



Tuesday e-Tech Alert
November 13, 2007
Number 99

Best Questions of October 2007

We have selected the following questions as the “best of October 2007” answered by the engineering staff as part of the NFSA’s EOD member assistance program:

Question 1 – Conducting the 5-Year NFPA 25 Standpipe Flow Test

NFPA 25 requires a 5-year flow test for standpipe systems and states (Section 6.3.1.1 in the 2002 edition) that the test “shall be conducted every 5 years at the hydraulically most remote hose connection of each zone of an automatic standpipe system to verify the water supply still provides the design pressure at the required flow”, but doesn’t clarify how to do the test. Does this mean we should be flowing 500 gpm from the most remote standpipe at the same time we are flowing 250 gpm from less remote standpipes up to the total water supply provided for the system, or does it mean that we should be flowing 500 gpm from each standpipe individually?

Answer: The standard is not specific on this issue, and the authority having jurisdiction may accept any reasonable proposal. Section 6.3.1.2 allows consultation with the AHJ in the event flow tests are simply not practical. The best test is probably one which checks on the ability of the topmost outlets from each individual standpipe zone to provide 500 gpm, in the event that is the standpipe the fire department is relying on as the primary source of supply during a fire. The ability of the water supply to provide the total amount of water needed for all standpipes is essentially checked on an annual basis during the pump flow test.

Question 2 – NFPA 13R vs. NFPA 13 Based on Construction Type

We had been contracted to provide an NFPA 13R sprinkler system for a multi-story residential building with a 12,000 sq. ft. footprint above a mercantile occupancy, with sufficient fire separation to consider it a separate building under the building code. A change was made in the construction of the building from noncombustible to combustible, and we were advised that we could no longer use a 13R system, but would need to install an NFPA 13 system. Why would this be the case if there was no change to the fire separation or the size of the building?

Answer: Under the International Building Code, area increase allowances are available for NFPA 13 systems, but not NFPA 13R systems. A Group R2 multi-family residential occupancy of unprotected wood frame construction would require an NFPA 13 sprinkler system to be built to the size indicated.

Question 3 – Using Insulation to Lower the Ceiling

I have a project with 24-inch deep composite wood joists, with insulation stapled to the bottom of the composite wood joists so as to create a flat ceiling at the bottom of the lower chords. Can the

sprinkler deflectors be spaced 1 to 12 inches below bottom of the insulation? In general, is it acceptable to space deflector below insulation vs. the structure above the insulation?

Answer: Yes, you are permitted to space sprinklers below the insulation as if the insulation lowered the ceiling. In your case, the insulation lowers the ceiling all the way to the bottom of the composite wood joists. In other cases, the insulation may only lower the ceiling a few inches. For example, we have seen situations with 24 inch deep composite wood joists and 4 inches of insulation at the ceiling (in every pocket). The sprinklers can then be installed 2 inches below the bottom of the composite wood joists and still be considered only 22 inches down from the effective ceiling at the bottom of the insulation.

The issue is addressed in Section A.8.5.4.1 of the 2007 edition of NFPA 13, which specifically states that the insulation can be considered the “ceiling”. The only concern is to make sure that the insulation is installed in such a manner that it stays in place early in the fire scenario.

Question 4 – Using 25-ft Bay Line Spacing in 50-ft Bays

Can the 12’6” spacing exception of Table 8.6.2.2.1(c) of NFPA 13 (2007 edition) be applied to bays wider than 25’0” as long as they are in increments of 12’6”? In other words, if a bay was 50’0” wide, and the 12’6” exception was applied, only 4 lines would be required in lieu of 5 lines.

Answer: The 12’-6” spacing should be permitted for the building with the 50 ft bays. The 12’-6” spacing would clearly be permitted if the structural members were spaced with 25 ft between them, and the spacing of the structural members has very little to do with the performance of the sprinkler system. Therefore, the placement of an additional structural member halfway between members spaced 50 ft apart does not make the sprinkler system any better, so any spacing permitted with the members 25 ft apart should also be permitted when the members are 50 ft apart.

An Authority Having Jurisdiction can accept the 12’-6” spacing for situations where structural members are 50 ft apart under sections 1.5 and 1.6 of NFPA 13. This is an alternate arrangement that is the same level of safety as would be provided with the 25 ft bay rule.

Question 5 – Minimum Distance Between Sprinklers in Library Book Stacks

We have an architect who thinks that paragraph 8.6.4.3 of NFPA 13 (2007 edition), which allows in-rack sprinklers to be placed less than 6 ft (1.8 m) on center, can apply to sprinkler spacing in a library rack shelving area. Then he thought that the books on the shelves could act as a baffle. Your thoughts on this would be appreciated.

Answer: The situation depends on where the sprinklers are going and how they are intended to perform. In book stacks with multiple tiers where sprinklers are installed at each tier under a solid deck that acts as a ceiling, the minimum 6 ft rule would apply.

In book stacks that are similar to rack storage with sprinklers installed within the rack protecting vertical flue spaces, the sprinklers are acting very much like in-rack sprinklers and the minimum 6 ft rule should not apply. When protecting vertical flue spaces, there is no concern for cold soldering because the only time we want the sprinkler to open is when the fire is in the flue space, and then spray from the next sprinkler over will not prevent the sprinkler from opening.

Question 6 – PEX Piping in Standalone NFPA 13D Systems

Some contractors in our area are installing standalone NFPA 13D fire sprinkler systems using cross-linked polyethylene (PEX) piping. I have looked at the manufacturer's installation manual and cannot find where they can use PEX pipe rated for 130 psi at 120°F for anything other than multipurpose systems. Is this allowed?

Answer: As far as we understand, the current listing of all cross-linked polyethylene (PEX) piping limits it to use only in multipurpose piping systems as intended by NFPA 13D. This restriction is to specifically deal with the concern of pressure surges getting trapped in the pipe and having no source of relief in a stand-alone system.

One manufacturer of PEX has claimed that a standalone sprinkler system is a multi-purpose system when the underground main bringing water into the building is common to the domestic plumbing and the sprinkler system. As proof of their claim, they cite Figure A.6.3(a) in the 2002 edition of NFPA 13D, which shows a common underground pipe that splits inside the dwelling to serve a standalone sprinkler system and a standalone plumbing system. Since the caption of this figure is "Multipurpose Piping System with Separate Supply", they claim that this is a multipurpose system and that their UL listing allows for them to use their pipe in this fashion.

The NFPA Residential Sprinkler Systems Committee would disagree. The reason they allowed the reduced pressure rated pipe in multipurpose piping systems was that pressure surges that get trapped in the system would be eliminated when someone opened a sink or flushed a toilet. In a stand-alone system, such pressure relief is not available. The committee discussed the possibility of allowing the lower pressure rated pipe on stand-alone systems if they had a pressure relief valve during the 2007 edition rewrite, but ultimately decided that it would be a mistake to encourage the use of pressure relief valves. The committee changed the name of Figure A.6.3(a) (and renumbered it to A.6.3(d)) in the 2007 edition specifically to straighten out any confusion. The committee specifically removed any reference to "multipurpose piping" in the figure so that there was no confusion.

Question 7 – Working Pressures in Dry Pipe Systems

We have a 10-story high rise with 6 stories of underground parking. The parking structure is protected with a dry system that runs off the same pump as the aboveground piping. The lowest 2 levels of parking will exceed 175 psi with the fire pump. The fittings and sprinklers are only listed for a working pressure of 175 psi. The dry system will have 30 psi of air on the system. Do we need to use high pressure sprinklers on the dry system even though the system will only have 30 psi of air under normal circumstances? Or is the working pressure limitation based on the pressure of the system when operating?

Also, does item 6.4.4 allow us to use cast iron fittings of size 1 through 2-inch without a specific listing for pressures exceeding 175 psi, or does 6.4.4.3 only validate 6.4.4 when there is a specific listing for pressures over 175 psi?

Answer: The portions of the dry-pipe system on the lower levels will need to have sprinklers and components listed for higher pressures. Even though they will only be exposed to 30 psi of air pressure under normal conditions, they will be exposed to the higher water pressure any time that the dry-pipe valve trips. For example, during all of the trip tests, the pipe, fittings and sprinklers will be subjected to the higher pressure. Even though this pressure does not stay in the system for long, it is an exposure to the components and they need to be listed to handle the higher pressure even under the short duration.

Sections 6.4.4.1 and 6.4.4.2 in NFPA 13 are written to specify the pressure conditions under which certain fittings can be used. The standard is just trying to say that when you use these standard fittings, you can use them at a pressure up to 300 psi. Section 6.4.4.3 is for specially listed fittings and should not be intertwined with 6.4.4.1 or 6.4.4.2. All section 6.4.4.3 is trying to say is that there are specially listed products in the marketplace that must be used in accordance with their special listings.

Question 8 – Column in Front of Extended Coverage Sidewall Sprinkler

I have a 14 ft x 18 ft room with one (1) residential horizontal sidewall sprinkler on the 14 ft wall capable of protecting 16 ft x 20 ft. There is a 2 ft x 2 ft column directly in front of the sprinkler with the closest face of the column 4 ft away. Since this meets the “4 x rule” is this an acceptable arrangement per Figure 8.10.7.2.1.4?

Answer: Yes, the configuration that you describe complies with NFPA 13. Figure 8.10.7.2.1.4 specifically shows an obstruction like a column directly in front of the sidewall sprinkler. According to section 8.10.7.2.1.4, the sprinkler and column combination are acceptable as long as the sprinkler is at least 36 inches (4 ft) away. There is no requirement for any additional sprinkler protection in such a room. In fact, Figure 8.10.7.2.1.4 shows no other sprinklers in the space.

Question 9 – Documentation for an Existing System

We are doing a half-floor tenant finish in a 10-story building. The work we are doing will be on the 6th floor and is pretty simple for the most part. The AHJ is asking for full shop drawings to be submitted in accordance with NFPA 13, but there are no as-builts or original system drawings available. We believe this is an unreasonable request, since it could take weeks to prepare full drawings.

Answer: Whenever an existing system is revamped, the amount of documentation that is necessary is up to the AHJ to determine. If only a few sprinklers are being moved, it's usually enough to show that the new configuration is not any more demanding than the original layout. This is fairly easy as long as the sprinkler contractor sticks to the pipe sizes and lengths in the remote area. If the new layout is more demanding, some calculations are in order. If you can't find the original plans, it is reasonable for the AHJ to ask for a survey of the affected area.

Question 10 – Purpose of Main Drain Test

What is the purpose of the annual main drain test? Does all the water have to come out of the system?

Answer: The primary purpose of a main drain test is to make sure that the valves between the sprinkler system and the water supply are open. The water that exits from the main drain comes mostly from the water supply, not the sprinkler system, so the purpose can never be to drain the system. NFPA 25 requires a main drain test to be conducted any time a system control valve is closed and reopened.

The secondary purpose in running the main drain test is to make sure that the water supply is not deteriorating significantly. NFPA 25 requires an annual main drain test for this purpose, and the new 2008 edition of NFPA 25 establishes a threshold for additional investigation of deterioration in main drain full flow results:

13.2.5.2 When there is a 10 percent reduction in full flow pressure when compared to the original acceptance test or previously performed tests, the cause of the reduction shall be identified and corrected if necessary.

Question 11 – Far Wall Obstructions to Sidewall Sprinklers

Table 8.7.5.1.3 and Figure 8.7.5.1.3 of NFPA 13 (2002) indicate the positioning of sidewall sprinklers to avoid obstructions located at the ceiling. Is there a table or figure for sidewall sprinklers similar to the one for upright and pendent sprinklers (Figure 8.6.5.1.2) when the obstruction is located against the far wall?

Answer: There is no specific table or figure regarding sidewall sprinklers and obstructions at the far wall. Section and Figure 8.7.5.1.3 are designed to limit the interference of obstructions near the ceiling that prevent the spray from the sprinkler from getting past the obstruction to protect portions of the room beyond the obstruction. If the obstruction is against a wall, there is less of a need to get water past the obstruction. It is expected that AHJs will use good judgment in enforcing sprinkler spacing and location.

There is no requirement in NFPA 13 to have water from the sprinkler impact every square foot of floor area within the coverage area of the sprinkler. In fact, there are many sections of NFPA 13 that specifically allow dry spots in the coverage area of sidewall sprinklers. Section (and Figure) 8.7.5.2.1.3 specifically allows a significant dry spot behind a column or other vertical obstruction. Based on the size of typical columns and the placement of a sidewall sprinkler, the dry spot behind a column can get up to 10 sq ft of floor area, which is acceptable to NFPA 13 because a fire starting in such a dry spot would still activate a sprinkler in the room and the water spray would not allow the fire to spread beyond the dry spot, achieving the objective of fire control (NFPA 13 does not demand the suppression of the fire by the sprinklers).

Similarly, section 8.7.5.2.2 allows a significant dry spot on the floor on the other side of a partition when sprinklers are spraying water over the partition. This rule was written after water distribution tests showed that the dry spots on the other side of the partition from the sprinklers were limited when the dimensions in the rule are followed and that the fire would be limited to these dry spots. Depending on the length of the partition, these dry spots could easily be 15 or 20 sq ft in the area protected by a single sidewall sprinkler.

Sections 1.5 and 1.6 of NFPA 13 allow alternative arrangements to the prescriptive rules of NFPA 13 as long as the same level of protection allowed by the standard is achieved. If several sections of the standard allow a dry spot of 10 sq ft where sidewall sprinklers are installed, then an arrangement not specifically described in the standard that also produces a dry spot of approximately 10 sq ft can also be allowed by the AHJ as an alternative arrangement that provides an equivalent level of protection.

Question 12 – Loading Docks

Is the issue of “exterior loading docks” going to be addressed in NFPA 13? We run into many projects that have non-combustible metal canopies on the exterior of a warehouse building where trucks back directly up to the building. Is this a “loading dock” or an exterior canopy with “short-term transient storage per A.8.15.7.5? We never know whether these “docks” are required to be protected or not and I feel the committee should address this issue so we don’t have AHJs flip-flopping on the requirement. One plans reviewer requires it and another doesn’t. Would it be possible to get the committee to clarify and define this type of situation as either a loading dock

or not a loading dock? In my opinion, the definition of a “loading dock” should be something along these lines – “an exterior raised platform, covered or not, where combustibles are stored or handled” This would eliminate parking lot areas where the only occupancy is trucks backing up to a building. Can we request that they add a clarification describing this situation to A.8.15.7.5 if that section does apply? Is a truck backing up to the building considered “storage and handling” of combustibles? I would not consider these loading docks. I see limited value in installing dry systems in otherwise heated buildings just to cover a canopy in this situation. First, all of the combustibles are inside a truck box and the sprinkler discharge would not even reach a fire inside a truck if one were to occur.

Here is my specific question: If there is a 5 ft deep, non-combustible canopy on the exterior of a tilt-up concrete building, and the only use below the canopy is truck backing up to deliver packages, are sprinklers required under the canopy or not?

Answer: It is impossible for NFPA 13 to write one set of rules that will apply to every loading dock situation. The committee did the best that it could in the 2007 edition and added a great deal of information on loading docks to the standard. Ultimately, a judgment call needs to be made regarding the existence of a fire load on the dock. If packages will be immediately removed, then sprinkler protection is not required since it is considered transient. If packages are going to remain for any extended period of time, then there is a fire load present and sprinklers need to be extended into the area. In most cities, loading docks are not considered a problem because nothing is left for long on the dock. It would be stolen if it were left for any period of time, so there is no significant build-up of combustibles to worry about.

Upcoming NFSA “Technical Tuesday” Seminar – November 20th

Topic: NFPA 25 – the 2008 Update

Instructor: Russell P. Fleming, P.E.

Date: November 20, 2007

The 2008 edition of NFPA 25 is now available in print and includes new responsibilities for system inspectors. Among other items, the committee has been concerned about the lack of signage and the need for an air pressure integrity test for dry pipe systems. The committee has also attempted to address long-standing gray areas such as the degree to which a water supply can deteriorate before an investigation of adequacy is warranted, and the tests needed following component replacement or repair. Even in areas where older editions of NFPA 25 are enforced, the new provisions represent the state of the art that can impact the liability of companies performing inspection, testing and maintenance.

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.

NFSA Announces Technical Tuesday Onlines for 1st Half of 2008

For the first half of 2008, the NFSA “Technical Tuesday” Online Seminars will carry a “Systems Update” theme, focusing on recent changes in system requirements. In each of ten selected subject areas, the seminars will feature an update on rules changes that are important to fire sprinkler contractors, technicians, and authorities having jurisdiction. The seminars will present

information not only on the changes themselves, but in many cases on the research, deliberations and intentions behind the changes, which provide valuable insights needed for proper application.

Date	Topic	Instructor
Jan 29	Wet Systems	Victoria B. Valentine, P.E.
Feb 12	Dry and Preaction Systems	Russell P. Fleming, P.E.
Feb 26	Antifreeze System Updates	Kenneth E. Isman, P.E.
Mar 11	NFPA 13R Systems-Outside the Dwelling Unit	Cecil Bilbo, Jr.
Apr 1	Foam Sprinkler Systems Update	Russell P. Fleming, P.E.
Apr 22	Water Supply Systems	Cecil Bilbo, Jr.
May 6	Exposure Protection Systems	Russell P. Fleming, P.E.
May 20	Water Cooling Towers	Michael Friedman, P.E.
Jun 10	Standpipes, Pressures and Pumps	Kenneth E. Isman, P.E.
Jun 24	The Extent of Systems	Jeff Hugo

The following are the descriptions for each class:

January 29, 2008 – **Wet Systems** – Victoria B. Valentine, P.E, Director of Product Standards – Basic/Intermediate

Wet-pipe sprinkler systems are the baseline type of sprinkler system. This seminar will review what makes a system a system. Common questions that arise such as how to define a system, how to define a riser and what are the functions of the system connections will also be addressed. Other items that will be included are system sizes, corrosion issues and pressure reducing valves.

February 12, 2008 – **Dry and Preaction Systems** – Russell P. Fleming, P.E., Executive Vice President – Intermediate

The 2007 edition of NFPA 13 incorporated some important new changes with regard to both dry pipe and preaction systems. The new rules affect water delivery times, pitching requirements, and freezer protection options. Discussion will also be included on system attributes that affect valve trip, water delivery time and other aspects of system performance. It will also address variations of preaction systems, including some that are not specifically addressed within NFPA 13.

February 26, 2008 – **Antifreeze System Updates** – Kenneth E. Isman, P.E, Vice President of Engineering – Intermediate

In the 2007 edition of NFPA 13, many changes were made regarding the use of antifreeze systems including the calculation techniques that are required to be used and the concentrations of solutions that are permitted. This seminar will provide an overview of antifreeze system requirements, review and explain the basis behind the changes in the 2007 edition, and provide examples of how to perform the new calculations.

March 11, 2008 – **NFPA 13R Systems – Outside the Dwelling Unit** – Cecil Bilbo, Jr., Director of Technical Services – Intermediate

NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height, has two different levels of protection required. The protection requirements “inside the dwelling” can be less demanding than “areas outside the

dwelling.” Participants will learn what portions of a building need to follow the rules for areas outside of the dwelling. The correct type of sprinkler for these applications will be identified, as will the density and area requirements. There will be references to both NFPA 13 and NFPA 13R. Participants should be ready to move back-and-forth between these standards to gain a thorough understanding on when and how to identify these areas.

April 1, 2008 – **Foam Sprinkler Systems Update** – Russell P. Fleming, P.E., Executive Vice President – Intermediate

This seminar will focus on recent changes to the NFPA standards on foam and foam-water systems (NFPA 11 and 16). The presentation will include a discussion of the use of the Darcy-Weisbach formula for hydraulic calculations for piping carrying foam concentrate. Special attention will be given to the growing acceptance of fixed piping systems employing compressed air foam (CAF) technology.

April 22, 2008 – **Water Supply Systems** – Cecil Bilbo, Jr., Director of Technical Services – Basic/Intermediate

When a sprinkler system is called on to help control a fire in a building, the adequacy of the water supply can determine if property and lives will be saved. Understanding the different types of water supplies that can be used in the NFPA Standards will ensure the system works properly. Whether it is a city water supply, fire pump, tank, or a pond, you will need to know the rules that affect the installation, testing, use and inspection of the different types of water supply systems. This seminar will cover a broad review of the rules for each of the types of water supplies allowed for use in fire protection systems. It will also cover some of the federal regulations that have made it into each state and county in the United States.

May 6, 2008 – **Exposure Protection Systems** – Russell P. Fleming, P.E., Executive Vice President – Intermediate

Changes to the 2007 edition of NFPA 13 restored long-lost criteria to the standard that is necessary for proper installation of an exposure protection system. This seminar will not only review how that criteria is applied, but review the use of exposure protection systems in the context of the entire need for exposure protection based on the principles of NFPA 80A exposure protection recommended practice and corresponding provisions of model building codes in the United States and Canada.

May 20, 2008 – **Water Cooling Towers** – Michael J. Friedman, P.E., NFSA Consultant – Intermediate

Protection of cooling towers falls under the umbrella of “Special Hazards” in the fire protection industry. This seminar will provide an overview of design considerations such as type of cooling tower, materials of construction for towers and system piping. It shall also cover types of fire protection systems, devices, detection methods and design criteria and system testing based on NFPA 214, Standard on Water-Cooling Towers, 2005 Edition.

June 10, 2008 – **Standpipes, Pressures and Pumps** – Kenneth E. Isman, P.E, Vice President of Engineering – Intermediate

Standpipe systems in very tall buildings have always been a challenge. Recent changes in NFPA 14 and NFPA 20 have made these systems more difficult to design and install. This seminar will

cover the effect of decisions such as breaking up the system into multiple vertical zones, using pressure reducing valves, and using variable speed pumps. The new provisions of NFPA 14 for master pressure reducing valves will also be explored.

June 24, 2008 – **The Extent of Systems** – Jeff Hugo, Manager of Codes – Basic

Are sprinklers required under a Porte-Cochere? When is an addition a separate building? Does the foundation of a building have anything to do with sprinklers? This seminar will answer those questions that stump the designer and can come out to haunt you in some jurisdictions. The Extent of Systems will go into detail on where to install sprinklers, where the codes and standards designate them, and how to justify their existence or non-existence. This seminar will also summarize the “Systems” theme for the first half of 2008.

Because these seminars are being offered as a complete “Systems Update” program, a 30% discount is available when signing up for all ten seminars in the series.

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

Additional NFSA training opportunities include...

NFSA Two-Week Technician Training Classes

<i>February 4-15, 2008 (waiting list only)</i>	<i>Centennial, CO</i>
<i>April 7-18, 2008</i>	<i>Orlando, FL</i>
<i>August 4-15, 2008</i>	<i>Providence, RI</i>
<i>October 13-24, 2008</i>	<i>Chicago, IL</i>
<i>November 10-21, 2008</i>	<i>Houston, TX</i>

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

In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country. Here are some seminars scheduled between now and the end of 2007:

Dec 11	Pumps for Fire Protection////Marana, AZ
Dec 12	Fire Pump Layout & Sizing (1/2 Day) (A.M.)////Marana, AZ
Dec 12	Standpipe Systems (1/2 Day) (P.M.)////Marana, AZ
Dec 13	Inspection, Testing & Maintenance////Marana, AZ

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

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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.

About the National Fire Sprinkler Association

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