NFSA The Voice of the Fire Sprinkler Industry TechNotes

Editor-Victoria B. Valentine, P.E. **Issue #326** **September 8, 2015**

Best of August 2015

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 August 2015." 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 a formal interpretation in accordance with the NFPA Regulations Governing Committee Projects and should therefore not be considered, nor relied upon, as the official position of the NFPA or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 – Sealing Piping Penetrations
Fire sprinkler piping crosses from one compartment within a building into others. Do all fire sprinkler piping penetrations through fire rated assemblies have to be sealed with a listed firestop material?

Answer: No, it is not always required to provide caulking or other sealants around fire sprinkler penetrations. The International Building Code (IBC), 2012 edition, Section 714.3.2 Exception 5 and Section 714.4.1.2 Exception 5 states that membrane penetrations by fire sprinklers are not required to be caulked as long as the fire sprinkler penetration is covered by a metal escutcheon plate. If, however, the sprinkler penetration is a through penetration (i.e. a penetration that goes directly from one room to another) this exception would not apply. Almost all ceiling penetrations are membrane penetrations (a penetration that goes from within the wall or ceiling into a single room) and thus do not require caulking.

Question 2 – Hose Connection Location
In recent editions of NFPA 14, the location of hose connections in stairwells has moved. At times, the requirement is for hose connections to be located on the main landing and other times the requirement is for the hose connections to be on the intermediate landings. What is the justification for the change in location?

Answer: The simplest explanation is that the committee members have modified the location based on proponents presenting the change to the group. In general, the fire service has

advocated for the hose connections to be located on the intermediate landing. Typically, the contractors and building owners have advocated for the hose connections to be located on the main floor landing along with the combined sprinkler/standpipe riser. Similar changes in location can also be seen in the IBC and IFC. However, regardless of the position of the code (IBC, NFPA 101/5000) or standard (NFPA 14) both provide a way for the authority having jurisdiction (AHJ) or code official to make the determination of the hose connection location. Unfortunately for contractors, this is not a consistent practice among the fire service or code officials and each jurisdiction has to be consulted on a job by job basis.

Question 3 – Sprinklers Under Overhead Doors
Sprinklers are required to be located below overhead doors. Do these sprinklers have to follow the spacing and location criteria for the occupancy of the space? For example, if the space is ordinary hazard, would sidewall sprinklers protecting under the door need to be listed and spaced for ordinary hazard protection?

Answer: No, the purpose of the sprinkler is to provide some flow of water under the door when the door is in the open position. It is not a requirement for these sidewall sprinklers to be spaced or to flow the same density as the ceiling sprinklers. The space below the door(s) would still be within the protection area of ceiling sprinklers which would need to be spaced and flow at the appropriate density for the hazard of the space.

Question 4 – Vertical Turbine Irrigation Pump
A sprinkler system installed at a golf course clubhouse is supplied from the same pump and water supply as the course irrigation system. The pump is a vertical turbine style fed from a million gallon pond. The authority having jurisdiction (AHJ) has declined to issue a certificate of occupancy on the grounds that the pump supplying the sprinkler system is not a listed fire pump. You have referenced NFPA 20 (2010) A.4.7.1, which states, "This subsection does not preclude the use of pumps in public and private water supplies that provide water for domestic, process, and fire protection purposes. Such pumps are not fire pumps and are not expected to meet all the requirements of this standard. Such pumps are permitted for fire protection if they are considered reliable by the analysis mandated in Section 4.6. Evaluating the reliability should include at least the levels of supervision and rapid response to problems as are typical in municipal water systems." Would the vertical turbine pump meet the intent of NFPA 20?

Answer: No the pump would not comply with NFPA 20 unless the existing vertical turbine is acceptable to the AHJ as being of comparable design, installation, and maintenance to a listed fire pump. The Annex A commentary is not enforceable as part of the standard. Section A.4.7.1 is intended to reflect situations where the water supply is provided by public or private water utilities as part of a large, typically domestic, water system where the reliability of the system is expected to be very high. Pumps in those systems, although not generally listed for fire service use, are designed, installed, and maintained for high reliability and, of necessity, promptly repaired or replaced when deficiencies occur. Although one might expect a better than average level of care to be provided for a pump supplying a golf course irrigation system during the playing season, it might not reasonably be considered equivalent to a pump in a public or private domestic water utility.

Question 5 – Fire Department Connection Location
There is a manifold on a wet pipe system which feeds seven (7) separate systems. Where should the Fire Department Connection (FDC) be located on a manifold system?

Answer: The FDC should be connected between the water supply control valve and the system control valves. Although the FDC is typically connected on the system side of the system valves for wet pipe systems, this requirement has an exception for multiple systems to allow a single FDC connection to serve all the systems. This allows for the fire department to have one connection point for any of the systems in a building should there be a fire incident.

This requirement is found in NFPA 13 in section 8.17.2.4.3 which states:

> *For multiple systems, the fire department connection shall be connected between the supply control valves and the system control valves.*

Question 6 – Hydraulic Calculations with a Fire Pump
Flow test data will not be available for a site for 4 weeks. Calculations were submitted based solely on the fire pump curve for the system. Are hydraulic calculations based only on the fire pump rating and not the water supply information acceptable as a worst case scenario for a building?

Answer: No, this calculation is not acceptable on its own. If the system is being served by a city water system, the city water supply data must be included in the calculations.

The fire pump alone may provide sufficient pressure for the system but it will be the connected water that supplies the flow. A calculation without the city water supply will not prove that sufficient flow is available. Also, most water utilities require that at maximum flow of the fire protection system, the residual pressure is not below 20 psi. They rely on the hydraulic calculations to prove this.

In addition, without the city water data, it will not be known if the fire pump will over-pressurize the system. For example, if the pump produces 115 psi at the system demand, and the water supply is 70 psi at the same demand, the discharge pressure at the system would be 185 psi. This could be above the rated pressure rating of the system components.

Question 7 – Standpipe Riser Size
Sections 7.6.1 and 7.6.2 of NFPA 14 state that the minimum standpipe size shall be 4-inches and that the minimum combination standpipe size shall be 6-inches. In addition, Section 7.6.3 states that "When a building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13 or NFPA 13R, that the minimum standpipe size shall be 4-inches for systems hydraulically calculated in accordance with 7.8.1". Is it the intent of the standard to require a minimum 6-inches on combination standpipe systems regardless of hydraulic calculations for the system?

Answer: No. A 4-inch riser pipe is permitted for combination standpipe and sprinkler systems as long as the hydraulic calculations show that the system demand can be met. Section 7.6.2 is in

the standard for standpipes that were permitted to be designed as pipe schedule systems. The concept of pipe schedule standpipe systems has been removed from the standard, so this section does not really apply to systems today. Assuming the system is hydraulically calculated and the building is fully sprinklered, the applicable section would be 7.6.3 and the minimum allowed size of the combined standpipe would be 4-inches.

Question 8 – Sprinklers in Skylights
A retail space has been planned to be protected as Ordinary Hazard Group 2 (OH2). The floor is completely protected with sprinklers at the main ceiling level. Under NFPA 13, it has been determined that the skylights, each 8 ft by 20 ft, will have to have sprinklers installed within them. There are two skylights with this area of 160-square-feet each. Can the skylights be protected as light hazard as the floor area below is completely protected with sprinklers at the lower elevation?

Answer: No. The skylight is not a separate area should a fire incident occur. Since the hazard classification for the area is OH2, it would still need to be protected as OH2. Based on the area noted for each skylight, when standard spray sprinklers are used this means at least 2 sprinklers would be needed within the skylight to properly protect it.

Question 9 – Protecting Below a Porte Cochere
A 4-story motel building is being protected by a NFPA 13R sprinkler system. There is a porte cochere at the lobby entrance. The porte cochere is physically detached but may be considered attached by the building code due to its close proximity to the main building. The building is of Type V construction. Are sprinklers required under the porte cochere according to NFPA 13R?

Answer: No, even if the porte cochere is considered to be attached, sprinklers under the porte cochere are permitted to be omitted per Section 6.6.5. The exception noted in Section 6.6.5.1 for Type V construction does *not* apply because the porte cochere serves the common lobby area; not a dwelling unit.

Question 10 – Return Air Plenum
Are there any special considerations for sprinklers and piping installed in concealed spaces where that space is acting as an HVAC return plenum?

Answer: No, sprinklers are commonly installed in air plenums without any special considerations. Normal air flow in plenum spaces is not anticipated to be sufficient to present a problem for sprinkler activation. The usual considerations for maximum anticipated normal ambient temperatures should be observed when selecting sprinkler temperature response characteristics.

Where listed pipe is used within air plenums, the manufacturer's installation instructions should be consulted for any special considerations for installation within plenums. For example, CPVC pipe is typically permitted to be installed within plenum spaces but has restrictions on its proximity to return air openings. Also, where CPVC is used in any concealed space *requiring sprinklers*, the piping must be protected in accordance with the pipe listing or in accordance with the listing for special application concealed space sprinklers.

Question 11 – Hangers Attached to Metal Deck
A project has a metal roof deck. Hangers are being installed on 1 inch unsupported armover in accordance with Section 9.2.3.5.2 of NFPA 13. Is the roof deck required to carry the 250 lb load mentioned in Section 9.1.1.2 (1), or would it be excluded per Section 9.2.1.3.1?

Answer: The metal roof deck is not required to carry the additional 250 pound load. The metal roof decks are exempted from this requirement in Section 9.2.1.3. It states that the building structure must support the weight of the water-filled pipe plus 250 lbs at the point of hanging except where permitted by Section 9.2.1.1.2, 9.2.1.3.3 and 9.2.1.4.1. Section 9.2.1.4.1 handles metal decks. It indicates that metal decks may be used to support branch line hangers for pipe 1 inch or less. Based upon the information provided, it meets the requirements of this exception in 9.2.1.4.1 and the additional 250 lb is not required to be accounted for by the building structure under this exception.

Question 12 – Quick Response Sprinkler Area Adjustment
A water curtain is installed an elevation change in a ceiling of a large room. The low side elevation is 11 ft. The high side elevation is 22 ft 3 inches. When calculating the area near the water curtain for the lower elevation side, can the quick response sprinkler area reduction be taken based on the 11 ft ceiling height?

Answer: Yes. The quick response sprinkler area reduction in Section 11.2.3.2.3.1 in NFPA 13 can be used as long as all of the conditions are met. When calculating the area plus the water curtain as noted in Section 11.3.3.4, the quick response reduction would still be permitted. Of course, this means that if an area under the higher elevation could operate the water curtain and that area per Section 11.3.3.3 then this will most likely be more demanding since it is too tall for the quick response area reduction.