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

TechNotes

Editor - Roland Asp, CET #529 02/13/2024

Best of January 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 January 2024. This information is being brought forward as the "Best of January 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 – Space Below Interior Platform

A project includes a small raised office platform with 4 foot space below, non-combustible, inside a sprinklered warehouse. The area below the platform is open on 3 sides.

Is this space considered a concealed space and can sprinklers be omitted?

Since the space is open on 3 sides this would not be considered a concealed space. Therefore, sprinkler protection is required.

If, however, the 3 open sides under the raised platform are enclosed with noncombustible or limited-combustible materials, that would make it a concealed space and sprinklers would be permitted to be omitted in accordance with Sections 8.15.1.2.1 or 8.15.1.2.2 of the 2013 edition of NFPA 13.

Question #2 – Date of Manufacture vs. Installation of Sprinklers

Can sprinklers manufactured in 2014 be installed in 2024? If so, when does the clock start for testing due to the age of sprinklers?

Sprinklers manufactured in 2014 can still be installed in 2024 as long as they are new and have never been in-service previously.

NFPA 25, 2023 edition, Section 5.3.1.1.1 requires sprinklers to be tested 50 years after installation, therefore, the 50-year time frame starts in 2024. Standard spray sprinklers installed in 2024 will require testing or need to be replaced in 2074.

With that said, it is quite common that documentation is not maintained properly over the 50-year time frame and the decision to test or replace the sprinklers at that time often is dependent on the information found on the sprinkler itself.

Question #3 – 24-inch Deep Exposed Wood Joists

What are the options for positioning (deflector distance) sprinklers under exposed wood joists that are 24 inches deep and 16 inches apart?

NFPA 13, 2019 edition, Section 3.3.41.1 defines this as obstructed construction. For standard spray sprinklers, Section 10.2.6.1.2 provides the requirements for deflector position. As the joists in question are solid wood joists, this section gives three options:

- Deflectors installed 1-6 inches below the bottom of the joist to a maximum dimension of 22 inches from the ceiling. This is not possible with 24-inch joists.
- Deflectors installed at or above the bottom of the joist to a maximum dimension of 22 inches from the ceiling as long as Section 10.2.7.1.2 (beam rule) is met. As the joists are spaced 16 inches on center, this is not possible either.
- Deflectors installed in each bay between the joists with the deflectors positioned 1-inch to 12 inches below the structural ceiling. This option is possible.

Another option may include installing a lower ceiling on the bottom of the joists or installing a ceiling or insulation between the joists to reduce the ceiling height. For example, Section 9.5.4.1.3 indicates for ceilings that have insulation installed directly against the underside of the ceiling or roof structure, the deflector distance shall be measured from the bottom of the insulation in accordance with Sections 9.5.4.1.3.1, 9.5.4.1.3.2, and 9.5.4.1.3.3. In short, the insulation becomes the ceiling for the purpose of measuring deflector distances.

In the case described, installation of a minimum of 3-inch deep insulation at the ceiling of each joist channel would allow the sprinkler deflector to be installed 1-inch below the bottom of the joist without exceeding the 22-inch requirement.

Question #4 – Dry Standpipe Water Delivery Time

Does the NFPA 14 standard have a maximum water delivery time to the hose connections for dry standpipe systems?

Yes, but only for automatic or semi-automatic dry standpipe systems.

NFPA 14 *Standard for the Installation of Standpipe and Hose Systems*, Section 12.6.7.2, 2024 edition, and in earlier editions of the standard Section 11.5.7.2, requires 250 gpm at the hose connection within 3 minutes at acceptance, for systems that exceed 750 gpm.

Manual wet/dry standpipe systems are supplied from fire department apparatus which would make it difficult to determine a standardized water to hose outlet requirement.

Question #5 – Water Supply Modeling for Sprinkler System Design

Sprinkler design is typically based upon hydrant flow tests; however, for a project we have received water supply modeling results instead of hydrant flow tests. The local authority states that the modeling results are to be the basis for the sprinkler design. The modeling results do not appear to match a typical flow test in accordance with NFPA 291 which is concerning.

Is modeling an acceptable source of the water supply characteristics based upon the 2016 edition of NFPA 13?

Yes, the use of modeling is permitted as an approved method as long as the AHJ accepts it. This concept can be found in NFPA 13, 2016 edition, in Section 24.2.2. This section states that the volume and pressure of the public water supply is determined by hydrant flow tests (NFPA 291) or “other approved method.” Water supply modeling can be considered an approved method if all AHJs accepted it, which based upon your EOD request appears to be the case.

Modeling of the water supply often builds in factors such as future development and seasonal and daily fluctuations; however, we are not familiar with the protocols built into this model.

While modeling is acceptable to calculate the strength of the public water supply, if approved, it is good practice to validate the modeling results with actual hydrant flow tests. In fact, the modeling results provided state: *"Estimates are based on City modeling data and should not be used for detailed designs. The applicant is recommended to perform a hydrant flow test at the site for precise information."*

The design of a fire sprinkler system would be considered a *detailed design,* therefore based upon the above referenced language it may be prudent to obtain an actual hydrant flow test.

Finally, it must be noted that modeling results cannot be directly compared to NFPA 291 hydrant flow tests as different procedures are followed.

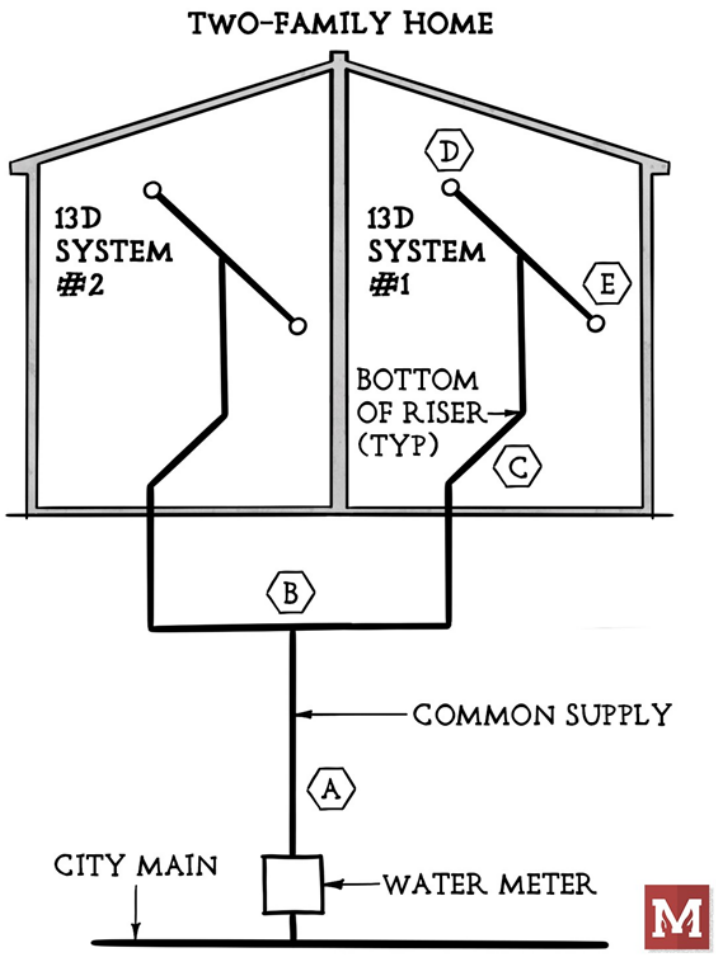
Question #6 - Common Supply Pipes NFPA 13D Duplex

NFPA 13D requires that when a common supply serves more than one dwelling unit, 5 gpm must be added to size the common piping. NFPA 13D does not specify where this demand needs to be added.

The attached sketch shows a crude drawing of two NFPA 13D fire sprinkler systems supplied by one common supply pipe. Different locations A, B, C, D, and E have been marked on sketch.

Does it matter where the additional five gallon per minute demand is inputted into the hydraulic calculations as the standard does not specify?

Ideally the additional flow would be added at the point of connection between the two systems or node "B" as noted on sketch. Any point down stream of B, however, would be acceptable since those points would be more conservative.



Question #7 – Hydraulically Most Demanding Area not Remote Area

On a sprinkler system submittal in accordance with the 2016 edition of NFPA 13, the designer/engineer indicates an area of the 1st floor as the remote area in a two-story building. The first floor does not seem to be the remote area.

Is this possible that the lower floor is the remote design area?

Yes, it is possible that the hydraulically most demanding area will not be on the floor with the highest elevation. While, in many cases, the hydraulically most demanding area would be at the highest elevation, this is not always the case.

The 1st floor may have greater spacing, different k-factor sprinklers or other issues that may increase the sprinkler demand. If this is not clear, it is suggested to contact the designer/engineer for clarification.

While the sprinkler industry often uses the term “remote area” when speaking about hydraulic calculations, this terminology can be misleading. The proper term is the “hydraulically most demanding” (See Section 23.4.4.1.)

The term remote area is really referring to the hydraulically most remote area which does not necessarily mean the most distant area. This concept can be found in Annex Section A.23.4.4.7 which states that *“The most distant area is not necessarily the hydraulically most*

remote" and *"When it is not obvious by comparison that the design selected is the hydraulically most remote, additional calculations should be submitted."*

Question #8 – Sprinkler Flow After Fire

Is there a specific amount of time a sprinkler is supposed to flow after a fire has been extinguished?

NFPA 13 does not provide any guidance as it serves as an installation standard for fire sprinklers and not as a guide for fire response operations. There is, however, a different NFPA document (NFPA 13E) that is called: "Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems".

NFPA 13E, 2020 edition – Section 5.2.1 provides the following guidance:

- Automatic sprinklers should not be shut off until the fire has been extinguished.
- If there is a sectional or floor fire control valve, this valve should be closed in lieu of the main valve.
- A fire fighter with a means of communication should be assigned to remain at the valve until overhaul is completed.
- Orders should also be given to the pump operator to shut down the lines connected to the fire department connection, because these lines can bypass the main sprinkler valve and, in the absence of a floor valve, water will flow until the pump discharge gates are closed.
- Where a combined sprinkler–standpipe system is installed, the hose lines should be charged and maintained charged until fire overhaul is completed.
- Where only a few sprinklers are operating, sprinkler tongs, tapered wooden wedges, or dowels should be used to immediately stop the flow from the opened sprinklers without shutting off the entire system.

Since there are so many variables to a given fire, NFPA 13E does not prescribe a minimum timeframe. The guidance is clear, however, that sprinklers should not be shut off until the fire is extinguished (completely out, not merely "still burning but under control").

Question #9 – Fire Pump Clearance

A fire pump and jockey pump have been installed on the same concrete pad. Upon inspection, the third-party inspector stated that the jockey pump is not permitted to be on the same pad and located within 3 feet of the fire pump.

Can a fire pump and jockey pump be installed on the same pad?

We are not aware of a requirement that would prohibit the installation of a jockey pump on the same housekeeping pad as the fire pump or require a specific minimum of three feet of clearance from the fire pump. The third-party inspector needs to provide a reference to the code, standard, or contractual requirement for these items.

NFPA 20, 2016 edition, Section 4.13.1.1.7 indicates the pump room or pump house shall be sized to fit all of the components necessary for the operation of the fire pump and to accommodate the following:

1. Clearance between components for installation and maintenance.
2. Clearance between a component and the wall for installation and maintenance.

3. Clearance between energized electrical equipment and other equipment in accordance with NFPA 70.
4. Orientation of the pump to the suction piping to allow compliance with 4.15.6.3.

Reference the IBC, 2018 edition, Section 902.1 for similar requirements for clearance.

Section 6.4 for centrifugal pump, foundation, and setting, does not have a requirement for a dedicated housekeeping pad for the fire pump.

Based on NFPA 20, clearance is required for installation/maintenance and per NFPA 70 for electrical equipment, but there does not appear to be a specific requirement that would prohibit the installation of a jockey pump on the same housekeeping pad as the fire pump or require a specific minimum of three feet of clearance from the fire pump.

Question #10 – Sidewall in Circular Ceiling Pocket

Can a sidewall be installed in the circular ceiling pocket, considering that the "wall" that the sidewall is installed on is not a straight wall?

Yes, a sidewall sprinkler can be installed along a wall that is not straight such as a circular wall. NFPA 13, 2016 edition, Section 8.7.4 for deflector position from ceilings and walls for standard sidewall spray sprinklers does not include any requirement for the wall to be straight. The intent of the standard is that a sidewall sprinkler be installed along a wall or soffit that will trap the heat from the fire and allow proper activation time for the sprinkler. This can be accomplished with a curved wall.

Question #11 – NFPA 13D in Duplexes

Does a duplex require a riser/system for each of the two dwelling units or can a single riser supply an entire duplex?

Each dwelling unit is required to have an individual control valve in that unit. This requirement is found in Section 6.2.3 in the 2022 edition of NFPA 13D (with similar requirements in older editions.) This in effect means that each dwelling unit will have its own sprinkler system.

There must be a way to isolate the sprinkler system in one unit without having to enter another unit. The reason for this provision is to allow one dwelling unit's sprinkler to remain operational if the system in the other dwelling unit is shut down for some reason.

Question #12 – Idle Pallet Storage

As there is no protection scheme listed for the storage of idle wood pallets in a 45 foot high building, is it not permitted?

No, based upon the requirements of Section 12.12.1.2 in the 2013 edition of NFPA 13, there is no prescriptive criteria to protect indoor storage of idle wood pallets in buildings over 40 feet in height.

- For CMDA sprinklers, table 20.14.1.3(a) lists a maximum ceiling height of 30 feet.
- For CMSA sprinklers, table 20.14.1.3(b) lists a maximum ceiling height of 40 feet.
- For ESFR sprinklers, table 20.14.1.3(a) lists a maximum ceiling height of 40 feet.

One reason for this limitation is the severe fire challenge that idle wood pallets can present. As the Annex states in A.12.12, stacks of idle pallets are one of the greatest challenges to sprinklers. The undersides of the pallets create a dry area on which a fire can grow and expand to adjacent pallets. This process will continue until the fire bursts through the top of the stack. At this point, it may not be possible for ceiling sprinklers to control this high challenge fire. Due to the severe fire conditions possible with idle pallet storage, the rules of Section 12.12 are used to mitigate these challenges. A protection criterion outside those listed in this section would be outside the scope of NFPA 13.

Finally, NFPA 13 does not include a prescriptive alternative design criteria for this situation.

Training and Education

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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

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National Fire Sprinkler Association
514 Progress Dr, Ste A,
Linthicum Heights, MD 21090
1-800-683-NFSA (6372)

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