



Best Questions of August 2009

We have selected the following questions as the “Best of August 2009” answered by the engineering staff as part of the NFSA’s EOD member assistance program:

Question 1 – More on Aircraft Hangar Back-Up Pumps

In last month’s *eTechAlert* best questions (Issue No. 155, Question No. 9), it stated that Section 7.8.8 of NFPA 409 requires a back-up fire pump. This section references back to 6.2.10.7 and 6.2.10.8. There is no specific requirement in 6.2.10.8 for a back-up fire pump, only some vague interpretation that a second fire pump would be required. If a back-up fire pump was the intent of the standard, shouldn’t it be clearly stated in the standard? It would only have taken a simple sentence in the beginning of this section. One could make the argument that the requirement of Section 6.2.10.8.2 is to be complied with only when a second or back-up pump is installed. If a back-up pump was the intent of the standard wouldn’t it be stated more clearly for such a major and costly system component?

Answer: Section 6.2.10.8.2 of NFPA 409 states, “The total pumping capacity shall be such that the maximum demand can be met with the largest fire pump out of service.”

As such, this section very clearly requires a back-up pump. If you only had one fire pump, how would you meet the demand if it was out of service?

The language is specifically written this way so that a minimum of back-up pumps are needed. The language does not require all pumps to have a back-up, only the single largest pump. For example, let’s consider a situation where a hangar has a fire protection system demand of 6,000 gpm. Since it is very difficult to meet this demand with a single fire pump (listed pumps only usually go up to 5,000 gpm), let’s say that you decide to meet this demand with two pumps, one rated for 4,000 gpm and one rated for 2,000 gpm. The system is designed so that both pumps running at the same time are needed for the system demand. Under Section 6.2.10.8.2, you would be required to install a third pump as a back-up with a 4,000 gpm capacity. A back-up for the 2,000 gpm pump is not required. If that pump fails, the larger back-up will kick in and make up the difference. If the committee inserted specific language as you suggested for all pumps to have a back-up, then you would need four pumps instead of three. The committee has carefully chosen language to convey its intent.

Question 2 – Painting CPVC

With all the recent information about compatibility issues, can CPVC piping be painted with simple latex-based paints, or does it have to stay orange?

Answer: While “oil-based paints” are listed among the “known unacceptable products” on the BlazeMaster® website addressing CPVC compatibility, there is no specific prohibition against water-based paints. Page 30 of BlazeMaster’s 2007 design manual contains the following more detailed guidance:

“Water-based acrylic latex paint is the preferred and recommended paint to use on BlazeMaster CPVC pipe and fittings. Oil or solvent-based paints may be chemically incompatible. Certain types of oil or solvent-based paints may, however, be used provided that it is a light coating that dries quickly. These paints should not be allowed to puddle or pool on the surface. Application of solvent-based paints must be individually reviewed as there are certain types of paints and stains that contain drying oils and should not be used at all on CPVC tubing.”

Question 3 – Use of Close Nipples in Earthquake Areas

NFPA 13 (2007 edition) Section 8.15.19.5.4 states: "The use of pipe nipples less than 1 inch (25 mm) in diameter is not permitted in areas subject to earthquakes."

We are estimating a project for a facility located in an area subject to earthquakes, in which concealed sprinklers are being replaced with semi-recessed sprinklers. We are telling the general contractor that we have to originate from a 1-inch outlet to adjust drop lengths for new sprinklers below the ceiling. Our approach for this retrofit of an existing system in which we only need to extend the pipe downward about 1.5 inches is to drill new holes in the existing branch line and install 1-inch diameter pipe down to the new sprinklers' locations.

Am I correct in telling the general contractor that the use of ½-inch brass nipple extensions is not an approved solution? And that the above statement from NFPA applies in this case? Or is there any type of exception that would allow these fittings to be installed? Our competitor on this estimate has submitted a quotation based on using the extensions - therefore we are in no way able to compete for this work based on our approach.

Answer: You are correct in your reading of Section 8.15.19.5.4, but it is understandable that this is a point of contention. This prohibition, which is within Section 8.15.19 on “revamping” of systems, prohibits the use of any nipple less than 1-inch in nominal diameter, regardless of length or configuration, in areas subject to earthquake. Originally the Committee added this section out of concern for the stresses that could be applied to a pipe nipple from the movement of a ceiling at the base of an armover. Whether it would be applied in the situation of a simple extension depends on the definition of “revamping”, but NFPA 13 does not contain a specific definition. Figures 8.15.19.4.2 and 8.15.19.4.3 both show the use of armovers in a traditional “revamping” of a system with upright sprinklers to accommodate pendent sprinklers below a new ceiling. However, the wording within 8.15.19 implies a broader definition, in which revamping refers to any intended change in the sprinklers supplied by existing branch lines. It may be possible to provide calculations or other means to demonstrate, to the satisfaction of the Authority Having Jurisdiction, that the expected stresses resulting from a simple extension from a pendent outlet to the ceiling would not be a concern in the event of an earthquake, but this would need to be pursued through the “equivalency” approach of Section 1.5.

Question 4 – Use of ESFR Sprinklers in Obstructed Combustible Construction

Table 8.12.2.2.1 of NFPA 13 (2007 edition) indicates that ESFR sprinklers cannot be used with combustible obstructed construction, but the commentary to Section 8.12.2.2.1 in the NFPA’s Automatic Sprinkler Systems Handbook suggest that this is permitted by Section 8.4.6.3 if ESFR sprinklers are installed in each channel when members exceed 12 inches in depth. Which is correct?

Answer: When sprinklers are installed in each channel of obstructed construction, they can be considered to protecting a small section of unobstructed construction. Section 8.4.6.3 specifies that minimum spacing and area of coverage must comply with the requirements of 8.12.2 and 8.12.3. This means that the minimum area of coverage per sprinkler must not be less than 64 sq ft, with the distance between sprinklers not less than 8 ft nor greater than 12 ft. These rules have the practical effect of allowing obstructed combustible construction to be protected with ESFR sprinklers only if the members are at least 5 ft 4 in. apart, with sprinklers staggered in adjacent channels.

Question 5 – Number of Spare Sprinklers

What is the minimum number of spare sprinklers of each type and temperature rating required to be provided in a spare sprinkler cabinet?

Answer: The answer depends on which sprinkler standard is referenced. Section 6.2.9.5 of NFPA 13 (2007 edition) requires that the cabinet contain each type and temperature rating, but does not state a minimum number of each. As such, the default is at least one of each, with a minimum total number of spare sprinklers based on the number of sprinklers in the facility, but never less than six. NFPA 25 contains no specific requirements, but an annex section recommends at least two sprinklers of each type and temperature rating. NFPA 13R is the most stringent standard, since Section 6.5.1 (2007 edition) requires three spare sprinklers of each type, temperature rating and orifice size to be on hand.

Question 6 – Use of NFPA 13R in a 5-Story Building

Can NFPA 13R be used in a 5-story building if the lowest story is a habitable basement?

Answer: A five-story building is not within the stated scope of NFPA 13R, but the applicable building code defines the term “story,” not NFPA 13R. If the building code considers a habitable basement to be other than a story, then NFPA 13R can be considered applicable. It should also be recognized that there are some jurisdictions, like the cities of Atlanta and New York, that have specifically allowed NFPA 13R to be used with a broader scope over the years (up to 6 stories), and the legally-adopted code takes precedence over the published scope of NFPA 13R.

There are other variations that have been used with NFPA 13R. “Pedestal buildings,” effectively constructed on stilts, may result in a four-story residential building over top of a single-story mercantile. Or the building code might specify a sufficient fire-resistant separation to allow the residential portion of a structure to be considered a separate building under the code. In that case, since it is a separate building, NFPA 13R could be used in a four-story residential part of the structure. As you can see, these decisions are dependent on the building code, not NFPA 13R.

Question 7 – Defining a Ceiling Pocket

Just what is the definition of a "ceiling pocket?" We have a design with extended coverage sprinklers on the lower ceiling plane. There is a distance of 11 in. between the upper stepped ceiling and the lower ceiling where the sprinklers are located. The sprinkler spacing is calculated to 16 ft x 16 ft. The 12-inch deflector distance complies with the NFPA 13 maximum. We would say this is a "raised ceiling" area, not a "ceiling pocket". If the ceiling area was raised more than 12 in. and the deflector distance could not be met, than we would call it a "pocket" and add sprinklers per NFPA 13 and the sprinkler listing. Is this correct? We see this situation a lot with corridors and common areas where the raised architectural ceiling could vary in depth from 1 in. to 12 in. We have a fire marshal here who is quoting NFPA 13 (2007 edition) Section 8.6.7.1: "Sprinklers shall be required in all ceiling pockets." He is ignoring the deflector distance issue. The question goes back to the lack of an NFPA 13 definition - just what is a ceiling pocket?

Answer: The NFPA 13 Committee has recognized that there has not been a solid understanding of the term “ceiling pocket.” Therefore, in preparing the 2010 edition of NFPA 13, they have added one. Per proposal 13-11, the definition of a ceiling pocket will be “an architectural ceiling feature that consists of a bounded area of ceiling located at a higher elevation than the attached lower ceiling.” This means that the areas of higher elevation in the arrangement you describe are considered ceiling pockets.

In addition, you have questioned if sprinklers are required in the ceiling pockets or if those at the lower elevation level are sufficient since the depth of the ceiling pocket allows the sprinkler deflectors to be positioned within acceptable limits below the ceiling (1 to 12 inches). As long as the floor area is covered by the sprinklers at the lower elevation, the answer is “yes.” The Committee’s concept has been that if the sprinkler throughout its coverage area is within the appropriate distance from the ceiling, the area is considered protected and additional sprinklers are not required at the higher elevation. During the comment cycle for the 2010 edition, the Committee further clarified this intent in comment 13-97 by adding wording to the annex in Section A.8.8.7.1: "Ceiling features in unobstructed construction that are protected by sprinklers in the lower ceiling elevation

when the higher ceiling elevation is within 12 in. of the deflectors or greater for sprinklers with greater listed distances from the ceiling should not be considered unprotected ceiling pockets." Similar language has also been added to the appropriate sections for standard spray sprinklers.

Question 8 – Sprinklers on Top Balconies

We have a four-story multi-family residential building being constructed that has balconies. The sprinkler design has provided for sidewall sprinklers on the 1st through 3rd level balconies but no coverage on the 4th level because of a concern about heat collection, since the fourth level balconies are open to sky. The designer has told me that there have been some jurisdictions that have required coverage on the upper level balconies. I am of the opinion that although heat collection may initially be a problem, a sprinkler on the balcony is still a good thing. Are sprinklers required on the top balcony? If not, are sprinklers a good idea anyway?

Answer: The answer to the first question is no, sprinklers are not required on the top balcony. You did not specify a code or standard, so let's look at several. If you are following NFPA 13 (2007 edition), then Section 8.15.7.1 says sprinkler coverage is required for balconies where roofs or canopies exceed 4 ft in width, and Section 8.15.7.5 requires sprinklers under all roofs and canopies where combustibles are stored and handled. There are also certain exceptions, but neither of these sections applies in the absence of a roof or canopy. If you are following NFPA 13R (2007 edition), then Section 6.9.5 states sprinklers are not required on balconies that are open and attached. If you are following IBC (2009 edition), then Section 903.3.1.2.1 says that balconies without a roof or deck above do not need to be sprinklered. So even the IBC, which overrules NFPA 13R relative to the need for sprinklers on many balconies, does not require a sprinkler in the absence of a roof or deck above.

Would a sprinkler be a good idea anyway? There are potentially some fire scenarios in which a sprinkler could respond and contribute to faster control or suppression of the fire. Although heat collection needed for activation would be a problem, an exterior sprinkler could still be expected to prevent a fire from entering the top floor of the building from the balcony if there were a threat of such a fire and the sprinkler were properly positioned. However, if the balconies are non-combustible and will contain minimal combustible storage, it is doubtful that the cost of the sprinkler would be worth the benefit, and that is the basis on which the codes waive the requirement.

Question 9 – Lower Limit on Size of Cross Mains

We are encountering review comments from the AHJ on our project requiring sway bracing on what they are calling cross mains that are smaller than 2-inch. Some of these are 1 ½ in. and 1 ¼ in. We have considered these to be lines rather than mains. The configuration involves a line with a bull-head tee supplying lines in two different directions in the configuration of a cross main. Is it the intent of NFPA 13 that sway bracing and flushing connections be installed on these small lines? They often are supplying 8 sprinklers or less.

Answer: A run of pipe can be a main regardless of size or the number of downstream sprinklers. It's the configuration that matters. A length of piping that includes sprinklers, even when it supplies them through sprigs, drops, armovers or return bends, is considered a branch line per the definition of NFPA 13 Section 3.5.1 (2007 edition). A cross main is piping that supplies branch lines, while a feed main is piping that supplies cross mains. Traditionally, the size of mains was such that they presented an obstruction to upright sprinklers, so the practice of occasionally supplying sprinklers directly from mains to provide extra protection in some difficult areas was less common, but the practice is not specifically prohibited by NFPA 13. In such a case, the piping can still serve as a cross main and must meet applicable requirements. On the subject of the difference between a branch line and a cross main, Annex figures A.9.3.5.6(c) and (d) often raise questions relative to the outside lines on a gridded system. We generally take the position that such lines are considered mains only when they are oversized relative to the other branch lines in the grid.

Section 9.3.5.3.1 (2007 edition) states that lateral bracing is required for all feed and cross mains "regardless of size." While branch lines are only provided with bracing when of a diameter 2-1/2 inches or larger, bracing of feed and cross mains provides the basic stability against earthquake movement for the entire system. Similarly, there are no minimum sizes associated with the

requirement for flushing connections on the ends of mains in Section 8.16.3. The flushing connections provide a reasonable point in the system to inspect the piping and through which to eliminate obstructions when necessary. Regardless of size, it is expected that they are at least as large as the branch lines they serve. Note that Section 8.16.3.3 requires that all cross mains terminate in 1-1/4 in. or larger pipe. While not specifically stated, this implies that all mains are at least 1-1/4-inch in diameter.

Question 10 – Drum Drip Drains in Freezers

Please advise as to the intent of the following excerpt from NFPA 13, and to what extremes one should go to in order to comply with this section of the standard:

8.16.2.6.6 Drain pipes shall be arranged to avoid exposing any part of the sprinkler system to freezing conditions.

The words “shall” and “avoid” seem to contradict each other. At what point is this up to the discretion of the system designer? The first thing that comes to mind are drum drips on rack systems in cold storage facilities – do they need to be piped to a warm area? Do they serve any purpose?

Answer: The intent of 8.16.2.6.6 is to keep a drain pipe from exposing wet portions of the system to freezing conditions. Most people do this by following the note in Figure A.8.17.4.2(a), keeping 4 ft of pipe in the warm space before taking the drain outside. The 4 ft is not specified in the standard directly because longer distances may be needed in climates with extremely cold weather.

There is no point to enforcing Section 8.16.2.6.6 for portions of dry-pipe or preaction systems that are already exposed to freezing conditions due to their environment. If the piping and sprinklers are already exposed to freezing conditions, what difference would it make if the drain connection was also exposed to freezing conditions?

This brings us to the last part of your question, relating to the need for drum drips on rack systems in cold storage facilities. There is no requirement for drum drips (or drains of any kind) to be in heated spaces. In fact, Section 8.16.2.5.3.1 clearly permits drains to be in areas subject to freezing and provides rules for how they need to be arranged.

There are advantages to running drum drips to locations that are heated. There is less of a chance for damage if water gets into the drum drip, and the water can be more readily released the next time the drip is opened. But the standard does not require drum drips to be in heated locations because there are too many circumstances in which it simply can't be done.

Question 11 – Sprinklers Under Temporary Scaffolding

When scaffolding is constructed and is over 4 ft in width, is it considered an obstruction in accordance with NFPA 13? The scaffolding in question is not permanent but may be in position for a couple of weeks to a month.

Answer: Section 8.5.5.3.1 of the 2007 edition of NFPA 13 does require sprinkler protection under permanent obstructions like ducts or decks. Section 8.5.5.3.2 specifically does not require sprinkler protection under obstructions that are not fixed in place like conference tables. Scaffolding is typically temporary and therefore could be considered to be "not fixed in place".

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, could be used to help offset the temporary obstruction concern. Section 7.1 of NFPA 241 provides information on a Fire Safety Program, including the development of a prefire plan with the local fire department. Section 8.2 of NFPA 241 provides information on Scaffolding, Shoring, and Forms. This section provides guidance on the suggested use of noncombustible forms and the addition of portable fire extinguishers or hose lines.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, also provides guidance on impairments to a sprinkler system and has requirements for an impairment program that helps ensure that increased risks are minimized and the duration of the impairment is limited.

Question 12 – Listed Expansion Chambers for Antifreeze Systems

During the inspections that I have been performing lately I have not been seeing the required UL listings on expansion chambers provided for antifreeze fire systems. Instead, I am noting the use of standard water heater expansion tanks used on fire sprinkler systems more and more. They are required to be UL listed by both NFPA 13 and NFPA 13R, although not 13D. I also, however, find it very challenging to acquire pricing and availability for listed tanks. Do you agree?

Answer: Yes, and we appreciate your concern. We are aware that the NFPA standards call for listed expansion chambers when an antifreeze system is provided with a backflow prevention device, and we are aware there have been failures when non-listed expansion tanks were substituted. The only thing we would add is that the NFPA 13 committee also allows an alternative to the listed expansion tank. Section 7.6.3.4 of the 2007 edition of NFPA 13 allows elimination of the tank if three conditions are met: (1) an automatic pressure pump or other device is provided to keep the pressure higher on the system (antifreeze) side of the check valve separating the antifreeze system from the water supply, (2) a means is provided to automatically release solution to prevent over-pressurization due to thermal expansion of the antifreeze solution, and (3) provision is made to automatically supply a premixed solution as needed to restore system pressure due to thermal contraction. This option was deliberately included in the 2007 edition of NFPA 13 to help put some pressure on the expansion tank manufacturers to produce more economical listed expansion chambers.

With regard to availability, you should be aware that while for years there was only one manufacturer of listed expansion tanks, NFSA member company Amtrol, Inc. also now produces these devices (www.amtrol.com).

eTechAlert Moves into 2nd Place among NFSA Publications

With this issue, *eTechAlert* has passed *SQ* to move into second on the list of NFSA publications with the most issues. Started in July of 2004 and sent out to NFSA members electronically on Tuesdays for which there is no “Technical Tuesday” online seminar, *eTechAlert* marks its 157th issue in just over five years. The September/October 2009 issue of NFSA’s *SQ* magazine was a 156th issue, although the name and frequency has changed over the years. It was originally started as the *Sprinkling of News* in 1968, was renamed the *Sprinkler Quarterly* in 1981, but shortened its name to *SQ* in 2005 in anticipation of the shift to six issues per year beginning in 2006.

NFSA’s *Sprinkler TechNotes*, started in 1978 as a bi-monthly technical newsletter, holds the lead with 183 issues published. Although issues are not consecutively numbered, the newsletter is in its 32nd year of publication. There have been six double issues and one triple issue that have contained compilations of extended coverage sprinkler listings.

The combined publication of *Sprinkler TechNotes* and the *eTechAlert* means that, not counting technical articles in the *SQ* magazine, NFSA has issued 340 technical bulletins to its members over the past 30 years, with more than half of them published in the last five years.

Upcoming “Technical Tuesday” Online Seminar – September 15th

Topic: *Math*

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

Date: *September 15, 2009*

Math is a fundamental tool used throughout fire protection systems from their planning and detailing to their inspections as the systems mature. This seminar will include a review of mathematical functions, significant figures and interpreting graphs on a basic level. On the intermediate level problems using algebra, geometry and trigonometry will be discussed. In addition, metric measurements will also be covered focusing on converting. (Great study guide for NICET Work Elements 41004, 41010, and 43010)

To register or for more information, contact Dawn Fitzmaurice at (845) 878-4207.

Upcoming "Business Thursday" Online Seminar – September 24th

Topic: *Roles of the System Inspector and AHJ*

Instructors: *Dominick Kasmauskas, NFSA New York Regional Manager and Russ Fleming, NFSA Executive Vice President*

Date: *September 24, 2009*

This seminar focuses on the assigned roles and obligations of both the system inspector and the Authority Having Jurisdiction charged with the enforcement of NFPA 25. It will highlight areas in which the inspector must be careful to avoid crossing the line into hazard analysis and evaluation of system design capabilities. What are the options for the AHJ who would like to see these issues addressed? How are system deficiencies and impairments best reported?

To register or for more information, contact Dawn Fitzmaurice at (845) 878-4207.

Additional training opportunities available include...

Two-Week Layout Technician Training

September 14-25, 2009

Baltimore, MD

October 12-23, 2009

Phoenix, AZ

Three-Day Inspection and Testing Seminar

November 10-12

Murfreesboro, TN

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

In-Class Training Seminars

Introduction to Sprinkler Systems (1/2 Day AM)	Alexandria, MN	Sept 8
NFPA 13 2002 Update (1/2 Day PM)	Alexandria, MN	Sept 8
Plan Review Policies & Procedures	Alexandria, MN	Sept 9
Inspection, Testing & Maintenance	Alexandria, MN	Sept 10
Commissioning & Acceptance Testing (1/2 Day)	Seattle, WA	Sept 15
CPVC Piping (1/2 Day)	Seattle, WA	Sept 15
Hydraulics for Fire Protection	Seattle, WA	Sept 16
Standpipe Systems for Fire Protection (1/2 Day)	Seattle, WA	Sept 17
Fire Pump Layout & Sizing (1/2 Day)	Seattle, WA	Sept 17
NFPA 13 2007 Update	Dayton, OH	Sept 16
Sprinklers for Dwellings	Dayton, OH	Sept 17
CPVC Piping Installation Requirements (1/2 Day)	Dayton, OH	Sept 18
Commissioning and Acceptance Testing (1/2 Day)	Dayton, OH	Sept 18
NFPA 13, 13R, 13D 2007 Update	Anaheim, CA	Sept 22
Hydraulics for Fire Protection	Anaheim, CA	Sept 23
Underground Piping (1/2 Day)	Anaheim, CA	Sept 24
Basic Seismic (1/2 Day)	Anaheim, CA	Sept 24
Plan Review Policies & Procedures	Berlin, VT	Sept 22
Sprinkler Protection for Rack Storage	Berlin, VT	Sept 23
CPVC Piping (1/2 Day)	Berlin, VT	Sept 24

Basic Seismic Protection (1/2 Day)	Berlin, VT	Sept 24
NFPA 13 Overview	Menasha, WI	Sept 30-Oct 1
Hydraulics for Fire Protection	Menasha, WI	Oct 2
Inspection, Testing & Maintenance	Concord, NH	Oct 13
Residential Sprinklers: Homes to High Rise	Concord, NH	Oct 14
Sprinklers for Dwellings	Concord, NH	Oct 15
Underground Piping (1/2 Day)	Woodland, CA	Oct 20
Commissioning & Acceptance Testing (1/2 Day)	Woodland, CA	Oct 20
Sprinkler Protection for General Storage	Woodland, CA	Oct 21
Sprinkler Protection for Special Storage	Woodland, CA	Oct. 22
Pumps for Fire Protection	Edwardsville, IL	Oct 27
Sprinkler Protection for General Storage	Edwardsville, IL	Oct 28
Sprinkler Protection for Rack Storage	Edwardsville, IL	Oct 29
NFPA 13 Overview	Pembroke, MA	Oct 27-28
Plan Review Policies & Procedures	Pembroke, MA	Oct 29
Inspection, Testing & Maintenance	Irving, TX	Oct 27
Hydraulics for Fire Protection	Irving, TX	Oct 28
NFPA 13, 13R, 13D 2007 Update	Irving, TX	Oct 29
NFPA 13, 13R, 13D 2007 Update	Effingham, IL	Nov 10
Plan Review Policies & Procedures	Effingham, IL	Nov 11
Hydraulics for Fire Protection	Effingham, IL	Nov 12
Sprinkler Protection for Rack Storage	Marana, AZ	Dec 8
Sprinkler Protection for General Storage	Marana, AZ	Dec 9
Basic Seismic Protection (1/2 Day)	Marana, AZ	Dec 10
Advanced Seismic Protection (1/2 Day)	Marana, AZ	Dec 10

These seminars qualify for continuing education as required by NICET.

To register or for more information, contact Dawn Fitzmaurice at (845) 878-4207 or send an e-mail to seminars@nfsa.org

NFSA Tuesday eTechAlert is c. 2009 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.

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.

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