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

TechNotes

Editor - Roland Asp, CET #543 09/10/2024

Best of August 2024

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 August 2024. This information is being brought forward as the "Best of August 2024." 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: Trapeze Hanger

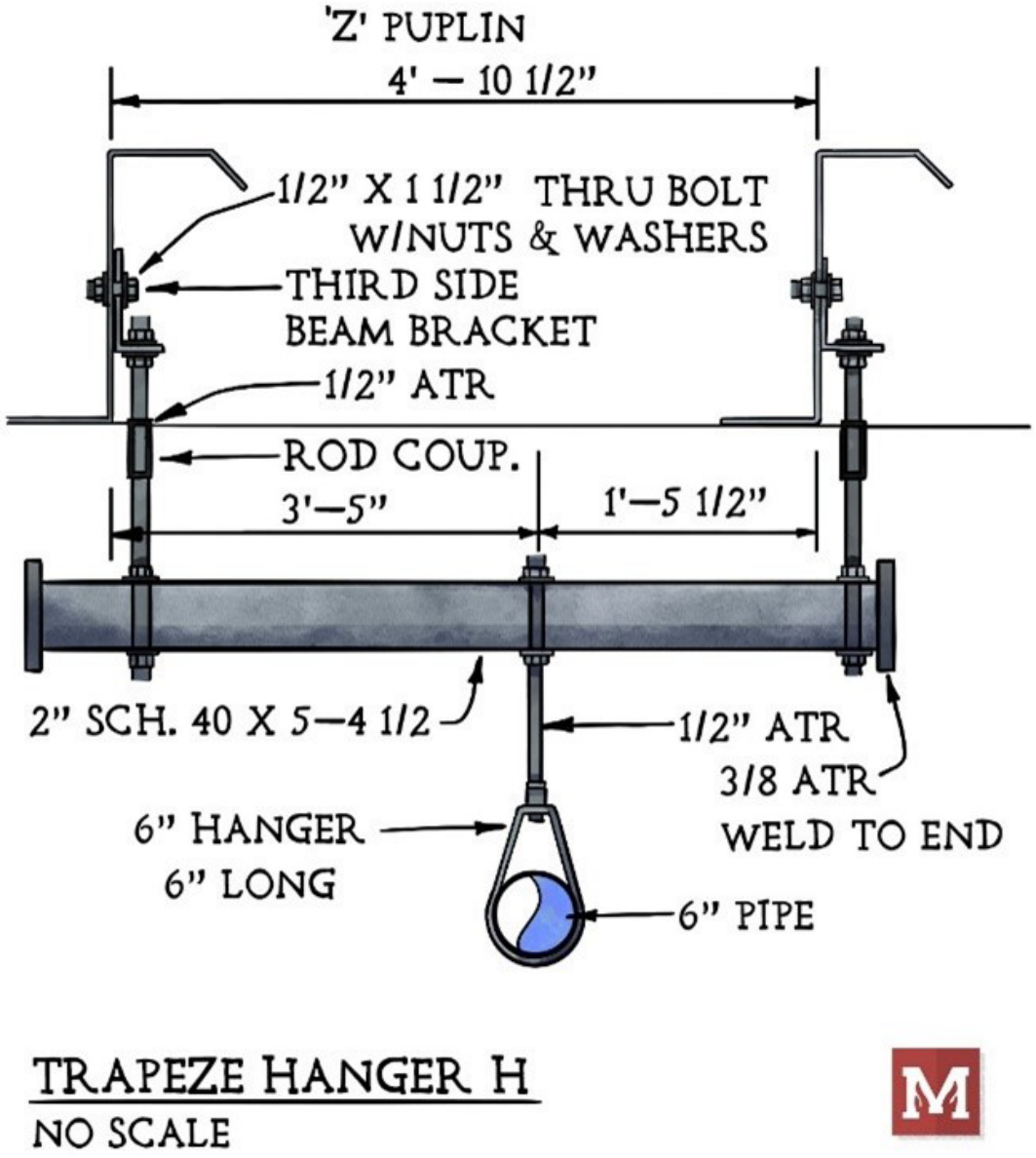
Is it allowed to use nut/washer/all thread rod to support the trapeze member if it is a piece of pipe?

Details in NFPA 13 only show nut/washer and all thread rod for angle iron trapeze members.

Yes, nut/washers and all thread rods are permitted to hang a trapeze hanger consisting of pipe as opposed to angle iron.

Section 17.3.5 in the 2019 edition of NFPA 13 indicates that the components of the hanger assembly must meet the requirements of Section 17.1.6. This section indicates that the components that directly attach to the pipe and/or the structure must be listed; however, Section 17.6.2 states that hanger rods do not need to be listed and Section 17.1.6.3 states that fasteners, such as nuts and washers, do not need to be listed as long as they meet the provisions of Sections 17.2.2, 17.2.3 and 17.2.4.

It should also be noted that as per the attached figure, the sprinkler pipe is not located at the center of the trapeze hanger; the equations shown in A.17.3 could be applied. The reason is that section modulus values in Table 17.3.1(a) is based upon the sprinkler pipe being located at the midpoint of the span of the trapeze hanger. As, in the case described, the load is not at the midpoint, the equation (L=4ab/a+b) in A.17.3 allows an equivalent length of the trapeze to be used, which will likely result in a lesser section modulus. As this is in the annex, it is not a requirement but rather an option.



Question #2 - Monitoring of Dry Standpipes

Section 6.1.1 of the 2016 edition of NFPA 14 states that dry standpipes must be monitored with supervisory air pressure.

Does this section apply to dry manual fire standpipes?

No, the 2016 edition of NFPA 14 *Standard for the Installation of Standpipe and Hose Systems*, does not require manual dry standpipes to be monitored with supervisory air. This section is intended to provide guidance for standpipe system monitoring, including standalone manual standpipes, when required to be supervised to ensure proper operation

and integrity of the system. This supervision would be required of automatic dry standpipe systems.

Supervision can be achieved through central station, a constantly attended local station, or by a signal or local alarm at the initiating device attached to the standpipe system.
This Section has caused confusion over the years by not being specific to automatic dry standpipes and needed clarification. It was discussed by the technical committee during the 2019-2024 cycle with clarification being made in the 2024 edition.

The latest edition of the standard now requires all dry standpipes to be supervised with air. It is not the intent to require remote monitoring in accordance with NFPA 72 *National Fire Alarm and Signaling Code* and the manual dry systems can have local alarm unless required by another section of the code.

Question #3 – Balconies

The local AHJ has determined that the non-combustible metal balconies with open grate decking need sprinkler protection and is citing the IFC 705.2.3.1.

Is the AHJ correct, and sprinklers are needed for these balconies?

There are two conditions outlined in the IBC/IFC for providing sprinklers on balconies and decks. Condition #1 is the building is of Type V construction, provided there is a roof or deck above. Condition #2 is the exterior deck, balcony or ground floor patio of a dwelling unit or sleeping unit is constructed in accordance with Section 705.2.3.1 Exception #3 of the IBC. Exception #3 to Section 705.2.3.1 requires balconies and similar projections to buildings of Type III, IV and V construction to be permitted of Type V construction and not need a fire resistance rating when sprinklers are provided on the deck or balcony. In other words, this section requires the deck or balcony to meet certain construction criteria or be fire-rated. But the fire-rating requirement goes away when the deck or balcony is sprinklered.

It's unclear why the code official is citing 705.2.3.1, because if the deck/balcony is non-combustible, it complies section 705.2.3. This section requires projections from buildings to be non-combustible, combustible materials with a 1-hour fire rating, heavy timber, or fire-retardant treated wood.

However, keep in mind, that if the building is classified as Type V construction, sprinkler protection is required on the deck or balcony based on Section 903.3.1.2.1, condition #1, provided there is a roof or deck above. This applies even if the deck or balcony is constructed of non-combustible materials.

Question #4 – Fire Department Connections – Location Requirements

What are the requirements in NFPA 13 regarding Fire Department Connection (FDC) location and control valves.

If the question is correctly understood, you are looking for the section of NFPA 13 that provides the location requirements for fire department connections (FDC) and control valves.

This will vary depending on the edition of NFPA 13 that has been adopted and is applicable to this project.

For NFPA 13 (2016 and earlier editions):

- FDC – location – Section 8.17.2.4.6: “Fire department connections shall be located at the nearest point of fire department apparatus accessibility or at a location approved by the authority having jurisdiction.”
- Control valves – general – Section 8.1.2: “System valves and gauges shall be accessible for operation, inspection, tests, and maintenance.”
- Control valve – location – Section 8.16.1.1.1.1: “Each sprinkler system shall be provided with a listed indicating valve in an accessible location, so located as to control all automatic sources of water supply.”
- Control valve – accessibility – Section 8.16.1.1.7: “All control valves shall be located where accessible and free of obstructions.”

For NFPA 13 (2019 and 2022 editions):

- FDC – location – Section 16.12.5.7: “Fire department connections shall be located at the nearest point of fire department apparatus accessibility or at a location approved by the authority having jurisdiction.”
- Control valves – general – Section 16.1.1: “System valves and gauges shall be accessible for operation, inspection, tests, and maintenance.”
- Control valve – location – Section 16.9.3.1.1: “Each sprinkler system shall be provided with a listed indicating valve in an accessible location, so located as to control all automatic sources of water supply.”
- Control valve – accessibility – Section 16.9.3.4: “All control valves shall be located where accessible and free of obstructions.”

Also note that some model fire codes – such as the International Fire Code (IFC) – contain additional requirements for FDCs (such as connection height and obstructions).

The location of the underground water supply into the building may dictate the location of the system riser and main control valve in some situations. Underground piping into the building is limited to 10 feet in most cases per NFPA 24.

Question #5 – ESFR Design Criteria

We are asked to design an ESFR system to protect exposed, nonexpanded, Group A plastics in a 35-foot building. Table 23.3.1 of NFPA 13, 2022 edition, does not provide a minimum end-head pressure for a 35-foot building (just shows a “dash”).

Can the pressure listed for a 40-foot building be used in a 35-foot high building?

Yes, it is permitted to use the criteria for a higher ceiling height to be applied to a situation with a lower ceiling height.

As you have noted, Table 23.3.1 simply has a “dash” for 25.2K ESFR sprinklers for a 35-foot ceiling height. For a 40 foot ceiling height the required pressure is 60 psi, for exposed nonexpanded Group A plastics. However, it is acceptable to use a design scheme for a higher hazard to protect a less hazardous arrangement.

To mitigate the confusion cause by the “dashes” in the table, the 2025 edition will revise the table to fill in the dashes with acceptable criteria. In other words, Table 23.3.1, in the 2025 edition, will indicates that a K-25.2 can protect exposed nonexpanded Group A plastics in a 35-foot building with a minimum operating pressure of 60 psi.
This change was made by First Revision No. 1218 with the following committee statement:

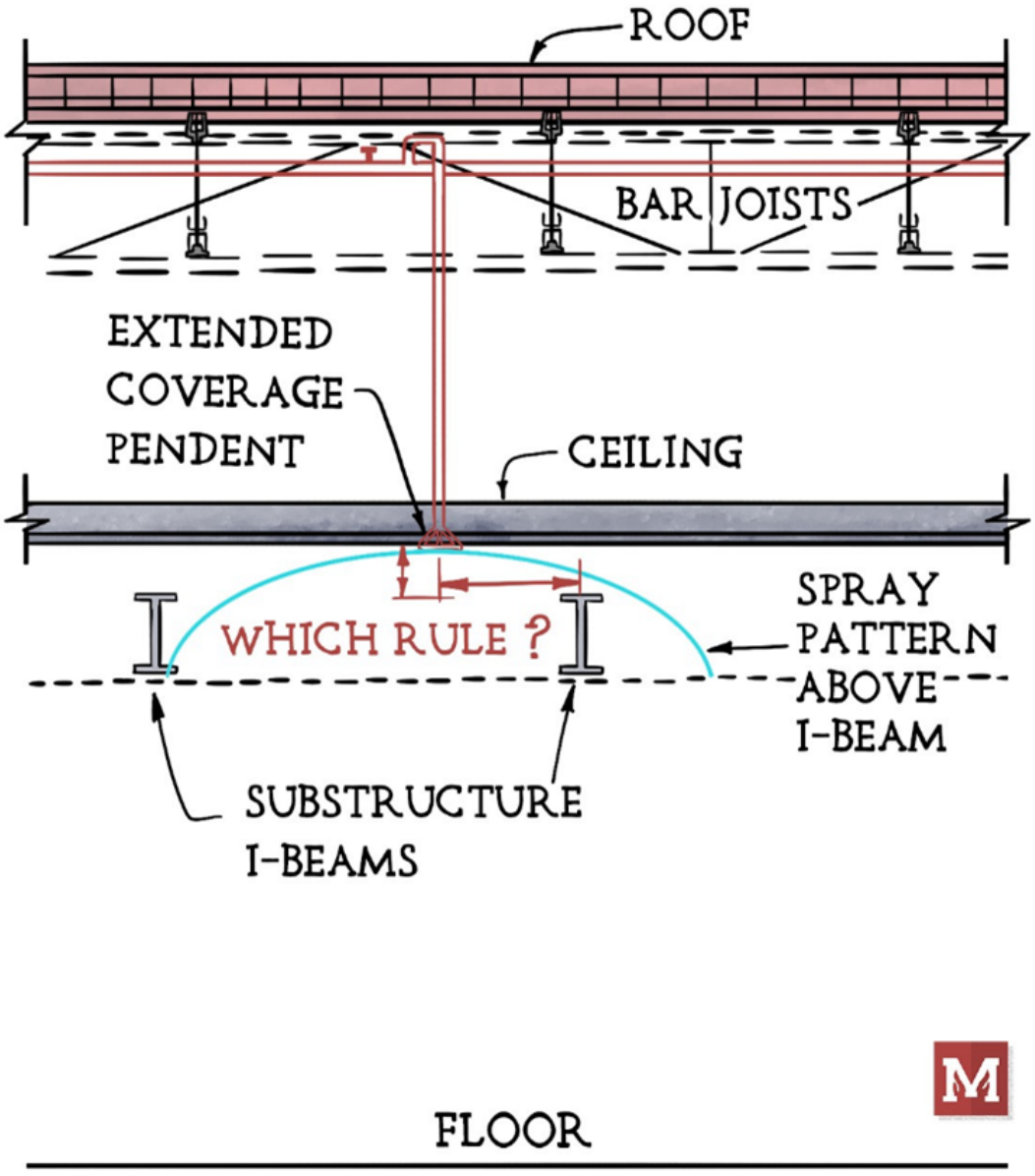
“…design schemes that protect higher hazards were filled in blank cells to protect less hazardous arrangements….”

Question #6 – Exposed I-Beam Obstruction Below the Sprinkler

There will be substructure I-beams installed below the ceiling where extended coverage pendant sprinklers will be used to protect the floor.

Should Figure 8.8.5.2.1.3(b) in the 2016 edition of NFPA 13 be used since we are throwing over an I-beam flange or should Figure 8.8.5.2.2 be used because the obstruction can be considered suspended?

When the I-beam is suspended below the sprinklers, as illustrated in the visual, the goal is to ensure water coverage both above and below the I-beam without causing a significant shadow on the opposite side. In this scenario, the "four-times rule" from Section 8.8.5.2.1.3 would apply. Although the annex for this section notes that the four-times rule is generally ineffective for solid continuous obstructions, such as beams, due to the sprinkler's inability to distribute water above and below the obstruction, this case is different. Here, water can flow both over and under the beam, making the four-times rule applicable. Additionally, the partition rule outlined in Section 8.8.5.2.2 does not apply, as the I-beam is not considered an obstruction similar to partitions, curtains, or room dividers.



Question #7 – Did NFPA Publish a 2022 edition of NFPA 14?

The 2024 edition of the International Fire Code, IFC, Chapter 80 "Referenced Standards", lists the 2022 edition of NFPA 14. On the NFPA's website they do not list a 2022 edition

and the origin and development section of the 2024 edition of NFPA 14 does not mention a 2022 edition either: they go right from discussing the 2019 edition to the 2024 edition.

Did NFPA publish a 2022 edition of NFPA 14?

There is no 2022 edition of NFPA 14 *Standard for the Installation of Standpipe and Hose Systems.*

The edition cycle was extended with the latest edition (2024) having an effective date of September 14th, 2023.

The 2024 edition of NFPA 14 is referenced by the 2024 NFPA 1 *Fire Code* and an Errata was issued January 19th, 2024, to the IFC Chapter 80 Reference Standards to update the NFPA 14 reference to the 2024 edition of the standard.

Question #8 – Cloud Ceiling - Ordinary Hazard Group II

A project designed in accordance with the 2019 edition of NFPA 1 includes cloud ceilings in an ordinary hazard group 2 occupancy. The clouds are over 4 feet in width and the gap width/ceiling ratio is 0.75 in./ft of ceiling height. Table 9.2.7.1 indicates a maximum protection area per sprinkler of 150 square feet.

Is this protection area, 150 square feet, correct as ordinary hazard occupancies have a maximum protection area per sprinkler of 130 square feet?

The maximum protection area and spacing for a cloud ceiling, >4 feet, with a 0.75 gap/ceiling ratio in an ordinary group 2 occupancy would be 130 square feet per sprinkler and a maximum spacing between sprinklers of 15 feet.

Although Table 9.2.7.1 does indicate a maximum protection area of 150 square feet per sprinkler for the above-described cloud ceiling, Section 9.2.7.1(3) states that the requirements of Section 9.2.7.2 must be met.

Section 9.2.7.2.3 indicates that the maximum spacing and area of protection cannot exceed the requirements spelled out in Table 10.2.4.2.1(a) for light hazard and Table 10.2.4.2.1(b) for ordinary hazard.

Table 10.2.4.2.1(b) states that for ordinary hazard, the maximum protection area for ordinary hazard occupancies is 130 square feet per sprinkler with a maximum spacing of 15 feet.

Question #9 – Plastics Stored Under 5 feet in Height

Is there guidance for protecting Group A plastics under 5 feet in height in the 2022 edition of NFPA 13? It used to be in Table 13.2.1 in the 2016 edition. I don't see anything that covers this in the 2022 edition.

Is it still acceptable to store exposed, unexpanded plastics on the floor to 5 feet in height with an OH2 density at the ceiling level? Please advise.

Yes, the 2022 edition of NFPA 13 still contains design criteria for low-piled storage, 5 feet or less, of exposed, nonexpanded plastics at OH Group 2 densities.

The information from Table 13.2.1 from the 2016 edition of NFPA 13 has been moved to chapter 4 in the 2022 edition. See Table 4.3.1.7.1.1 titled “Discharge Criteria for Miscellaneous Storage Up to 12 feet in Height.”

It must be noted that although Table 4.3.1.7.1.1 is titled “Miscellaneous Storage” the criteria also apply to low piled storage. This is made clear in Section 4.3.1.7.2. For the 5 feet of exposed nonexpanded plastic, refer to Section 4.3.1.7.2.4 which states that the criteria of Table 4.3.1.7.1.1 apply to low-piled storage of Group A plastic commodities up to a maximum height of 5 feet.

Question #10 – ESFR Draft Curtains

Are draft curtains required to separate ESFR sprinklers from quick-response sprinklers?

No. As long as quick-response sprinklers are installed in the adjoining area, a draft curtain would not be required.

The intent of a draft curtain required by NFPA 13, 2016 edition, Section 8.4.6.4.1 is to separate the areas so that sprinklers operate only on the side that is experiencing a fire incident. If one side has ESFR sprinklers and the other side uses standard response sprinklers, there is a risk of opening sprinklers far from the fire source that may result in too many sprinklers being open. Therefore, if the ordinary hazard area also uses quick-response sprinklers, then a draft curtain would not be required because both quick-response sprinklers and ESFR sprinklers have fast response elements, or elements with a RTI of 50 (meters-seconds)1/2 or less.

Question #11 – Standard Response vs Quick-Response

I have a situation where a Fire Protection Engineer decided to install standard response sprinklers instead of quick-response in the light hazard, hospital, area because he is saying the standard sprinklers have a longer life, sustainability, than the quick-response, testing 75 years for standard response and 40 years for quick-response.

Many people who have studied and researched the evolution of quick-response (QR) technology would disagree with the sustainability argument being made. QR sprinklers were developed from a recommendation in the early-1970’s report: America Burning. The intent was to develop a faster-operating fire sprinkler that would provide enhanced life safety benefits. Much was written about this in fire science research articles and books; for the sake of brevity, which will not be repeated here.

Some of the original research showed that QR sprinklers responded as much as 4 to 5 times faster than standard response (SR) fire sprinklers. Recent tests conducted by NFSA have shown a substantial reduction in activation times in fires protected by QR as opposed to SR

sprinklers (QR sprinklers operating faster and compartment fire temperatures being significantly lower than with SR sprinklers).

It is true that there is a more frequent testing interval for QR sprinklers. Part of the rationale for this is that NFPA 13, since the 1996 edition, has recognized the benefits of QR sprinklers, smaller design area, fewer sprinklers, etc., but since QR sprinkler technology was relatively new at the time, as compared to SR sprinklers that had been around for over 100 years, a shorter testing period was warranted.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, does not require replacement of fire sprinklers at prescribed intervals. It does, however, require testing of a representative number of sprinklers after being in service for designated periods of time and, if they fail the testing, requires replacement. Those intervals may be what the engineer is basing his longer life or sustainability argument on.

In the United States, the model building, fire, and life safety codes would all require the use of QR sprinklers in a hospital due to their faster activation times and enhanced life safety benefits. Textbooks, such as NFPA's Fire protection Handbook and SFPE's Handbook of Fire Protection Engineering, have sections on QR sprinkler technology.

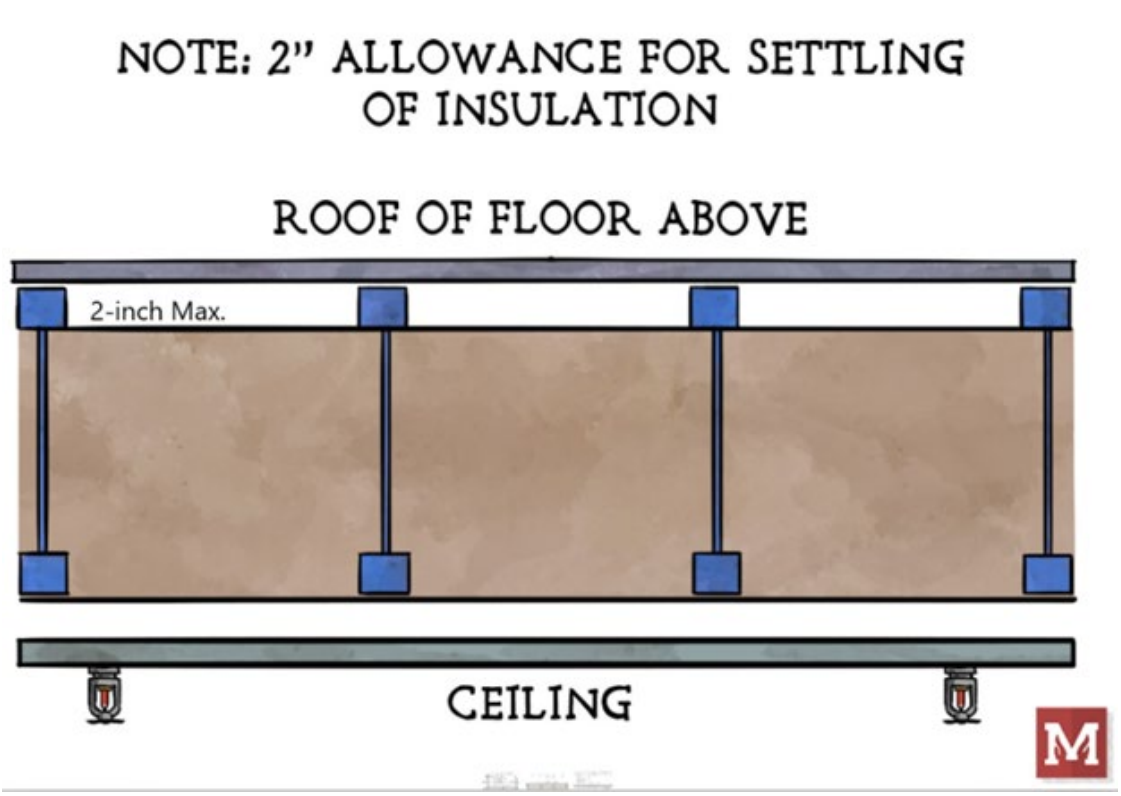
Question #12 – Sprinklers in Concealed Space with Insulation

Are sprinklers required in concealed space above insulation? A room has ceiling joists filled with insulation and the deck has board covering the wood structure above. There is a gap of approximately 6 inches from the top of the insulation to the deck above.

We are using Section 8.15.1.2.7 from the 2016 edition of NFPA 13 to omit sprinklers in the space. Is this correct?

Per NFPA 13, Section 8.15.1.2.7, non-combustible insulation must fill the entire concealed space, leaving only a 2-inch gap from the deck. Based on the sketch provided, it appears the insulation is installed solely between the I-joists. If this is the case, the space would be considered a combustible concealed space and would require sprinklers.

However, if the combustible deck is covered with drywall on the interior side of the concealed space, and the top of the combustible I-joists is protected with a non-combustible or limited combustible material, then the space would be exempt from the sprinkler requirement under Section 8.15.1.2.1.



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