems
- Not connected to suction side of fire pump
- Drip valves required in areas subject to freezing

NFSA

75

75

FIRE DEPARTMENT CONNECTIONS CONT.

- Location & Identification
  - Visible from street or FD access
  - Arranged to attach hose lines without obstruction
  - Each FDC shall have a sign at least 1" letters: "STANDPIPE" (if manual, shall also indicate wet or dry)
  - If also supplying automatic sprinklers, sign shall indicate: "STANDPIPE & AUTOSPKR" or "AUTOSPKR & STANDPIPE"

NFSA

76

76

FIRE DEPARTMENT CONNECTIONS CONT.

- Location & Identification cont.
  - Sign shall indicate the pressure required at inlets
  - If multiple buildings, sign shall indicate buildings served
  - FDC shall be at within 100' to nearest hydrant
    - May exceed 100' if approved by AHJ
  - Located 18"-48" above level of adjoining grade surface

NFSA

77

77

Signs

- Installation of signs
  - All shall be secured with corrosive resistant chain or wire
- Signs for water supply pumps
  - Where pumps are used, a sign shall be installed in the vicinity of the pump indicating pressure and flow needed at the pump flange to supply the system

NFSA

78

78

HYDRAULIC DESIGN INFORMATION SIGN

- Installing contractor shall provide a sign indicating the basis of design
- Located at control valve for auto or semi-auto systems
  - At an approved location for manual systems
- Shall include the following:
  - Location of two most hydraulically remote connections
  - Design flow rate for the connections
  - Design residual inlet & outlet pressure for the connections
  - Design static pressure & design flow & residual pressure at the control valve or pump discharge & at each FDC

NFSA

79

79

MODULE 5

- Design

NFSA

80

80

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. Explain the general rules for standpipe piping
2. Explain the requirements for minimum pipe sizes
3. Describe required hose locations & number of standpipes
4. Explain minimum/maximum pressure limits in systems and how it is controlled

NFSA

81

81

LEARNING OBJECTIVES CONT

At the end of this Module, participants will be able to:

5. Explain various pressure requirements for systems
6. Explain the concept of standpipe zones and their impact on design
7. Explain minimum flow rates in different systems
6. Explain the purpose & requirements for drains, test risers and FDC's

NFSA

82

82

DESIGN

- General rules
- Pressure limitations
- Locations of hose connections
- Number of standpipes
- Interconnection of standpipes
- Minimum sizes for standpipes & branch lines
- System design & pipe sizing
- Standpipe system zones
- Flow rates
- Drain & test risers
- Fire department connections

NFSA

83

83

GENERAL RULES

- Design shall be governed by
  - Building height
  - Area per floor occupancy
  - Classification
  - Egress system design
  - Required flow rate & residual pressure
  - Distance of hose connection to water supply
- When PRD's are used, they shall be approved for installation within the minimum/maximum anticipated flow conditions

NFSA

84

84

MINIMUM PIPE SIZES

- Class I & II shall be a minimum of 4" in size
- Standpipes in combination systems must be a minimum of 6"
  - If building is protected throughout by a sprinkler system (either NFPA 13 or 13R), minimum size is 4"
- Branch shall be hydraulically calculated but a minimum of 2 ½"

NFSA

85

85

PIPE SIZE FOR SYSTEM DEMAND

- For Class I & III, must be designed so the system demand can be supplied by each FDC
- Where auto or semi-auto water supply is required (based on class of system), must be designed to be independently supplied by the attached water supply & each FDC provided on the system

NFSA

86

86

PIPE SIZE FOR SYSTEM DEMAND CONT.

- Attached water supply not required to supply the standpipe demand for manual wets or sprinkler standpipe combined manual wet systems
- When the system demand is to be supplied by the fire department connection, the fire department shall be consulted regarding the water supply available from their pumper

NFSA

87

87

DESIGN

- Location of Hose Connections

88

LOCATIONS OF HOSE CONNECTIONS

- General
  - Connections & stations must be unobstructed & located 3-5' above the floor
  - This dimension shall be measured from the floor to the center of the device
  - Shall not be obstructed by the closed or open stairwell door or other objects on the landing

89

HOSE CONNECTION LOCATIONS CLASS I (2 ½ INCH)

- Exit stairways
- Horizontal exits
- Exit passageways
- Covered mall buildings
- Highest landing of stairway or on roof
- Travel distance

90

CLASS I (2 ½ INCH) EXIT STAIRWAYS

- Outlets in every required exit stairwell
  - Most protected place in the building
  - Fire fighters protected before they get water into hose
  - Not required in non required stairs connecting two floors
- Put outlet at the main floor landing in exit stairwells
  - Intermediate landing previous editions IBC
- Allowed to put outlet at highest intermediate landing between floor levels if approved by AHJ

NFSA

91

91

INTERMEDIATE FLOOR LEVEL LANDING

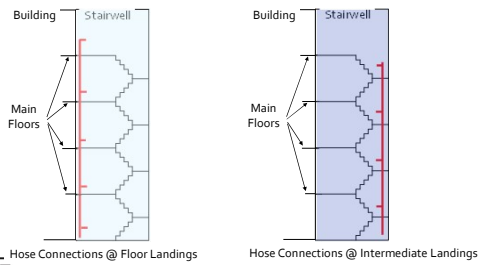
- NFPA 14/IBC floor landing differences
- Headroom
- Sweep of hose
- Area of refuge
- Hose kink

NFSA

92

92

CLASS I (2 ½ INCH) EXIT STAIRWAYS



NFSA

93

93

CLASS I (2 ½ INCH) HORIZONTAL EXITS

- A way of passage from one building to an area of refuge in another building on approximately the same level.
- Each side of the wall adjacent to exit openings of horizontal exits (unless the distance can be covered by one already in place)

NFSA

94

94

CLASS I (2 ½ INCH) HORIZONTAL EXITS

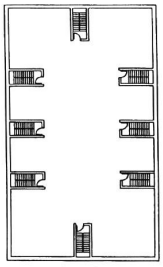


Figure 1

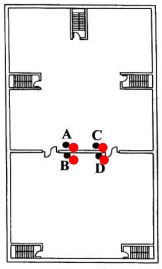


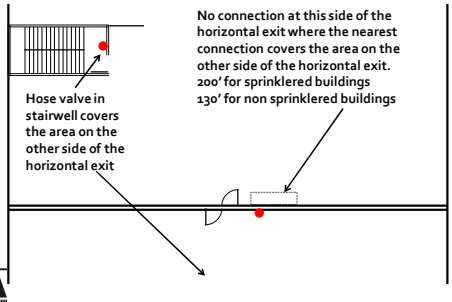
Figure 2

NFSA

95

95

HORIZONTAL EXITS EXCEPTION



NFSA

96

96

CLASS I (2 ½ INCH) EXIT PASSAGEWAYS

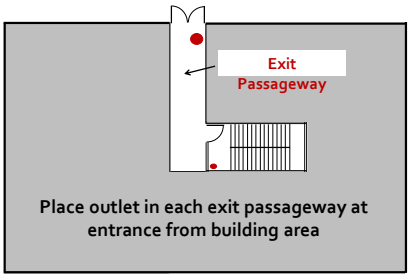
- Hallways, corridors, passages, or tunnels used as exit components and separated from other parts of the building in accordance with NFPA 101.

NFSA

97

97

CLASS I (2 ½ INCH) EXIT PASSAGEWAYS



Place outlet in each exit passageway at entrance from building area

NFSA

98

98

CLASS I (2 ½ INCH) COVERED MALL BUILDINGS

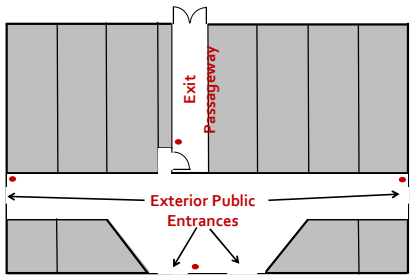
- Adjacent to each exterior public entrance
- Adjacent to each entrance from an exit passageway (or exit corridor) to the mall

NFSA

99

99

CLASS I (2 ½ INCH) COVERED MALL BUILDINGS



NFSA

100

100

CLASS I LOCATIONS CONT. HIGHEST LANDING

- At the highest landing of stairways with roof access or on roofs (where slope is less than 4 in 12)
- See Section 7.3.2.7 thru 7.3.2.9

NFSA

101

101

CLASS I LOCATIONS CONT.

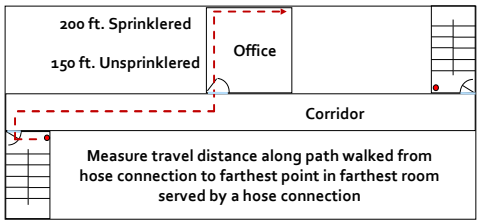
- Non sprinklered buildings
  - All portions of a floor must be within 150 feet of travel distance from a hose connection
- Sprinklered buildings
  - All portions of a floor must be within 200 feet of travel distance from a hose connection
- Distances do not apply to roofs if not occupied

NFSA

102

102

CLASS I (2 ½ INCH) TRAVEL DISTANCE (DOES NOT APPLY TO THE ROOF IF NOT INTENDED FOR OCCUPANCY)



NFSA

103

103

CLASS II LOCATIONS

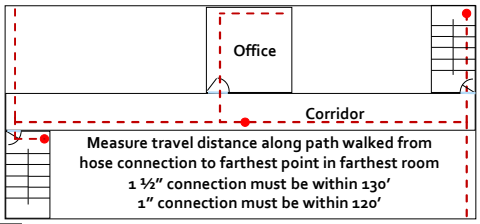
- 1 ½ inch hose stations
  - All portions of each floor level must be within 130 feet of a hose connection
- Less than 1 ½ inch hose stations
  - All portions of each floor level must be within 120 feet of a hose connection

NFSA

104

104

CLASS II (1 ½ INCH) TRAVEL DISTANCE



NFSA

105

105

CLASS III LOCATIONS

- Class I and II requirements
  - Does not have to meet the 130' requirement for Class II systems
- Where the building is completely sprinklered in accordance with NFPA 13, Class II hose stations are not required if
  - Approved by the AHJ & local Fire Department
  - Each Class I hose connection is equipped with 2 ½" x 1 ½" reducer with cap attached by a chain
  - Flow, pressure & duration according to Class I in buildings protected throughout with an approved automatic sprinkler system

NFSA

106

106

NUMBER/INTERCONNECTION OF STANDPIPES

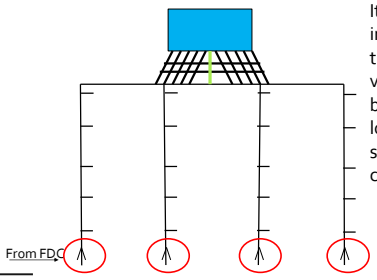
- Number of standpipes
  - Separate standpipes for each exit stairwell
- Interconnection of standpipes
  - Two or more in the same building or section of building must be interconnected
  - If supplied by tanks at the top of the building or zone, connect at the top
  - Where connected at the top & bottom, check valves are required at the base to prevent circulation
  - Dry standpipes only need a single level of interconnection

NFSA

107

107

TANK FED STANDPIPE CONNECTED AT TOP & BOTTOM



It would be important for these check valves to be below the lowest standpipe connection

NFSA

108

108

MINIMUM & MAXIMUM PRESSURE LIMITS

NFSA

109

109

HISTORY BEHIND SYSTEM PRESSURE REQUIREMENTS

- The first edition of NFPA 14 was made in 1912
- The first requirements were in the 1950s due to increase in high-rise buildings
- 250 gpm at 50 psi at the nozzle
- 15 friction loss in the hose
- 65 psi total required

NFSA

110

110

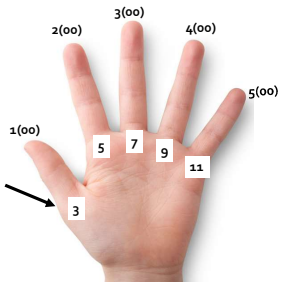
HISTORY BEHIND SYSTEM PRESSURE REQUIREMENTS CONT.

Friction loss in 2 ½" fire hose (per 100')

$$F_L = 2Q^2 + Q$$

Where Q = number of gallons ÷ 100

Conversion number



NFSA

111

111

HISTORY BEHIND SYSTEM PRESSURE REQUIREMENTS CONT.

- In the 1990s fire departments started using fog nozzles instead of solid tip nozzles
  - 100 psi to operate
- 65 psi was allowed for solid stream nozzles
- 100 psi was required for fog nozzles
- In 2007 the 65 psi allowance was removed

NFSA

112

112

PRESSURE LIMITATIONS

- Maximum pressure anywhere in the system must not exceed 400 psi (was 350 psi in 2016 edition and earlier)
  - Does not apply to express mains according to their listing or approval by the AHJ
- No hose connections allowed on any portion of a system where the pressure exceeds 400 psi

NFSA

113

113

PRESSURE LIMITATIONS CONT.

- Maximum pressure at hose connections
  - Pressure regulating devices must limit residual pressure to 100 psi for 1 ½-inch hose connections (does not apply to 2 ½" x 1 ½" reducer allowed in Class III systems)
- Pressure regulating devices must limit static & residual pressure to 175 psi for 2 ½-inch hose connections
- Pressure on the inlet side of the PRD shall not exceed the rated working pressure of the device

NFSA

114

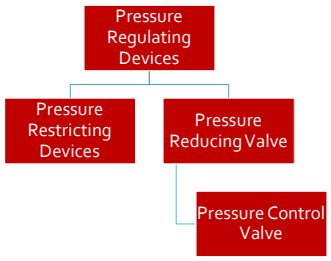
114

PRESSURE CONTROL

115

115

DEVICE HIERARCHY
ALL ARE REQUIRED TO BE LISTED

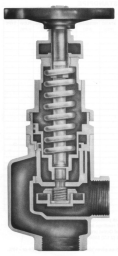


116

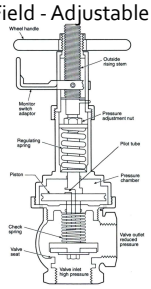
116

PRESSURE REDUCING VALVES

Preset



Field - Adjustable

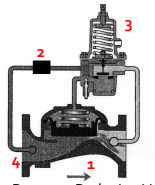


117

117

PRESSURE REDUCING VALVES

- Pilot-Operated (Pressure Control Valves)



1. Pressure Reducing Valve
2. Restriction tube fitting
3. Pilot valve
4. Strainer

NFSA

118

118

PRESSURE CONTROL

- Maximum pressure at hose connections
- Where more than two hose connections are used downstream of a PRD, the following conditions must apply:

1. In systems w/ multiple zones, PRD's are permitted to control lower zone pressures as long as all other conditions are met	**6. PRD provided with inlet & outlet gauges**
2. Isolation method of the PRD for repair & maintenance must be provided	7. FDC on system side of outlet isolation valve
3. Regulating devices must be arranged so failure of one does not allow pressure > 175psi to any hose connections downstream	8. PRD provided with a pressure relief device according to mfgr. recommendations
4. Equally sized bypass, normally closed shall be installed	9. Remote monitoring & supervision for detecting high pressure failure of the PRD must be provided according to NFPA 72
5. PRD's installed no more than 7 ½' above floor	

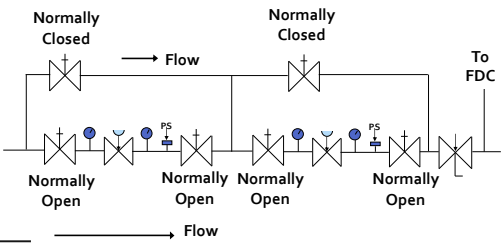
NFSA

119

119

MASTER PRD – NFPA 14

(2nd PRD must be pilot operated for this to work)



NFSA

120

120

PRESSURE REQUIREMENTS

- Minimum 100 psi residual pressure at the hydraulically most remote 2 ½" hose connection
  - Maximum 175 static or residual pressure
- Minimum 65 psi residual pressure at the hydraulically most remote 1 ½" hose station
  - Maximum 100psi residual
- Include loss in hose valve
- Minimum 100psi at top most outlet calc'd to FDC for manual systems

NFSA

121

121

STANDPIPE SYSTEM ZONES

- Except where a master PRD is used, each zone must have a separate pump
  - Use of pumps in series is permitted
  - Allowed but not required to be on the same level
  - May have a separate discharge outlet from a multi port pump
- Each zone above the low zone shall have two or more separate & direct supply pipes sized to automatically & independently supply flow & pressure requirements
  - May use standpipes in the lower zone

NFSA

122

122

STANDPIPE SYSTEM ZONES

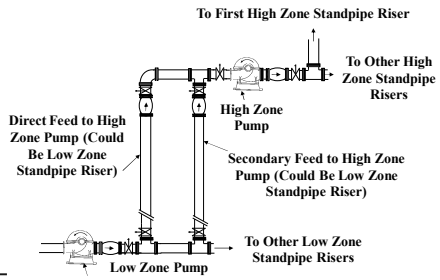
- An annex note to Section 7.9.2. further clarifies the position of the committee by use of an illustration.

NFSA

123

123

STANDPIPE SYSTEM ZONES



NFSA

124

124

STANDPIPE SYSTEM ZONES CONT.

- For systems where 2 or more zones exceed the capacity of the fire department, hi level water storage is required with additional pumping equipment or other means acceptable to the AHJ
- NFPA 20 has an entire chapter dedicated to pumps in high rise buildings

NFSA

125

125

FLOW RATES

NFSA

126

126

FLOW RATES

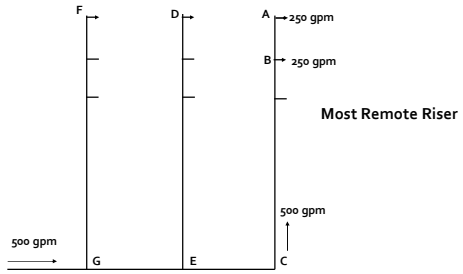
- Class I & III systems
  - Flow 500 gpm through the two most remote 2 ½" hose outlets
  - 250 gpm for each additional riser
  - Do not have to balance flows
  - Maximum flow rates
    - Sprinklered Building 1000 gpm
    - Unsprinklered Building 1250 gpm

NFSA

127

127

CLASS I & III FLOW RATES

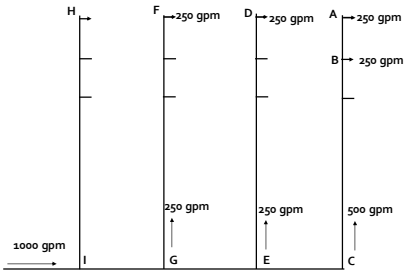


NFSA

128

128

SPRINKLERED BUILDING

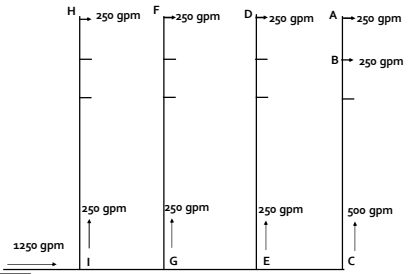


NFSA

129

129

UNSPRINKLERED BUILDING

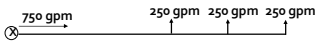


130

130

HORIZONTAL STANDPIPE

- Horizontal Standpipe
  - The horizontal portion of the system piping that delivers the water supply for two or more hose connections, and for sprinklers on combined systems, on a single level

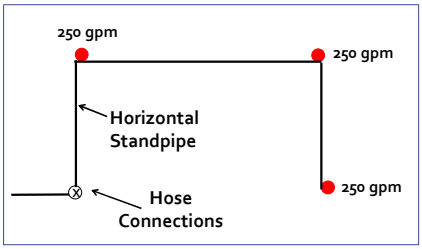


Plan view of horizontal standpipe

131

131

HORIZONTAL STANDPIPE
HORIZONTAL STANDPIPE, 750 GPM DEMAND



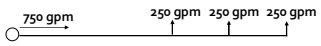
Plan View

132

132

HORIZONTAL STANDPIPE

- Class I & III systems
  - For horizontal standpipes that supply three or more hose connections on any floor
    - Flow 750 gpm through the three most hydraulically remote hose connections on the standpipe
  - 250 gpm for each additional riser to meet total requirements

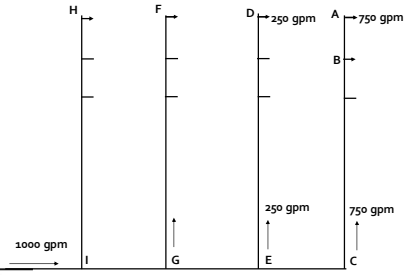


NFSA

133

133

SPRINKLERED BUILDING WITH HORIZONTAL STANDPIPE SERVING 3 OR MORE



NFSA

134

134

FLOW RATES CONT.

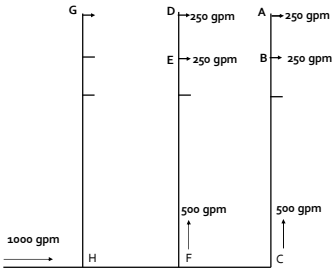
- Class I & III systems cont.
  - For large buildings (floor area > 80,000 ft2/floor)
    - 500 gpm from most remote standpipe
    - 500 gpm each for any additional standpipes needed for required flow
  - Do not have to balance flows
  - Maximum flow rates
    - Sprinklered Building 1000 gpm
    - Unsprinklered Building 1250 gpm

NFSA

135

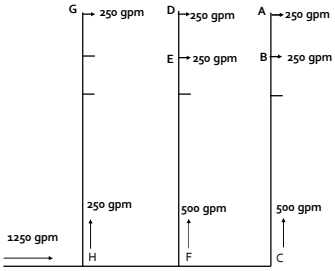
135

LARGE BUILDING SPRINKLERED



136

LARGE BUILDING NON SPRINKLERED



137

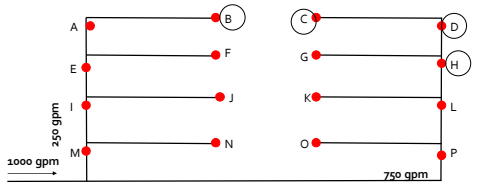
FLOW RATES CONT.

- Flow Rates for Single Outlets on Lateral Piping
  - Where lateral piping serves a single outlet, the minimum flow rate for the system shall be determined as if the outlet is being served from a separate standpipe

138

SINGLE OUTLET ON LATERAL PIPING

For sprinklered building

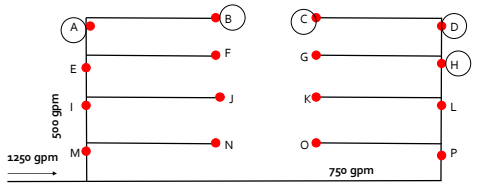


139

139

SINGLE OUTLET ON LATERAL PIPING

For non sprinklered building



140

140

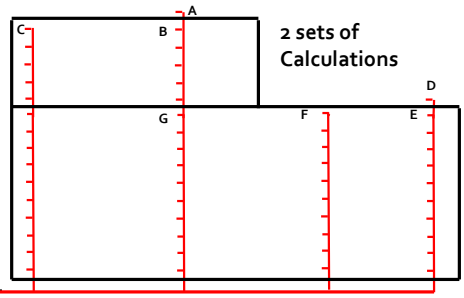
FLOW RATES CONT.

- Hydraulic calculation requirements
  - When standpipe systems have risers terminating at different floor levels, separate calculations are required for the standpipes that exist on each level.
  - In each case, flow shall be added only for standpipes that exist on the level of the calculations

141

141

STANDPIPE SYSTEMS WITH RISERS AT DIFFERENT HEIGHTS



NFSA

142

FLOW RATES CONT.

- Combined systems
  - A standpipe and sprinkler system sharing the same riser
- Fully sprinklered buildings (either NFPA13 or 13R)
  - Provide the greater demand of the standpipe or sprinkler system
- Partially sprinklered buildings
  - Standpipe demand plus
    - The lesser of Sprinkler demand or 150 gpm for LH
    - The lesser of Sprinkler demand or 500 gpm for OH

NFSA

143

FLOW RATES CONT.

- Class II flow rates
  - Flow 100 gpm at the most remote hose connection
- Additional flow is not required

NFSA

144

DRAINS, TEST RISERS & FIRE DEPARTMENT CONNECTIONS

NFSA

145

145

DRAIN AND TEST RISERS

- Test risers
  - Install a 3 inch drain riser adjacent to each standpipe with pressure regulating devices
  - Must handle flow from the largest PRD but not less than
    - Size of discharge outlet for those PRD's > 2 ½" in size
    - 3" for those PRD's that are 2 ½" in size
    - 2" for those PRD's that are 1 ½" in size
  - Drain risers shall be equipped with tees that are the same size as the discharge outlet of the PRD with internal threaded swivel fitting as specified with NFPA 1963, unless specified by the local fire department, located on at least every other floor.

NFSA

146

146

DRAIN AND TEST RISERS CONT.

- Drains
  - Each standpipe systems must be equipped with drains
  - A main drain shall be provided on the standpipe system side of the system control valve
  - May use lowest hose connection if acceptable to the AHJ
  - Main drain shall be located to allow opening without damage

NFSA

147

147

DRAIN AND TEST RISERS CONT.

- Drains
  - Trapped portions must have an auxiliary method of draining by one of the following:
    - An auxiliary drain according to NFPA 13
    - An auxiliary drain according to Table 7.11.2.3

Sizing for standpipe drain	
Standpipe size	Size of drain connection
Up to 2"	¾" or larger
2 ½", 3", or 3 ½"	1 ¼" or larger
4" or larger	2" or larger

  - A hose connection at a low point for use with an approved hose to drain water from the system

NFSA

148

148

FIRE DEPARTMENT CONNECTIONS

- One or more FDC's required for each zone for Class I or Class III
  - Not required in high zone if beyond FD capability
- Hi rise buildings shall have at least 2 remotely located FDC's for each zone
  - Single connection for each zone if AHJ approved
- One 2 ½" connection for each 250 gpm demand
  - LDH connections are permitted
  - May be on multiple FDC's
  - May be located in multiple locations with AHJ approval

NFSA

149

149

MODULE 6

- Plans, Calculations, & Water Supply Testing

NFSA

150

150

LEARNING OBJECTIVES

At the end of this Module, participants will be able to:

1. Describe and explain the 27 items required on a set of plans and specifications
2. Explain the procedures to be followed for hydraulic calculations
3. Explain the requirements for water supplies and the required duration

151

151

PLANS AND CALCULATIONS

- Plans & Specs
  - Working plans must include pertinent items from a list of 27
- Hydraulic calculations
  - Piping shall be sized by hydraulic calculation
- Hydraulic calculation procedure
  - Shall begin at the outlet of each hose connection
  - Shall include the friction loss for the valve & any piping from the valve to the riser
  - Equivalent feet of valves & fittings similar to requirements of NFPA 13

152

152

MINIMUM DESIGN PRESSURES

- Pressure loss in the hose valve shall be calculated in accordance with the additions to the equivalent pipe length chart:

Fittings & Valves Expressed as Equivalent Feet of Pipe		
Fittings & Valves	1 ½"	2 ½"
Globe (straight) hose valve	46	70
Angle or hose valve	20	31

- When published, the valve manufacturer's most up-to-date data shall be used

153

153

WATER SUPPLIES & TESTING

- Auto & semi-auto systems shall be attached to an approved water supply capable of supplying demand
- Manual systems must have an approved supply accessible to the fire department
- Where the system demand cannot be supplied through the FDC, high water storage with additional pumping equipment is required
  - The auxiliary demand must meet the 30 minute supply

NFSA

154

154

Water Supplies & Testing

- Acceptable water supplies
  - Public water works
  - Fire pumps connected to approved water source
  - Manually controlled fire pumps w/ pressure tanks
  - Pressure tanks
  - Manually controlled fire pumps operated by remote control devices at each hose station if supervised
  - Gravity tanks
- Minimum supply for standpipe systems
  - Class I & III- 30 minutes
  - Class II- 30 minutes

NFSA

155

155

WATER SUPPLIES & TESTING

- Water supply evaluation
  - Water flow test is required to determine ability of the water system to provide the demand flow & pressure
  - Water flow test data must be no more than 12 months old unless approved by the AHJ

NFSA

156

156

MODULE 7

- Acceptance Testing

157

157

LEARNING OBJECTIVES CONT

At the end of this Module, participants will be able to:

- Discuss how baselines are established for future insp/test for NFPA 25
- Describe requirements for flushing UG pipe & calculate allowable leakage
- Describe requirements for hydrostatic testing for UG & AG pipe
- Describe the purpose & requirements for pneumatic testing
- Describe & explain all of the operational tests required
- Describe and discuss signs required & materials required to be provided to owner & importance of NFPA 25

158

158

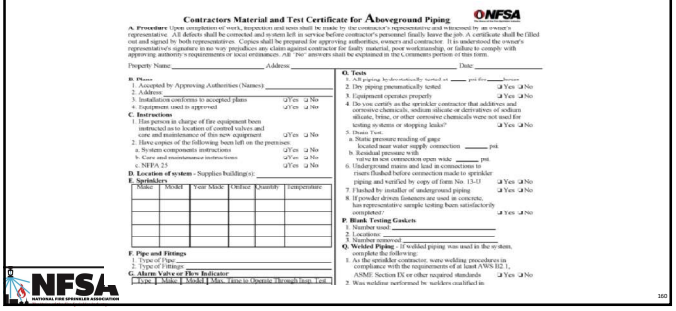
ACCEPTANCE TESTING

- Ensures that the system is completely installed and correctly functioning
- Establishes a baseline for future system tests
- Provides the owner with the means to maintain the system

159

159

CONTRACTORS MATERIAL AND TEST CERTIFICATES



Contractors Material and Test Certificate for Aboveground Piping

NFSA

A. Procedure Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job. A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances. All "No" answers shall be explained in the Comments portion of this form.

Property Name _____ Address _____ Date _____

B. Plans
1. Accepted by Approving Authorities (Names) _____
2. Address _____
3. Installation conforms to accepted plans ☐Yes ☐No
4. Equipment used is approved ☐Yes ☐No

C. Instructions
1. Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment ☐Yes ☐No
2. Have copies of the following been left on the premises:
a. System components instructions ☐Yes ☐No
b. Care and maintenance instructions ☐Yes ☐No
c. NFPA 25 ☐Yes ☐No

D. Location of system - Supplies building(s): _____

E. Sprinklers

Number	Model	Year Made	Orifice	Quantity	Temperature

F. Pipe and Fittings
1. Type of Pipe _____
2. Type of Fittings _____

G. Alarm Valve or Flow Indicator

Type	Make	Model	Man.	Time to Operate Through Inst. Test

O. Tests
1. All piping hydrostatically tested at _____ psi for _____ hours
2. Dry piping pneumatically tested ☐Yes ☐No
3. Equipment operates properly ☐Yes ☐No
4. Do you certify as the sprinkler contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? ☐Yes ☐No
5. Drain Test:
a. Static pressure reading of gauge located near water supply connection _____ psi.
b. Residual pressure with valve in test connection open wide _____ psi.
6. Underground mains and lead in connections to risers flushed before connection made to sprinkler piping and verified by copy of form No. 13-U ☐Yes ☐No
7. Flushed by installer of underground piping ☐Yes ☐No
8. If powder driven fasteners are used in concrete, has representative sample testing been satisfactorily completed? ☐Yes ☐No

P. Blank Testing Gaskets
1. Number used _____
2. Locations _____
3. Number removed _____

Q. Welded Piping - If welded piping was used in the system, complete the following:
1. As the sprinkler contractor, were welding procedures in compliance with the requirements of at least AWS B2.1, ASME Section IX or other required standards ☐Yes ☐No
2. Was welding performed by welders qualified in

NFSA

160

160

FLUSHING OF PIPING

- In accordance with NFPA 24
- Three Acceptable Flow Rates
  - Flow at system demand
  - Maximum flow available to the system under fire conditions
  - Flow at 10 ft/s (3 m/s) velocity

NFSA

161

161

FLUSHING OF PIPING

Flow required to produce a velocity of 10 ft/sec in pipes	
Pipe size (in)	Flow rate (gpm)
4	390
6	880
8	1560
10	2440
12	3520

NFSA

162

162

HYDROSTATIC TESTING

- Two hour long test pressure test at 200 psi or the system pressure plus 50 psi for systems over 150 psi. (may use an interim air test in inclement weather)
- Pressure is measured at the lowest point of the system
- Including the FDC

NFSA

163

163

HYDROSTATIC TESTING – EXISTING SYSTEMS

- Same as for new installations
- For newly added piping only
- Testing in excess of static pressure not required if the piping cannot be isolated

NFSA

164

164

SAMPLE PROBLEM #1

- City water pressure: 75 psi
- Pump static pressure: 100 psi
- What would the hydrostatic pressure be?

$$75\text{psi} + 100\text{psi} > 150\text{psi}$$

$$75\text{psi} + 100\text{psi} + 50\text{psi} = 225\text{psi}$$

NFSA

165

165

SAMPLE PROBLEM #2

- City water pressure: 25 psi
- Pump pressure: 110 psi

- What would the hydrostatic pressure be?

$$25\text{psi} + 110\text{psi} < 150\text{psi}$$

$$25\text{psi} + 110\text{psi} = 200\text{psi}$$

NFSA

166

166

LEAKAGE TEST – UNDERGROUND

- Underground piping shall be tested in accordance with NFPA 24

- Testing allowance is in gallons lost, not psi lost

- Testing results are measured from pumping from a calibrated container

NFSA

167

167

SAMPLE PROBLEM 1

- Using the table: 100 ft. of 8" pipe can lose 0.076 gallons per hour

0.076 gallons x 3 x 2 = 0.456 gallons

- Using the formula:

$$L = \frac{SD\sqrt{P}}{148{,}000} = \frac{300x8x\sqrt{200}}{148{,}000} = \frac{33{,}941.13}{148{,}000}$$

$$L = 0.229x2 = 0.459\text{gal}$$

NFSA

168

168

PNEUMATIC TESTING

- Interim test when a hydrostatic test cannot be performed on wet pipe systems
- Required for:
  - Automatic dry pipe systems
  - Semiautomatic systems

NFSA

169

169

PNEUMATIC TESTING

- 40 psi
- Maintain pressure for 24 hours
  - Can lose up to 1.5 psi
  - No check for visible leakage is required

NFSA

170

170

SYSTEM OPERATIONAL TESTS

- Flow test
- Automatic dry and semiautomatic systems trip test
- Pressure-regulating devices
- Alarm and supervision
- Main drain test
- Backflow test
- Manual valves

NFSA

171

171

FLOW TESTS

- Flow 250 gpm from each hose connection as required
  - 250 gpm from two most remote locations
    - Additional standpipes may use flow from any connection on that standpipe
  - Maximum 3 (horizontal standpipe system)
  - Maximum 4 (sprinklered building)
  - Maximum 5 (unsprinklered or partially sprinklered building)

NFSA

172

172

FLOW TEST

- Manual systems require a means of providing flow
  - Could use a fire department pumper
  - Could use a portable pump with required capacity
  - Test may be waived by the AHJ
- Suction tanks require verification that the supply valve operates as needed
  - Shut off all fill valves
  - Drain the tank to below designated low water level
  - Open supply valve to verify automatic operation

NFSA

173

173

AUTOMATIC DRY AND SEMIAUTOMATIC SYSTEM TRIP TEST

- For systems larger than 750 gallons:
  - 250 gpm to the most remote hose connection
  - Within 3 minutes of opening the hose valve
- All remote control activation devices for semiautomatic systems tested in accordance with manufacturer's specifications

NFSA

174

174

PRESSURE-REGULATING DEVICES

- Installed correctly
- Operating
  - Additional rules for devices in series
- Static Pressure
  - Inlet
  - Outlet
- Residual Pressure
  - Inlet
  - Outlet
- Annex suggests
  - Test at minimum & maximum anticipated flow rates
  - Test at sustained flow at minimum flow rates

NFSA

175

175

ALARM AND SUPERVISION

- Each alarm & supervisory device shall be tested according to NFPA 72
  - Examples of components supervised by fire alarm system
    - Flow alarm
    - Supervisory switches
    - Semiautomatic actuation devices
    - Low temperature signal (dry pipe valve enclosures)

NFSA

176

176

MAIN DRAIN TEST

- Static pressure
- Residual pressure
- Baseline strength of the water supply
- Not required for manual systems with no permanently attached water supply

NFSA

177

177

BACKFLOW PREVENTERS

- Forward flow test
- Full system demand must be capable of going through the backflow preventer
- Will occur during the system flow test

178

178

MANUAL VALVES & HOSE THREADS

- All valves intended to be manually opened or closed shall be operated through their full range and returned to normal position
- Make sure hose caps are tight during the test
- Take hose caps off after the test to drain water and relieve any pressure
- ALL hose and FDC connections must be verified to be compatible with the fire department

179

179

RECORD DRAWINGS, TEST REPORTS & MANUALS PROVIDED TO THE OWNER

- Set of record drawings
- Copy of completed test report
- All literature & instructions from the manufacturer describing operation & maintenance of devices installed
- Set of instruction manuals for all major components containing
  - Explanation of the operation of the component
  - Routine maintenance instructions
  - Instructions concerning repairs
  - Parts list & identification for serviceable components
  - Copy of the current edition of NFPA 25

180

180

SIGNS

- The installation of all signs shall be verified
- Standpipes & hose systems not meeting the requirements of NFPA 14 & not required by the AHJ
- Signs for room identification, valves & hose connections
- Signs required on FDC's
- Signs required on pumps
- Hydraulic design information sign

181

181

SYSTEM INSPECTION, TESTING & MAINTENANCE

- Shall be performed by the property owner or an authorized representative in accordance with NFPA 25

.D Pin Header

Table 6.1.1.2 Summary of Standpipe and Hose Systems Inspection, Testing, and Maintenance

Item	Frequency	Reference
Inspection		
Cabinet	Annually	6.2.9
Control valves	–	Chapter 13
Gauges	–	Chapter 13
Hose	Annually	6.2.5
Hose connection	Annually	6.2.3
Hose nozzle	Annually and after each use	6.2.6
Hose storage device	Annually	6.2.7
Hydraulic design information sign	Annually	6.2.2
Hose valves	–	Chapter 13
Piping	Annually	6.2.4
Pressure-regulating devices	–	Chapter 13
Supervisory devices (except valve supervisory devices)	–	Chapter 13
Valve supervisory devices	–	Chapter 13
Test		
Control valves	–	Chapter 13
System valves	–	Chapter 13

182

182

CONCLUSION

Questions?

Contact: Michael Joanis
joanis@nfsa.org
410-983-9417

183

183