NFSA The Voice of the Fire Sprinkler Industry TechNotes

Editor-Victoria B. Valentine, P.E. Issue#332 October 13, 2015

Best of September 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 September 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 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 – Water Supply Demand for a Combined System
A fire sprinkler system and a standpipe system are combined to serve a building. Section A.11.1.5.6 in NFPA 13, as well as Section 7.7.3 in NFPA 14, have been referenced. The standpipe system is a manual wet system. Specifically, does the automatic water supply need to support the standpipe system demand?

Answer: When an automatic water supply is provided to supply the sprinkler system, it must meet the system demand based on the hydraulic calculations. For the water in a manual wet standpipe, the attached water supply is not required to satisfy the demand of the standpipe system per Section 7.7.3 of NFPA 14. In addition, Section 11.1.6.4(1) of NFPA 13 specifically says that the sprinkler system demand is not required to be added to the standpipe demand for combined systems. The intent with a combined system is that the standpipe demand is to be calculated separately from the sprinkler demand. The automatic water supply would meet each of the demands individually.

Question 2 – Hose Stream for a Combined System
An automatic sprinkler system and a manual wet standpipe system are combined in a building. When calculating the hydraulics for the fire sprinkler system, does 100 gpm get added as an inside hose allowance based on the manual wet standpipe system?

Answer: No. A combined standpipe and sprinkler system would not require inside hose stream to be added to the fire sprinkler hydraulic calculations. There is no inside hose allowance

required because of the presence of the manual wet standpipe system. If there were other hose connections required on the premises by the authority having jurisdiction, then inside hose would be added to the fire sprinkler calculations.

Question 3 – Multiple Obstructions
NFPA 13 provides guidance on locating sprinklers below obstructions wider than 4 feet. Sometimes there are smaller multiple obstructions. Are there any guidelines requiring the installation of sprinklers under these multiple obstructions such as walkways and decks that are less than 4 feet wide?

Answer: No. There are no specific requirements in NFPA 13 to locate sprinklers below these multiple small obstructions. This has been discussed by the NFPA 13 committee numerous times but no specific guidelines were agreed upon. The standard cannot address every possible circumstance and relies on a thoughtful case by case analysis. It remains a question of judgment whether to treat multiple small obstructions individually or as a single obstruction. There is no direct guidance on this matter from the standard, only the performance objective presented in Section 8.5.5.1, which states, "Sprinklers shall be located so as to minimize obstructions to discharge as defined in 8.5.5.2 and 8.5.5.3, or additional sprinklers shall be provided to ensure adequate coverage of the hazard. (See Figure A.8.5.5.1.)."

Question 4 – Fire Pump Check Valve Inspection
NFPA 25 Section 13.4.2.1 was referenced. It has been noted that the fire pump is required to have an annual full flow test, which will verify that the check valves do open. Is it the intent of the referenced section to require fire pump check valves to be inspected internally given the annual testing?

Answer: Yes, the intent of the internal inspection is to verify the condition and proper operation of the valve as well as provide an opportunity for any needed maintenance. While a flow test might reveal that a check valve is not opening properly, it will not necessarily demonstrate that it is closing properly or that it does not have pending issues due to corrosion or debris that might cause the valve to fail in the future. Therefore, the check valves should undergo the internal inspection every 5 years.

Question 5 – Auxiliary Dry Pipe System
There is a gridded wet pipe sprinkler system planned. Can a dry pipe sprinkler system be installed off of this system?

Answer:
Yes, NFPA 13 permits a dry pipe system to be supplied from a gridded wet pipe system. However, the dry pipe system cannot itself be a gridded system configuration. The dry pipe system would also need to follow all of the rules necessary for a dry pipe system in the standard.

Question 6 – Number of Sprinklers Calculated in NFPA 13R

NFPA 13R permits the hydraulic calculations to have an area including the sprinklers in a compartment up to four sprinklers. Are there situations following NFPA 13R that would require more than four sprinklers to be calculated?

Answer: Yes. The four sprinkler calculation applies to most of the areas protected with NFPA 13R, but there may be specific occasions outside the dwelling unit that would have more than four sprinklers in the design area.

Section 7.2 addresses sprinklers outside the dwelling unit. Section 7.2.2 states that unless the area is 500 square feet or less (in 7.2.2.1 and 7.2.4 both have a four-sprinkler design) the design criteria are found in NFPA 13. The annex note of 7.2 states that the reference from NFPA 13R to NFPA 13 is for the sprinkler discharge and positioning. If the sprinklers are installed outside the dwelling unit and the area exceeds 500 square feet, there may be more than four sprinklers in the design area.

Question 7 – Control Valve Location

All fire sprinkler systems according to NFPA 13 need to have a control valve. In new installations, are the control valves required to be in a certain location or have a specific clearance?

Answer: No. NFPA 13 requires control valves to be "located where accessible and free of obstructions," in Section 8.16.1.1.7 of the 2013 edition. Exact placement and clearance distances have not been specified as they could change from one valve to another. In general, there needs to be space to work around the valve as well as perform inspection, testing and maintenance over the life of the valve. In addition, enough space to remove the valve and replace it, should it no longer function, needs to be considered. The intent of the standard here is functionality of the space as opposed to an exact measurable distance. It may also be beneficial to review manufacturer literature for recommendations.

Question 8 – Flow Velocity for Underground Pipe

Underground pipe is handled separately from aboveground pipe. Are there any fire protection standards that impose a maximum flow velocity in underground pipe?

Answer: No, NFPA standards do not impose a maximum flow velocity on underground fire protection piping. Velocity limits are typically imposed to reduce wear on piping from the constant flow of water. This is generally not considered an issue with fire protection piping as it typically only flows during testing and activation. In practice, systems designed to operate at reasonable pressures and volumetric flows for fire protection will also have acceptable flow velocities for fire protection. However, specific velocity limits may be imposed by project specifications, manufacturers' literature, or AHJs based on potential scouring of lining materials, restraint, or other concerns.

Question 9 – Restraining Sprigs

As part of the hanging rules, NFPA 13 Section 9.2.3.7 requires that sprigs longer than 4 ft be restrained against lateral movement. Can the information provided for seismic restraint in

Section 9.3.6 and the corresponding appendices be used to provide the lateral restraint required by Section 9.2.3.7?

Answer: Yes, Section 9.3.6 highlights methods of restraint against horizontal seismic forces, which is a type of lateral movement. Acceptable methods of restraint are those acceptable to the AHJ. Many AHJs will use the methods in Section 9.3.6 as examples to determine if a restraint is acceptable. Common options appear in the list, but "other approved methods" is also noted. This just shows that other methods, when acceptable, can be used.

Question 10 – Storage of Aerosol Products

A facility is storing aerosol products on racks. Following NFPA 30B, Tables 6.4.2.7 (e) through 6.4.2.7 (l) have protection criteria for ESFR sprinklers at the ceiling. In some of the scenarios in-rack sprinklers are also required. NFPA 13 is referenced in Section 6.4.2.9 for in-rack sprinkler installation. Scenarios are presented in Section 6.4.2.9.1 for hydraulic demands. Do the in-rack and ceiling sprinklers require a balanced simultaneous demand as per NFPA 13?

Answer: Yes, since NFPA 30B refers back to NFPA 13 and section 6.4.2.9.1 states that the in-rack sprinkler demand is based upon the simultaneous operation of the most remote sprinklers as follows:

(1) Sprinkler design parameters shall be in accordance with the protection tables.
(2) In-rack design flows indicated in table 6.3.2.7(e) through 6.3.2.7(l) with the end sprinkler discharge 15 psi or greater
(3) .....

The wording of these two sections would indicated that the in-rack water demand must be added to the ceiling demand and balanced in accordance with NFPA 13 Section 23.8.

Question 11 – Sprinkler in Small Space

Modifications were made to a building. There is a situation where the installation of noncombustible double doors in front of a trash chute has created a compartmented space. This space has a depth of 7-inches wide by 7-feet long between the doors and the face of the trash chute which is finished with drywall. Does this narrow area need a sprinkler?

Answer: Yes. NFPA 13 requires "all areas except where specific sections of this standard permit the omission of sprinklers". Common small spaces that permit sprinklers to be omitted are concealed spaces. However, the described space is part of the occupied space. There is no section in NFPA 13 that would apply to this specific area, as it is an accessible area, so a sprinkler is needed.

Question 12 – Noncombustible Balcony

NFPA 13 does not require sprinkler protection of balconies of noncombustible construction. However, many residential units have balconies where occupants then place furniture and belongings on them. Does the presence of furniture require noncombustible balconies to have sprinklers installed?

Answer: No. NFPA 13 evaluates sprinkler installation for balconies based on the construction. Noncombustible construction means a sprinkler would not be required. Furniture is anticipated as a common use of the balcony space. Section A.8.15.7.5 specifically states this intent, "The presence of combustible furniture on balconies for occupant use should not require sprinkler protection".

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Following the September 2015 NFSA Engineering and Standards Committee meeting, an updated version of Question 9 from TechNotes Issue #322 is being reprinted:

Question 9 - Fire Pump Serving Two Buildings
There is a situation where a single fire pump has been installed for a single building and it is being proposed to use the same fire pump and water supply for an additional building. Is it possible for a single fire pump and water supply to supply both buildings?

Answer: Yes, a single fire pump and water supply can be used to protect two different buildings. However, it really depends on the height of the two buildings. NFPA 14 requires a separate fire pump for each zone in Section 7.9.1, unless the lower zones have pressure regulating devices (as described in Section 7.2.4). Also, NFPA 20 requires very tall buildings to have redundant fire pumps in Section 5.6.2.

It should be noted that the fire pump and water supply would have to be sized to serve either buildings' demand. Fire pumps provide the system demand for the buildings served. Each building system is designed for a fire event. For example, a NFPA 13 system is designed for a single fire in a building. If there are multiple buildings on a fire pump, each building has a "single fire" demand. While NFPA 14 does not have the same statement, the premise is the same. The fire pump would need to accommodate the demand of each building (the most hydraulically demanding situation(s)), which is really no different than a public or private water main.