NFPA 13, 2016
Highlights of What’s New
Part 1

Presented by:
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Polling Question #1
Email & Phone Inquiries

Fire Sprinkler Questions
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NFPA 13 Change Highlights

Tip of the Iceberg
2020 MN Fire Code

Effective date was March 31, 2020
1.2* Purpose

1.2.1 The purpose of this standard shall be to *provide a reasonable degree of protection for life and property from fire* through standardization of design, installation, and testing requirements for sprinkler systems, including private fire service mains, based on sound engineering principles, test data, and field experience.
3.3.23* Sprinkler System. A system that consists of an integrated network of piping designed in accordance with fire protection engineering standards that includes a water supply source, a water control valve, a workflow alarm, and a drain. The portion of the sprinkler system above ground is a network of specifically sized or hydraulically designed piping installed in a building, structure, or area, generally overhead, and to which sprinklers are attached in a systematic pattern. The system is commonly activated by heat from a fire and discharges water over the fire area.
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A.3.3.23 Sprinkler System. As applied to the definition of a sprinkler system, each system riser serving a portion of a single floor of a facility or where individual floor control valves are used in a multistory building should be considered a separate sprinkler system. Multiple sprinkler systems can be supplied by a common supply main.
8.2.4 Floor Control Valve Assemblies.

8.2.4.1* Multistory buildings exceeding two stories in height shall be provided with a floor control valve, check valve, main drain valve, and flow switch for isolation, control, and annunciation of water flow for each individual floor level.
8.2.4 Floor Control Valve Assemblies.

8.2.4.1* Multistory buildings **exceeding two stories in height** shall be provided with a **floor control valve**, **check valve**, **main drain valve**, and **flow switch** for isolation, control, and annunciation of water flow **for each individual floor level**.
8.17.3 Gauges.

8.17.3.1 A pressure gauge with a connection not smaller than 1/4 in. shall be installed at the system main drain, at each main drain associated with a floor control valve, and on the inlet and outlet side of each pressure-reducing valve.
Gauge

7.1 Wet Pipe Systems.
7.1.1 Pressure Gauges.

7.1.1.1 A *listed* pressure gauge conforming to 8.17.3 shall be installed in each system riser.

2010 Edition

7.1 Wet Pipe Systems.
7.1.1 Pressure Gauges.

7.1.1.1 An *approved* pressure gauge conforming to 8.17.3 shall be installed in each system riser.

2016 Edition

3.2.1* Approved. Acceptable to the authority having jurisdiction.
8.16.2.4.7 Where drain connections for floor control valves are tied into a common drain riser, the drain riser shall be one pipe size larger than the largest size drain connection tying into it.
Floor Control Assemblies

8.2.4.2 The floor control valve, check valve, main drain valve, and flow switch required by 8.2.4.1 shall not be required where sprinklers on the top level of a multistory building are supplied by piping on the floor below.
8.2.4.3 The floor control valve, check valve, main drain valve, and flow switch required by 8.2.4.1 shall not be required where the total area of all floors combined does not exceed the system protection area limitations of 8.2.1.

8.2.1 The maximum floor area on any one floor to be protected by sprinklers supplied by any one sprinkler system riser or combined system riser shall be as follows:

(1) Light hazard — 52,000 ft² (4830 m²)
(2) Ordinary hazard — 52,000 ft² (4830 m²)
(3)*Extra hazard — Hydraulically calculated — 40,000 ft² (3720 m²)
(4) Storage — High-piled storage (as defined in 3.9.1.16) and storage covered by other NFPA standards — 40,000 ft² (3720 m²)
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10,000 + 10,000 + 10,000 + 10,000 + 20,000 = 50,000
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\[
\begin{align*}
25,000 & + 25,000 \\
75,000 & =
\end{align*}
\]

1st Fl. = 25,000 sq. ft.
2nd Fl. = 25,000 sq. ft.
3rd Fl. = 25,000 sq. ft.
Roof = 25,000 sq. ft.
75,000 sq. ft. total.
Floor Control Assemblies
Purpose / Intent

VS.
A.8.2.4.1 It is not the intent of this section to require floor control valve assemblies in all multistory buildings. Where small buildings such as multilevel condominiums or apartments are under the control of a single owner or management firm, a single control valve should be adequate for isolation, control, and annunciation of water flow.
Floor Control Assemblies
7.1.5 Air Venting. A single air vent with a connection conforming to 8.16.6 shall be provided on each wet pipe system utilizing metallic pipe. (See A.8.16.6.)

7.1.5.1 Venting from multiple points on each system shall not be required.
Venting Purpose

WATER + METAL + OXYGEN = CORROSION
8.16.6 Air Venting. The vent required by 7.1.5 shall be located near a high point in the system to allow air to be removed from that portion of the system by one of the following methods:

1. Manual valve, minimum ½ in. size
2. Automatic air vent
3. Other approved means
Venting

Trapped Air
7.1.5 Air Venting. A single air vent with a connection conforming to 8.16.6 shall be provided on each wet pipe system utilizing metallic pipe.
Polling Question #2
8.16.6…“located near a high point in the system to allow air to be removed…”
Venting – When?

Each wet pipe sprinkler system should be vented every time the system is filled.
Venting Signage

6.6.4 Identification of Valves.

6.6.4.1 All control, drain, venting, and test connection valves shall be provided with permanently marked weatherproof metal or rigid plastic identification signs.

6.6.4.2 The identification sign shall be secured with corrosion-resistant wire, chain, or other approved means.
Venting
6.2.1.1 When a sprinkler is removed from a fitting or welded outlet, it shall not be reinstalled except as permitted by 6.2.1.1.1.

6.2.1.1.1 Dry sprinklers shall be permitted to be reinstalled when removed in accordance with the manufacturer’s installation and maintenance instructions.
Extension Fitting

6.4.8.1 Extension fittings shall be permitted to be used with sprinklers K-8.0 or smaller.

6.4.8.2 Extension fittings shall be permitted to be used with sprinklers in light hazard and ordinary hazard occupancies only.

6.4.8.3 The internal diameter of extension fittings shall have the same nominal inlet diameter of the attached sprinkler.

6.4.8.4 A single extension fitting up to a maximum of 2” in length shall be permitted to be installed with a sprinkler.

6.4.8.4.1 Extension fittings longer than 2” shall not be permitted unless specifically listed.

6.4.8.5 Extension fittings shall be included in the hydraulic calculations.

6.4.8.5.1 Extension fittings 2” and less shall not be required to be included in the hydraulic calculations.
8.5.5.3.1 Sprinklers shall be installed under fixed obstructions over 4 ft in width.

8.5.5.3.1.1 Sprinklers shall be located below the obstruction and not more than 3 in. from the outside edge of the obstruction.

What is meant by “Under” Obstructions?
What is meant by “Under” Obstructions?

8.5.5.3.1.2 Where sprinklers are located adjacent to the obstruction, they shall be of the intermediate level rack type.
What is meant by “Under” Obstructions?

8.5.5.3.1.3 The deflector of automatic sprinklers installed under fixed obstructions shall be positioned no more than 12 in. below the bottom of the obstruction.
What is meant by “Under” Obstructions?
8.6.5.3.7 Sprinklers installed under round ducts shall be of the intermediate level/rack storage type or otherwise shielded from the discharge of overhead sprinklers.
**Obstructions**

**8.5.5.3.1.4** Sprinklers shall not be required under noncombustible obstructions over 4 ft wide where the bottom of the obstruction is 24 in. or less above the floor or deck.
Clarified that “Shadowed areas” are allowed:

A.8.1.1(3) Notwithstanding the obstruction rules provided in Chapter 8, it is not intended or expected that water will fall on the entire floor space of the occupancy.

When obstructions or architectural features interfere with the sprinkler’s spray pattern, such as columns, angled walls, wing walls, slightly indented walls, and various soffit configurations, shadowed areas can occur.
Clarified that “Shadowed areas” are allowed:

A.8.1.1(3) …Where small shadowed areas are formed on the floor adjacent to their referenced architectural features, these shadowed areas are purely on paper and do not take into account the dynamic variables of sprinkler discharge.
8.6.5.2.1.3* Minimum Distance from Obstructions. Unless the requirements of 8.6.5.2.1.4 through 8.6.5.2.1.9 are met, sprinklers shall be positioned away from obstructions a minimum distance of three times the maximum dimension of the obstruction (e.g., structural members, pipe, columns, and fixtures) in accordance with Figure 8.6.5.2.1.3(a) and Figure 8.6.5.2.1.3(b).

(A) The maximum clear distance required shall be 24 in.

(B) The maximum clear distance shall not be applied to obstructions in the vertical orientation (e.g., columns).

Same applies to sidewall sprinklers.
Vertical Obstructions
3x Rule

3.5
\times 3.0
\frac{10.5}{10.5}

10'-6''
3'-6''
3'-0''

Plan View of Column
(Obstruction in vertical orientation)
\[ A \geq 3C \text{ or } 3D \]
(Use dimension $C$ or $D$, whichever is greater)
8.15.1.2.1.2 Small openings with a combined total area of not more than 20% of the ceiling, construction feature, or plane used to determine the boundaries of the concealed space shall be permitted where length greater than 4 ft. shall not have a width greater than 8 in.

- Permits the space above a drop ceiling to be considered a concealed space
  - Omit sprinklers without having to be called a “cloud ceiling”

- Combined total area of not more than 20% of the ceiling
  and

- Gaps greater than 4 ft. long shall not be more than 8 in. wide
3.3.5.1 Cloud Ceiling. Any ceiling system installed in the same plane with horizontal openings to the structure above on all sides. This does not include sloped ceilings as defined in 3.3.5.4.
To omit sprinklers above the cloud ceiling, the functional limitation is a maximum 1 in. gap between clouds per vertical foot of height from the floor to the cloud, up to a maximum of 20 ft. 
To properly apply this new section, one must identify the following pieces of information:

- Cloud ceiling height
- Cloud ceiling panel dimensions
- Maximum width between clouds or cloud / wall
- Maximum coverage based on opening and sprinkler type
11.2.3.2.3 Quick-Response Sprinklers.

11.2.3.2.3.1 Where listed quick-response sprinklers, including extended coverage quick-response sprinklers, are used throughout a system or portion of a system having the same hydraulic design basis, the system area of operation shall be permitted to be reduced without revising the density as indicated in Figure 11.2.3.2.3.1 when all of the following conditions are satisfied:

1. Wet pipe system
2. Light hazard or ordinary hazard occupancy
3. 20 ft maximum ceiling height
4. No unprotected ceiling pockets as allowed by 8.6.7 and 8.8.7 exceeding 32 ft²
5. No unprotected areas above cloud ceilings as allowed by 8.15.24
(5) No unprotected areas above cloud ceilings as allowed by 8.15.24

“Small openings” are not “cloud ceilings”

3.3.21 Small Openings. Openings in the ceiling or construction features of a concealed space that allow limited amounts of heat to enter the concealed space.

3.3.5.1 Cloud Ceiling. Any ceiling system installed in the same plane with horizontal openings to the structure above on all sides. This does not include sloped ceilings as defined in 3.3.5.4.
8.5.5.4 Closets.
In all closets and compartments, including those closets housing mechanical equipment, that are not larger than 400 ft$^3$ in size, a single sprinkler at the highest ceiling space shall be sufficient without regard to obstructions or minimum distance to the wall.
8.5.5.4 Closets.

In **all** closets and compartments, including those closets housing mechanical equipment, that are not larger than 400 ft$^3$ in size, a **single sprinkler** at the highest ceiling space shall be sufficient without regard to obstructions or minimum distance to the wall.
Closets

10 ft. x 2 ft. x 8 ft. = 160 ft³
Polling Question #3
8.15.9* Hospital Clothes Closets. Sprinklers shall not be required in clothes closets of patient sleeping rooms in hospitals where the area of the closet does not exceed 6 ft² provided the distance from the sprinkler in the patient sleeping room to the back wall of the closet does not exceed the maximum distance permitted by 8.5.3.2.

3 ft x 2 ft = 6 ft²

6 ft² max.
8.15.9* Hospital Clothes Closets. Sprinklers shall not be required in clothes closets of patient sleeping rooms in hospitals where the area of the closet does not exceed 6 ft² provided the distance from the sprinkler in the patient sleeping room to the back wall of the closet does not exceed the maximum distance permitted by 8.5.3.2.

This exception is limited to hospitals.

Not applicable to nursing homes, and many limited-care facilities.
Change Highlights

Large Equipment
Change Highlights

Obstructions Against Walls
Uprights & Pendents

Wall

Obstruction

\[ A \geq (D - 8 \text{ in.}) + B \]
\[ A \geq (D - 200 \text{ mm}) + B \]
where: \( D \leq 30 \text{ in.} (750 \text{ mm}) \)

Ceiling
8.6.5.1.2

(4) Obstructions located against the wall and that are not over 24 in. in width shall be permitted to be protected in accordance with Figure 8.6.5.1.2(c). The maximum distance between the sprinkler and the wall shall be measured from the sprinkler to the wall behind the obstruction and not to the face of the obstruction.

Also:

- 8.8 - Extended Coverage Upright and Pendent Spray Sprinklers
- 8.10 - Residential Sprinklers
8.4.9 Dry Sprinklers …the minimum exposed length of the barrel of the dry sprinkler shall be in accordance with Table 8.4.9.1(a) or Table 8.4.9.1(b).
## Change Highlights

### Dry System Pipe

**Table 22.4.4.7 Hazen–Williams C Values**

<table>
<thead>
<tr>
<th>Pipe or Tube</th>
<th>C Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlined cast or ductile iron</td>
<td>100</td>
</tr>
<tr>
<td>Black steel (dry systems including preaction)</td>
<td>100</td>
</tr>
<tr>
<td>Black steel (wet systems including deluge)</td>
<td>120</td>
</tr>
<tr>
<td>Galvanized (all)</td>
<td>120</td>
</tr>
<tr>
<td>Plastic (listed) all</td>
<td>150</td>
</tr>
<tr>
<td>Cement-lined cast or ductile iron</td>
<td>140</td>
</tr>
<tr>
<td>Copper tube or stainless steel</td>
<td>150</td>
</tr>
<tr>
<td>Asbestos cement</td>
<td>140</td>
</tr>
<tr>
<td>Concrete</td>
<td>140</td>
</tr>
</tbody>
</table>

**Table 23.4.4.8.1 Hazen–Williams C Values**

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**2010 Edition**

**2016 Edition**
7.2.6.6.3.1 Each dry pipe system shall have a dedicated air maintenance device.
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7.2.6.6.3 The automatic air supply to more than one dry pipe system shall be connected to enable individual maintenance of air pressure in each system.
25.2.2.1.1 Modifications to existing systems shall be tested for air leakage using one of the following test methods:

(1) An air pressure test at 40 psi (2.7 bar) shall be performed for 2 hours.
   (a) The system shall be permitted to lose up to 3 psi (0.2 bar) during the duration of the test.
   (b) Air leaks shall be addressed if the system loses more than 3 psi (0.2 bar) during this test.

(2) With the system at normal system air pressure, the air source shall be shut off for 4 hours. If the low pressure alarm goes off within this period, the leaks shall be addressed.
Listed Antifreeze

7.6.2 Antifreeze Solutions.

7.6.2.1* Except as permitted in 7.6.2.2, antifreeze solutions shall be listed for use in sprinkler systems.
8.17.2.6.1 The automatic drain valve shall be installed in a location that permits inspection and testing as required by NFPA 25.
6.2.9.3 The sprinklers shall be kept in a cabinet located where the temperature to which they are subjected will at no time exceed the maximum ceiling temperatures specified in Table 6.2.5.1 for each of the sprinklers within the cabinet.
8.4.3 Extended Coverage Sprinklers. Extended coverage sprinklers shall only be installed as follows:

(7) Extended coverage sprinklers installed to protect areas below a single overhead door(s)
Change Highlights

Sidewall Sprinklers

8.7.4.1.4* Soffits and Cabinets. Where soffits are used for the installation of sidewall sprinklers, the sprinklers and soffits shall be installed in accordance with 8.7.4.1.4.1, 8.7.4.1.4.2, or 8.7.4.1.4.3.

8.7.4.1.4.1 Where soffits exceed more than 8 in. (200 mm) in width or projection from the wall, pendent sprinklers shall be installed under the soffit.

8.7.4.1.4.2 Sidewall sprinklers shall be permitted to be installed in the face of a soffit located directly over cabinets, without requiring additional sprinklers below the soffit or cabinets, where the soffit does not project horizontally more than 12 in. (300 mm) from the wall.

8.7.4.1.4.3 Where sidewall sprinklers are more than 36 in. (900 mm) above the top of cabinets, the sprinkler shall be permitted to be installed on the wall above the cabinets where the cabinets are no greater than 12 in. (300 mm) from the wall.
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8.7.4.1.4.1 Where soffits exceed more than 8 in. (200 mm) in width or projection from the wall, pendent sprinklers shall be installed under the soffit.

8.7.4.1.4.2 Soffits shall be permitted to be installed directly over cabinets, provided sprinklers below the soffit or placed not project horizontally more than 36 in. (900 mm) from the wall.

8.7.4.1.4.3 Where sprinklers are more than 36 in. (900 mm) from the wall above the cabinets, the sprinkler shall be installed in the wall above the cabinets and shall project horizontally greater than 12 in. (300 mm) from the wall.
12” max.

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8.7.4.1.4.3 Where sidewall sprinklers are more than 36 in. (900 mm) above the top of cabinets, the sprinkler shall be permitted to be installed on the wall above the cabinets where the cabinets are no greater than 12 in. (300 mm) from the wall.
6.3.7.2 When nonmetallic pipe is used in combination systems utilizing steel piping internally coated with corrosion inhibitors and nonmetallic piping, the steel pipe coating shall be investigated for compatibility with the nonmetallic piping by a testing laboratory.

6.3.7.4 When nonmetallic pipe is used in combination systems utilizing steel pipe, cutting oils and lubricants used for fabrication of the steel piping shall be compatible with the nonmetallic pipe materials.

6.3.7.5 Fire-stopping materials intended for use on nonmetallic piping penetrations shall be investigated for compatibility with the nonmetallic pipe materials.
Change Highlights

24” max.
24.1.6.1.2 Where required due to specific mechanical or environmental conditions, the transition piece shall be protected against possible damage from corrosive agents, solvent attack, or mechanical damage.
Pipe Stand

New sections in 2016 edition
Pipe Stand
New sections in 2016 edition
Pipe Stand
New sections in 2016 edition

9.2.6.3.2 *

A.9.2.6.3.2
These short pipe stands commonly support items such as backflow preventers, header piping, and other appurtenances.

Pipe diameters up to and including 10 in. (200 mm) Schedule 40 are permitted to be supported by 2 in. (50 mm) diameter pipe stands when all of the following conditions are met:

1. The maximum height shall be 4 ft (1.2 m), as measured from the base of the pipe stand to the centerline of the pipe being supported.
2. The pipe stand shall be axially loaded.

This requires that the pipe or valve being supported be located directly above the pipe stand.

2” Sch. 40 – 4 ft. Max.
Axially loaded
Pipe Stand
2010

8.17.4.6.1* Backflow Prevention Valves. Means shall be provided downstream of all backflow prevention valves for flow tests at system demand.

2016

8.17.4.5.1* Backflow Prevention Valves. Means shall be provided downstream of all backflow prevention valves for forward flow tests at a minimum flow rate of the system demand including hose allowance where applicable.
Closed Valves #1 Reason

Reasons for sprinkler failures: 2010-2014

- System components damaged, 7%
- Inappropriate system for type of fire, 7%
- Lack of maintenance, 10%
- Manual intervention defeated system, 17%
- System shut off, 59%

NFPA - Nationally
Closed Valves #1 Reason

Reasons for sprinkler failures: 2010-2014

- System shut off, 59%
- Manual intervention defeated system, 17%
- Lack of maintenance, 10%
- Inappropriate system for type of fire, 7%
- System components damaged, 7%

Minnesota 46%
3.3.48 Valve Status Test. Flowing water to verify that valves for a portion of the system are not closed.

3.3.49* Valve Status Test Connection. A point in the system where water is discharged for purposes of performing a valve status test.

A.3.3.49 Valve Status Test Connection. These connections can include the main drain, fire pump test header, backflow preventer forward flow test connection, fire hydrant, and other similar locations. In the absence of the aforementioned devices, an inspector’s test connection might be used.
13.3.1.2.1 When the valve is returned to service, a valve status test (either main or sectional drain, as appropriate) shall be conducted to determine that the valve is not closed.

- Separate from Main Drain test
- Allowable to use Main Drain for Valve Status Test

Main drain test is used to gauge the strength of the water supply available to the system and determine if any changes have taken place.

Valve status test is used to flow some water to verify that valves serving a portion of the system have been reopened following testing or repairs.
Polling Question

#4
Thank You