e-TechNotes

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Best of August 2012

This month, we have selected the following fifteen questions as the "Best of August 2012" answered by the engineering staff as part of the NFSA's EOD member assistance program. 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. These 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 – Fire Department Connections in Subdivided Buildings

In a large building like a shopping mall, where a single sprinkler system (less than 52,000 sq ft per floor) is subdivided into tenant spaces with sectional control valves, does each separate portion of the system need its own FDC? Does the answer change if the walls of each tenant space are sufficient under the building code to make each individual tenant space its own "building"?

Answer: A single FDC is permitted to serve the entire sprinkler system. Your description of this arrangement is analogous to a multi-story building where each floor would have its own floor control valve. In that scenario, one FDC is unquestionably acceptable for the building as long as all of the piping is connected in a manner where it can all be fed by the FDC. In fact, this arrangement is desired by the fire department so that they know when they connect to that one FDC that they are supplying sprinklers wherever the fire is in the building.

The answer does not change when the single sprinkler system connects multiple buildings. Section 8.17.2.4.2 of NFPA 13 only requires the sprinkler system to have one fire department connection. Section 8.2.4 allows the single system to protect multiple buildings as long as the system size does not exceed that of the maximums provided in Section 8.2 (52,000 sq ft per floor for light and ordinary hazard spaces).

Typically, when we answer this question, the code enforcer then asks, "What about section 8.17.2.5.2, which states, 'There shall be no shutoff valve in the fire department connection piping.'" The answer to this question is that the user is not violating this section when they arrange a single FDC to serve multiple subsections of a single system. The "fire department connection piping" discussed in section 8.17.2.5.2 is the portion of piping between the inlet connections that the fire department threads their hose onto and the fitting that attaches this pipe to the sprinkler system. Piping that carries water from the main water supply to the sprinklers is not in the "fire department connection piping". Control valves are allowed between FDC's and sprinklers (see sections 8.17.2.4.3 and 8.17.2.4.4). The only place that a control valve is not allowed is in the short piece of pipe that only carries water from the FDC to the rest of the system.

Question 2: Test Connection for Preaction System Serving a Freezer

For a double-interlock preaction system serving a freezer, where is the trip test connection required to go?

Section 8.17.4.4.4 requires the test connection to be at the most remote portion of the system, but that will put it in the freezer and we don't want to introduce water into the freezer when we do the test.

Answer: For freezer spaces, section 7.9.2.5 overrides section 8.17.4.4.4. Admittedly, the text of NFPA 13 could use some cleaning up, but the intent is clear by looking as Figure 7.9.2.7.1.1(a), which is a portion of the mandatory requirements in NFPA 13 and is intended by the committee to be enforceable. Above the preaction valve (still in the warm space before the piping goes into the freezer) is a control valve that cuts off flow to the freezer portion of the system. Between this control valve and the preaction valve is a bypass line that can be opened for testing. In this manner, the preaction valve can be exercised and maintained.

Since this bypass line is piped to a drain, the trip and transit times for water flowing through this path are not indicative of the sprinkler system's situation and should not be used for sprinkler system installation or maintenance requirements. If water delivery time is a concern, the acceptance test must be done at a time when the freezer is not operational so that the delivery time can be confirmed or the user will need to use an approved computer program to predict water delivery times.

Question 3 – Small Orifice Sprinklers and Corrosion Resistant Pipe

Section 8.3.4.3 of NFPA 13 allows K-4.2 sprinklers to be used in dry systems protecting light hazard occupancies when the piping is corrosion resistant or internally galvanized. Specifically, you have asked if pipe with MIC treatments or coatings meet this requirement.

Answer. No. MIC treatments or coatings protect the pipe from a specific type of corrosion, but concerns about pipe scale due to other forms of corrosion, namely oxidation, still exist with these pipes. In order to use the small orifice sprinklers, the committee intends the pipe to be copper, brass, nickel, stainless steel, galvanized steel or some other product that is corrosion resistant. The committee would also accept CPVC if it was used in accordance with a listing that allowed dry system use. By using the term "corrosion resistant", the committee is trying to keep the options open for contractors to balance cost issues with availability. The committee did not want to create a list of acceptable pipes because there is always the possibility that they miss a product that would be acceptable. This type of "performance-based" language is a direction that codes and standards are headed in and will be more prevalent in the future.

Question 4 – NFPA 13D and Fraternity/Sorority Houses

Can NFPA 13D be used to protect a fraternity or sorority house?

Answer: Yes, if the fraternity or sorority house is constructed and occupied under the local building code as a one- or two-family dwelling. The scope of NFPA 13D limits its use to one- and two-family dwellings. However, most building codes limit one- and two-family dwellings to a small number (usually 6) unrelated people (and they don't consider fraternity "brothers" or sorority "sisters" as related). It is more likely that a fraternity or sorority house is considered a lodging and rooming house or a multi-family dwelling under the building code, in which case NFPA 13R would be more appropriate.

Question 5 – Obstruction Inspections and Obstruction Investigations

Chapter 14 of NFPA-25 (2008 edition) states that a sprinkler system should be internally inspected once every 5 years. However, in Annex D the suggestion is made for dry and preaction systems that the inspection should start after 15 years and then be conducted again at 25 years then every 5th year after that. Does the annex give you permission to put off the internal inspection?

Answer: NFPA 25 has two different requirements regarding the inside of fire sprinkler systems:

Obstruction Inspections and Obstruction Investigations. The intent is for these to be completely separate items, although they have very similar names. The Obstruction Inspection is required on every sprinkler system at 5 year intervals. The Obstruction Inspection is basically an internal inspection inside of the system in two places (at a branch line by removing a sprinkler and looking in, and at a cross main by removing a flushing connection and looking in).

The other internal item is the Obstruction Investigation, which is not required with any specific frequency. Instead, the Obstruction Investigation is triggered when one of the 14 items listed in section 14.3.1 is found during the other regular inspection and testing of the sprinkler system or if one of the 14 items is reported by the building owner. Basically, the Obstruction Investigation happens when there is a suspicion that the system may have foreign material in it or is subject to blockage.

An Obstruction Investigation is more involved and requires that the system be internally examined in four places (system valve, riser, a cross main, and a branch line).
The information in Annex D is specific to an Obstruction Investigation. The time frames you referenced of 15 and 25 years are suggestions for performing the more involved Obstruction Investigation on dry and preaction systems because they are more likely to have problems with scale build-up.

Question 6 – Effective Height of Sprinklers

We are researching the sprinkler system in a 75ft high field house. Is there a height at which standard spray fire sprinklers will become ineffective?

Answer: NFPA 13 does not limit the effective height of a sprinkler system above a floor. A sprinkler system located in a high ceiling space will provide a benefit during many fire scenarios. During a fire, the water drop does not need to make it all the way to the floor in order to assist in controlling the fire. Before the water droplet evaporates, it still has absorbed heat from the fire, which helps to protect the structure of the building.

Over the years, a number of full-scale fire tests and other analyses have been performed to show that sprinklers are effective in buildings with ceilings as high as 100 ft above the floor. A summary of these tests and analyses is available on the NFPA website (in the Members Only section) in a series of articles titled High on Sprinklers, High on Sprinklers 2, and Still High on Sprinklers by Russ Fleming and Ken Isman.

Even if the floor or ground surface is not regularly used for activities that might generate a large fire, these buildings with high ceilings are sometimes used for special activities that warrant greater protection and the fire protection system must accommodate these special activities. For example, some indoor sporting arenas are used for trade shows during the off-season. These trade shows include large structures that take advantage of the high ceiling. The sprinkler protection is important for these special uses. During trade shows for fire fighters, it is common to bring fire trucks into these buildings and put the ladders up close to the ceiling. The hazard is then closer to the ceiling and needs to be protected.

The International Building Code does have a section that allows sprinklers to be eliminated from ceilings over 55 feet in height, but there is little research to show that this is beneficial. If sprinklers are left out of high ceilings it would be reasonable to provide other fire protection features to offset the lack of sprinkler protection. Items like fire resistant construction, smoke and heat management systems, fire alarm systems, and more restrictive egress requirements are some examples of other fire protection systems which could be used. Keep in mind that there is usually no direct replacement for eliminating sprinkle protection and if sprinklers are left out of high ceilings then any alternate fire protection plan might not be as effective or as economical as sprinkler protection.

Question 7 – Exposed CPVC in Ordinary Hazard

Section 6.3.6.2 allows pipe or tube listed for light hazard occupancies (like CPVC) to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 sq ft. So, is this pipe permitted to be installed exposed?

Answer: Yes, CPVC pipe installed in small ordinary hazard portions of otherwise light hazard buildings (such as mechanical rooms in schools) are permitted to be installed with the piping exposed as long as the special requirements of the exposed listings are followed. This means that the ceiling must be horizontal and the sprinklers must be quick response or residential and the deflectors must be close to the ceiling.

Question 8 – "Cold Fire" as Antifreeze

A manufacturer of a noncombustible liquid called "Cold Fire" is advertising that it can be used as a replacement for glycerine or propylene glycol in fire sprinkler systems. Is this true?

Answer: We have heard of the Cold Fire product and have officially asked the company that makes the product to state whether they have investigated their product for compatibility with sprinkler system components. They have not chosen to answer our request. We have two specific concerns about any product that is put into sprinkler systems:

1) Is the product compatible with the parts of a sprinkler system? This is a huge issue. For example, we don't know if the Cold Fire product would hold a check valve closed when it is pressed against the rubber face and held there for a long period of time. Once a sprinkler is opened and the pressure is released, would the check valve stay stuck in the closed position? We've seen this happen with other fluids. Would it happen with Cold Fire? What about compatibility with other components like gaskets in fittings and seats of sprinklers?

2) Is the product compatible with CPVC pipe? Even if you are putting it in a steel piping system, there might be CPVC pipe downstream.

Until we get written confirmation from Cold Fire's manufacturer that it is completely compatible with all of the components of a sprinkler system, it should not put it in a sprinkler system. For new sprinkler systems, the product would need to be listed (based on the TIA just passed by the NFPA Standards Council this summer) and the Cold Fire product is not yet listed, although they certainly could submit it for such consideration.

Question 9 – Diesel Fuel Containment in a Pump Room

We are involved in a project that involves a fire pump with diesel driver. The fuel tank is a double walled tank with leak detection. Does this meet the exception criteria of 6.3.2.4 in NFPA 37 or is spill containment still required?

Answer: Spill containment is not required by the NFPA standards. The applicable NFPA standard is NFPA 20, not NFPA 37. Section 11.4 of NFPA 20 has been clarified to specifically state that dikes or other containment are not required where double wall tanks are used. NFPA 20 requires the interstitial space between the tank walls to be monitored in case the inner wall is breached.

From a flammable and combustible liquids code perspective, NFPA 30 was recently modified to state that the rules of NFPA 20 are "deemed to comply" with NFPA 30. This means that if you follow the rules of NFPA 20, you are automatically in compliance with NFPA 30. This settles the question of containment for any jurisdiction that uses NFPA 30 as their flammable and combustible liquids code.

For jurisdictions that use other flammable and combustible liquids codes or write their own codes, it is possible that some additional containment might be required, but it is impossible for us to keep track of all such local modifications.

Question 10 – Removal of Old Components

Do old sprinkler system components need to be removed from a building when a new system is installed if the old components do not affect the operation of the new system?

Answer: There is no requirement in the NFPA or ICC codes and standards to remove old components. There is a general philosophy in fire protection that we do not want to create a false sense of security in the public. So, if a sprinkler system is taken out of a building, the sprinklers should be removed so that the occupants do not think they are protected, but the piping and other equipment is not required to be removed.

Question 11 – Hot Air Diffusers that are not so Hot

Table 8.3.2.5(c) in NFPA 13 requires ordinary temperature sprinklers to be a certain distance away from a hot air diffuser. If the diffuser is in a building in a warm climate (like Florida) and is just for an air conditioning system, do we still need to follow this rule?

Answer: The specific language in the Table is for "hot air diffusers". If the diffuser is only for an air conditioner, then it is not a "hot air diffuser" and you do not need to worry about the distance of a sprinkler away from the diffuser.

If the diffuser is used for any heating system, even during the relatively short heating season in Florida, then you should worry about the distance from the diffuser to the sprinkler. While the heating unit might be set to normally operate at a lower temperature, it does have the potential to release heated air above 100 degrees and could be a potential problem for an ordinary temperature sprinkler that is too close.

Question 12 – Vertical Sidewall Sprinklers for NFPA 13R Use

We have a situation in an NFPA 13R system within a dwelling unit where a residential pendant sprinkler that is only 2 inches from a wall. It would be an ideal placement for a vertical sidewall sprinkler, but we can't find a residential vertical sidewall. Are we allowed to use a quick response vertical sidewall?

Answer: In general, the answer to the question would be "no." NFPA 13R requires sprinklers within the dwelling unit to be residential sprinklers. Quick response sprinklers are not residential sprinklers. There is an exception in NFPA 13R that allows quick response sprinklers to be used within the dwelling unit, but the dwelling unit has to be so small that the entire dwelling unit can be protected with a total of four sprinklers (think hotel room). If this exception is used, all of the sprinklers in the compartment need to be quick response. You cannot mix quick response sprinklers with residential sprinklers in the same compartment.

Question 13 – Deflector Distance from Deck for Deluge Systems

For a deluge sprinkler system installed under an obstructed ceiling, is it critical to get the sprinklers installed within 6 inches of the bottom of the structural members? Since sprinkler activation time is not important, can't the sprinklers be farther down?

Answer: The sprinklers still need to be within 6 inches of the bottom of the structural members. The issue here is not just response time (which is being taken care of by the detection system), but cooling of the structural members. Remember that the spray sprinkler that we use sends all of the spray down towards the floor. This means that the cooling mechanism that prevents structural damage has to be handled by the ability of the water at the top of the spray pattern to absorb heat near the ceiling. Due to the channeling

effects of heat transfer in obstructed construction, tests have shown that the sprinkler needs to be within 6 inches of the bottom of the member to help keep the member cool.

Section 8.1.1(6) of NFPA 13 allows sprinklers to be installed more than 6 inches below obstructed construction if tests or calculations showed that the sprinkler would still perform its job of controlling the fire and preventing structural damage. It is possible that a lower location might work for some combination of channel depths and widths of construction, but you would need to establish that through tests or calculations.

Question 14 – What is Required During an Inspection?

If we are doing an inspection of a sprinklered building in accordance with the 2008 edition of NFPA 25, what are we obligated to do in these 3 scenarios?

1) A duct that is 6' wide does not have sprinkler coverage under it.

2) A restroom has an drop ceiling with adequate pendant head sprinkler coverage but there is also an additional 4' x 6' room within it with a toilet that has walls all the way to the ceiling completely around it and there is no sprinkler head inside of that room.

3) There is an overhead garage door and there is no sprinkler coverage underneath it.

Answer: None of the items that are mentioned above are a part of the NFPA 25 inspection and you would not be obligated under that standard to report any of them. As a matter of company practice, you may wish to tell the owner of the problem that you spotted (and you even might want to give them a quote to fix it), but you must be very careful in this area. If you start pointing out problems with the system design, you take on the liability of evaluating the system and unless you find and point out every problem with the system, you may take on some future liability for a problem that you did not find that later results in a loss.

There are a number of sections in NFPA 25 that back up these statements. The issue is much clearer in the 2011 edition of the standard, but I'll provide you with the quotes and section numbers from the 2008 edition since this is what you have referenced and might be what is enforced in your area.

The purpose of NFPA 25 is to inspect, test and maintain the sprinkler system that has been installed. It is NOT the purpose of NFPA 25 to require an analysis of the building and whether or not the sprinkler system is sufficient for the building. That kind of analysis would be the practice of Engineering, which can only be done by a Professional Engineer, and most inspectors do not have this type of credential.

NFPA 25 starts with the premise that the sprinkler system was designed and installed properly. Any changes to the building or changes to the sprinkler system that the owner performed after the sprinkler system was completed are the owner's problem to deal with, but it is not the inspector's job to find these problems.

Section 1.1.2 states (in the middle of the section), "This standard applies to fire protection systems that have been properly installed in accordance with generally accepted practices. Where a system has not been installed in accordance with generally accepted practices, the corrective action is beyond the scope of this standard. The corrective action to ensure that the system performs in a satisfactory manner shall be in accordance with the appropriate installation standard."

Sections 4.1.5 and 4.1.6 go on to describe the responsibilities of the building owner with respect to making changes to the building or addressing changes to the hazard of the building. These sections go to great lengths to explain that it is the building owner's responsibility to perform these tasks, not the inspecting contractor. The building owner may hire a fire protection engineer to perform a hazard analysis, but this would be well beyond the scope of NFPA 25 as discussed above.

What most contractors do when they are performing NFPA 25 inspection, testing, and maintenance is they carry around two separate sheets of paper. On the first sheet, they keep track of the deficiencies and impairments that they find in the fire protection system(s) that are a part of the NFPA 25 work. On the other paper, they list situations like you described that have more to do with the building and the sprinkler system design and installation. At the top of this second form, they must have some qualifying language such as is written below (although your company's attorney might suggest alternate language, the point is that some qualifier is necessary):

> During our work in your building, our representatives noticed the following items on your fire protection system that may need further investigation. These items are not a part of the normal NFPA 25 inspection, testing or maintenance functions, but we are providing you with notice of these concerns as a courtesy. This does not constitute or represent that we have performed a full analysis of the fire protection system(s) in this building and there may be other items of concern that we have not identified because this type of analysis is beyond the scope of what we were hired to do in accordance with NFPA 25.

While you don't have to use this exact language, the point that you have to get across is that you did not perform a full analysis of their system and its ability to deal with all of the potential hazards within their building. Contractors that have not used language like this have gotten into real trouble.

Question 15 – ESFR Sprinklers under 32 ft Ceilings

The ESFR sprinkler tables have special requirements for k-14 and k-16.8 ESFR sprinklers under 32 ft ceiling heights. But there is no information on how to use k-25.2 ESFR sprinklers under 32 ft ceiling heights. Are we allowed to use k-25.2 ESFR sprinklers under 32 ft ceilings? Do we use the 35 ft ceiling criteria?

Answer: The 32 ft ceiling height criteria in the ESFR tables was developed using an analysis that included the k-14 sprinkler only. For some time, this criteria only applied to the k-14 sprinkler. Then, there was a separate analysis that was performed for the k-16.8 sprinkler that concluded that anything the k-14 sprinkler could do, the k-16.8 sprinkler could do at a lower pressure, so the k-16.8 sprinkler was added to the same places in the table as the k-14. No such analysis has ever been done for the k-25.2 sprinkler, so it has not been added to the 32 ft portion of the table.

The headings at the top of the column indicate that the numbers in the columns are MAXIMUM ceiling heights. This means that the values in the table for any sprinkler in any situation can always be used for smaller ceiling heights. This means that you would be allowed to use the 35 ft ceiling criteria for k-25.2 sprinklers under a 32 ft ceiling.

Upcoming NFSA "Technical Tuesday" Seminar – September 25

Topic: Concealed Spaces
Instructors: James D. Lake
Date: Tuesday, September 25, 2012- 10:30 am EST

NFPA 13 requires sprinklers to be installed throughout the entire building…except…where they are specifically permitted to be omitted. One of the locations where sprinklers can be omitted is in concealed spaces. With very specific language, Section 8.15.1.2 of NFPA 13 (2010 Edition) provides the requirements that concealed spaces must meet in order omit sprinklers. Some of these are straight forward, others are more detailed. This seminar will explore the details and provide insight into the background of the requirements that permit sprinklers to be omitted from these special spaces.

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:

Sept 25-27	Houston, TX	3 Day Inspection & Testing for the Sprinkler Industry
Sept 25	Hillsboro, OR	Plan Review Procedures & Policies
Sept 26	Hillsboro, OR	Commissioning & Acceptance Testing/Underground Piping
Sept 26	Roseville, CA	Flammable & Combustible Liquids/Pump Layout & Sizing
Sept 27	Hillsboro, OR	Sprinkler Protection of Rack Storage
Sept 27	Roseville, CA	Basic & Advanced Seismic
Oct 2	Glenwood Sprgs, CO	Fire Service Mains & Their Appurtenances
Oct 3	Glenwood Sprgs, CO	Sprinkler System Installation Requirements
Oct 4	Glenwood Sprgs, CO	Designing with Fire Sprinklers

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.