



TechNotes

Editor - Roland Asp, CET

#540

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This edition of TechNotes was written by Roland Asp, Manager of Codes and Standards for NFSA.

Changes in the 2025 Edition of NFPA 13

The three-year revision cycle leading to the publication of the next edition of NFPA 13 is in its last stages, and the 2025 edition of NFPA 13 will be issued sometime this fall. The first and second draft stages are complete as is the 2024 Technical Meeting where the NFPA membership considers and votes on Certified Amending Motions. The last remaining step is for the NFPA Standards Council to hear any appeals. Appeals will be voted on during the August Standards Council meeting and the finalized document will be issued soon after.

The various technical committees responsible for this standard (as well as NFSA staff and the NFSA Engineering and Standards Committee) spent a tremendous amount of time and effort in ensuring that this new edition maintains the high level of life safety and property protection provided by previous editions of the standard. These changes will significantly affect the layout and installation of sprinkler systems and is a “must-know” for layout technicians, installers, AHJs and others in the industry.

This article will highlight some of the significant technical changes found in the second draft report of NFPA 13. This will not be a list of every change to the standard but is intended to help everyone understand some of the major changes to expect from the 2025 edition of NFPA 13. The number in parenthesis is the section number from the second draft report of the 2025 edition of NFPA 13.

Slope Ceilings

Significant changes to the criteria pertaining to sloped ceilings (over 2 in 12) will be included in the 2025 edition of NFPA 13. These changes and others pertaining to sloped ceilings were a result of a Fire Protection Research Foundation project titled “Protection of Storage Under Sloped Ceilings” which can be accessed on the NFPA website.

Storage Allowed w/Sloped Ceilings (20.9): For the first time, sloped ceilings will be allowed for storage occupancies. Section 20.9 gives six (6) options for protecting storage occupancies where the ceiling slope exceeds 2 in 12:

1. In-rack sprinklers (no storage above in-racks)
2. Install false ceiling that can withstand 3 lb/sq ft uplift force
3. Install per Chapter 20 through 26 (which permits ceiling in excess of 2 in 12)
4. CMDA (up to 4 in 12) – sprinklers in every channel
5. Unobstructed (up to 4 in 12) – increase design area by 50%

6. Obstructed (up to 4 in 12):
 - a. Purlins run across roof slope
 - b. Purlins do not exceed 18 in deep and 5 ft O.C.
 - c. Purlins supported by girders 40 ft O.C or less
 - d. Purlin channels are provided with blocking above each girder

ESFR Design Area with Sloped Ceilings above 2/12 (28.3.4.4.1): Along with the changes above, sloped ceilings above 2/12 for ESFR sprinklers, Section 28.3.4.4.1 changes the requirement for how many ESFR sprinklers need to be calculated in certain sloped ceiling arrangements. The existing criteria of 12 sprinklers with four sprinklers on three branchlines remains; however, Section 28.3.4.4.1 states that when the design area for an ESFR system is increased from 12 to 18 sprinklers, the design area will be 18 ESFR sprinklers with five sprinklers on most demanding three branchlines and three sprinklers on next most demanding branchlines. The 18 sprinkler design area is mandated by Option 5 of Section 20.9 which states that for unobstructed construction where the ceiling slope does not exceed 4 in 12, increase the design area of the ceiling sprinklers by 50 percent ($12 \times 1.5 = 18$).

Spray Sprinkler Design Area with Sloped Ceilings (19.2.3.2.4): Changes to sloped ceiling situations is not limited to storage occupancies. NFPA 13 has long simply required that for sloped ceilings using the density/area method of calculation be increased by 30%. This concept has been revised and for spray sprinklers, the 30% increase for ceiling slope has been limited as shown in the following table:

Option	Design Area Increase
1. Install false ceiling that can withstand 3 lb./sq ft uplift w/ sprinklers below	N/A
2. Unobstructed Constructed	30%
3. Obstructed - Up to 4 in 12 slope where: <ul style="list-style-type: none"> • Purlins run across roof slope • Purlins do not exceed 18 in deep and 5 ft on center • Purlins supported by girders 40 ft on center or less • Purlin channels are blocked above each girder 	N/A
4. Obstructed Up to 4 in 12 slope <ul style="list-style-type: none"> • Sprinklers in every Channel 	N/A
5. Obstructed Construction not meeting 3 or 4 above	30%

Deflector Orientation (9.5.4.3): NFPA 13 has long required the sprinkler deflector be aligned parallel to the slope of the ceiling. This concept remains as an option for non-storage occupancies; however, Section 9.5.4.3 (2) states that for sloped ceiling in non-storage occupancies, the deflector may be installed parallel to the slope or parallel to the floor. For storage occupancies, Section 9.5.4.3 (3) indicates that for sloped ceilings in storage occupancies, the deflector must be aligned parallel to the floor.

High Ceilings (Non-Storage)

NFPA 13 historically did not give a maximum effective height for spray sprinklers or any special considerations for “high” ceilings when protecting non-storage occupancies. This will change in the 2025 edition of NFPA 13. These changes will include limiting the sprinkler type and orientation, minimum K-factors based upon occupancy classification, minimum density requirements and design area.

Sprinkler Types for Ceiling Heights over 30 ft (19.2.3.2.5): The 2025 edition of NFPA 13 will restrict sprinkler types for ceilings over 30 ft as follows:

- OH-1 and higher - sidewall sprinklers not permitted
- OH-2 and higher - minimum K-factor 11.2
- OH-2 and higher - no extended coverage sprinkler with a K-factor of 22.4 or less
- OH2 with ceiling height over 40 ft - no standard response sprinkler

Sprinkler Density/Areas for Ceiling Heights over 30 ft (19.2.3.5.2): New design areas and density requirements for ceilings over 30 ft are summarized in the below table:

Occupancy Hazard	Ceiling Height	Sprinkler Orientation	Sprinkler Coverage	K-factor	Minimum Density	Increase of Design Area
OH-1	> 30 ft	Upright or Pendent	Standard or Extended	5.6 or greater	Per table 19.2.3.1.1	30%
OH-2	> 30 ft but <= 40 ft	Upright or Pendent	Standard or Extended	11.2 or greater	0.37	None
OH-2	>40 ft	Upright or Pendent	Standard	11.2 or greater	0.45	30%
OH-2	>40 ft	Upright or Pendent	Extended	25.2	0.45	None
EH-1 & EH-2	>30 ft	Upright or Pendent	Standard	11.2 or greater	0.45	None
EH-1 & EH-2	>30 ft	Upright or Pendent	Extended	Greater than 22.4	0.45	None

Supplemental Sprinklers

NFPA 13 has long required sprinklers to be installed under fixed obstructions over 4 feet in width. This concept remains; however, the 2025 edition of NFPA 13 includes numerous additions and clarifications to requirements for sprinklers below obstructions.

New Definitions related to Supplemental Sprinklers:

- **Supplemental Sprinkler (3.3.221.3.6):** Section 3.3.221.3.6 now defines a supplemental sprinkler as “A sprinkler that is installed below an obstruction.”
- **Non-Flat Obstruction (3.3.142):** Section 3.3.142 now defines a non-flat obstruction as “An obstruction where the underside of the obstruction is not in the same plane and not capable of collecting heat.”
- **Non-Solid Obstruction (3.3.143):** Section 3.3.143 now defines a non-solid obstruction as “An obstruction that consists of openings that constitute at least 30 percent of the footprint of the obstruction.”

New Requirements for Supplemental Sprinklers (9.5.5.3.3):

- Must be quick response or have a fast response element.
- Permitted to have different K-factor, orientation, and coverage than the ceiling sprinklers under certain conditions.
- Required to have water shield (or otherwise shielded) where installed:
 - Under non-flat obstructions
 - Under non-solid obstructions
 - Beyond outer edge of obstruction
 - Under open grating

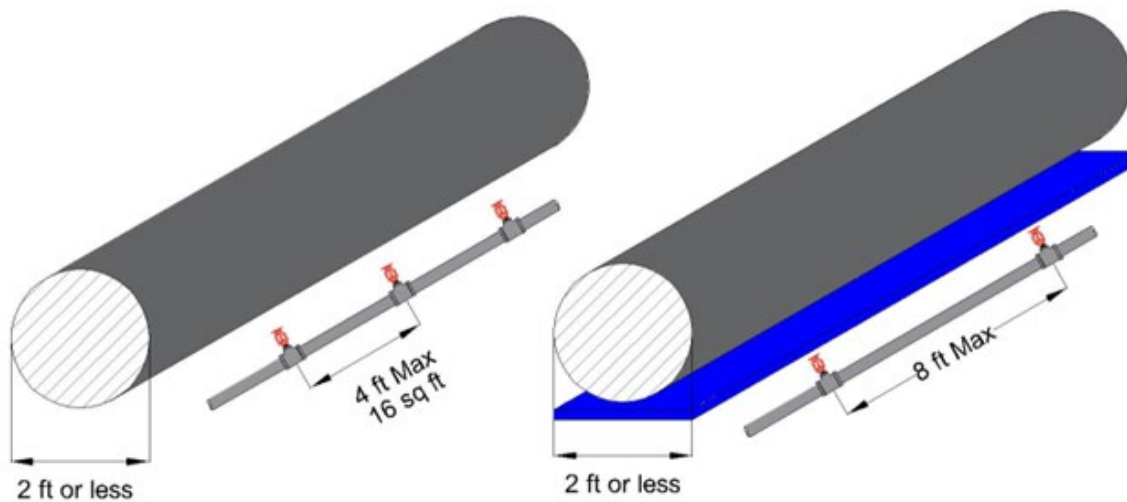
Spacing Requirements for Supplemental Sprinklers:

NFPA 13, prior to the 2025 edition, did not have guidance on spacing of sprinklers installed under obstructions. The 2025 edition has added spacing guidance as follows:

- **General Spacing of Supplemental Sprinklers – except ESFR & CMSA (9.5.5.3.4.2):** This section specifies that the spacing of supplemental sprinklers may be in accordance with the unobstructed construction requirements for the hazard that they are protecting. This allows for the spacing of the supplemental sprinklers to not have to follow the spacing guidelines for the sprinklers installed at the ceiling.
- **Spacing of Supplemental Sprinklers – ESFR & CMSA (14.2.10.3.5):** ESFR and CMSA sprinklers are particularly sensitive to obstructions and as such the spacing rules for supplemental sprinklers are more restrictive. Additionally, heat collection needed to activate sprinklers is difficult under non-flat and non-solid obstructions. As a result, the required spacing for supplemental sprinklers is reduced for such obstructions. This reduced spacing can be increased if a solid horizontal barrier is installed beneath non-flat and non-solid obstructions. The table below summarizes the spacing requirements for ESFR and CMSA supplemental sprinklers. Although these requirements are in chapter 14, it should be noted that for CMSA sprinklers chapter 13 points you to these requirements in chapter 14.

Obstruction Type	Obstruction Width	Max. Linear Spacing	Max. Area Spacing
Non-flat or Non-solid (2 ft max from edge)	N/A	4 ft	16 ft
Flat, Solid	2 ft or less	8 ft	N/A
Flat, Solid Barrier placed under non-flat or non-solid Obstruction	2 ft or less	8 ft	N/A
Flat, Solid	Greater than 2 ft but less than 10 ft	10 ft	N/A
Flat, Solid Barrier placed under non-flat or non-solid Obstruction	Greater than 2 ft but less than 10 ft	10 ft	N/A
Flat, Solid	Greater than 10 ft	Per unobstructed construction rules	N/A
Flat, Solid Barrier placed under non-flat or non-solid Obstruction	Greater than 10 ft	Per unobstructed construction rules	N/A

The following diagram illustrates the increased spacing allowed where a continuous barrier is installed beneath a non-flat or non-solid obstruction.



Design Approaches for Supplemental Sprinklers (28.4.7.4): Due to the additional rules for supplemental sprinklers, the design approaches for sprinklers under obstructions in chapter 28 were expanded.

- **Section 28.3.4.7.4.1:** Supplemental sprinklers are not required to be included in the hydraulic calculations for the ceiling sprinklers.
- **Section 28.3.4.7.4.2:** Where the piping to the supplemental sprinklers follows the same sizing pattern as the ceiling sprinklers, no additional hydraulic calculations are required.
- **Section 28.3.4.7.4.3:** Where the piping to the supplemental sprinklers do not follow the same sizing pattern as the ceiling sprinklers, additional hydraulic calculations are required as follows:
 - Calculations to include up to four supplemental sprinklers on a branch line.
 - For Density/Area, the area of coverage of supplemental sprinklers is only the footprint of the obstruction.
 - For Density/Area, the design criteria are based upon the hazard below the obstruction.
 - For ESFR and CMSA sprinklers, the design pressure is based upon the hazard below the obstruction and the bottom of obstruction is treated as the ceiling.

- The supplemental sprinklers are not required to be balanced with the ceiling sprinklers.

Concrete Tee Construction (10.2.7.1.2): Prior to the 2025 edition of NFPA 13, there was no limit to the depth of concrete tee construction in obstructed construction and the sprinkler deflector was permitted to be located at least 1 inch below the bottom plane of the concrete tee. The 2025 edition of NFPA 13 retains the deflector position but restricts the depth of the concrete tees to 30 inches.

2025: Concrete Tees are limited to 30 inches

2019: No Max.

2025 deflector 1" below stem

2019 deflector 1" below bottom stem

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New Concepts for Dry Pipe Systems

Dry Pipe Systems Section Rewrite (8.2): Section 8.2 titled Dry Pipe Systems was awkward and in need of reorganization. The 2025 edition of NFPA 13 rewrote this section so that it flows much better and is in a more logical sequence.

Vapor Corrosion Inhibitor (VCI): Corrosion continues to be a concern for dry pipe systems and the 2025 edition of NFPA 13 accepted a new concept to reduce corrosion. Vapor Corrosion Inhibitor is defined in Section 3.3.242 as “A chemical compound that emits rust-inhibiting vapor to protect ferrous and nonferrous metals against corrosion in air-filled dry pipe or preaction sprinkler systems.” Section 8.2.11 outlines the installation requirements for this technology.

Vacuum Dry and Preaction Systems: Also known as negative pressure systems, vacuum systems were added to NFPA 13. The definitions are found in Section 3.3.222.10 and 3.3.222.11. The installation requirements are found in Section 8.11.

C-Factor Changes (28.3.4.8.1): In the 2022 edition of NFPA 13, the C-factor for dry systems with nitrogen installed in accordance with the standard was changed from C-100 to C-120. For the 2025 edition, the committee made the same change for both dry systems and preaction systems with Vapor Corrosion Inhibitors (VCI) and for Vacuum systems.

Pipe or Tube	C Value
Black/Galvanized steel - Wet System	120
Black/Galvanized steel - Dry/Preaction System	100
Black/Galvanized steel - Dry/Preaction System with nitrogen	120
Black/Galvanized steel - Dry System/Preaction with vacuum pressure	120
Black/Galvanized steel - Dry System/Preaction with vapor corrosion inhibitor	120

Flexible Sprinkler Hose: Flexible sprinkler hose has been used in NFPA 13 systems for a long time; however, the guidance for this component was lacking in NFPA 13 and the only requirements were found in the hanging and bracing chapters. The 2025 edition of NFPA 13 expanded the requirements and made numerous changes related to this concept.

- **Flexible Sprinkler Hose Fitting Requirements (7.4.5):** This new section simply states that flexible sprinkler hose fittings must be installed in accordance with their listing and manufacturer’s instructions.
- **Flexible Sprinkler Hose Fitting Lengths (16.8.8):** Although not referenced in previous editions of NFPA 13, the listing requirements for flexible sprinkler hose is limited to 6 feet in length. The purpose of this length requirement is to attempt to prevent untrained personnel from relocating a sprinkler (on a flexible hose) without regard to the spacing requirement of the sprinkler. This makes sense when the sprinkler and flexible hose is located above an easily removable or accessed ceiling such as an acoustical ceiling tile (ACT) suspended ceiling. In situations where the flexible sprinkler hose is not easily accessed (such as above a hard ceiling or wall), this concern is mitigated, and greater lengths of flexible hose are permitted by this section. Section 16.8.8 states:
 - Installed above rigid ceiling = 12 feet max
 - Installed above lay-in ceiling = 6 feet max

As these components are required to be listed, the listing protocols (such as UL 2443) must be updated to allow lengths greater than 6 feet.

- **Flexible Sprinkler Hose Fitting Friction Loss (28.3.4.8.1):** Section 28.3.4.8.1 which deals with friction loss in calculations has been updated for flexible sprinkler hose fittings. This change will require that pressure losses of flexible sprinkler hose be included in the system’s hydraulic calculation based upon the number of bends referenced in the listing for a particular hose length.

Documentation Cabinet (16.11.1.3): Too often, vital documents such as the sprinkler plans are not available. This makes ITM and system modifications difficult and often expensive for the owner. To mitigate this problem, this new section requires that a documentation cabinet be installed, and that important documentation be stored in the cabinet. This documentation includes, at a minimum, final documentation of

completion documents, final shop drawings and as-builts of the sprinkler system. This documentation may be stored in electronic or hardcopy format.

Signs (16.17): A related concept is signage. Important signage (such as general information and hydraulic information sign) is often missing or illegible. This new section requires that copies of all required signage be kept in the documentation cabinet in either electronic and/or hardcopy format

Owner's Certificate (4.2): Numerous changes/updates were made to Section 4.2:

- The title was changed to "Basis of Design for the Owner's Certificate". The title was changed as this information is needed for designing the sprinkler system.
- A new requirement was added to provide a Storage Plan (where applicable) which includes the maximum height of storage, the commodities stored, and the storage arrangement. Added because storage layout plans are often required by the fire code.
- A new requirement for the owner (or their representative) is to provide the water supply data, including any needed adjustments. This requirement confirms that water supply analysis is the responsibility of the owner (or owner's representative). Guidance for this concept is found in the annex to this section.
- A new requirement for the owner (or their representative) to determine whether seismic protection is required.

System Area Limitations (4.4.1): The longstanding system area limitations (floor area protected with a single sprinkler system) was modified. The area limitations for light hazard wet pipe systems that are electrically supervised has been increase by 50 percent, from 52,000 square feet to 78,000 square feet. This revision to wet systems allows for flexibility in light hazard occupancies. The 2025 edition system area limitation will be as follows:

System Protection Area Limitations:	
Light Hazard	52,000 sq ft
Light Hazard – Wet System - Supervised	78,000 sq ft
Ordinary Hazard	52,000 sq ft
Extra Hazard (hydraulically calculated)	40,000 sq ft
High-Piled Storage	40,000 sq ft
In-Rack Storage	40,000 sq ft

Conclusion

This edition of TechNotes highlights just some of the significant changes in the upcoming 2025 edition of NFPA 13. There are many more and NFSA will continue to publish resources to highlight the changes important to our industry. It must be noted that the section numbers used in this article are from the Second Draft Report and they may be adjusted when the standard is published in the fall of this year.



Training and Education



Sign-Up for one of our Layout Technician Pathway Courses

NFSA's newly updated fire sprinkler Layout Technician Pathway (LTP) prepares fire sprinkler layout and design professionals for NICET Levels I & II certifications. It also provides a great refresher for those who have been designing systems but need a comprehensive refresher. Students will receive a hard copy of the recently updated and revised "Layout Book" as well as a copy of the 2022 edition of the NFPA 13 standard.

The LTP consists of two parts. Students must first complete the on-line Part 1: Fundamentals before attending the in-person Part 2: Application session. The 25 self-paced online modules cover everything from "Parts of a Sprinkler" to "Introduction to Fire Sprinkler Calculations." The 3-day in-person instructor-led Part 2: Application class applies the content learned in the previous Fundamentals course. There are four in-person and one virtual session offered in 2023.

NOTE: Students must register for Part 1: Application at least one month before the start of in-person Part 2: session in order to allow enough time to complete the on-line modules.

Layout Technician Pathway cost:
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Registration Deadline for Fundamental & Application	Layout Technician: Fundamentals Completion Deadline	Layout Technician: Application Class Dates	Location
23-Sep-24	11-Oct-24	October 12-24, 2024	Virtual

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Register now for our next Tech Tuesday!

Our next Tech Tuesday will be August 20, 2024 from 12:30 pm to 1:30 pm eastern time.
The topic will be Update from the NFPA 13 Technical Session.

NFPA 13 has finished the revision process that resulted in the 2025 edition of the standard. This presentation will highlight some of the major potential changes that may significantly affect the layout and installation of sprinkler systems and is a “must-know” for layout technicians, installers, AHJs and others in the industry.

Member Cost: Free

Non-member Cost: \$50.00 [Learn more about membership here.](#)

****UPDATE**** We have updated our enrollment process for Tech Tuesdays. If you have already registered for this Tech Tuesday, please disregard any links you have received. You will receive a reminder email with the updated link on the Monday prior to the Tech Tuesday session going forward.

Register for the next Tech
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