



TechNotes

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Best of October 2014

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 October 2014." If you have a question for the NFSA Expert of the Day (and you are an NFSA member), send your question to cod@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 - Hose Allowance for Combined Systems

A combined system, standpipe and sprinkler systems, was described in a building. It was specifically asked where the hose stream allowance for the sprinkler system should be added into the hydraulic calculations.

Answer: The hose stream would be added at the street level, at a fire hydrant or where the sprinkler piping connects to the public water supply. This would be the same location as if the sprinkler system were a standalone system. Although the two systems share a riser, they are handled independently for their hydraulic calculations.

Since this is a combined sprinkler/standpipe system, a set of calculations for the sprinkler system and a separate set of calculations for the standpipe system in accordance with NFPA 14 will be required. Whichever set of calculations requires the higher demand will have to be supplied. NFPA 13 states in Section 11.1.6.4(1), "The water supply shall not be required to be added to standpipe demand as determined from NFPA 14..."

Question 2 - Water Delivery Time

Does every dry pipe sprinkler system have to have water delivery time calculations?

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Answer: No. Every dry pipe system does not have to have a water delivery time calculation performed. Section 7.2.3.1 in NFPA 13 provides 5 possible options for sizing a dry pipe system. Calculated water delivery time is one option, but there are 4 others. The ways to comply with system size for a dry pipe system are listed below:

1. Water discharged from the inspector's test connection (ITC) in no more than 60 s.
2. Systems up to 500 gallons do not have to deliver water to the ITC in a specified time.
3. Systems up to 750 gallons with a quick-opening device do not have to deliver water to the ITC in a specified time.
4. Calculate the discharge time with a listed program and complying with Table 7.2.3.6.1.
5. Discharge water using the ITC (or manifold) in compliance with the times noted in Table 7.2.3.6.1.

It should be noted that residential dwelling units utilizing a dry pipe system have a lower delivery time of 15 s.

Question 3 - Ceiling Pockets in Adjacent Compartments

An office building was noted to have ceiling pockets near each window of adjacent offices. The space complies with the requirements of Section 8.6.7.2 in NFPA 13, which allows standard spray sprinklers to be omitted from the ceiling pockets. Yet in a plan view the ceiling pockets are closer than 10 feet apart on opposite sides of a wall. Can the sprinkler still be omitted from inside the ceiling pockets?

Answer: Yes. The requirement for keeping unprotected ceiling pockets apart is for when they are within the same compartment. The wall will assist in containing the smoke and hot gasses so that the sprinkler(s) outside the ceiling pocket will operate as intended. The Committee clarified the ceiling pocket language beginning in the 2010 Edition to better relay the intent of distance being maintained between unprotected ceiling pockets when they are in the same compartment.

Question 4 - Replacing Antifreeze in Existing Systems

Is it permissible to replace the antifreeze in an existing system as part of the maintenance for that system?

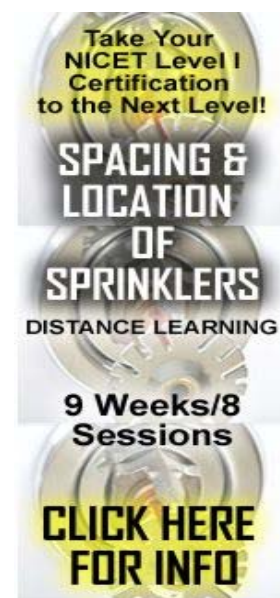
Answer: Yes. It is permissible to continue to use and refill antifreeze in existing antifreeze systems subject to the limitations imposed by NFPA 25, 2014 Edition, Section 5.3.4.2 and its subparagraphs. This applies to systems that were installed before September 30, 2012 and will apply through September 30, 2022 at which time antifreeze solutions must be listed.

When concentrations are tested during their normal maintenance and need to be recharged or following a system activation, the antifreeze solution can be refilled in the system. The limits for antifreeze solution are 50 percent glycerine or 40 percent propylene glycol, both measured by volume. In addition, to comply with the requirements of

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NFPA 25, the solution must be premixed by the manufacturer. The language also notes that higher concentrations have to be approved based on deterministic risk assessment completed by qualified personnel.

Question 5 - Air Supply Plenum for Spray Booth

There is a spray booth that has been sprinklered and installed in accordance with NFPA 33. The building surrounding the spray booth is fully sprinklered per NFPA 13. Does the air supply plenum of the spray booth have to have fire sprinklers in it?

Answer: No. NFPA 13 does not require sprinklers inside of air intake plenums and it refers spray booths to NFPA 33. In reviewing the 2011 Edition of NFPA 33, Section 9.1 states that spray areas shall be protected with an approved automatic fire protection system. The spray area is defined by NFPA 33, Section 3.3.2.3. It includes: (1) any area in the direct path of the spray application process, (2) the interior of a spray booth, (3) interior of exhaust plenum, (4) interior of exhaust duct, (5) interior of air re circulation filter and (6) solvent recovery or concentration unit. The following are not considered part of the spray area: (1) Fresh air make-up units, (2) Air supply ducts and plenums, (3) Re-circulation air supply ducts downstream of secondary filters and (4) Exhaust ducts from solvent concentrator units. Based on the definition, the air plenum would not be required to be sprinklered.

Question 6 - Control Valve on a Dry Manual Standpipe System

A dry manual standpipe system is being installed per NFPA 14. Is the control valve for this manual standpipe required to be monitored?

Answer: No. Section 5.6.1 of NFPA 14 specifically states supervision for the control valve in a dry manual standpipe system is not required. This may seem to contradict Section 6.3.7.1 of NFPA 14, but a dry manual standpipe system is not connected to an automatic water supply. Dry manual standpipes are supplied by the fire department and the valve position is controlled by the fire department. As NFPA 14 does not require supervision on this valve, then certainly the monitoring is not required. Monitoring is required by the building code and only applies when the valves are supervised.

Question 7 - Minimum Design Area for ESFR Sprinklers

There is editorial commentary in the [NFPA Automatic Sprinkler Handbook, 2013 Edition](#), following Section 8.12.2.3.

The commentary includes a statement that ESFR sprinklers require a minimum design area of 960 square-feet per Section 23.4.4.2.1. The reference is to a section on CMSA sprinklers. Is there a requirement for a minimum 960 square-foot design area?

Answer: No. The requirement for a minimum 960 square-foot area when calculating the hydraulics for ESFR sprinklers was eliminated in the 2010 Edition of NFPA 13. The commentary in the handbook should always be regarded as the opinion of the author as it is not



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reviewed by the committee responsible for maintaining the enforceable standard. In this case, commentary referring to an earlier edition of the standard has slipped through the editorial process and appears in the handbook in error.

Question 8 - Fire Pump for a Single-Family Home

A single-family home has residual pressure at the street which was too low to supply the minimum design pressure for the fire sprinkler system designed to NFPA 13D. In lieu of adjusting pipe sizes and using alternate sprinklers, is there an option for boosting pressure, such as a fire pump?

Answer: Yes. NFPA 13D permits several different ways to supply water and pressure to the sprinkler system in a single family dwelling. In Section 6.2, NFPA 13D permits an automatically operated pump to boost pressure, just like a fire pump. However, the fire pump for a NFPA 13D system does not have to be listed. NFPA 13D (Section 5.1.3) specifically states that the fire pump (along with tanks, etc.) is not required to be listed. There are many manufacturers of NFPA 13D pumps and any reliable pump can be used. The horsepower of the pump is going to depend on the system demand, however, a pump for a single family dwelling is typically a 1 ? horsepower pump. The pump needs to be installed according to NFPA 13D Section 6.2.1 or 6.2.2.

Question 9 - Sprinkler Inside Equipment

There is equipment that is self-contained and has access doors for maintenance purposes only. The equipment is quite large. Specifically, it was asked if sprinklers are required to be installed inside the equipment.

Answer: No. Section 8.1.1 (8) in NFPA 13, 2013 Edition, states, "Sprinklers shall not be required to be installed within electrical equipment, mechanical equipment, or air handling units not intended for occupancy." This means that the floor area occupied by the equipment would be protected from the ceiling sprinkler system, but sprinklers would not need to be installed inside of the equipment.

Question 10 - Quick Response Design Area Reduction

A building has a 14-foot ceiling. There are 24-inch solid wood truss members located at less than 3 feet on center and an acoustical tile ceiling located at 9 feet in elevation. You have noted that there will be quick response sprinklers both above and below the 9-foot ceiling. Can the area reduction for quick response sprinklers be used in the concealed space above the 9-foot ceiling?

Answer: Yes. The reduction is appropriate for use in a concealed space as long as it complies with the requirements of Section 11.2.3.2.3.1 that include the list of 4 items. Based on the height from the drop ceiling to the ceiling above, the height is within the allowance of the reduction rule. While complying with the rest of section 11.2.3.2, the calculation area could be reduced for the

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sprinklers above the acoustical tile ceiling by 40%, due to the 5-foot height of the space. If the system and space for below the ceiling also meet the requirements of the section a 40% reduction would be applicable there too as it is a 9-foot ceiling height.

Question 11 - Lightning Protection Connected to Fire Protection Riser

It was described that lightning protection has been attached to the top of a fire protection riser. Is this permitted under NFPA guidelines?

Answer: Yes. First, it is important to make sure the terminology is explained. An electrical system cannot be grounded to aboveground piping on its own. By definition, a ground has to lead to the ground, which is why NFPA 13 and NFPA 24 prohibit the grounding of electrical systems to underground pipe. If someone is attaching the ground of the electrical system to aboveground pipe, they are counting on the fact that the electrical system will eventually be grounded through the underground. This is prohibited by NFPA 13 for safety reasons. If a sprinkler contractor removes one of the devices on the riser (maybe a check valve or an alarm valve for maintenance or repair) then the electrical ground is broken and the aboveground piping still connected to the electrical system carries a deadly charge. Anyone touching the sprinkler pipe could be killed. Therefore, grounding an electrical system to any part of the sprinkler system is prohibited by both NFPA 13 and NFPA 24.

However, further information about electrical systems is needed to understand completely what is going on. It is possible that the connection that is visible and termed "lightning protection" in your message is "bonding" rather than "grounding". The electrical system is required to have its own ground in accordance with NFPA 70 (Article 250 in the 2014 Edition). But in addition to the ground for the electrical system, all metal in the building (sprinkler system, standpipe system, structural members) is required to be bonded together. Bonding consists of metal straps that may look similar to grounding straps. The purpose of bonding is to keep the electrical potential of all of the steel in the building the same. That way, if a stray current, such as a lightning strike, contacts any steel, the current can be dissipated without harm. Without bonding, the sprinkler system may be isolated from a ground of its own. Then, if a stray current contacts the sprinkler system, a person could become electrocuted if they touch the pipe at the same time. Therefore, a sprinkler system of metal pipe needs to be bonded to all of the other steel or metal systems in a building.

Question 12 - Small Irregular Shaped Rooms

In NFPA 13, the distance standard spray sprinklers are permitted to be from a wall are found in Section 8.6.3.2.1. When the room is an irregular shape applying the maximum distance permitted from walls may be a little different. It has been asked if the exception for irregular shaped rooms (8.6.3.2.3) can be combined with the exception for small rooms (8.6.3.2.4).

Did You Know??

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Answer: Yes both rules can be applied in one room. However, caution should be used as the requirements for each section would need to be met. Therefore, this could only occur in light hazard occupancies where the room is no more than 800 square feet. The concept of a sprinkler still being no more than 9 ft off of only one wall could become challenging depending on the actual configuration of the irregular shaped room. Although there is nothing that would prohibit applying both rules, the application of both rules in a small space may or may not result in any fewer sprinklers being installed.

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