NFSA The Voice of the Fire Sprinkler Industry TechNotes

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Best of April 2015

Following are a dozen questions answered by the engineering staff as part of the NFSA's EOD member assistance program being brought forward as the "Best of April 2015." If you have a question for the NFSA Expert of the Day (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 - Forward Flow Test for Backflow Preventer
There is a project that plans to utilize a hydrant downstream of a backflow preventer as the means to perform a forward flow test on the backflow preventer. Is this method acceptable as a means to perform the forward flow test of the backflow preventer per NFPA 13?

Answer: Yes, a hydrant located downstream of the backflow would be an acceptable method to perform a forward flow test on a backflow preventer.

The intent of section 8.17.4.6.1 in NFPA 13 (2013) can be achieved by any outlet downstream of the backflow device that can be opened to achieve the flow demand of the sprinkler system. This outlet can be a test header, a bypass around the check valve in the FDC line, a closed loop around the backflow device with a pump and sight glass or any other method that that would move the amount of water needed by the sprinkler system. The point is to exercise the springs in the backflow device and flowing through a hydrant downstream of the backflow would achieve this.

This is not intended to be a burdensome requirement. There are no complicated calculations that need to be made. It is only required to provide something downstream of the backflow device that can be opened to achieve the flow demand of the sprinkler system.

Question 2 - **Manual Standpipe Flow Test**
Is it the intent of section 6.3.1 of the 2014 edition of NFPA 25 to conduct a flow test every 5 years on a manual standpipe system?

Answer: Yes, in accordance with 2014 edition of NFPA 25, it is the intent of the standard to conduct flow tests on all Class I and Class III standpipes, including manual standpipes. Prior to the 2014 edition of NFPA 25, section 6.3.1 read "A flow test shall be conducted every 5 years on all Class I and Class III automatic standpipe systems...". The most recent edition removed the word "automatic" in order to apply to all types; automatic, semi-automatic and manual. This is to ensure that required flow and pressure are available at the hydraulically most remote hose valve outlet(s) and would be applicable for both pipe schedule and hydraulically designed systems.

Question 3 - Combustible Concealed Space
Is the intent of the standard to permit sprinklers to be omitted from combustible concealed spaces in soffits, eaves, etc. if they meet just one of the four elements listed under NFPA 13 Section 8.15.1.2.18?

Answer: No. The answer is that all four elements must be satisfied to permit sprinklers to be omitted in accordance with this section. In order to omit sprinklers in combustible soffits, eaves, etc, all of the following conditions must be met:

1. They shall not exceed 4 feet in width.
2. They shall be draftstopped with a material equivalent to that of the soffit, into volumes not exceeding 160 cubic feet.
3. They shall be separated from the interior of the building by walls or roofs of noncombustible or limited combustible construction.
4. They shall have no openings or unprotected penetrations directly into the building.

It should be noted that the 2013 edition of NFPA 13 mistakenly did not include the charging statement from the 2010 edition. This statement reads "Sprinklers shall be permitted to be omitted from within combustible soffits, eaves, overhangs and decorative frame elements that are constructed in accordance with 8.15.1.2.18.2 through 8.15.1.2.18.5".

This oversight will be corrected in the 2016 edition and will clarify that all four elements must be met in order to omit sprinklers in accordance with this section.

Question 4 - Domestic Connection in NFPA 13R
There is an application where an engineer is calling for a domestic fixture to be connected to the remote end of the multi-family residential fire sprinkler system to induce periodic flow in the fire sprinkler piping network. This remote connection is intended to prevent freezing and to relieve excess system pressure. This is similar to a "passive purge system" as allowed by NFPA 13D.

Is this "passive purge" connection permissible under NFPA 13R?

Answer: No, NFPA 13R does not provide for this kind of connection. Passive purge is permitted in NFPA 13D systems largely because these systems are permitted to utilize lower maximum operating pressures. NFPA 13D allows the piping and fittings to be designed to withstand a working pressure of 130 psi maximum in a passive purge type system. The maximum operating pressure of 175 psi required by NFPA 13R makes connection of such system to domestic fixtures problematic.

It should be also be noted that "passive purge" is also not a permissible method to protect pipes from freezing under NFPA 13R. Section 5.4.2 of NFPA 13R states that piping in areas that cannot be maintained above 40°F (4°C) shall be protected by use of one of the following methods:

(1)* Antifreeze system using a listed antifreeze solution in accordance with NFPA 13
(2) Dry pipe system
(3) Preaction system
(4) Listed dry pendent, dry upright, or dry sidewall sprinklers extended from pipe in heated areas
(5) Heat tracing in accordance with 6.7.2.2

Question 5 - Extending the Hydraulic Calculation Area
This question deals with performing hydraulic calculation in a large room with differing ceiling heights. This room is classified as Ordinary Hazard. The primary portion of the room has a ceiling height in excess of 20 ft which would not allow for the use of the quick response reduction rule (Section 11.2.3.2.3) but a portion of the room has a ceiling height of 8 ft which would allow for the use of the quick response reduction rule.

The primary hydraulically remote area has been calculated without using the quick response reduction and an additional calculation was performed under the lower ceiling using the quick response reduction. Does the calculation under the lower ceiling have to be extended 15 ft into the higher ceiling area as stated in section 11.1.2 of NFPA 13? Also, does the calculation have to be adjusted in the primary room to include 15 ft of the lower ceiling as stated in this section?

Answer: The answer is "no" for both situations. Section 11.1.2 requires that when the there are two different adjacent hazards or two different design methods that are not separated by a barrier, then the more demanding criteria shall extend 15 ft into the adjacent area. This is not applicable in this situation as: both areas are the same hazard classification and the same design method (Density / Area method) is being used for both calculations. The quick response reduction is not a different design method and is still considered the Density / Area method.

Question 6 - Open Parking Garage
There is an open parking garage being protected with a standpipe in accordance with NFPA 14. Does the piping have to be galvanized steel pipe for this system?

Answer: No. Section 6.1.2.4 of NFPA 14 only requires a corrosion-resistive coating on piping that is exposed to the weather. Open parking garages are not considered open, as in open to the weather, but their openings are large enough and frequent enough to change their height, area, sprinkler requirements, etc. in the building code. There may be some areas of an open parking garage that are exposed to the weather, such as the top tier that is usually without a roof. Just because it is an open parking garage would not mean all standpipe piping is required to have corrosion protection. Piping that is protected, according to NFPA 14, Section 6.1.2.4, could be painted piping or other means to protect; galvanized piping is not the only option.

Question 7 - Pipe in Trenches
In reference to section 10.6.2 (2) of NFPA 24, and the phrase "Running pipe in covered trenches," does it means they need to be in an accessible trench to be periodically inspected?

Answer: Yes. This language has been clarified in the proposed language for the 2016 edition of NFPA 24. There is a proposed new section 10.4.3 Private Fire Service Mains under Buildings, and specifically a section 10.4.3.2.2 which states the following:

10.4.3.2.2 *It shall be acceptable to install the piping in covered trenches where the trenches are accessible from within the building.*

The intent here is that when the piping is installed under the building, that it would be accessible for maintenance and repairs in case leaks occur. A leak in an underground main under a building could compromise the integrity of the buildings foundation, and therefore needs to be accessible.

Question 8 - ESFR Sprinkler Storage Heights
In chapter 14 of NFPA 13, Table 14.4.1 includes criteria for a maximum ceiling height of 32-feet with a maximum storage of 25-feet for ESFR sprinklers. Yet there is no data for K-25.2 and K-22.4 sprinklers. Can the criteria for a 35-feet maximum ceiling height with 30-feet maximum storage height be used for a K-25.2 sprinkler with a minimum 20 psi to protect 25 feet of storage under a 32-foot high ceiling?

Answer: Yes. Any set of criteria is permitted for protecting a space as long as it does not exceed the maximum values permitted for height and the system can provide the hydraulic demand. The column titled "Maximum Storage Height" and "Maximum Ceiling/Roof Height", permit heights less than the maximum. Therefore, if the storage height or ceiling height exceeds the maximum heights for one set of design criteria, the next range of design criteria which would not exceed the maximum heights would have to be used.

The parameters in Table 14.4.1 for ESFR sprinklers are based on full-scale fire testing performed by various fire protection groups over the years and submitted to the Committee for inclusion in the standard.

The reason there is no criteria for K-22.4 and K-25.2 k-factor sprinklers at 32-feet maximum ceiling height with maximum 25-feet storage height is because there was no testing presented to the committee for that specific criteria. Ceiling height is one of the most critical parameters when dealing with ESFR sprinklers, as they are designed to suppress the fire by having the water droplets penetrate the fire plume. Higher ceiling heights will allow more time and distance for the water droplet to evaporate, preventing it from penetrating the fire plume. However, it may also be that criteria for that height arrangement requires the same amount of water as a greater height and is therefore only listed in the table once.

Question 9 - Omitting Sprinklers in Bathrooms
A multi-story residential building is being built and within certain dwelling units there are unique bathroom arrangements that have a sliding pocket door separating the shower from the vanity and toilet area. Both spaces meet the NFPA definition of a compartment. Each compartment is individually less than 55-square-feet but combined would be over 55-square-feet. Per section 8.15.8.1.1 can sprinklers be omitted from these compartments?

Answer: Yes, it is acceptable to omit sprinklers from neighboring bathroom compartments. Per NFPA 13 it is not required by the letter of the standard to include sprinklers within these bathroom compartments that are under 55-square-feet based on the definition of a bathroom and annex language associated with it.

It should be noted that the language in Section 8.15.8.1.1 specifies that this exception would only apply to hotels and motels. However, this was language that was introduced to the 2013 edition of NFPA 13 and is proposed to be removed from the 2016 edition of NFPA 13 per First Revision No. 149. The substantiation for F.R. 149 is that the bathroom exception has been around since 1991 and that there was no technical fire data provided when it was limited to hotels and motels in the 2013 edition. If your jurisdiction currently adopts the 2013 edition of NFPA 13, a conversation could be had with your local authority having jurisdiction (AHJ) to allow for a variance based on the aforementioned revisions.

Question 10 - Car Stackers
Recently, there have been multiple projects which utilize car stackers, two- and three-car high arrangements, in regular parking garages. Can you provide information on whether NFPA will be addressing this? Is there a criterion in the meantime for protecting these types of projects?

Answer: There have only been conversations on car stackers two high at this point. This was discussed by an article written by Ken Isman in the 2007 March/April edition of NFSA's SQ Magazine. The NFSA's Engineering and Standards committee also discussed this at their March 19th, 2014 meeting and it was decided that in lieu of other design criteria, a double layer car storage should be protected by Extra Hazard Group II criteria. The rationale for this was the presence of shielded combustibles by the car. Following the discussions by the Engineering and Standards Committee, the NFSA has submitted annex language in the upcoming 2016 edition of NFPA 13 under A.5.4.2 which includes car stackers two high to fall under Extra Hazard Group II. We should know by July, 2015 weather this language is accepted into the standard.

Question 11 - Hydraulic Information Sign
A client has a multistory building fed by one riser. Each floor has its own system comprised of a floor control valve assembly. Hydraulic data is clearly posted on the riser but not on each system as noted in NFPA 25, 2011 edition, Section 5.2.6 Hydraulic Design Information Sign. It states, "The hydraulic design information sign for hydraulically designed systems shall be inspected quarterly to verify that it is attached securely to the sprinkler riser and is legible." Should there be a data plate on each system?

Answer: Yes, there should be a hydraulic design information sign for each system. As-built drawing often become lost or misplaced over time. By keeping a permanent record of the design parameters attached to the system riser, as required by Section 25.5.1 of NFPA 13, it is much easier and less costly to perform modifications or work on the system in the future. This is the best way to maintain record of each systems characteristics as individual floors may alter their protection scheme under new tenants. Each system is

required to perform their own set of hydraulic calculations which should be recorded on its hydraulic design information sheet.

Question 12 - Hydrostatic Test for a System Addition
This question references NFPA 13 criteria for hydrostatically testing systems when modifications or additions to the system. You have noted that Section 25.2.1.4 in the 2013 edition allows for the hydrostatic test to be done at system working pressure when 20 or fewer sprinklers are affected. Is there a time duration for maintaining the pressure?

Answer: No, there is not specific time duration to maintain. System working pressure is defined in Section 3.3.23 as "the maximum anticipated static (nonflowing) or flowing pressure applied to sprinkler system components exclusive of surge pressures and exclusive of pressure from the fire department connection." Therefore, once the valve to the water supply is opened and the system is charged, that is the working pressure that the piping network must be capable of carrying. If the piping is filled and no leaks are found, then it would pass the hydrostatic test.