



Tuesday e-Tech Alert

Number 67

October 3, 2006

Best Questions of September 2006

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

Question 1 - Protection of Sprinkler Piping

Does sprinkler piping running through an unprotected area need to be protected? We thought there was a code that required this but we cannot find it in the latest NFPA edition. Was this or is this still a requirement?

Answer: Unlike NFPA 14, which in Section 6.1.2 (2003 edition) states minimum piping protection requirements and in A.6.1.2 recommends against putting standpipes in unsprinklered areas of combustible construction, there are no such requirement for protection in NFPA 13. However, Section 4.1 of NFPA 13 states that it is a fundamental assumption of the standard that all areas of the building are sprinklered except those that are specifically allowed to have sprinklers omitted. This is the protection envisioned by the standard.

If someone is running sprinkler piping through an unsprinklered building, then the space is not protected as assumed in NFPA 13. Whether or not this is a problem depends on the nature of the buildings in question and the probability of a fire in one building needing to have water directed at the second building. In most cases, this is not a problem because the fire in the unprotected building can't be controlled by the sprinklers in the protected building, so it does not matter if the water supply to the sprinklers is compromised. However, there could be special circumstances, such as a waiver of required exterior exposure protection on the basis that a building is sprinklered. If the sprinkler system is intended to play a role in such exposure protection, then it should not be made vulnerable to the fire against which it is expected to provide protection.

Question 2 – Protecting Pitched Combustible Attics

Table 8.6.2.2.1(a) in NFPA 13 (2002 edition) addresses protection area and maximum spacing. For unoccupied attics having combustible wood joist or wood truss construction with members less than 3 feet on center with slopes having a pitch of 4 in 12 or greater the table indicates either 8 ft x 15 ft (minimum 7 psi) or 10 ft x 12 ft (minimum 20 psi). Are these the only spacing options available or can we space the heads differently? What if our attic is 24'-7" wide and our spacing becomes 8'-2"x14'-8"?

Can we still use 7 psi starting pressure? In other words, can the spacings listed (8 ft by 15 ft and 10 ft by 12 ft) be modified at all?

Answer: Yes. However, the values listed in the table are maximum values. This means that if you wanted to space sprinkler more than 8 ft apart (perpendicular to the slope) than the 10 ft by 12 ft spacing would have to be used, along with the minimum 20 psi pressure. In your example, spacing sprinklers 8 ft 2 in. perpendicular to the slope would be acceptable as long as the 10 ft by 12 ft spacing was selected. Your spacing would be 8 ft 2 in. by 12 feet. It would never be acceptable to space the sprinklers more than 10 ft apart perpendicular to the slope.

Question 3 – Areas Open Above Ceilings

If you have an area protected by upright sprinklers that is open to an area that has ceilings with pendent sprinklers below, and there is no full height wall separating the two areas, what is the criteria for covering the area above the ceiling? The same question comes up if there is a store that has a small area in the center of all of its acoustical ceiling that is open grate. The grate does not meet the 70% rule and therefore need sprinklers above it. Is the area around the grate and above the ceiling required to have sprinklers? What about a water curtain? Or 15 ft of sprinkler coverage into the ceiling area? Or 30 ft? Would a wall of sprinklers be an option?

Answer: Yes, the areas described require sprinklers, since NFPA 13 states that all areas of the building need to be sprinklered. There are exceptions for non-combustible concealed spaces, but the spaces described are not concealed. They are open to other spaces and fires in these other spaces could send hot gasses into the area and cause damage to structural members.

NFPA 13 does not specifically allow the alternatives suggested. A local AHJ might accept them, but would probably require some engineering calculations performed to ensure that the water discharge would satisfactorily handle the heat from a potential fire. Remember that NFPA 13 calls for the calculation of 1.2 times the square root of the design area in the direction of the branch lines. This is the measurement of how many sprinklers might open during a fire. Although it takes less heat to activate a sprinkler than to cause structural damage, the effect of the heat must nevertheless be considered.

Question 4 – Inspection and Testing of Pressure Restricting Valves

I have a situation involving inspection of pressure restricting valves, not pressure reducing valves or pressure regulating valves. I don't see in NFPA 25 where pressure restricting valve requirements are addressed. Do I treat these as I would regular hose valves?

Answer: In the 2002 edition of NFPA 25, pressure restricting devices are defined in Section 3.3.27 with a note that the definitions have been adopted from NFPA 14. However, the device is tested as part of the hose valve installation. Section 12.5.5.1.9 states, "Hose valves shall be inspected to ensure that restricting devices are present." A pressure restricting device only reduces the pressure under flowing conditions. Therefore, only when it is flowing as part of the hose valve testing can it be verified that it is operating properly.

Question 5 – Maximum Building Area vs. Sprinkler Area

NFPA 13 Section 8.2.1 (2002 edition) states "The maximum floor area on any one floor to be protected by sprinklers supplied by any one sprinkler system riser or combined riser shall be as follows:..." and goes on to state the area limitations for the various hazards. Our specific question is this; In calculating this area, does one use the gross area of the floor ($L \times W = A$) or are you permitted to subtract from this total areas on the floor which are exempt from sprinkler coverage? As an example, the gross area of a floor of a building that is to be protected by an ordinary hazard system might measure 52,800 square feet in area but within that footprint there may be more than a thousand square feet of noncombustible stairways, nonaccessible vertical duct shafts, and other areas that do not require sprinkler protection.

Answer: You have asked if the maximum system areas of NFPA 13 apply to building areas or sprinkler protection areas. The latter is the case. You are correct that noncombustible shafts and other areas in which sprinklers are not installed are not included in system protection area limitations.

Question 6 - Ceiling Fan and Light Obstructions

According to NFSA's *Sprinkler TechNotes* March/April 2006 edition there is a new Section 8.2.5 for 13D regarding obstructions for ceiling fans and lights, etc. However, in an article in the January/February 2006 *NFPA Journal* an NFSA staff engineer is quoted as saying that NFSA-sponsored research showed that the true obstruction concerns of ceiling fans are the motor housings and the escutcheons where the fans attach to the ceiling, not in the blades themselves. It was further stated that NFPA 13 is being clarified to state that sprinklers can be spaced without regard to the location of the fan blades as long as the fan is at least 50 percent open in the plan view, and that an Annex note will remind users that the sprinkler will need to meet the four-times rule with respect to the motor housing. The research, conducted with the fans off, the fans pulling air up and the fans pushing air down, reportedly showed that the four-times rule was extremely conservative. As a result, the rule would not be required in NFPA 13R or NFPA 13D, but that the Technical Committee felt that the extra level of protection was appropriate for NFPA 13. Which is correct?

Answer: Both pieces of information are correct. The 2007 edition of NFPA 13 will contain the 4-times rule because it is conservative and more in keeping with the property protection aspects of that document. NFPA 13R and NFPA 13D will have relaxed rules that allow the sprinkler to be closer based on the testing conducted by the NFSA. There is some concern for adverse performance of the residential sprinklers, so the NFPA Committee did not allow the user to completely ignore the ceiling fan. But the concern was over the motor housing, not the blades. For pendant sprinklers, the minimum distance between the fan and the sprinkler will be 3 ft, and for sidewall sprinklers, the minimum distance will be 5 ft. It is important to note that the minimum distance is measured in this case from the center of the sprinkler to the CENTER of the ceiling fan, not the near edge as in other obstruction rules. This is consistent with the test results and allows the sprinkler contractor to plan for sprinkler placement before the homeowner selects the fixture that they want to install. Since the fan is typically located in the middle of the room, the sprinkler contractor can place the sprinkler before the fan is installed.

Question 7 – Use of CPVC Piping in Concealed Spaces

I am protecting a restaurant with plastic pipe in the seating area and steel in the kitchen. The construction is non-combustible. There is a concealed space with exposed combustibles (plywood) in the horizontal plane. Can the CPVC pipe be run through this space?

Answer: Whether or not you can install the CPVC pipe in a combustibile concealed space depends on whether or not the space is being protected with sprinklers and what kind of sprinklers are being installed. CPVC pipe is always permitted (per its listing) to be installed in a combustibile concealed space that is not sprinklered. The theory is that the worst thing that could happen is that a fire starts in the concealed space and burns through the pipe. This would release water in an otherwise non-sprinklered space and would also sound a waterflow alarm. When the worst thing that could happen is not so bad, the concept is allowed. CPVC is NOT allowed to be installed in concealed spaces that are required to be protected with sprinklers and are protected with standard spray sprinklers. Here the worst thing that could happen is that the fire starts in the concealed space and burns through pipe before getting to the sprinklers. That would be a problem and the listing for CPVC does not allow it to be installed this way. CPVC pipe has recently been listed for use in combustibile concealed spaces where the concealed space is protected with a special listed concealed space sprinkler. This special listing is found in the special listing for the sprinkler, not the special listing for CPVC pipe.

Question 8 - FDC on Suction Side of Fire Pump

Is it permitted per NFPA to have the FDC serve the suction side of a pump? If not, where is it excluded? We have a retrofit project where it would be advantageous to leave the existing FDC in place.

Answer: You have asked if a fire department connection (FDC) can be connected to a sprinkler system on the suction side of a fire pump where the pump is being added as part of a retrofit. The answer to your question is "no." Section 8.16.2.4.8 of NFPA 13 (2002 edition) states, "Fire department connections shall not be connected on the suction side of fire pumps." The concern is that 150 psi is assumed to be supplied through the FDC and if that pressure is on the suction side of the fire pump then the components downstream would have to be capable of withstanding the cumulative pressure of that provided through the FDC and what the pump produces. In most cases this would be more than the 175 psi for which most components in the sprinkler system are rated. While there are components rated for higher pressures, it would mean added cost at the least. Therefore, the standard requires that the FDC be tied in on the system side (discharge side) of the fire pump to guard against overpressurization.

Question 9 - Pressure Tank Water Supply Curves

Based on NFPA 13 (2002 edition) Section 15.2.3.3 and associated appendix notation, we can determine a pressure tank starting pressure for a given sprinkler system demand. However, can we develop a typical water supply curve for a pressure tank based on the rate at which the water is discharged? In other words, can a static pressure (the starting pressure as determined by 15.2.3.3) and a flow with a residual pressure be developed?

Answer: It would be extremely difficult, if not impossible to do what you are proposing. Furthermore, there is no reason to draw a water supply curve from a pressure tank. The pressure from a pressure tank is not a function of flow. Instead, the pressure in the tank is a function of the volume of air in the tank. As water flows out of the tank, the water goes out and the air expands, dropping the pressure in the tank. But the pressure in the tank is not a function of the flow. If the flow starts out as 25 gpm, the pressure will drop. If the flow drops to 10 gpm, the pressure will not go up. Instead the pressure will continue to drop. You do not need to figure out the pressure drop. You only need to figure out the demand flow in order to make sure you have enough water in the tank and the pressure demand so that you know how much air and air pressure to keep in the tank.

Question 10 –Protection of Bank Vaults

I just spoke with my local AHJ about sprinkler protection in a bank vault. He said he is not 100 percent sure that protection is needed in such a vault. However, until I can provide documentation that sprinkler protection is not required, he is going to have me add sprinklers in the vault. I have looked in NFPA 13 (1999 edition) but have not found anything on the subject. Can you give me any insight?

Answer: There is nothing specifically written in NFPA 13 about bank vaults. NFPA 13 requires all areas of a building to be protected with sprinklers. There are exceptions for noncombustible concealed spaces. Some AHJ's have stretched the concept of concealed spaces to include vaults for security reasons so that there isn't the penetration of the integrity of the vault for the sprinkler pipe. Other AHJ's have required the sprinklers in order to protect the objects in the vault. Ultimately, this is a judgment call that the AHJ has to make. The situation is no different than the one in operating rooms in hospitals. Although the general rules of NFPA 13 call for all areas of a building to be sprinklered, many hospital officials don't want them to be sprinklered because they are worried that if the sprinkler discharges on a patient, it will contaminate the field of surgery and kill the patient. These owners manage to convince their local AHJ's that their very special and specific concern overrides the very general requirement from NFPA 13. The bank vault is a similar specific concern that could override a general requirement in the standard if sufficient justification is presented regarding the concern for the integrity of the vault.

Question 11 – Positioning Attic Sprinklers Along Eaves

Section 8.6.4.1.4.3 of NFPA 13 (2002 edition) indicates that the outer sprinkler line is to be spaced within 6 ft from the outer line of the concealed space. The NFPA's *Sprinkler Handbook* indicates the sprinkler protection is to be within 6 ft from the inside edge of the eave line. If the eave has an enclosed soffit extending from the face of the exterior wall, does this area have to be provided with sprinkler protection? Does it make a difference if the area is separate from the attic area proper or if it can be accessed from the attic area? The main reason I ask is because the Handbook suggests the reasoning for having the sprinkler line within 6 ft from the inside edge of the eave line is to ensure that if there were a fire starting in the concealed space along the eave (which I would assume to be the soffit area that I am referring to above) then there would be sprinklers close to the fire. If sprinklers are required in the subject soffit area, then there are obvious issues with drainage and access.

Answer: Chapter 8 requires that sprinklers be located a "minimum" of 6 ft from the eave. The NFPA 13 Committee has defined the point for measuring the 6 ft dimension as the point where "the bottom of the top chord meets the top of the bottom chord". If you have a partition separating the eave, then the partition would be the demarcation. As for the eaves that are enclosed, if they are not more than 4 ft wide, NFPA 13 does not require sprinkler protection in overhangs that are less than 4 ft wide.

Question 12 - Floor Control Valves and Trash Chute Sprinklers

In a high rise building, are the sprinklers for that floor to come off a single control valve, i.e. should you feed sprinklers off a floor control valve to serve a trash chute, or is a separate riser appropriate?

Answer: The sprinklers in the trash chute are allowed to be fed from the floor they are adjacent to in the trash chute. For example, if you have a high-rise building with 8 floors and a trash chute with sprinklers

at the 2nd, 4th, 6th, and 8th floors, the sprinkler in the trash chute at the 2nd floor is permitted to be fed from the sprinkler system on the 2nd floor. The sprinkler in the trash chute at the 4th floor is permitted to be fed from the sprinkler system on the 4th floor. Alternatively, a separate trash chute riser could be utilized.

Upcoming NFSA “Technical Tuesday” Online Seminar

Topic: Draft Stops and Closely-Spaced Sprinklers

Instructor: Russell P. Fleming, P.E, NFSA Executive Vice President

Date: October 10, 2006

NFPA 13 has long included rules for draft stops and closely spaced sprinklers around escalator and similar floor openings, but the intended application of those criteria has been the subject of debate during the preparation of the 2007 edition of NFPA 13. Under what conditions is this special protection needed around floor openings and when is it unnecessary? This seminar will examine the history of this sprinkler configuration, including fire test programs and technical committee decisions that shaped the protection scheme and its recognition within building codes. It will also discuss the changes to the 2007 edition of NFPA 13, and will briefly discuss related protection schemes for water curtains used in theater stage applications and atrium window protection.

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

Upcoming NFSA “Business Thursday” Online Seminar

Topic: Project Scheduling

Instructor: Michael J. Friedman, P.E.

Date: October 19, 2006

The word “schedule” evokes many reactions in the contracting world. Scheduling is an extension of the planning process, and there is no doubt that once price and terms have been agreed upon, the most important performance objective to an owner is to complete the work on time. This course will explore the principal scheduling types: bar chart, CPM and Short Interval Schedules. The focus will be use of the CPM as a management tool to accomplish on-time completion, cash flow management and better utilization of manpower resources within the company.

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

NFSA In-Class Training Opportunities

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

Inspection, Testing & Maintenance

North Las Vegas, NV

Oct 3

Residential: Homes to High-Rise	North Las Vegas, NV	Oct 4
Standpipe Systems (1/2 day) (AM)	North Las Vegas, NV	Oct 5
Underground Piping (1/2 day) (PM)	North Las Vegas, NV	Oct 5
Two-day NFPA 13 Overview & Intro to Plan Review	Noblesville, IN	Oct 17-18
Inspection, Testing & Maintenance	Noblesville, IN	Oct 19
Introduction to Sprinkler Systems (1/2 day) (AM)	Southfield, MI	Oct 24
Standpipe Systems (1/2 day) (PM)	Southfield, MI	Oct 24
Introduction to Sprinkler Systems (1/2 day) (AM)	Willoughby, OH	Oct 24
Standpipe Systems (1/2 day) (PM)	Willoughby, OH	Oct 24
Hydraulics for Fire Protection	Southfield, MI	Oct 25
Sprinklers for Dwellings	Willoughby, OH	Oct 25
Pumps for Fire Protection	Willoughby, OH	Oct 26
Two-day NFPA 13 Overview & Intro to Plan Review	Southfield, MI	Oct 26-27
Sprinkler Protection for General Storage	Irvine, CA	Nov 7
Sprinkler Protection for Rack Storage	Irvine, CA	Nov 9
Two-day NFPA 13 Overview & Intro to Plan Review	Winston-Salem, NC	Nov 14-15
Hydraulics for Fire Protection	Winston-Salem, NC	Nov 16
Sprinkler Protection for Rack Storage	Tucson, AZ	Dec 12
Sprinkler Protection for Special Storage	Tucson, AZ	Dec 13
Sprinklers for Dwellings	Tucson, AZ	Dec 14

For more information or to register, visit www.nfsa.org or call Michael Repko at 845-878-4207, email: seminars@nfsa.org.

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