NFSA The Voice of the Fire Sprinkler Industry

TechNotes

Editor-Kenneth E. Isman, P.E. **Issue# 284** **January 14, 2014**

This month, we have selected the following baker's dozen (13) questions as the "Best of December 2013" answered by the engineering staff as part of the NFSA's EOD member assistance program. If you have a question (and you're a member of the NFSA), you can send your question to eod@nfsa.org and we'll answer it as soon as we can.

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.

Question 1 – Densities for Dry Systems Protecting Storage

Section 12.5.2 in the 2013 edition of NFPA 13 says that you have to select density/area criteria so that after you apply the 30% increase to the design area, it does not exceed 3900 sq ft. So how does this apply to Tables and Figures that would put you over 3900 sq ft, even if you select the least area of operation? For example, Table 12.12.1.2(a), which is for pallets on racks without solid shelves, says that the criteria for pallets stored 8-12 feet in height (for a wet system) is .60 gpm per sq ft over 3500 sq ft (using high temp sprinklers). If you increase this area by 30% for a dry system, the area becomes 4550 sq ft. Do we then drop the area back down to 3900 sq ft per section 12.5.2?

Answer: This is one of the poorly written sections in NFPA 13 and a good example of how a group of people, doing the best that they can, don't always develop a perfect document. Many years ago, this section told people to select density/area criteria so that after increasing the area for dry pipe systems, the final area was below 6,000 sq ft. Then, more recently, all of the area/density curves were cut off at 3,000 sq. ft., which when adjusted by 30% would not be over 3,900 sq. ft. So, the section was modified to drop the requirement down from 6,000 sq ft to 3,000 sq ft.

Unfortunately, the committee members forgot that there were density/area criteria in some places in the standard (like tables and figures) that were not curves and were not cut down to a maximum of 3,000 sq ft for wet pipe systems. This was just a simple mistake by the committee. The committee is taking steps to fix the problem in the 2016 edition by just eliminating the section. Since the truncation of the curves, it serves no purpose.

When using the 2013 edition, you have to increase the design area for dry pipe systems by 30%. If the criteria for wet pipe systems causes the dry pipe system criteria to be past 3,900 sq ft, then the design area will need to go beyond 3,900 sq ft. You can't ignore the fact that the standard

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requires the design area to be increased by 30% when you have a dry pipe system.

Question 2 - Ordinary Hazard Space Converted to Light Hazard

When an ordinary hazard space with standard response sprinklers is converted to a light hazard space, do the sprinklers need to be changed to residential or quick response?

Answer: It depends. First, you need to determine why the space is changing. If it is changing due to a change in "Use Group" as defined by the building code, then it will need to meet the rules for new construction and (assuming that the code references a fairly recent edition of NFPA 13) the sprinklers will need to be changed if the space is really light hazard. However, there is no rule that says that office spaces, assembly occupancies, restaurant seating areas, or even residential areas have to be protected as light hazard. If you are protecting a building that used to be some sort of ordinary hazard occupancy and now is going to be used as an office, assembly occupancy, restaurant seating area, or even a residential area, it can be protected as an ordinary hazard occupancy and the standard response sprinklers can stay in place. The closer spacing of the sprinklers and greater discharge and water supply will make up for the slower response characteristics of the sprinklers.

Question 3 - Listed Antifreeze

Are there any listed antifreeze products yet? If not, can we still use propylene glycol and glycerine in NFPA 13 systems?

Answer: There are no listed antifreeze products yet. This means that in NFPA 13 (and NFPA 13R systems) we are not allowed to design any new antifreeze systems unless we happen to be using listed ESFR sprinklers that are listed specifically to be used with antifreeze.

Question 4 - Continuous Obstructions

Is a column a continuous obstruction because it goes from the floor to the ceiling?

Answer: No. Section 3.3.18.1 of NFPA 13 defines a continuous obstruction as, "An obstruction located at or below the level of sprinkler deflectors that affect the discharge pattern of two or more adjacent sprinklers." A column only affects the discharge pattern of one sprinkler, so it does not meet the concern of a continuous obstruction.

Question 5 - Quick Response Reduction

An extended coverage sprinkler that we are thinking of using on a job is listed as a quick response sprinkler for light hazard and as a standard response sprinkler for ordinary hazard. Can we use it in an ordinary hazard and take the quick response reduction because it has a fast response link, even though it is not considered "quick response"?

Answer: No. The sprinkler is not a quick response sprinkler in ordinary hazard, so you can't take the quick response reduction when using it in ordinary hazard.

Question 6 - Sprinkler Extenders in Earthquake Zones

We appreciate your previous article on sprinkler extenders, and we wonder if we are allowed to use them in earthquake zones? NFPA 13 currently does not allow the "revamping" rules that you mention in that article in earthquake zones.

Answer: Yes, they can be used in earthquake zones. Sections 8.15.20.4.4 and 8.15.20.5.4 of NFPA 13 prohibit the use of nipples less than 1 inch in size for armovers. It is important to point out that a nipple coming straight out of a fitting to a sprinkler is NOT an armover, therefore, these sections do not prohibit the use of brass inserts or sprinkler extenders in earthquake zones.

The reason for the prohibition on armovers is a concern for the unbalanced load of the sprinkler being offset to the side of the nipple coming out of the pipe (see Figure 8.15.20.4.2). In the arrangement shown in the figure, if the nipple was ½ inch in size, the forces from an earthquake might break such a thin nipple. But if the nipple comes straight down out of the fitting to a sprinkler, the forces are completely different and much less of a concern.

The committee is taking steps to clarify this further in the 2016 edition. The most recent position of the committee supports the use of brass inserts (sprinkler extenders) in earthquake zones.

Question 7 - Commentary and Text on 6-Inch Rod Rule

In the 2013 Automatic Sprinkler System Handbook (the text of the 2013 edition of NFPA 13 with additional commentary) the commentary on section 9.3.5.5.10 states that the lateral sway brace requirements do not apply to pipes supported by rods less than 6 in. long measured between the top of the pipe and the point of attachment to the building structure. Specifically, the commentary reads, "For the 2013 edition, cross mains as defined in 3.5.5 cannot use this exception and need lateral braces even if short hangers are used." Is this correct? Also, Section 9.3.5.5.10 references section 9.3.5.3, is this correct?

Answer: No. Both the commentary and the section reference are in error. The commentary is required by the NFPA to be written before the final version of the text of the standard is complete. In this case, the committee was thinking of limiting the use of the 6-inch rod rule so that it could not be used on cross mains. The commentary was written during that time. But in the long run, the NFPA decided to continue to allow the 6-inch rod rule to be used on cross mains, but the commentary was not updated. The NFPA is aware of the problem and will hopefully correct it in the next printing of the Handbook.

The section reference of 9.3.5.3 is incorrect. This was the correct section reference in the 2010 edition. In the 2013 edition, the section got moved to 9.3.5.5, but the section reference did not get updated. The NFPA is aware of this error and promises to publish an errata acknowledging it very soon.

Question 8 - Shell Buildings and Hydraulic Calculations

Once a tenant moves into a shell building, do hydraulic calculations need to be performed for the tenant improvements? If so, where does NFPA 13 say that they need to be done?

Answer: Yes, hydraulic calculations need to be performed for the tenant improvements. Sections 23.3 and 23.4 of NFPA 13 require that hydraulic

calculations be performed with specific details about the exact length of pipe and existence of fittings, valves and other pressure loss creating devices that are on the system. These calculations are required to be performed whenever NFPA 13 is invoked by a building or fire code. Sections 901.2, 901.4, and 901.4.1 of the International Fire Code require that NFPA 13 be followed not only for new systems, but also when a building is altered, remodeled or added to.

The sprinkler system is required to be, "extended, altered or augmented" "in accordance with applicable standards". In this case, the applicable standard is NFPA 13, which requires the completion of hydraulic calculations (unless the system complies with the pipe schedule rules).

Question 9 - Selecting Fire Pumps

We note from section A.4.8 of NFPA 20 recommends the selection of a fire pump so that the flow demand of the fire protection system is between 90% and 140% of the rated flow of the pump. Are we required to do this?

Answer: No. A fire pump can be used to supply any fire protection system between 0% and 150% of the rated flow of the pump. Section A.4.8 is in the annex of NFPA 20 and is not a part of the legally enforceable portions of the standard. This particular annex note is not written very well. It is intended to let the user know where the pump reaches its maximum efficiency in terms of net pressure developed from a specific horsepower input. But this should not be confused with any requirement to size the pump in any specific way.

The last sentence of this annex section does say that the pump is allowed to operate at any point in its performance curve from shutoff (zero flow) to 150% of the rated capacity of the pump.

Question 10 - Low Suction Throttling Valve

Is a low suction throttling valve allowed on a fire pump system?

Answer: Yes. In order to comply with NFPA 20, the low suction throttling valve needs to be listed for fire pump service, it needs to be installed on the discharge side of the pump (between the pump and the discharge check valve) and it needs to have a sensing line connected to the suction side of the pump.

Note that this is different from a low suction cut-off device. Low suction throttling devices do not completely stop the flow of water to the fire protection system, which makes them much better than low suction cut-off devices. Low suction cut off devices are prohibited by NFPA 20.

Question 11 - Two Pumps in Two Separate Buildings

We are installing two different pumps in two completely separate buildings on the same property. The AHJ wants us to size the water supply so that it can handle both pumps operating at the same time. Is there something that limits the water supply to one pump at a time?

Answer: Yes. Section 1.1.3 of NFPA 13 says that we only design fire sprinkler systems for a single fire. As long as the pumps serve completely separate buildings, they are only required to deal with a single fire at a time, not two different simultaneous fires.

Question 12 - Inter-control Wiring for Vertically Staged Pumps

Did You Know??

The NFSA keeps a member of the Engineering Department staff on duty every business day to answer your technical questions live. We call this the Expert of the Day (EOD) program and it is available to our members by phone, fax, or e-mail. Call us at (845) 878-4200 and press 5, or you can send a fax to (845) 878-4215, or you can e-mail us at eod@nfsa.org. Last year we answered more than 2600 requests for assistance.

In a recent discussion on this subject, you indicated that inter-control wiring between controllers for vertically staged pumps needs to be rated for a fire resistance of 2-hrs or be run in 2-hr rated conduit. We can't find that in NFPA 20? Where is it?

Answer: The requirement for protection of the inter-control wiring first came into NFPA 20 in the 2010 edition as a TIA that was processed in March of 2010. A TIA is an emergency change to a document that is made because the committee realized that they had left an important piece of information out. The TIA gets printed separately. It is available for download from the NFPA website.

The change should have been brought into the 2013 edition of the standard, but it got caught up in the debate over whether pumps in series need to be in the same pump room. The NFPA process is rather complex, but the end result is that the NFPA could not come to a consensus on the answer to that question, so all of the material on the subject got thrown out of the 2013 edition. That means that the requirement to protect the wiring when they are not in the same room got thrown out too. But it's an important concept that should not get lost. My guess is that the NFPA will process another TIA soon to make it officially apply to the 2013 edition.

Section 10.5.2.5 of NFPA 20 requires some interconnection between controllers for electric motor driven pumps where there are multiple pumps that are responsible to work together, so you cannot just rely on water pressure to start the pumps. Section 12.7.2.4 handles the same situation for diesel driven fire pumps. Common sense would require that the inter-control wiring be protected from fire as it is run through a building.

Question 13 - Draining Drum Drips

Is there a set frequency for draining drum drips?

Answer: No. Section 13.4.4.3.2 of NFPA 25 states that drains are drained after each system activation, before cold weather, and on an as needed basis. The frequency with which the drum drip needs to be emptied depends on the amount of condensate in the air in the dry system and how quickly that condensate drops out of suspension from the air. The amount of condensate and the rate at which it drops out of suspension is a function of the humidity of the air going into the compressor for the dry system, the volume of the dry system, the temperature of the air when it went into the system, the temperature of the dry system, and a number of other variables. It is too difficult to predict a specific rate at which the drum drips would need to be emptied given all of the different possible combinations of the variables listed above.