

Best of December 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 December 2014." 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 - Fire Pump Maintenance

During the life span of a building and its fire protection equipment, maintenance may be necessary for some components, such as the fire pump. Is it permissible for a building owner, or their personnel, to perform machine work on a shaft of a fire pump?

Answer: It may be possible. The work needs to be performed by qualified persons or contractors. While many owners may not be qualified, some owners, or their personnel, are qualified. If the owner is qualified to work on the fire pump, they would be permitted to make these repairs. The AHJ determines what qualifications are acceptable.

Maintenance of components is a subject for existing systems. Therefore, the provisions of NFPA 25 would apply. Section 4.1.5 of the 2014 edition of NFPA 25 states the "correction and repairs shall be performed by qualified maintenance personnel or a qualified contractor". NFPA 25 goes on to define "qualified" in section 3.3.34 as "A competent and capable person or company that has met the requirements and training for a given field acceptable to the AHJ".

Also, when dealing specifically with fire pumps, NFPA 20 expands on the required qualifications of service personnel in section 4.3.4.2. This section states that qualified personnel shall include, but is not limited to one of the following:

1. Factory trained and certified personnel (in the type and brand of fire pump)
2. Personnel who are certified by nationally recognized fire protection organization acceptable to the AHJ
3. Personnel who are registered, licensed, or certified.
4. Personnel who are employed and qualified by a nationally recognized testing laboratory.

It is not industry practice or sound fire protection to have fire pumps repaired by those who are not fully trained and qualified to work on them. Fire pumps are a necessary component of the fire protection system that they serve and it

makes sense that the work be performed by those who are fully trained and knowledgeable in their operation.

Another concern is that the manufacturer may not support the product if it has not been maintained and repaired by fully qualified persons. It is important that any work done to the fire pump does not affect the listing of the fire pump. Both NFPA 20 and NFPA 25 require that any replacement parts used must maintain the listing of the fire pump or if this is not possible, because the part is unavailable, an approved like part must be used. It is not assured that a re-machined shaft will maintain the listing of the fire pump. It may be a better practice that the shaft be replaced in which case section 14.5.2 states that this work be performed by factory authorized personnel or qualified persons acceptable by the AHJ.

Regardless of who performs the work it is important that the provisions of NFPA 25 be followed. The impairment procedures of chapter 15 must be followed when the system is off line for the repairs and the tests required by Table 8.6.1 must be performed to restore the system to service. Table 8.6.1 of NFPA 25 requires that the annual test in accordance with section 8.3.3 be performed when the main shaft is repaired or replaced.

In summary, it is the responsibility of the AHJ to determine if the owner is qualified for this work.

Question 2 - Racquetball Courts

A fitness complex is planning to have racquetball courts within their facility. Sprinklers could be at risk for impact from a racquetball during use of the court. Does NFPA 13 allow the omission of sprinklers from racquetball courts?

Answer: No. Racquetball courts are required to be equipped with sprinklers.

The concern with these courts is that the balls could hit a sprinkler and lead to damage of the sprinkler or unintended water discharge. In general, the approach in any area where there is a chance of impact from objects in the room such as racquetball courts, is to keep the sprinkler profiles as low as possible. One option would be to use concealed sprinklers. If this is not possible, another option may be to install cages or guards on the sprinklers. In some cases using upright sprinklers might reduce the risk of impact as the sprinklers would be tucked up towards the ceiling and the pipe below could offer some protection. These options, while providing some protection to the sprinklers, may still impact the game as the entire room is part of the playing field.

Question 3 - Dedicated Electrical Space

Clarification is being sought on NFPA 13 section A.22.31.2.3. This section begins by stating that sprinkler piping is permitted in an electrical room as long as it is not within the "dedicated electrical space" as defined by section 22.31.2.1. The dedicated electrical space extends 6 ft above the electrical equipment. Section A.22.31.2.3 then states that that sprinklers and piping can run above this space as long as the electrical equipment is protected by a shield. Are sprinklers and their piping actually permitted in this space?

Answer: Yes. The information found in Section 22.31 of NFPA 13 has been extracted from NFPA 70, National Electric Code,

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for convenience of the user. The sections indicate that the electrical space should still be protected with fire sprinklers.

NFPA 70, 2011 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. So, as long as the sprinkler piping does not run through this dedicated electrical space, it can go in and out of the electric room without issue.

NFPA 70, 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. So the sprinkler piping may run above the dedicated electrical space (6 ft above equip), as long as the equipment below is protected from leaks. This is accomplished with the use of shields. The annex section only aimed to emphasize that this is permitted.

Question 4 - Large Round Ductwork

A round duct is being installed. It is over 4 feet in diameter. The ceiling sprinklers are standard spray sprinklers with more than 18 inches between the deflector and the ductwork. When locating sprinklers below the obstruction, do they have to be in the center-line of the duct or is it permitted to be anywhere below the duct?

Answer: NFPA 13 has no requirement for the sprinkler below an obstruction to be located in the center-line of the obstruction when using standard spray sprinklers, even if it is a round duct. Yet, it is important to remember that the sprinklers below an obstruction are to handle a situation that starts directly under that obstruction.

This was discussed in the first draft meeting for the 2016 edition of NFPA 13. There were concerns presented that the heat would not bank below round ducts and the activation of the sprinkler could be delayed. However, no modifications were made to the rules of NFPA 13. The rule remains that a sprinkler must be located under obstructions more than 4 ft wide, but no further guidance on placement under round obstructions is given. There was a first draft revision that stated "sprinklers shall be located below the obstruction and not more than 3 inches from the outside edge of the obstruction. It goes on to say that if the sprinkler is in that 3-inch range beyond the obstruction then it is considered adjacent to the obstruction and will need to be intermediate level rack type.

Question 5 - Main Drain Testing

There is a multi-story building that has a floor control valve assembly on each floor. There is also a main control valve that has a drain serving the main system riser. For the initial acceptance testing, does a main drain test need to be performed at each floor or just at the main sprinkler valve at the bottom of the riser?

Answer: The main drain test should be performed at each floor control valve assembly. The purpose of the main drain is to provide a baseline of the water supply and to ensure the valves are open. It is important to establish from the start that the floor control valve is fully open. Also, the test results will

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be different on each floor. It is true that the test results will only vary by the change in elevation, but there is no need to make somebody do that math as it only takes a few minutes to run the test and record the data. The value outweighs the minimal cost.

This requirement is clear in the 2013 edition of NFPA 13. Based upon the definition of a sprinkler system, which was added to the 2013 edition, each floor would be considered a separate sprinkler system. Section 8.16.1.5 goes on to state that each floor of a multi-floor building must have a floor control valve, check valve, flow switch and a main drain valve. This new wording makes it clear that as each floor is considered its own system, each floor would need its own acceptance test which includes this main drain test.

Question 6 - Air Compressors for Dry Pipe Systems

A dry pipe sprinkler system, in many cases, needs to be able to maintain the air supply in the piping throughout its lifetime. A common question asked is: Do air compressors for dry pipe systems have to be listed?

Answer: No, air compressors are not required to be listed. NFPA 13 states where an air supply to a dry pipe system is to be maintained automatically, it has to utilize an air maintenance device specifically listed for such service. However, the air maintenance device is not the compressor. The air maintenance device is the device that monitors the pressure in the sprinkler system piping and turns on the compressor when the pressure drops too low or otherwise regulates a plant air supply.

Air compressors themselves do not have to be listed, which is consistent with Section 6.1.1.2. That section requires that "all materials and devices essential to successful system operation shall be listed." Since the fire protection system should be able to control or extinguish a fire even without a working compressor, the interpretation has been that the compressor is not essential to the successful operation of the system. Certainly, if the compressor fails and allows a system trip there could be a problem, so the owner does need to make sure that they maintain a good working compressor. But there is no requirement that the compressor be listed.

Question 7 - Waterflow Devices for Standpipe Systems

There is a single wet standpipe system with three standpipe risers. Two of these risers are combination standpipe/sprinkler risers feeding sprinkler systems with control valves and waterflow switches at each floor. NFPA 14 requires a single waterflow device for each standpipe system in Section 5.6.1. Is it permissible for a single waterflow device to be placed upstream of all the individual riser control valves in order for it to serve all three risers?

Answer: Yes, Section 5.6.1 only requires a single waterflow device for an entire standpipe system. The definition of a standpipe system per Section 3.3.15 encompasses all of the interconnected standpipes which would include all three risers in this example. Although only one waterflow device is *required*, some jurisdictions may have their own requirements for providing a waterflow device downstream of each riser control valve. This would allow the identification of which standpipe is flowing water.

Question 8 - Solder Used in NFPA 13D System

A sprinkler system is being installed in a single-family home. NFPA 13D is the installation standard. Copper tube will be used for the fire sprinkler piping. Are specific solders required for copper tube under NFPA 13D?

Answer: Yes, NFPA 13D Section 5.2.2 requires specific solders in accordance with ASTM B 32, *Standard Specification for Solder Metal*, and Section 5.2.8 requires solder, methods, and procedures in accordance with ASTM B 828, *Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings*. The NFPA Automatic Sprinkler Systems for Residential Occupancies Handbook notes: "Older editions of NFPA 13D allowed 50-50 solder, because it was the type normally used in domestic plumbing systems. The 1986 amendments to the Federal Safe Drinking Water Act prohibited the use of 50-50 solder in plumbing systems because of the lead content in the solder and concern that the lead would leach into the drinking water in a home. Although the Federal Safe Drinking Water Act does not specifically apply to residential sprinkler systems, the technical committee considered it poor practice to use this leaded solder in close proximity to potable water systems. The solder alloys that conform to Table 5, Section 1 of ASTM B 32, *Standard Specification for Solder Metal*, have a higher melting point, contain no lead, and are permitted under the Federal Safe Drinking Water Act."

Question 9 - Locating In-Rack Sprinklers

A building is planned to have rack storage of Class IV and Group A commodities. For the protection being used, in-rack sprinklers are necessary. Is it permissible to install in-rack sprinklers further apart than 8 feet for this hazard?

Answer: No, the prescriptive spacing contained in NFPA 13 cannot be exceeded without exercising the requirements of the equivalency clause in Section 1.5.

The standard permits spacing of in-rack sprinklers up to 8 feet. Some type of analysis would have to be done in order for sprinklers to be located farther apart. Even if the desire is to extend the distance a small amount beyond the 8-foot maximum, the AHJ would have to approve the variation from the prescriptive method.

Question 10 - Armover at the End of a Branch Line

The criteria in NFPA 13, which deals with the spacing of hangers on the end of a branch line and those on armovers, has been referenced. This criteria, for situations where the pressure is expected to be over 100 psi at the sprinkler, limits the horizontal length of pipe that cantilevers after the last hanger. It has been noted that an armover is used for the last sprinkler on a branch line. Specifically, do the hanging requirements of sections 9.2.3.4.4 and 9.2.3.5.2 for branch lines and armovers apply cumulatively to installations using a steel piping and rigid armovers?

Answer: Both Section 9.2.3.4.4 and 9.2.3.5.2 apply to rigid piping. However, they are applied individually. Section 9.2.3.4.4 is specific to branch lines while Section 9.2.3.5.2 would apply to armovers. The distance for the hanger on the end of a branch line is measured only on the branch line piping, and not from the end of an armover. In most cases, the hanger and rigid piping can accommodate the small additional load from an armover. If there is a scenario where the armover has significant weight, it may be wise to add a hanger to

support that load. However, this is a subjective decision of the specific project as there are no requirements to add a hanger based on the supported weight of an armover.

Question 11 - Obstruction to Residential Sprinklers

A space being protected with residential sprinklers has a obstruction against the wall that is more than 30 inches wide. The property is being protected in accordance with NFPA 13. Is there a spacing scheme that would allow the space to be protected without sprinklers installed below the obstruction?

Answer: NFPA 13 allows multiple arrangements in order to deal with obstructions from discharge in order to minimize the effect of the obstruction without requiring additional sprinklers. Section 8.10.6.1.2 states that the arrangement of sprinklers has to comply with one of the following:

- (1) Sprinklers shall be in accordance with 8.5.5.2, table 8.10.6.1.2 and figure 8.10.6.1.2(a)
- (2) Sprinklers shall be permitted to be spaced on opposite side of obstruction of obstructions not exceeding 4-feet in width, provided the distance from the centerline of the obstruction to the sprinklers does not exceed one-half the allowable distance permitted between sprinklers
- (3) Obstructions located against the wall and that are not over 30-inches in width shall be permitted to be protected in accordance with Figure 8.10.6.1.2(b).
- (4) Obstructions that are located against the wall and that are not over 24 in. (610 mm) in width shall be permitted to be protected in accordance with Figure 8.10.6.1.2(c). The maximum distance between the sprinkler and the wall shall be measured from the sprinkler to the wall behind the obstruction and not to the face of the obstruction.

Since it was indicated that the obstruction is against the wall and is over 30-inches, option (2), option (3), and option (4) cannot be used. Section 8.10.6.1.2(1) would be the only viable option so that sprinklers are not required below the obstruction. Based on the specific dimensions, Table 8.10.6.1.2 and Figure 8.10.6.1.2(a) would be used to determine if the sprinklers can be arranged with the appropriate distances so water can reach below the obstruction.

Question 12 - Refrigerated Display Cases

A wholesale grocery store is being sprinklered in accordance with NFPA 13. Are sprinklers required to be installed in refrigerated commercial display cases?

Answer: No, NFPA 13 does not require sprinklers to be installed inside furniture and/or electrical appliances. Display cases would be considered furniture. Section 8.1.1 addresses this in subsections (7) and (8):

- (7) Furniture, such as portable wardrobe units, cabinets, trophy cases, and similar features not intended for occupancy, does not require sprinklers to be installed in them. This type of feature shall be permitted to be attached to the finished structure.
- (8)*Sprinklers shall not be required to be installed within electrical equipment, mechanical equipment, or air handling units not intended for occupancy.

Although sprinklers are not required inside the display cases (or other furniture), it is important to make sure that the floor area occupied by the furniture or equipment is still protected by the sprinklers outside of the items.

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