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

TechNotes

Editor - Roland Asp, CET #521 10/10/2023

# Best of September 2023

The following are a dozen questions answered by the NFSA's Codes, Standards, and Public Fire Protection staff as part of the Expert of the Day (EOD) member assistance program during the month of September 2023. This information is being brought forward as the "Best of September 2023." If you have a question for the NFSA EOD submit your question online through the "My EOD" portal.

It should be noted that the following are the opinions of the NFSA Engineering, Codes, and Standards staff, generated as members of the relevant NFPA and ICC technical committees and through our general experience in writing and interpreting codes and standards. They have not been processed as formal interpretations in accordance with the NFPA Regulations Governing Committee Projects or ICC Council Policy #11 and should therefore not be considered, nor relied upon, as the official positions of the NFSA, NFPA, ICC, or its Committees. Unless otherwise noted the most recently published edition of the standard referenced was used.

## Question #1 – Single Point Density Table

**In reference to Table 19.2.3.1.1 in the 2022 edition of NFPA 13, why is it referred to as "single point" design when you have two points for each hazard classification? For example, OH1 can be a 0.15/1500 or a 0.12/3000.**

It's referred to as "single point density" because the default (based on the hazard classification) is now specifically identified in Table 19.2.3.1.1 in the 2022 edition of NFPA 13. The option for the designer to choose any point of the density/area curves, as in past editions has been removed.

The 3,000 sq. ft. design area is specific to when a sprinklered space is adjacent to a non-sprinklered concealed space (as outlined in Section 19.2.3.1.5). That is the reason for the asterisk after the 3,000-design area in each of the hazard classes.

To specifically address the example given, for an ordinary hazard group 1 design, the default in Table 19.2.3.1.1 is a density of 0.15 gpm/sq ft over a 1,500 sq ft area. However, if Section 19.2.3.1.5 applies (unsprinklered combustible concealed spaces), the designer must use a 0.12 gpm/sq ft density over 3,000 sq ft design area. The 3,000 sq. ft. design area only applies when a sprinklered space is adjacent to a combustible concealed space.

## TABLE 19.2.3.1.1

| HAZARD | DENSITY/AREA (GPM/FT/FT$^2$) |
|---|---|
| LIGHT | 0.1/1500 OR 0.07/3000* |
| ORDINARY GROUP 1 | 0.15/1500 OR 0.12/3000* |
| ORDINARY GROUP 2 | 0.2/1500 OR 0.17/3000* |
| EXTRA GROUP 1 | 0.3/2500 OR 0.28/3000* |
| EXTRA GROUP 2 | 0.4/2500 OR 0.38/3000* |

* = DENSITY / AREA WHEN ADJACENT TO NONSPRINKLERED COMBUSTIBLE CONCEALED SPACE

## Question #2 – Order of Design Area Reductions

**A project consists of an Extra Hazard Group 1 protected by a dry system with high temperature rated sprinklers. There are two area adjustments that are applicable: 30% increase for the dry system, and 25% decrease (but not less than 2,000 sq ft) for high-temperature sprinklers.**

**Depending on the order that these adjustments are applied the final design area changes. Starting density/area is 0.3 gpm/sq ft over 2,500 sq ft the two options are: Starting with .3/2500 - add 30% area for dry system then 25% reduction for HT sprinklers and area is 2,437 sq ft,**

**Or reverse it, starting at .3/2500, Reduce 25% but not below 2,000 sq ft for HT sprinklers, then add 30% for dry system = 2,600 sq ft.**

**Which method is correct?**

The order in which simultaneous modifications are applied to the area of system operation is not important as long as the final minimum area limitation of 2,000 sq ft for Extra Hazard occupancies with high temperature sprinklers is met. Where there are multiple modifications, the 2,000 sq ft limitation is applied after the other adjustments are made.

In the case described, the final area would be 2,437.5 sq ft with a density of 0.3 gpm/sq ft.
2,500 x 1.3 x 0.75 = 2,437.5 sq ft or 2,500 x 0.75 x 1.3 = 2,437.5 sq ft

Although, NFPA 13 (2022) does not specifically address this for Extra Hazard occupancies with high temperature sprinklers (Section 19.2.3.2.6) this is similar to applying the 3,000 sq ft minimum area of sprinkler operation where certain unsprinklered combustible concealed spaces exist.

Section 19.2.3.2.8.2 states that the 3,000 sq ft minimum area limitation for unsprinklered concealed spaces is applied “after all other modifications have been made.”

It should also be noted that for Extra Hazard occupancies using K-11.2 sprinklers there is also an allowance to reduce the design area by 25% but not less than 2,000 sq ft, however this reduction cannot be compounded with the other area of operation adjustments. (See Question 3 below)

## Question #3 – Multiple Adjustments Remote area in Extra Hazard

**Section 19.3.3.2.8.1 for multiple adjustments to a remote area calls out 19.3.3.2.3 thru 19.3.3.2.6 specifically but does not mention 19.3.3.2.7.**

**For a project with a dry Extra Hazard Group 2 system, the remote area will be increased by 30%, but can it then be reduced by 25% twice if both high temp and extended coverage sprinklers are used, per 19.3.3.2.6 and 19.3.3.2.7?**

No, NFPA 13, 2019 edition, Section 19.3.3.2.7 area of operation adjustment for K=11.2 or larger sprinklers is not applicable to Section 19.3.3.2.8.1 for multiple adjustments and thus cannot be compounded with other adjustments.

Section 19.3.3.2.8 for multiple adjustments indicates where multiple adjustments to the area of operation are required to be made in accordance with 19.3.3.2.3, 19.3.3.2.4, 19.3.3.2.5, or 19.3.3.2.6, these adjustments shall be compounded based on the area of operation originally selected from Figure 19.3.3.1.1. This does not include Section 19.3.3.2.7.

Because Section 19.3.3.2.8 for multiple adjustments does not include or reference Section 19.3.3.2.7 for sprinklers with a K Factor of 11.2 or greater, the area of operation adjustment from Section 19.3.3.2.7 for larger K factor sprinklers cannot be compounded based on the original area of operation. It can still be used and applied when sprinklers have a K factor of 11.2 or greater, it just cannot be compounded with the other area of operation adjustments found in Sections 19.3.3.2.3, 19.3.3.2.4, 19.3.3.2.5, or 19.3.3.2.6.

The intent of the standard is to allow a 25% area reduction for either high temperature rated sprinklers or sprinklers with a K factor of 11.2 or larger, but not both.



## Question #4 – Waterflow Device Requirements for Combination Standpipe/Sprinkler Riser

**Is a waterflow switch required on a combination manual wet standpipe/wet sprinkler system riser, at the main riser into the building?**

No, a “standpipe specific” waterflow device is not required on a combined manual wet standpipe/automatic fire sprinkler system.

NFPA 14 Standard for the Installation of Standpipes and Hose Systems, Section 5.6.1, was revised in the 2019 edition of the standard to help clarify the requirements for waterflow and supervisory alarms.

The substantiation for Public Input No. 26 clarified that a manual wet standpipe, as part of a combined system, would already be required to have a waterflow alarm device as part of the fire sprinkler portion of the combined systems. This would negate the need for an additional separate waterflow device to be installed on the manual wet standpipe or on the main riser.

## Question #5 - Storage/Equipment in Fire Pump Room

**Is it acceptable to have storage or equipment, not essential to the operation of the fire pump, installed within a fire pump room?**

No. Only equipment relevant to the fire suppression system and the fire pump are permitted to be in the fire pump room. The one exception to this is equipment for domestic water service for that building. Note that this allowance does not extend to anything that could create additional hazards such as a hot water heater. (See Section 4.14.1.1.6 and its annex section.)

Storage is not permitted in the fire pump room for any reason.

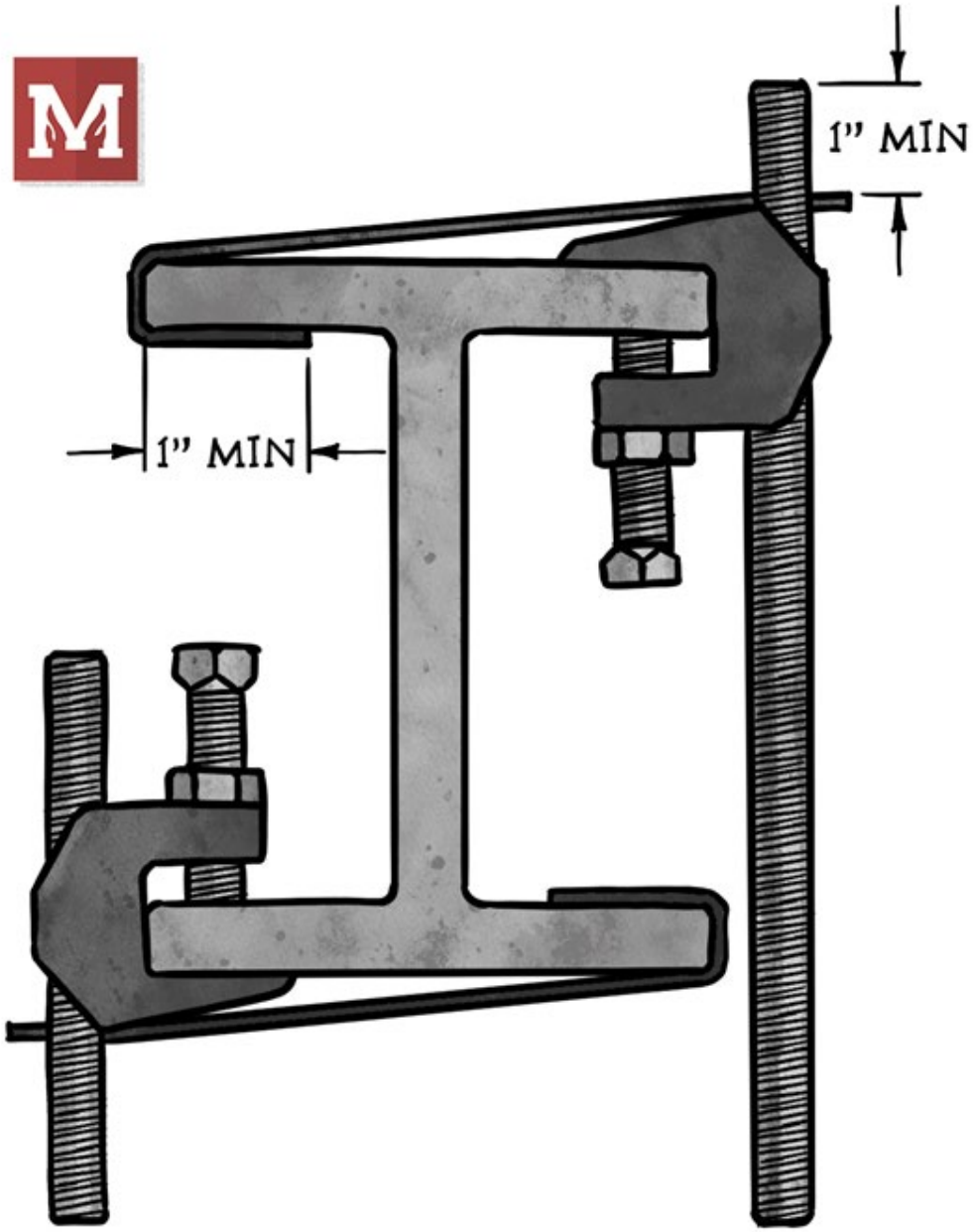
## Question #6 - Restraining Strap Installation

**Restraining straps on C-type clamps have been installed per the requirements of Section 9.3.7.1 of the 2016 edition of NFPA 13. The straps have been wrapped around the beam flange more than an inch in accordance with Section 9.3.7.3.**

**We are being told that the straps need to be formed tight to the beam as shown in the Automatic Sprinkler Handbook (2016) Exhibit 9.23.**

**Does the restraining strap need to be form fitted to the beam?**

No, NFPA 13 (2016 edition) does not require the restraining strap to be form fitted to the beam, it simply must wrap around the beam flange 1-inch minimum, later editions of the NFPA 13 handbook shows examples of both straight restraining straps angled to the beam flange where it then wraps around, and form fitted restraining straps. The strap would only be required to be form fitted if that was the requirement for installation detailed by the manufacturer of the restraining strap. Bending the strap excessively beyond the manufacturer's instructions could weaken the strap depending on the manufacturing and material parameters






## Question #7 – HDPE SDR 11 Piping for Underground Use

**Is High Density Polyethylene Pipe with a Standard Dimension Ratio of 11 permitted to be used as an underground service to a fire sprinkler system?**

Yes. According to the provided cut sheet HDPE Water Service pipe, it is manufactured according to ANSI/AWWA C906. NFPA 24 and NFPA 13, Table 10.1.1.1 (Manufacturing Standards for Underground Pipe) specifically allows for AWWA C906 piping to be used in this application.

This product can be used in the underground supply for a fire sprinkler system. It also is FM approved and is listed to be NSF 61 as a lead-free, potable water supply.
Another consideration is that the underground pipe must be rated for the maximum working pressure but not less than 150 psi.

Unless there is a local ordinance that prohibits C906, the minimum fire sprinkler standard, NFPA 24 and NFPA 13 states it can be used.

## Question #8 – Horizontal Sidewall Sprinkler Distance Below Ceilings

**The 2016 edition of NFPA 13 in Section 8.7.4.1.1.2 states, "Horizontal sidewall sprinklers shall be permitted to be located in a zone 6 inches to 12 inches or 12 inches to 18 inches below noncombustible and limited-combustible ceilings were listed for such use."**

**It would appear the combustible requirements only apply to the 12-inch to 18-inch requirement. Is this correct?**

Yes, the range 12 inches to 18 inches only applies to noncombustible and limited-combustible ceilings. The range 6 inches to 12 inches, applies to all ceiling types. If this section applied to all ceiling types, it would simply provide a range of 6 inches to 18 inches. It must be noted that the requirement for the sprinkler to be listed for that distance still applies to all ceiling types.

## Question #9 – Seismic Bracing for Drainpipes

**Section 9.3.5.5.1 in the 2016 edition of NFPA 13 calls for seismic bracing on piping greater than 2 ½ inches.**

**Does this requirement apply to 3-inch drain piping?**

No. Seismic bracing is not required for drain piping downstream of the drain valve. It has never been the intent of the Hanging and Bracing Committee to brace piping that is not essential to sprinkler system operation. Other components of the system drainage system are treated similarly. For example, drain valves are simply required to be approved, not listed, in accordance with Section 6.6.3. The wording of Section 9.3.5.5.1, however, calls for lateral sway bracing on “all branch lines and other piping with a diameter of 2 1/2-inch and larger,” which could be considered to apply to drain piping as well. However, Section 9.3.5.1.6 was added in the 2013 edition of NFPA 13 stating “Bracing requirements of 9.3.5 shall not apply to drain piping downstream of the drain valve”. This section remains in the 2016, 2019, and 2022 editions.



## Question #10 – Fire Sprinklers for Entry Canopy in NFPA 13R

**A building of Type V construction is to be provided with a fire sprinkler system in accordance with the 2016 edition of NFPA 13R. There is a combustible canopy over the entrance which opens to a common area.**

**Are sprinklers required under this entry canopy in accordance with NFPA 13R or the International Building Code?**

No. NFPA 13R and the International Building Code (IBC) only require protection when the covered balcony, deck or patio is directly connected to and specifically serves the dwelling unit. IBC Section 903.3.1.2.1 states, "Sprinklers...shall be provided to exterior balconies decks and ground floor patios of dwelling or sleeping units..."

NFPA 13R (2016) has similar requirements in Section 6.6.5.

The roof over the main entrance door does not require a sprinkler because it is not directly connected to the dwelling or sleeping unit.

## Question #11 – Extended Coverage Sprinklers- Limitation of Use

**Can extended coverage sprinklers be used in unobstructed ceilings where the slope is over 2/12 and the ceiling is not flat, smooth?**

**Is it required to meet all conditions (1) to (6) of Section 8.4.3 in the 2013 edition of NFPA 13 for an extended sprinkler to be used?**

No, it is not a requirement (or is it possible) to meet all the conditions of section 8.4.3. Based upon the info given (unobstructed with a slope exceeding 2 in 12 and the ceiling is not flat, smooth) it does not appear that extended coverage (pendent or upright) sprinklers are appropriate.

It should be noted that the definition of a flat ceiling is different than that of a horizontal ceiling and a flat ceiling is simply one on a single plane and is permitted to be on a slope. (See Section 3.3.5.1). Additionally, in the 2013 edition of NFPA 13, a smooth ceiling is defined as a “A continuous ceiling free from significant irregularities, lumps, or indentations.” This definition was clarified in the 2022 edition of NFPA 13 and the word significant was defined as being “greater than 4 inches in depth”. (See Section 3.3.28.4 in the 2022 edition of NFPA 13.)

As the described slope of the ceiling is greater than 2 in 12, the extended coverage (pendent or upright) sprinklers would need to be specifically listed (per 8.4.3 (4); however, the slope cannot exceed 4 in 12 and the unobstructed ceiling must be considered flat and smooth. (See paragraph above.)

It should also be noted, that listed extended coverage sidewall sprinklers are permitted as long as they are located at the “high point of the slope and positioned to discharge downward along the slope.” (See Section 8.4.3 (5).)