



Tuesday e-Tech Alert  
March 14, 2006

### **Best Questions of February 2006**

We have selected the following questions as the “best of February 2006” answered by the NFSA Engineering Staff:

#### **Question 1 – Fire Department Connection Tie-in Locations for High Rise**

In a high rise building, may the fire department connection (FDC) be installed upstream of the fire pump if the churn pressure plus available static pressure exceeds 175 psi? If the high rise has two risers with isolation valves at their base, may the test header and the FDC be installed on the same feed from the fire pump discharge side or do they need to be separate? Can the test header connection be anywhere downstream of the fire pump or is it required before the fire pump discharge isolation valve?

#### **Answer:**

The fire department connection is not permitted to be installed on the suction side of the pump. See section 8.16.2.4.8 in NFPA 13. There is a similar section in NFPA 14. The fire department will pump into the fire department connection at significantly high pressure. If that water were to go through the pump and be increased again, it would be detrimental to the system.

The test header and the FDC connection need to be separate. The FDC connection has to have a check valve in it that stops the water from flowing from the system to the outside of the building. The test header has to allow water to flow from the system to the outside of the building. Since the pipes need to have water flowing in opposite directions, the same pipe cannot be used for the two different purposes.

Another reason that the test header and the FDC need to be separate is that NFPA 20 requires the test header supply pipe to have a control valve supervised in the closed position. This prevents people from impairing the fire protection system by starting a fire and robbing water from the system by opening the test header line. But the FDC is not allowed to have a control valve in the system piping, so to meet both NFPA 20 and NFPA 13, you need to run separate lines for the FDC and the test header.

The test header needs to be run from the discharge piping of the fire pump. The discharge piping of the fire pump is the short piece of pipe between the pump discharge flange and the pump discharge control valve. The reason that the test header needs to be connected to the discharge pipe is that in some circumstances it is necessary to isolate the fire pump from the fire protection system while running pump tests. In order to do this, the discharge valve needs to be closed while water is run through the test header. If the test header is connected on the system side of the discharge control valve, there would be no way to isolate the pump from the system during testing.

#### **Question 2 – Including Water Curtains in Calculations**

A water curtain is located around a conveyor floor opening, and four sprinklers have been included in the calculations. Should the four sprinklers on the opposite side of the opening and the one under the conveyor also be added to the remote area? What if the sprinklers on the opposite side are supplied from a different cross main?

**Answer:**

First, there is no need to include the sprinkler under the conveyor in the calculations. NFPA 13 (2002 edition Section 14.4.4.3) states that you do not need to include sprinklers under an obstruction so long as the ceiling system is more demanding (assuming that these are not ESFR sprinklers).

The number of sprinklers to include in the water curtain depends on the size of the sprinkler design area. NFPA 13 (2002 edition Section 11.2.3.8.2) states that the number of sprinklers to be added to the calculations for the water curtain is related to the length of the remote area parallel to the branch lines. For example, for a remote area of 1500 sq ft, the length of the area parallel to the branch lines is required to be at least 46.5 ft (1.2 times the square root of 1500). If sprinklers are spaced 6 ft apart, this would require 8 sprinklers to make up the length, meaning that the remaining four sprinklers in the water curtain should be included in the calculations. However, in the event the four opposite sprinklers are on a different branch line served by a separate cross main, they would not need to be added. In this case, Section 14.4.4.1.1.3 could be considered applicable, which states that in the case of a branch line not containing sufficient sprinklers to meet the 1.2 times the square root rule, sprinklers shall be added from additional branch lines served by the same cross main.

**Question 3 – Power Sources to Electric Drives for Pumps**

Section 6-2 of NFPA 20-1999 states that power shall be supplied to the electric motor driven fire pump by a reliable source of two or more approved independent sources.

Section 9-2.1.1 NFPA-20 2003 states power shall be supplied to the electric motor driven fire pump by a reliable source or two or more independent sources. Was there an error in the wording of the 1999 code? Earlier versions and the most recent version of this section would lead one to believe that if the fire pump motor was connected to a reliable power source no additional connections to independent power sources would be needed.

**Answer:**

The answer is "yes." An erratum was issued on this paragraph in the 1999 edition in September of 1999. For future reference errata and TIAs that are issued are available on the NFPA website ([www.nfpa.org](http://www.nfpa.org)) under "Codes and Standards." The language in the 2003 Edition of NFPA is correct.

**Question 4 – Overhead Sprinklers at a Bank Drive-Thru**

A bank building is two stories tall and part of the second floor extends over a drive-thru area. This canopy area is 72 ft by 48 ft in size with a lay-in tile ceiling. Are sprinklers required below this "ceiling"? What about within the space above the ceiling? Would both spaces be considered light hazard?

**Answer:**

NFPA 13 (2002 edition Section 8.14.7.1) requires sprinklers under combustible exterior canopies over 4 feet wide, and under roofs and canopies where combustibles are stored and handled (Section 8.14.7.4). Annex section A.8.14.7.4 clarifies that it is not the intent to require sprinkler protection for short-term transient storage, and the NFPA's *Automatic Sprinkler Systems Handbook* notes that "Areas located at drive-in bank windows or porte cocheres at motels and hotels normally do not require sprinklers."

With regard to the above-ceiling space, NFPA 13 (2002 edition Section 8.14.1.1) would require sprinkler protection in that area if it is of combustible construction, unless it were addressed by one of the special cases described in 8.14.1.2. If the omission of sprinklers from a combustible concealed space is permitted, the sprinkler design area in the building above might be increased to 3000 sq ft (Section 11.2.3.1.8 (3) and (4)).

If sprinklers are provided in the drive-thru area, ordinary hazard Group 1 would be considered appropriate based on the inclusion of “automobile parking” within the examples of A.5.3.1. With regard to the above-ceiling space, Section 8.14.1.3 allows sprinklers in concealed spaces having no access for storage to be installed in accordance with the requirements for light hazard occupancy.

### **Question 5 – Sprinklers Below Lofts**

In a child daycare center, a loft of combustible construction is proposed to be constructed in each of 6 childcare rooms. In some areas the lofts will be only 30 inches above the floor (clear space) to allow play space for very small children, and in other areas will allow 42 inches of clear space. Proper light hazard sprinkler protection is being provided at the ceiling level in each childcare room. If these lofts are 47 inches wide and 6 ft long, can sprinkler protection below the lofts be omitted per NFPA 13 (Section 8.6.5.3.3, 2002 edition)? If sprinklers are required below the lofts, wouldn't they be easy to reach and subject to damage?

#### **Answer:**

If the lofts are located at least 18 inches below the ceiling sprinkler deflectors and the lofts are less than 4 ft in width, then NFPA 13 would technically not require sprinkler protection below the obstructions created by the lofts. However, good practice would dictate that the ceiling sprinklers be positioned such that some protection is provided for the below-loft areas.

### **Question 6 – Laundry Chute Sprinkler Protection**

A four-story building contains a laundry chute that consists of a concrete shaft containing a metal tube. Is a sprinkler needed at every level within the shaft?

#### **Answer:**

No. NFPA 13 (2002 edition Section 8.14.2.1) requires a sprinkler to be installed at the top of such shafts. If the shafts have combustible surfaces then additional sprinklers need to be installed at each alternate floor level. Section 8.14.2.3 requires an additional sprinkler installed near the bottom of accessible shafts with noncombustible surfaces.

Even gravity chutes used in incinerators only require a sprinkler at the top and at alternate floor levels with a mandatory sprinkler located at the lowest service level (NFPA 13 2002 edition Section 13.15).

### **Question 7 – NFPA 13 and 13R Bathroom Sprinkler Requirements**

Does the shower or bathtub area in a bathroom count toward the 55 sq. ft. maximum without sprinkler protection? We are concerned with an NFPA 13 project in which the bathrooms are 41 sq. ft. without the tub area included, or 60 sq. ft. with the tub area. Is the situation different for NFPA 13R applications?

#### **Answer:**

For bathrooms within dwelling units, the 1999 editions of both NFPA 13 and NFPA 13R allowed exclusion of the area occupied by full-height noncombustible tub/shower enclosures (1999 NFPA 13 Section 5-

13.9.1; 1999 NFPA 13R Section 2-6 Exception1). However, the 2002 editions of both documents require inclusion of tub and shower areas in the bathroom size calculations (2002 NFPA 13 Section 8.14.8.1.1; 2002 NFPA 13R Section 6.8.2(1)). Annex language in both documents relating to the definition of “bathroom” clarifies that separate adjoining rooms can individually be considered bathrooms for application of the sprinkler omission. For nursing homes, NFPA 13 (2002 edition Section 8.14.8.1.2) never allows omission of sprinklers from bathrooms regardless of size.

### **Question 8 - Secondary Water Supply Calculations**

Is there a code section pertaining specifically to hydraulically calculating a secondary water supply (tank). One AHJ recently asked for calculation of an area as close to the riser as possible to make sure that the supply was adequate for a 30-minute duration. However, this area however is not the most demanding in terms of pressure. Both demands could be met if a pressure regulating valve is used to balance the system. Is this appropriate?

#### **Answer:**

If a sprinkler system is required to have a secondary water supply then it should be calculated the same as the primary water supply. Local building and fire codes can have special requirements for a secondary water supply, such as a reduced duration. However, efforts to ensure the minimum duration of a stored water supply based on the use of a “near area” as opposed to a remote area tend to be counterproductive and should be resisted. It should be pointed out that the remote area calculation is based on all sprinklers open, which generally takes time and serves as a safety factor for water supply duration. Also, the fact that near sprinklers tend to operate with higher pressure and flow tends to reduce the size of the sprinkler operating area, again making it less likely that the water supply will have insufficient duration.

With regard to balancing demands, it is not uncommon to have two hydraulically most demanding areas. One area can be more demanding for the pressure and another area can be more demanding for the flow. Each area should be calculated separately and independently of each other. There should be no attempt to balance the system with both remote areas flowing water at the same time.

### **Question 9 - NFPA 13D System Over Another Occupancy**

An existing nightclub is being retrofit with NFPA 13 sprinkler protection. An apartment on an upper level is served by a covered stair, and there is a small storage area located opposite the entrance to the apartment. Would the apartment, stairs, and storage fall under the residential portion of NFPA 13 or could they be protected using the reduced residential sprinkler application rates of NFPA 13D? If 13D is applicable, can sprinklers be omitted from the stairs and storage because these areas are not intended for living purposes?

#### **Answer:**

NFPA 13D can only be used when the entire building is a one or two family dwelling. In the situation described, NFPA 13 protection would be required throughout.

It is theoretically possible that a dwelling unit can be sufficiently separated from the other portion of the building so that it is legally considered a separate “building”, but that kind of separation is difficult. If you wanted to use NFPA 13D, the building code authority would need to agree that the dwelling unit was sufficiently separated from the rest of the building so that it was legally considered a different building.

### **Question 10 - Drum Drip Locations**

On dry systems are drum drips required to be installed in warm areas?

**Answer:**

There is no requirement in NFPA 13 that drum drips to be located in a warm area. The nature of the drum drip is that it is installed where dry-pipe systems are in an area subject to freezing and cannot be pitched to drain back to the main drain. The drum drip allows condensate to be dumped without losing air from the dry-pipe system. Drum drips need to be emptied frequently, as much as weekly during cold weather so that condensate that does build up can be drained before it freezes in the piping and causes problems.

If a small amount of water freezes in the barrel of the drum drip, it should not result in damage to the system but a larger amount of water freezing in the drop might lead to cracking of the pipe. Many building owners (through contract specifications) specify that the drum drip be located in a heated space, or that the barrel of the drum drip be heat traced so that water collecting in the bottom of the drip will not freeze and can be discharged without waiting for warm weather. This is not a requirement of NFPA 13 but must be respected when it is in the system specifications.

**Question 11 – Loaded Sprinklers**

What is the definition of the term "loaded" as used in Section 5.2.1.1.2 of NFPA 25?

**Answer:**

NFPA 25 uses the term "loaded" to refer to any build-up of foreign material on a sprinkler. In the 2002 edition of NFPA 25, an annex clarification was made between severely loaded and lightly loaded sprinklers (A.5.2.1.1). Severely loaded sprinklers are to be rejected as part of a visual inspection, meaning that the sprinklers are required to be replaced. Lightly loaded sprinklers can be continued in use if sample testing confirms proper operation.

**Question 12 - Rating of Bracing Components**

If a listed brace fitting or assembly is rated at 2000 lbs and is used at an angle between 30 and 44 degrees from vertical, does this rating need to be divided by 1.5 and then again by 2 in order to meet the requirement of Section 9.3.5.8.10 and Table 9.3.5.10.3 of the 2002 edition of NFPA 13? This would result in a usable load of only 666 lbs

**Answer:**

No. The 1.5 safety factor that is mentioned in Section 9.3.5.8.10 is guidance for the laboratories during the listing of bracing components. This section will be moved to the annex of NFPA 13 for the upcoming 2007 Edition. If the brace fitting is listed for 2000 lbs then the only adjustment that needs to be made is for the angle of installation, which for between 30 and 44 degrees from vertical involves dividing by 2, resulting in an allowable load of 1000 lb.

**Upcoming NFSA Technical Tuesday Online Seminar**

**Topic: ESFR, Large Drop, and Specific Application Sprinklers**

**Instructor: Kevin J. Kelly, P.E., NFSA Manager of Codes**

**Date: March 21, 2006**

This online seminar will cover the history and development of the ESFR, Large Drop and Specific Application Sprinklers. The rules from NFPA 13 will be covered in detail along with possible expanded uses of these sprinklers. The listing requirements and the manufacturers' rules for such sprinklers provide specific instructions for their use. These specific rules will be summarized and explained in simple terms.

Information and registration for this seminar is available at [www.nfsa.org](http://www.nfsa.org).

## **2006 Basic and Advanced Technician Training, NICET Inspection Seminars**

The NFSA is the only organization that offers two-week basic technician training seminars, 3-day advanced technician training seminars, and NICET-oriented inspection and testing review seminars at various locations across the United States. The 2006 schedule has been set for the following dates and locations:

### 2-week Basic Technician Training

*August 14-25, 2006 – Seattle, WA*  
*October 16-27, 2006 – Philadelphia, PA*

### 3-day Advanced Technician Training

*April 18-20, 2006 – Chicago, IL*  
*October 3-5, 2006 – Minneapolis, MN*

### 3-day NICET Inspection and Testing Certification Review

*July 11-13, 2006 - Edwards, CO*  
*November 14-16, 2006 - Anchorage, AK*

For more information, contact Nicole Sprague using [Sprague@nfsa.org](mailto:Sprague@nfsa.org)

## **NFSA In-Class Training Opportunities**

NFSA also offers in-class training on a variety of subjects at locations across the country. Here are some upcoming seminars:

April 4	McFarland, WI	Introduction to Sprinkler Systems
April 5	McFarland, WI	Inspection, Testing & Maintenance
April 6	McFarland, WI	Pumps for Fire Protection
April 18-19	Woodland, CA	Plan Review & Inspection
April 20	Woodland, CA	Sprinklers for Dwellings
May 2	Cockeysville, MD	Inspection, Testing & Maintenance
May 3	Cockeysville, MD	Sprinkler Protection for Rack Storage
May 4	Cockeysville, MD	Standpipe Systems
May 4	Cockeysville, MD	Underground Piping
May 9	Colorado Springs, CO	Pumps for Fire Protection
May 10	Colorado Springs, CO	Sprinkler Protection for General Storage
May 11	Colorado Springs, CO	Sprinkler Protection for Rack Storage
May 9-10	Nags Head, NC	Plan Review & Inspection
May 11	Nags Head, NC	Hydraulics for Fire Protection
May 16-17	Richmond, CA	Plan Review & Inspection
May 18	Richmond, CA	Underground Piping
May 18	Richmond, CA	Seismic Protection
May 23-24	Freeland, MI	Plan Review & Inspection
May 25	Freeland, MI	Residential: Homes to High-Rise

May 23-24	Murray, UT	Plan Review & Inspection
May 25	Murray, UT	Hydraulics for Fire Protection
May 23	Spokane, WA	Sprinkler Protection for General Storage
May 24	Spokane, WA	Sprinkler Protection for Rack Storage
May 25	Spokane, WA	Hydraulics for Fire Protection

For more information or to register, visit [www.nfsa.org](http://www.nfsa.org) or contact Michael Repko at 845-878-4207.

*NFSA Tuesday e-Tech Alert is c. 2006 National Fire Sprinkler Association, and is distributed to NFSA members on Tuesdays for which no NFSA Technical Tuesday Online Seminar is scheduled. Statements and conclusions are based on the best judgment of the NFSA Engineering staff, and are not the official position of the NFPA or its technical committees or those of other organizations except as noted. Opinions expressed herein are not intended, and should not be relied upon, to provide professional consultation or services. Please send comments to Russell P. Fleming, P.E. [fleming@nfsa.org](mailto:fleming@nfsa.org).*

*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*