e-TechNotes

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Best Questions of May 2012

This month, we have selected the following dozen questions as the "Best of May 2012" answered by the engineering staff as part of the NFSA's EOD member assistance program:

Question 1 – Compact Module Storage

We have a situation in which mobile file cabinet units (also called compact module storage units) will be in an area with an 8 inch clearance to the ceiling. How do we go about protecting these units as per NFPA 13?

Answer: NFPA 13 does not provide protection criteria for the situation you are describing. Several years ago, in an effort to answer some frequently asked questions about how to protect this kind of storage, the Fire Protection Research Foundation (FPRF) sponsored a research project to figure out protection criteria for this unique type of storage. The National Fire Sprinkler Association was involved in the research project and during the development of the test protocol, the NFSA recommended trying to evaluate a variety of options for short clearance situations. The NFSA thought that it would be a good idea to try using horizontal sidewall sprinklers to spray across the top of the units or to try sprinklers like residential sprinklers or extended coverage sprinklers because they have broader, flatter spray patterns. But the manufacturers of the compact module shelving units refused to allow any testing that did not have an 18 inch clearance. They promised that they would always insure that their units would be used with a minimum of 18 inch clearance and that they would make sure their customers knew how important this requirement is.

The results of the FPRF project are found in section 20.6 of NFPA 13 along with the minimum 18 inch clearance that is required to protect this storage (section 20.6.2). This space is needed for the sprinkler deflector to develop a spray pattern that covers the protection area of the sprinkler. As Figure A.8.5.5.1 shows, at a distance of 18 inches down from the sprinkler, the spray pattern from a typical spray sprinkler only gets about 4 ft out from the sprinkler. With less clearance between the top of the unit and the sprinkler deflector, sprinklers would need to be extremely close together in order to actually cover the area with water spray.

Question 2 – Hose Stream Demand for NFPA 13R Systems

Is there a requirement to include hose stream demand for an NFPA 13R system?

Answer: NFPA 13R does not have any hose stream demand requirement. The reference to NFPA 13 is not intended to include any hose stream demand. See section A.7.2 of NFPA 13R, which explains that it is not the intent of the reference to NFPA 13 to pull any hose stream demand requirement into NFPA 13R.

Question 3 – Hydraulic Calculations with Cloud Ceilings

Where sprinklers are installed both above and below a cloud ceiling and the design area is 1500 sq ft, do the hydraulic calculations need to include 1500 sq ft of sprinklers both above and below the cloud ceiling?

Answer: The hydraulic calculations only need to include one level of sprinklers, either the sprinklers above the cloud ceiling or the sprinklers below the cloud ceiling, whichever is more demanding. Section 22.4.4.6.3 covers this issue. Even though it uses examples of obstructions such as wide ducts and tables, the concept is the same for larger obstructions.

Question 4 – Reusing a Sprinkler

Sprinklers are frequently taken out of their fittings for a variety of reasons (to release air while filling a system or to perform an internal inspection in accordance with NFPA 25 to name two). If a sprinkler is taken out of its fitting, can it be re-inserted?

Answer: The answer to this question has changed in recent months. NFPA 13 has been silent on this issue in the 2010 and previous editions. Section 6.2.1 really does not address this issue. The intent of section 6.2.1 was to apply to the sprinklers being used for the original system installation.

While using the 2010 edition, or previous editions, whether or not a contractor wanted to remove a sprinkler and then reuse it was a function of the contractor's acceptance of risk. Taking the sprinkler out of its fitting does put stress on portions of the sprinkler. Then there are issues of how the sprinkler is treated while it is out of its fitting and whether it is damaged or subjected to extreme temperatures. Then there is the question of putting the sprinkler back and whether it is still appropriate for the space. The contractor could re-use the sprinkler if they were willing to accept the risk. Most contractors were only willing to accept the risk if they took the sprinkler out, did whatever work needed to be done and put the sprinkler right back in the same room on the same day. This philosophy was not written anywhere; it was just the way that sprinkler contractors dealt with the risk. Some contractors did not want to deal with the risk, so they just installed new sprinklers whenever they pulled the old sprinklers out.

The sprinkler manufacturers have always warned that they do not want a sprinkler to be reinstalled once it has been removed. The concern is for the stress put on the sprinkler when it is removed from its fitting. For the relatively low cost of a new sprinkler, they do not want the contractors taking the risk at all, even for the sprinkler going back into the same room on the same day. Some manufacturers even put the statement in their warrantees that the sprinkler is no longer under warrantee if it has been removed and re-installed.

The situation will be clarified under the 2013 edition of the standard. This edition will explicitly state that any sprinkler that has been removed for any reason must be replaced with a new sprinkler. This will end the practice of removing sprinklers and re-using them once and for all.

This rule will not apply to sprinkler drops. If you remove a whole drop, you can re-use the drop assembly with the sprinkler in it (assuming that the sprinkler is not subjected to torque when the drop is removed) as long as you are extremely careful in storing the sprinkler/drop assembly so that the sprinkler does not get damaged or exposed to high temperatures during the time it is removed from the system and as long as the sprinkler is not damaged while the drop is being removed or re-installed.

Question 5 – Definition of a "New Sprinkler"

Section 6.2.1 of NFPA 13 requires the use of a "new" sprinkler. We received a shipment of sprinklers from the manufacturer that were made three years ago, but never installed in a system. Are these "new" sprinklers?

Answer. Yes. As long as a sprinkler has never been installed, and as long as it has not been exposed to high temperatures while it has been stored, there should be no problem with its installation. When purchasing directly from a manufacturer through their normal distribution chain, there should be no concerns about the temperatures to which the sprinkler has been exposed.

Question 6 – Draft Curtains Between ESFR and Quick Response Sprinklers

If ESFR sprinklers are used to protect a portion of a compartment and quick response sprinklers are being used to protect another part of the same compartment, is a draft curtain required between the two different types of sprinklers?

Answer: No. Section 8.4.6.4.1 of NFPA 13 only requires a draft curtain between ESFR sprinklers and standard response sprinklers. Since quick response sprinklers are not standard response sprinklers, no draft curtain is required. There is no need for a draft curtain between ESFR sprinklers and quick response sprinklers. While it is true that ESFR sprinklers and quick response sprinklers might have slightly different RTI's (one might be 40 while the other is 45 for example), but there is no need to be worried about such small differences.

The reason for the draft curtain between standard response sprinklers and ESFR sprinklers is to deal with the concern that a fire under the standard response sprinklers will open ESFR sprinklers remote from the fire prior to opening standard response sprinklers over the fire. That concern goes away when the two different types of sprinklers are both fast response. A small differential in RTI would still not allow an ESFR sprinkler remote from the fire from opening before the quick response sprinklers above the fire.

There are so many variables that affect the time when a sprinkler opens including the horizontal distance between the sprinkler and the fire, the vertical distance between the sprinkler and the fire, the distance of the sprinkler below the ceiling, the conductivity between the sprinkler and the water-filled piping, and the size of the fire. With all of these variables, the slight difference between two different types of fast response sprinklers is irrelevant.

Question 7 – Floor Mounted Obstructions

Section 8.6.5.2.2 makes reference to clearance requirements for floor-mounted vertical obstructions for light hazard occupancies. What do we use for ordinary hazard occupancies? The specific application is a self storage facility with partial height walls that are open to the deck above by 18 inches or more. The intent is to allow sprinkler spacing without regard to the partial height walls.

Answer: As long as a vertical distance of 18 inches is maintained from the top of the walls or partitions to the sprinkler deflectors, you can space your sprinklers without concern for the walls or partitions. This is consistent with the clearance rules of section 8.6.6 and the charging paragraph in section 8.6.5.2, which tells you only to use the information in 8.6.5.2 for obstructions within 18 inches vertically of the sprinkler deflector.

Question 8 – Aerosol Protection and Discharge Criteria for Higher Hazards

According to Table 6.3.2.7(h) in NFPA 30 B, the protection for an unlimited roof/ceiling height with clearance between the top of the storage and the ceiling of up to 15 feet, the protection criteria has to meet Figure 6.3.2.7(b), which has sprinklers in every row except the top. And ceiling sprinklers need to meet discharge criteria of 0.6 gpm per sq ft over 2500 sq ft.

If the clearance increases to any height greater than 15 feet, the protection criteria needs to meet Figure 6.3.2.7(c), which requires an additional row of sprinklers with a barrier across the top and a ceiling sprinkler density of 0.3 gpm per sq ft over 2500 sq ft.

Since the clearance situation of greater than 15 ft is a greater hazard, can we use the criteria for the greater than 15 ft clearance even though the clearance in our situation is less than 15 ft?

Answer: You should be allowed to use the fire protection criteria from a higher hazard in a lower hazard situation. We know that the clearance of more than 15 ft is a higher hazard situation than the clearance of less than 15 ft. Therefore, you should be permitted to use the rules for protecting aerosols with more than 15 ft clearance when you have a situation with less than 15 ft clearance.

Unfortunately, the standard does not explicitly state that you can do this. Of course, such a position has always been implicit in codes and standards. For example, I don't think that NFPA 30B explicitly states that Level 2 aerosols can be protected with criteria for Level 3 aerosols, or that 20 ft of storage can be protected with the same criteria as 30 ft of storage, but such assumptions are an integral part of all codes and standards.

Still, an AHJ would be allowed to approve such an approach on an equivalency basis in accordance with section 1.5 of NFPA 30B. The barrier and extra row of in-rack sprinklers should limit the fire to the rack structure and minimize the need for any ceiling sprinklers to get involved in controlling the fire. If ceiling sprinklers do open, the lesser density of 0.3 gpm per sq ft should be sufficient to prevent damage to the structural members and assist the in-rack sprinklers in controlling the fire.

We'll make a note of this and propose it as a change for the next edition of NFPA 30B. I know that this does not help you in your immediate need, but it should clarify the issue for future use.

Question 9 – Clearance for Sprinklers Protecting Tire Storage

In most situations, a minimum of 18 inches of clearance is required between the top of storage and the deflector of a standard spray sprinkler at the ceiling. But what is the clearance requirement for ceiling sprinklers when the storage is rubber tires? Do the clearance requirements also apply to in-rack sprinklers.

Answer: Section 8.5.6.5 of NFPA 13 requires a clearance of 36 inches between the top of rubber tire storage and the sprinkler deflector. This requirement originally came from NFPA 231D and was inserted in Chapter 8 of NFPA 13 when that document was merged with NFPA 13. Most people only look in Chapter 18 for rubber tire storage protection information, but Chapter 18 only applies to the discharge criteria (flow, pressure and number of sprinklers in the design area for in-rack and ceiling sprinklers and installation criteria for in-rack sprinklers). For installation criteria of ceiling sprinklers, other portions of NFPA 13 apply. So, the rules for clearance when protecting rubber tire storage ended up in Chapter 8 with the other clearance rules and many people miss them when using NFPA 13.

The clearance rules of 8.5.6.5 only apply to ceiling sprinklers. For in-rack sprinklers, section 18.5.1 refers the user back to Chapter 17. In Chapter 17, you find the clearance requirements for in-rack sprinklers as 6 inches over the adjacent tier of storage (see 17.2.4.2.1).

Question 10 – Attic Rules and "Perpendicular to the Slope"

Table 8.6.2.2.1(a) contains requirements for sprinkler spacing in combustible concealed spaces with a roof slope of 4 in 12 (or more) and combustible wood joists or trusses less than 3 ft on center. These spacing rules differ depending on the direction parallel or perpendicular to the slope. Which distance is parallel and which distance is perpendicular?

Answer: The direction parallel to the ridge line of a roof is parallel to the slope. The direction perpendicular to the ridge line is perpendicular to the slope. A pipe running parallel to the slope does not change elevation. A pipe running perpendicular to the slope changes elevation.

Question 11 – Small Private Water Utilities

A small development is going to have its water drawn from wells on the sight and stored in an 80,000 gallon private storage tank with a very large centrifugal pump that is NOT a fire pump. A 6-inch main will feed domestic systems on the property as well as sprinkler systems. There is a full generator power backup to this pump supplying domestic water to this park. Is this small private utility considered a "reliable" water supply?

Answer: It is up to the Authority Having Jurisdiction (AHJ) to decide whether the private water supply is "reliable" or not. The AHJ is free to use any criteria that they believe is relevant to the situation in order to make a decision. The AHJ may want to consider the following information when working on that decision. Most private water utilities are considered reliable for the following several reasons:

1. They provide water to customers that do not tolerate outages. These customers tend to complain loudly and continuously until water delivery is restored. Often, water utilities will do everything that they can to quiet these concerns; which means that the utility will do everything that they can to prevent an outage and minimize the time of any outage.

2. They adhere to standards and recommended practices of the American Water Works Association that are intended to address the reliability of the design of the water delivery system. This would encompass design and maintenance of main-line equipment and a design for redundant equipment that is used during maintenance and repair of main-line equipment.

3. Even though they are private, many utilities are monopolies, acting in the public good, and therefore report to some government agency or commission. When anything goes wrong, they are hauled in front of government leaders and asked to account for their actions. In order to prevent this from happening, they do everything they can to avoid having anything go wrong.

You may want to use any or all of these criteria in determining whether or not the particular private water supply is "reliable" enough to connect to a fire sprinkler system. You may want to ask questions like, "Who is going to maintain the centrifugal pump and on what schedule?" "What are they planning to do when the pump is down for maintenance or repair?" "What are they going to do during a long power outage?" The answers to this question might assist you in making a determination.

Another option is to put the responsibility on the building occupant. You can approve the use of the water supply, but require the building to be evacuated or have an approved fire watch every time the

water supply is not operational (which would be in accordance with the impairment procedures of NFPA 25). An electronically supervised low pressure switch at the sprinkler riser would help provide an indication as to whether the water supply was operational or not. A signal from this switch could be relayed to the fire department, so that you would know when the supply went down. If the building occupant gets tired of evacuating or hiring a fire watch, they may decide to go with a different (dedicated) water supply.

Question 12 – Horizontal Barriers for Protection Storage of Plastics on Racks

Figures 17.3.4.1.3 (a) and (b) clearly indicate barriers are required for protecting unexpanded plastic storage in multiple row racks with Control Mode Density/Area sprinklers at the ceiling. But Figures 17.3.4.1.3 (c), (d), (e) and (f) do not mention barriers, even though some of them have shading in the figures, which we thought indicated the presence of horizontal barriers. To make matters more confusing, the NFPA Automatic Sprinkler Systems Handbook indicates horizontal barriers in Exhibit 17.18, which tells the user how to comply with Figure 17.3.4.1.3(d). Can you verify that in-rack barriers are required for Figures 17.3.4.1.3 (a) and (b), and that barriers are not required for Figures 17.3.4.1.3 (c) through (f)?

Answer: Yes. Only Figures 17.3.4.1.3(a) and 17.3.4.1.3(b) require barriers. Figures 17.3.4.1.3 (c), (d), (e) and (f) do not require barriers. The confusion comes from a situation where previous editions of NFPA 13 required horizontal barriers for Figures 17.3.4.1.3(c) and (d), but the requirement for the barriers was intentionally eliminated in the 2010 edition. The NFPA removed the mention of the barriers, but forgot to eliminate the shading and failed to update the Handbook text. Thank you for brining this to our attention. We will make sure that the 2013 edition of both the standard and the handbook are corrected.

Upcoming NFSA "Technical Tuesday" Seminar – June 19

Topic: Periodic Inspection, Testing & Maintenance of Standpipe Systems
Instructors: Bernie Arends
Date: Tuesday, June 19, 2012- 10:30 am EST

Standpipes are often neglected in the periodic inspection, testing, and maintenance of fire sprinkler systems. However, this key component is crucial to the firefighting tactics in multi-story structures and can dramatically impede efforts if the standpipe system is not functioning properly. This seminar will review the requirements of NFPA 25, Chapter 6, that deal with the upkeep for standpipe systems to operate effectively.

To register or for more information, click HERE or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Layout Technician Training Course (2-week course)

Fishkill, NY – October 8-19, 2012

For more information, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149 or click HERE.

Upcoming In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country, and in recognition of the current recession has adopted a new reduced fee structure. Here are some upcoming seminars:

July 8	Denver, CO	Sprinkler System Installation Requirements
July 9	Denver, CO	Fire Service Mains & Their Appurtenances
July 10-11	Denver, CO	2-Day Sprinkler Protection of Storage
July 24	Mashantucket, CT	Plan Review Procedures & Policies
July 24	Westminster, CO	Sprinkler Installation Requirements
July 25	Westminster, CO	Fire Service Mains & Their Appurtenances
July 26	Westminster, CO	NFPA 13 Update 2010

These seminars qualify for continuing education as required by NICET, and meet mandatory Continuing Education Requirements for Businesses and Authorities Having Jurisdiction.

To register for these in-class seminars, click HERE. Or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org for more information.

About the National Fire Sprinkler Association

Established in 1905, the National Fire Sprinkler Association (NFSA) is the voice of the fire sprinkler industry. NFSA leads the drive to get life-saving and property protecting fire sprinklers into all buildings; provides support and resources for its members – fire sprinkler contractors, manufacturers and suppliers; and educates authorities having jurisdiction on fire protection issues. Headquartered in Patterson, N.Y., NFSA has regional operations offices throughout the country. www.nfsa.org.