NFSA The Voice of the Fire Sprinkler Industry TechNotes

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Best of June 2016

Following are a dozen questions answered by the engineering staff as part of the NFSA's Expert of the Day (EOD) member assistance program being brought forward as the "Best of June 2016." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to eod@nfsa.org and the EOD will get back to you.

It should be noted that the following are the opinions of the NFSA Engineering Department staff, generated as members of the relevant NFPA 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 and should therefore not be considered, nor relied upon, as the official positions of the NFPA or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 – Standpipe System in High-Rise Application

There is a manufacturing facility where the highest occupiable floor is approximately 155 feet above the lowest level of fire department vehicle access. The automatic water supply is capable of supplying the most demanding sprinkler system. However, the water supply is not capable of supplying the standpipe demand. The standpipe demand is approximately 190 to 200 psi at the lowest/fire department access level. The governing codes and standards are IBC/IFC (2015) and NFPA 14 (2013). Is it permissible for a combined system to be automatic with respect to the sprinkler system but manual with regard to the Class I wet standpipe system?

Answer: No, this is not permissible in the case of a high-rise building. That configuration is permissible, however, in a building not classified as a high-rise as per NFPA 14 Section 5.4.1.1 but prohibited in high-rise by Sections 5.4.1.2 and 5.4.1.2.1. It appears the scenario at hand is a high-rise building, which would require the standpipe system to automatic.

Question 2 – Sprinkler Pipe Supporting Sprinkler Pipe

In a compartment, sprinklers are being installed at multiple levels. Is it acceptable to support sprinkler pipe from another sprinkler pipe?

Answer: Yes, sprinkler piping can be hung from other sprinkler system piping. Annex section A.9.1.1.8.1 of NFPA 13 (2016) states "...NFPA 13 provides the option to support sprinkler piping from other sprinkler piping where the requirements of 9.1.1.2 are met." Section 9.1.1.2 contains the performance requirements for a hanger. Therefore it must be verified that the structure and the hangers can support the weight of both piping runs. If traditional ring hangers, a common option, do not meet the necessary loads for the scenario, then "heavy duty rings" might be an option as they are produced by a couple of the manufacturers so that the ring size fits appropriately on a smaller diameter pipe but can suspend heavier loads.

Question 3 – Fire Department Connection on Systems with a Fire Pump
Is it acceptable to connect the fire department connection (FDC) to the suction side of a fire pump?

Answer: No, Section 8.17.2.4.8 of NFPA 13 (2016) states, "Fire department connections shall not be connected on the suction side of fire pumps." The concern is that 150 psi is a reasonable pressure to assume the fire department will supply through the FDC and if that pressure is on the suction side of the fire pump then the components downstream would have to be capable of withstanding the cumulative pressure of that provided through the FDC and what the pump produces (net pressure). In most cases this would be more than the 175 psi for which most components in a sprinkler system are rated. While there are components rated for higher pressures, it would mean added cost at the least. It could also mean damage to the system if the components are exposed to these higher pressures and not rated for them. Therefore, the standard requires that the FDC be tied in on the system side (discharge side) of the fire pump to guard against overpressurization.

Question 4 – Sway Bracing Attached to Bottom Chord
It is only indicated that the structure has to be adequate to support the seismic loads of the sprinkler system based on the points of attachment. Does NFPA 13 permit a sway brace to be fastened to the bottom chord of a bar joist?

Answer: Yes, NFPA 13 does not prohibit a sway brace from being connected to the bottom chord of a bar joist. When a sway brace is connected to a structural component, in this case the bottom chord of a bar joist, it must be capable of resisting the anticipated seismic loads as stated in NFPA 13 (2016) in section 9.3.5.1.2:

> *9.3.5.1.2 The structural components to which bracing is attached shall be determined to be capable of resisting the added applied seismic loads.*

In general the entire bar joist including the bottom chord is considered a structural component. The structural engineer and the bar joist manufacturer may be consulted to determine if the specific bar joist is capable of resisting the seismic loads when a brace is connected to the bottom

chord. There are instances when the structure dictates that the system needs to be attached to the top chord.

Question 5 – CPVC in Trash Chutes
Is it permissible to utilize CPVC piping within a trash chute in a residential building designed in accordance with NFPA 13 or NFPA 13R?

Answer: The use of nonmetallic pipe is limited by its listing, and at the present time we are not aware of a listing that would allow such use. To begin with, a trash chute could not be considered as light hazard, defined as an occupancy or portion of an occupancy where the quantity and/or combustibility of contents would be low and fires with relatively low rates of heat release would be expected. And while CPVC has obtained some allowances for use in ordinary hazard areas, such as Section 6.3.10.2 of the 2016 edition of NFPA 13, this allowance is for "ordinary hazard rooms", for which a trash chute seemingly would not qualify.

If the manufacturer of the CPVC piping can provide evidence of a listing that would allow such use, then it could be accomplished in accordance with the applicable NFPA standards.

Question 6 – Sidewall Sprinkler Installed on a Soffit
There is a room that is protected with extended coverage sidewall sprinklers. It is indicated that the sidewall sprinkler is proposed to be installed on a soffit such that it is 8 inches from the wall of the room. According to NFPA 13, can the sidewall sprinkler be installed on this soffit without additional sprinkler required below it?

Answer: Yes. The guidelines for installing extended coverage sidewall sprinklers are found in Section 8.9 of NFPA 13 (2016). Section 8.9.4.1.3.1 states, "Where soffits used for the installation of sidewall sprinklers are less than or equal to 8 in. (200 mm) in width or projection from the wall, additional sprinklers shall not be required below the soffit." Therefore the sidewall sprinkler could be installed on a soffit up to 8 inches from the wall. It should also be noted that the coverage area of the sprinkler would be from the actual wall to its throw distance times the width it is covering.

Question 7 – Sprinkler Piping in Electrical Room
Can sprinkler pipe pass through an electrical room?

Answer: Yes. Piping for a sprinkler system can go through an electrical room. NFPA 70, 2014 Edition, Section 110.26(E)(1)(a) defines a dedicated electrical space as the space equal to the width and the depth of the equipment extending from the floor to a height of 6 feet above the equipment or the structural ceiling, whichever is lower. This section further states that no foreign systems shall be allowed in this zone. As long as the piping does not run through the dedicated electrical space it can go in and out of the electric room without issue. Section 110.26(E)(1)(b)

further goes on to say that foreign systems can be in the area above the dedicated electrical space so long as the electrical equipment is properly protected against leaks or breaks in the foreign system.

Question 8 – Suction Piping Diameter for Fire Pumps
A fire pump, rated for 1000 gpm, would require 8-inch diameter suction piping per section 4.26 of NFPA 20 (2013). It has been noted that the existing piping from the water supply is 6-inch diameter. What portion of the suction piping is required to be 8-inch diameter as specified in section 4.26?

Answer: It is required to provide suction piping to the size specified in section 4.26 for 10 times the pipe diameter upstream of the pump suction flange. This requirement is found in section 4.14.3.3. Therefore, if the pump suction piping is required to be 8 inches, then it is required to be 8 inches for 80 inches upstream from the pump suction flange.

Question 9 – ESFR Sprinklers and Sprinklers below Obstructions
In an ordinary hazard area is using ESFR sprinklers at the ceiling. Would ESFR sprinklers be required under ducts and small equipment platforms (For example a 6 ft x6 ft equipment platform) or could quick response sprinklers be used?

Answer: Section 8.5.5.3.3 in NFPA 13 clearly states that "Sprinklers installed under obstructions shall be of the same type (spray, CMSA, ESFR, residential) as installed at the ceiling except as permitted by 8.5.5.3.3.1." Section 8.5.5.3.3.1 allows the use of quick response sprinklers under overhead doors only. This means ESFR sprinklers are needed below the obstructions per the letter of the standard.

This occupancy in question is ordinary hazard. Since ESFR sprinklers are permitted to protect ordinary hazard occupancies in accordance with Section 8.4.6.6 if designed to meet any criteria in Chapter 12 through 20, and since the thermal response characteristics of ESFR sprinklers basically satisfy the requirement of 8.3.3.2 that where quick-response sprinklers are installed, all sprinklers within the compartment be of the quick response type, one could make the argument that it should be allowed, but this would have to be approved by the authority having jurisdiction (AHJ). However, it should also be recognized that the use of the quick response sprinklers, if approved by the AHJ for under ducts and other obstructions, would limit the ability to return to a higher hazard protection scheme should the occupancy change in the future.

Question 10 – Noncombustible, Limited-Combustible, and Combustible Materials
Please explain the difference between noncombustible, limited-combustible and combustible materials.

Answer: NFPA 13 (2016 and similarly in past editions) defines noncombustible materials in section 3.3.17and limited-combustible materials in section 3.3.16.

> **3.3.17 Noncombustible Material.** A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors, when subjected to fire or heat; materials that are reported as passing ASTM E136, *Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C*, shall be considered noncombustible materials.
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> **3.3.16* Limited-Combustible (Material).** Refers to a building construction material not complying with the definition of noncombustible material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8100 kJ/kg), where tested in accordance with NFPA 259, and includes either of the following: (1) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1⁄8 in. (3.2 mm) that has a flame spread index not greater than 50; or (2) materials, in the form and thickness used, having neither a flame spread index greater than 25 nor evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion, when tested in accordance with ASTM E84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or ANSI/UL 723, *Standard Test Method of Surface Burning Characteristics of Building Materials*.

Therefore, materials would have to meet these definitions to be considered limited- or non-combustible. The definitions are tied to the heat given off of the products as well as the ability of fire to spread over/through the materials. There is no definition for combustible, so anything not meeting either of these definitions would be considered combustible. There is an exhaustive list to what is combustible or non-combustible, however gypsum board is what we typically think of in regards to limited-combustible.

Question 11 – K-5.6 In-Rack Sprinklers

An in-rack sprinkler system is being installed. It has been indicated that Chapter 16 of NFPA 13, 2007 Edition is being applied for this in-rack sprinkler system. Specifically, you have asked if standard spray sprinklers that are standard response with a K-factor of 5.6 are acceptable for use in the racks.

Answer: Yes. Section 8.13.2.1 in NFPA 13, 2007 Edition, states, "Sprinklers in racks shall be ordinary-temperature standard-response or quick-response classification with a nominal K-factor of K-5.6 or 8.0, pendent or upright." The type of sprinkler mentioned is the type being used. In addition, the in-rack sprinklers are permitted to be ordinary temperature according to Section 8.13.2.1.

In more recent editions of NFPA 13, the same concept is still found in Section 8.13.2.1. Yet, the K-11.2 sprinkler has been included in the list as an option.

Question 12 – Three (3) Times Rule and Columns

The "Three (3) Times Rule" in NFPA 13, which spaces sprinklers near obstructions such that water can reach two sides of the obstruction, is one of the obstruction guidelines. Extended coverage sprinklers are being used in this scenario. Does a 3-foot wide column still only require 36 inches between the column and the sprinkler?

Answer: Per the letter of the standard, the answer is "yes." However, this is only because you have cited an older edition of NFPA 13. The Committee has recognized that a cap on the distance between a large obstruction and a sprinkler may not be the best protection scheme for large vertical obstructions, such as columns. Testing was done to further evaluate how much space did not receive direct water application and its impact. Below is the new language from the 2016 Edition:

> **8.8.5.2.1.3*** Unless the requirements of 8.8.5.2.1.4 through 8.8.5.2.1.8 are met, sprinklers shall be positioned away from obstructions a minimum distance of four times the maximum dimension of the obstruction (e.g., truss webs and chords, pipe, columns, and fixtures) in accordance with Figure 8.8.5.2.1.3(a) and Figure 8.8.5.2.1.3(b).
> **(A)** The maximum clear distance required to obstructions in the horizontal orientation (e.g., light fixtures and truss chords) shall be 36 in. (900 mm).
> **(B)** The maximum clear distance shall not be applied to obstructions in the vertical orientation (e.g., columns).

When obstructions are large and earlier editions of NFPA 13 are utilized, it should be recognized that the Committee has done research and modified this requirement.