



Tuesday e-Tech Alert
February 6, 2007
Number 75

Best Questions of January 2007

We have selected the following questions as the “best of January 2007” answered by the engineering staff as part of the NFSA “Engineer of the Day” member assistance program:

Question 1 – Mercantile Display vs. Storage

Traditionally, high-piled storage rules applied only above 12 ft, but the storage chapters of NFPA 13 now contain criteria for less than 12 ft of many types of storage. Since almost all mercantile applications contain stored goods either in piles or on shelves, can such occupancies continue to be treated as Ordinary Hazard Group 2 or must they be addressed as storage?

Answer: As it was developing the 2007 edition of NFPA 13, the NFPA Committee on Sprinkler System Discharge Criteria took specific steps to ensure that Ordinary Hazard Group 2 protection criteria could be continued for use in typical (non big-box) mercantile applications. This was done by making a distinction between “stockpiles” and “storage”, as well as by clarifying that Ordinary Hazard Group 2 protection cannot address storage of stockpiles with “high rates of heat release” above 8 ft. In addition to the definition in Section 5.3.2 of the 2007 edition, the wording of A.5.3 is very important, since it contains the clarification that only Group A plastics are considered to have the high rates of heat release, and that typical mercantile arrangements are “stockpiles” rather than “storage”.

Question 2- Entrance Alcoves along School Corridor

An existing elementary school has small alcove areas approximately 3.3 ft deep by 4.4 ft wide at the entrances to classrooms off the corridor. The ceilings in these areas are dropped about 1.2 ft lower than the 9 ft hallway ceiling. Sidewall sprinklers have been spaced down the corridor and in most cases will throw water into the alcoves, but there are a few locations where sprinklers are positioned along the same wall as the alcove and there are no sprinklers on the opposite side of the hall to discharge into the alcove area. Are additional sprinklers required to protect these areas?

Answer: When these entrances are located on the opposite side of the corridor from the sidewall sprinklers, it is likely that no additional protection is required in the entryway alcoves, assuming the hallways are typical in their width. The NFPA 13 committee created rules for obstructions in front of sidewall sprinklers in Table 8.7.5.1.3 (2007 edition). Since the deflector is generally installed 4 to 6 inches below the ceiling, a corridor width of 8 ft would allow the obstruction of the lower ceiling up to an additional 11 inches below the deflector, and the additional alcove depth of 3 ft would still be within the standard sidewall protection distance (room width) of 14 ft. However, when the sidewall sprinklers are located along the wall where the alcoves occur, there would need to be additional sprinkler protection provided. Section 8.7.4.1.3.1 states, “Where

soffits used for the installation of sidewall sprinklers exceed 8 in. (203 mm) in width or projection from the wall, additional sprinklers shall be installed below the soffit."

Question 3 – NFPA 13D in Adjacent Townhouses

Is there anything that would prevent a townhouse with actual property lines between attached units to have a single fire sprinkler riser that would serve all units? There are specific requirements that each unit have its own domestic water, sewer, electrical and cable/phone.

Could it be possible to have a fire protection system that would fall under a Home Owners Agreement (HOA) for maintenance similar to siding and painting, fencing and landscape? This would be a significant cost reduction to those jurisdictions that are requiring full sprinkler protection.

Answer: The only restriction found in the NFPA standards is related to the appropriate standard for the type of occupancy being considered. If these are considered individual buildings under the building codes and NFPA 13D is being applied for single family homes (with zero lot lines), a common riser is not permitted because NFPA 13D is limited to one and two-family dwellings. If this is considered an NFPA 13R application, a common riser could be considered for this structure, but there are many concerns to address. The first is that Chapter 25 of the International Residential Code (IRC) does not allow domestic water feeds into each dwelling to cross the common walls. Each unit must have an individual run-in for the domestic water. This might be interpreted by some AHJs to indicate that each unit would also need an individual fire sprinkler riser. Maintenance issues are also worthy of discussion. No individual property owner would want their system to be out of service if their neighbor were to have an impairment. This could happen if one of the owners left the heat off in their home, or if one of the owners were the victim of vandalism. Still, there would definitely be benefits to having a single system riser. As with any condominium living agreement, the HOA could be the governing authority over any common property, and could serve to ensure that the proper inspection, testing and maintenance were performed. This is a highly attractive option for those charged with the enforcement of NFPA 25. As with any requirement in the codes or standards, we would encourage a full examination of the requirements of your local building codes and weighing of the benefits and risks. Local ordinances often dictate which of the arrangements are considered the most beneficial to the homeowner and to the community at large.

Question 4 – Hazard Classification of Canopies for Drive-Throughs

A combustibile drive-through overhang is 19 ft by 20 ft in size with nothing combustibile below, and is enclosed only on the side facing the building. This area is for dropping off and picking up clothing. According to Section 8.14.7.1 (2007 edition), the canopy does not meet the requirements of 8.14.7.2 or 8.14.7.3 and requires sprinklers. What hazard classification would this fall under? Would it be considered Light Hazard - eaves and overhangs, if of combustibile construction (A 5.2) or Ordinary Hazard Group 1-automobile parking and showrooms (A 5.3.1)?

Answer: In many states, the determination of hazard classification needs to be done by a Professional Engineer in consultation with the building owner regarding exactly how the space is going to be used. However, NFPA 13 provides some general information on the topic. Light hazard by definition (Section 5.2 of the 2007 edition) involves protection of occupancies where the quantity and/or combustibility of contents is low and the expected heat release during a fire is also fairly low. With ordinary hazard (group 1) the combustibility is still low, but the quantity of

combustibles is considered moderate and fires with moderate rates of heat release are expected. The decision relative to quantity of combustibles should be based on what will be under a canopy on a regular basis. As noted, the intent of this area is to drive through for dropping off and picking up clothing. Section A.8.14.7.4 states, "Short-term storage, such as that for delivered packages...should not be considered storage or handling of combustibles." This section indicates that if the automobiles are transient then they are not the main product that needs to be protected. If there is nothing else that is planned to be under the canopy, then the amount of combustibles would be considered low.

Question 5 – Upgrading a Limited Area Sprinkler System

Our recent inspection of a medical office building showed a number of deficiencies in the fire sprinkler system, including no main drain, no piped inspector's test, sprinklers more than 12 in. below a smooth ceiling and provided with "heat collectors", and ductwork obstructing sprinkler discharge. The building is only about 10 years old. Reviewing NFPA 101, NFPA 13 and BOCA rules from that time, it appears the contractor was trying to install a limited area sprinkler systems in isolated hazardous areas. Multiple systems were installed in order to keep the sprinkler count within the maximum limit of six for the limited area system. Since the total sprinklered area exceeds NFPA's definition of "limited area sprinkler system" and "isolated hazardous area", to properly correct this situation we would need to install a complete sprinkler system. As our client will most likely not want to install a complete sprinkler system, can we simply address and correct the most critical deficiencies of the system? Most likely we will need to approach the AHJ.

Answer: The answer to your question depends on the guidelines that were followed when the building was built or when the system was installed. NFPA 13 does not provide information on partial systems. Therefore, when the system was first installed, it would have been up to the authorities at that time to determine what the necessary criteria should have been. One of the difficulties with partial systems like this is the lack of communication after it has been installed. Years after the installation, there is no clear understanding of the design intent. At a bare minimum, a means to test and maintain the system should be added. However, it really is up to the Authority Having Jurisdiction to determine what additional pieces should be added or if the system must be brought up to the current codes. If there has not been a recent change of occupancy or modifications to the building or contents, then the partial system may be grandfathered.

Question 6 – Large Drop vs. Specific Application Sprinklers

A recent article in NFSA's *SQ* magazine (Nov/Dec 2006 - No. 139) states that large drop and specific application sprinklers are different. Can the two terms actually mean the same sprinkler? I'm asking because I had recent job and had to choose a large drop sprinkler. One of the manufacturers offered a sprinkler as being both large drop and specific application all in one. Can one sprinkler be used with both sets of requirements?

Answer: The answer to your question is that one sprinkler can be both, but the two terms are not interchangeable. A Large Drop sprinkler is a type of Specific Application Control Mode Sprinkler. In NFPA 13 (Sections 3.6.2.3 and 3.6.2.12 of the 2002 Edition), there are separate definitions for each of these terms. In other words, a Large Drop sprinkler can be classified as a Specific Application Control Mode Sprinkler but not the other way around. One of the key

differences is that a Large Drop sprinkler always has a K-factor of 11.2. A Specific Application Control Mode Sprinkler may have a larger K-factor.

Question 7 – Water Discharge Location for Alarm Test Connection

Does the 2002 edition of NFPA 13 allow an alarm test connection to be equipped with a permanently installed hose and portable water receptacle? The proposed test connections (15 total) are located in an existing building with no other means to discharge the water.

Answer: This arrangement would require approval from the Authority Having Jurisdiction. Section 8.16.4.2.3 of NFPA 13 (2002 edition) states, "The discharge shall be to the outside, to a drain connection capable of accepting full flow under system pressure, or to another location where water damage will not occur." There could be concern of how large a water receptacle would be necessary and how to determine if the "mop sink" is actually adequate to handle the load. Should flooding occur during future testing, the calculations or other determination of the suitability of the drain/sink arrangement will become an issue. The proposed arrangement would need to include the "smooth bore corrosion-resistant orifice, giving a flow equivalent to one sprinkler of a type having the smallest orifice installed on the particular system". If the orifice is at the end of the "permanently installed hose", then that hose might have to be listed for use in sprinkler systems and would need to be of an appropriate size to supply the orifice. The AHJ and building owner may also have additional ideas or concerns related to appropriate discharge and removal of the test flow.

Question 8 – Trapeze Hanger Component Sizing

Based on the 2007 edition of NFPA 13, 2007 (Section 9.1.1.6.6), the ring, strap, or clevis installed on the pipe trapeze member of a trapeze hanger assembly must be sized according to the trapeze member. However, this excerpt does not address the rod size. To address the rod size, I refer to Section 9.1.1.6.5, which indicates the following: **9.1.1.6.5*** All components of each hanger assembly that attach to a trapeze member shall conform to 9.1.1.4 and be sized to support the suspended sprinkler pipe. Does this mean that if the trapeze hanger assembly is supporting an 8-inch main, and the trapeze pipe required to support the 8-inch main is 2-1/2" pipe, then the rings and rods suspending the trapeze pipe are to be sized for the 2-1/2" pipe trapeze, but the rings and rods supporting the 8-inch main have to be sized for the 8-inch main?

Answer: The 2002 edition of the NFPA 13 standard was not clear on whether it required that all rod and rings be sized according to the size of the sprinkler pipe. However, there is new wording in the 2007 edition that clarifies the Committee's view. As you have already quoted, section 9.1.1.6.5 states, "*All components of each hanger assembly that attach to a trapeze member shall conform to 9.1.1.4 and be sized to support the suspended sprinkler pipe.*" The Committee wanted to clarify the new rules by first stating that all components that are used must still be able to support five times the weight of the water filled pipe. So the components that attach to the trapeze must still be listed and must be able to carry their share of the load imposed on them. The Committee agreed that the hanger rings, at the ends of the trapeze and at the top of a hanger attaching the sprinkler piping to the trapeze, are allowed to be sized to accommodate the trapeze. They then created Section 9.1.1.6.6, which states: "*The ring, strap, or clevis installed on a pipe trapeze shall be manufactured to fit the pipe size of the trapeze member.*" It is important to note that the ring at the top of the hanger attaching the sprinkler pipe to the trapeze and at either end of the trapeze may need to have a "rod button" that is sized to accommodate a larger rod size than is

usually required. This usually leads to using a heavy duty ring and is one of the reasons the Committee placed the new language in the standard. The Committee made a definite change to require that the hanger rod and hanger attachments for the entire assembly must be sized based on the sprinkler pipe that the trapeze is intended to support. This would mean that your example of a 2- 1/2-inch trapeze member, supporting an 8-inch sprinkler main, would be required to have 2-1/2-inch rings with 1/2-inch rod and attachments for the entire trapeze assembly. The NFSA attempted to convince the Committee to allow 3/8-inch rod and attachments when using a pipe smaller than 4-inch on the trapeze member, as in your example. However, the Committee did not agree to this position.

Question 9 – Residential Sidewall Sprinklers Above Kitchen Cabinets

I have a meeting with the building inspector this week and need an answer to the question of whether it is permissible to install a residential sidewall head above a 12” wide kitchen cabinet. If so, do I need to be concerned about “shadows” created by the cabinets and other obstructions such as half height walls?

Answer: The 2007 edition of NFPA 13 offers new guidance on the first question. A limited series of fire tests undertaken by the NFSA showed that sidewall sprinklers could be installed above the cabinet on the back wall. However, the sprinkler must be 3 ft above the top of the cabinet. The sprinkler also may be installed on a wall when the wall is built out to the face of the cabinets and the cabinets are 12 inches or less in depth.

The NFPA 13 Committee allows for shadows created by obstructions. Short walls can be expected to create a very small floor shadow. The understanding that the sprinkler can overcome certain “footprint shadows” is important to fire sprinkler system design. The typical NFPA 13 system is a “fire control” system and not a “fire suppression” system. The Committee has reinforced this line of thinking by creating rules allowing some fairly large obstructions. As an example, the “three times rule” would allow a sprinkler to be located no more than 24 in. from the side of an 18-inch column. This would certainly create a protection shadow behind the column. If one were to consider the shadow as unprotected in this instance, it would take as many as four sprinklers placed symmetrically around the column to provide adequate protection. The commentary for Chapter 8 in the NFPA’s *Automatic Sprinkler Systems Handbook* notes that some shadow is anticipated.

Question 10 - NFPA 20 Power Reliability

I received my 2007 edition of NFPA 20 in the mail this week. I have been looking forward to seeing the changes I had expected that would finally define "reliable" for electric power supply. What a disappointment! I went back and read the Report on Proposals (ROP) to see what happened. I agreed with the NFSA response and find it difficult to believe that the Committee has avoided this very important issue. I do agree with the Committee statement that reliability is directly related to each location. Of course there are local conditions that apply, but this is also true for water supplies and pump control configurations for which the Committee provides minimum guidance in the standard. The same should be true for the electric power. I think that in failing to provide a definition for this the Committee has failed to meet its purpose as stated in Section 1.2 to provide a reasonable degree of protection.

Answer: The Committee did come up with a definition for "reliable" power, but placed it in the annex in Section A.9.3.2. In order to be "reliable", a power supply needs all of the following:

- Source power plant has not had any shutdowns longer than 4 continuous hours in the year prior to plan submittal
- No power outages in the area of the protected property caused by the failure of the grid (other than those caused by natural disasters and grid management failures)
- Normal source of power is not overhead conductors directly outside the facility
- Only the disconnect switches and normal protective devices permitted by NFPA 20 are installed in the normal power.

Since this guidance is in the annex, it is not enforceable in the strictest sense, but it does provide valuable background for AHJs attempting to evaluate a particular situation.

Question 11 - Sprinklers Under Raised Floors

A project has a raised floor throughout an office area. Ductwork and some electric heaters are under the floor. Are sprinklers required below the floor?

Answer: A key question is whether the space is concealed or has access for storage. If the space is concealed then the standard concealed space rules would apply. This means that sprinklers would be required or allowed to be omitted based on the type of construction of the space. For example, noncombustible construction of a concealed space typically allows the omission of sprinklers. Simply because there is equipment in the space is not enough of a reason by itself to require sprinklers in the concealed space.

If there is expected to be storage below the raised floor or there are enough combustibles below the floor protection may be necessary. For example, this is a common case with computer rooms that have bundled cable running below them. However, sprinklers are not always the best solution; sometimes a gaseous system or water mist system is better suited to tight spaces that have numerous obstructions.

Question 12 – Large Ceiling Fan Obstructions with ESFR Sprinklers

We have an ESFR job where the owner is thinking about installing a ceiling fan 20 ft in diameter underneath the lighting and ESFR sprinklers. Is there was anything in NFPA 13 that would prohibit this?

Answer: ESFR sprinklers are extremely sensitive to problems caused by obstructions and therefore the rules in NFPA 13 have been written in a different way than any of the other portions of NFPA 13 regarding obstructions to other kinds of sprinklers. Using the 2007 edition of NFPA 13, if you compare the organization of Section 8.6.5 (obstructions to standard spray sprinklers, upright and pendent) to the organization of Section 8.12.5 (obstructions to ESFR sprinklers) you will notice a significant difference. Section 8.6.5 is set up to explain that there is a zone close to the sprinkler (within 18 inches of the deflector vertically) where obstructions are significant with obstructions less significant below this zone. Section 8.6.5.2 covers obstructions that are within 18 inches of the deflector vertically, where there are a significant number of obstruction rules, while section 8.6.5.3 covers the rules for obstructions that are farther from the sprinkler, where

the standard is only concerned with putting sprinklers under obstructions more than 4 ft wide. Section 8.12.5 for ESFR sprinklers is not set up in the same manner. There is no distinction between obstructions close to the sprinkler compared to obstructions far away from the sprinkler. The rules about keeping sprinklers far enough away from an obstruction so that water can spray under the obstruction do not have any vertical limit except for the allowance for obstructions 2 inches or less in size to be permitted when they are more than 2 ft vertically below the deflector (Sections 8.12.5.2(4) and 8.12.5.3.1.(2)). This leads to the conclusion that obstructions like ceiling fans can be a problem, even when they are very far below the sprinkler. There are really only two potential answers to the issue of a ceiling fan. The first would be to position the fan above the level of the sprinkler deflectors. The second would be to position the sprinklers in such locations that they would be able to spray under the fan in accordance with Table 8.12.5.1.1. This response has focused on a single large (20 ft diameter) ceiling fan. It is possible that smaller obstructions could be permitted when they are more than 36 inches below the sprinkler deflectors and are approximately the same size as commodities on racks (roughly 20 sq ft in area) with spaces on all sides (like flue spaces) for water to get around the object.

Upcoming NFSA “Technical Tuesday” Online Seminar – February 13th

Topic: Changes to the Hanging Requirements

Instructor: Victoria B. Valentine, P.E., NFSA Manager of Product Standards

Date: February 13, 2007

This seminar is the third of a series of ten on changes to the 2007 editions of NFPA 13, 13D, 13R, 20 and 24. Even if you will not soon be using the 2007 edition of NFPA 13, you will find that the changes and clarifications will affect your understanding of the requirements of earlier editions.

The requirements for the support of sprinkler systems in Chapter 9 of NFPA 13 have changed significantly in the new 2007 edition of the standard. This program will focus on these changes including the new rules regarding the sizing of components that form trapeze hangers and the use of flexible sprinkler drops.

Information and registration for this seminar is available at www.nfsa.org or by calling Dawn Fitzmaurice at 845-878-4200 ext. 133 or email: dawn@nfsa.org.

First 2007 NFSA “Business Thursday” Online Seminar – February 15th

(NOTE: This seminar has been re-scheduled from its original date of February 22, 2007)

Topic: Project Close-Out

Instructor: Michael Friedman, P.E.

Date: February 15, 2007

Too often the final phases of a project nearing completion are overlooked as companies are involved with their work in progress and jobs just starting up. In actuality the successful closing out of a project is critical to complying with contract requirements, job profitability, and customer satisfaction. This course will explore the reasons that contractors must raise the importance given to this phase of a construction contract and offer ways and means to accomplish it successfully.

Information and registration for this seminar is available at www.nfsa.org or by calling Dawn Fitzmaurice at 845-878-4200 ext. 133.

NFSA Sets 2007 Schedule for 3-day Advanced Technician Training and NICET Inspector Certification Review Classes

The NFSA Engineering Department has set up the following classes for open registration:

May 22-24	ITM NICET Review	Anchorage, AK
June 19-21	ITM NICET Review	Wilmington, DE
July 24-26	Advanced Technician Training	Chicago, IL
August 14-16	ITM NICET Review	San Antonio, TX
September 5-7	Advanced Technician Training	St Louis, MO
November 6-8	ITM NICET Review	Providence, RI

For more information, contact Nicole Sprague at 845-878-4200 ext. 149 or email: Sprague@nfsa.org.

Remaining NFSA Two-Week Technician Training Events

Just like the two-week technician training seminar held in Philadelphia in October, the seminar just completed in Denver, CO was totally sold out. Make your reservations early for the two remaining technician training events in 2007:

April 16-27	Orlando, FL
September 24- October 5	Kansas City, MO

These seminars also serve as starting points for the NFSA's two-year Certificate Program for Fire Sprinkler Technicians.

For more information, contact Nicole Sprague at 845-878-4200 ext. 149 or email: Sprague@nfsa.org.

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In the promotion of the fire sprinkler concept, the National Fire Sprinkler Association represents all fire sprinkler industry interests including fire sprinkler contractors, manufacturers and suppliers of fire sprinklers and related equipment and fire protection professionals. Established in 1905, the National Fire Sprinkler Association provides publications, nationally accredited seminars, representation in codes and standards-making, market development, labor relations and other services to its membership. Headquartered in Patterson, New York, the National Fire Sprinkler Association has regional operations offices throughout the country.