NFSA
The Voice of the Fire Sprinkler Industry

Tuesday e-Tech Alert

Number 141 **March 3, 2009**
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Best Questions of February 2009

We have selected the following questions as the "Best of February 2009" answered by the engineering staff as part of the NFSA's "Expert of the Day" member assistance program:

Question 1 – Update on CPVC-Compatible Antimicrobial Coatings for Steel Pipe

The January 13, 2009 edition of e-TechAlert (No. 137) indicated that Lubrizol had recommended against the use of coated steel pipe with CPVC until some products could be evaluated and declared compatible. Have any products been successfully evaluated yet?

Answer: Yes. The company released the following February 26th announcement:

> Please be advised, the following has been added to the "**Steel Piping with Antimicrobial Coating**" section on Lubrizol's **"Other Chemical Compatibility Concerns**" web page at the following link: http://www.systemcompatible.com/other-compatibility-concerns.asp#SteelPiping.
>
> February 26, 2009 Update - Lubrizol is providing this update regarding the use of antimicrobial coated steel pipe with BlazeMaster® CPVC fire sprinkler piping systems. Contractors should not use steel pipe with antimicrobial coatings, such as Allied's ABF II, in conjunction with BlazeMaster CPVC pipes and fittings, *unless* the factory applied coated steel pipe has been approved for inclusion in our FGG/BM/CZ™ System Compatible program (www.systemcompatible.com). This recommendation covers antimicrobial coatings that are applied by the pipe manufacturer or sold separately in the aftermarket. At this time, Wheatland Tube Company's MIC SHIELD™ Coating (for steel pipe manufactured after 2/22/2009—the date when the product's validation was completed) is part of the FGG/BM/CZ System Compatible Program. For Wheatland Tube MIC SHIELD™ coated pipe manufactured before 2/22/2009 please contact Wheatland Tube for clarification. In the aftermarket, Potter Pipe-Shield™ corrosion inhibiting antimicrobial liquid is approved as part of the FGG/BM/CZ System Compatible Program. The coating must be applied and used in accordance with the manufacturer's installation instructions.
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> Lubrizol is continuing to thoroughly investigate the use of BlazeMaster CPVC with ABF II and other antimicrobial coatings and will issue its findings as soon as possible. In the meantime, we ask that contractors carefully follow the recommendations set forth by our compatibility program.

Question 2 – Number of Design Area Sprinklers for ESFR Systems

I have an existing ESFR system that has been calculated with 13 sprinklers to meet the minimum area of application. Now there is to be a tenant improvement to this building and they require sprinklers below obstructions. Would I now need to calculate a total of 15 sprinklers (13 at the deck and 2 below obstructions)?

Answer: In this case, you need to design for 15 sprinklers because the 960 sq ft design area needs to be satisfied separately from the sprinklers below the obstruction. Then, the 2 sprinklers under the obstruction need to be added in. Remember that if the obstruction is not in the most remote area, you are not required to add the demand for the sprinklers under the obstruction to the most remote ceiling sprinklers. If the sprinklers under obstructions are closer to the water supply, you can add the 13 most demanding ceiling sprinklers over the obstruction to the sprinklers under the obstruction instead.

It might also help you to know that for the 2010 edition of the standard, the committee agreed to get rid of the minimum 960 sq ft design area based on an analysis by FM Global indicating that even when sprinklers are spaced at 64 sq ft per sprinkler the design area of 12 ESFR sprinklers is adequate.

Question 3 – Application of 3000 Sq Ft Rule to NFPA 13 Residential Systems

We have a residential retirement condominium project being protected in accordance with NFPA 13. We've calculated the units using a "dwelling unit" calculation proving the four most hydraulically demanding residential sprinklers in the units. Due to the fact that the floor/ceiling construction includes composite wood joists, there are non sprinklered combustible concealed spaces. We are unsure how to address the 3000 sq ft rule requirements of 11.2.3.1.4 (3), or if this even applies to dwelling unit type calculated portions of the system.

Answer: Since you are using residential sprinklers, the 3000 sq ft rule does not apply for the 2007 and previous editions of NFPA 13. The 3000 sq ft rule only applies to the use of standard spray sprinklers with the density/area or room design methods of hydraulic calculations. But you should be aware that the Sprinkler System Discharge Criteria Committee considers this to be a loophole and has taken measures to require the 3000 sq ft design area with the use of residential sprinkler in the 2010 and future editions of NFPA 13.

Question 4 – Water Supply for Upper Standpipe Zones

Section 7.9.3.1.1 from NFPA 14, 2003 edition, states:

> 7.9.3 Where the supply for each zone is pumped from the next lower zone, and the standpipe or standpipes in the lower zone are used to supply the higher zone, such standpipe shall comply with the provisions for supply in 7.9.2.
>
> 7.9.3.1 At least two lines shall be provided between zones.
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> 7.9.3.1.1 One of these lines shall be arranged so that the supply can be automatically delivered from the lower to the higher zone.

If one supply line is required to be automatic, what would be the arrangement or arrangements of the other line, if it is not also automatic? Does this section of the standard permit the other line to be provided with a closed gate valve? What is the rationale for not requiring both lines to be automatic?

Answer: Section 7.9.3.1.1 only applies when standpipes in the lower zone are used to also provide water to the upper zone. In this case, the situation is only required to have one path for the water to travel automatically. A second (manual) path is required as a back-up. The second path is generally only used when the first path is out of service (planned impairment). It is theoretically possible that it could be used during a fire, but that is not its primary purpose. Yes, this secondary path is permitted to have a closed control valve, which would be opened if the primary (automatic) path needed to be closed for maintenance.

Question 5 – Supply Pipes under Building for NFPA 13R Application

Our question is based on the 1999 edition of NFPA 13R and deals with the underground fire main supply. As with many slab on grade residential structures, the riser room is located approximately 15 ft from the building footing. There is no way to rise the supply main at the exterior wall as the footing sits in (typical construction) so if you rise you are 6 inches into the room (away from the wall) in the living space. We consulted the city's plumbing commissioner and he stated that we were fine to come up in the mechanical room. The plumbing inspector reviewed the installation in the field and approved it. The fire marshal just now issued his letter, 5 months after submittal, and stated we are to rise at the exterior wall. Per NFPA 13R Section 1-5.1 and A 1-5.1 it seems that any listed piping is acceptable (ours is brazed Type K copper) and as NFPA 24 is not referenced in the NFPA 13R standard, does Exception 3 of NFPA 13 (1999 edition) Section 5-14.4.3.1 allow us to set the riser in the mechanical room? "Where…physical conditions make it impractical…"

Answer: You are correct that both NFPA 13 and NFPA 24 allow supply pipes to be run under the building slab when it is necessary due to the site/building conditions. As you pointed out, this allowance is specifically in Exception 1 to section 5-14.4.3.1 in the 1999 edition of NFPA 13 and the exception to section 8-3.1 in the 1995 edition of NFPA 24. Note that there is no 1999 edition of NFPA 24 because it was the NFPA's plan back then to merge NFPA 24 with NFPA 13 (which is why the section is in NFPA 13 in the 1999 edition). In 2002, the NFPA brought NFPA 24 back and both standards continue to allow pipe to be run under the building.

The situation is a little different with NFPA 13R. As you stated in your note, NFPA 13R does not reference NFPA 24. Instead, there is a blanket statement in NFPA 13R (section A-1-5.1) that states that the water supply pipe only needs to comply with the local plumbing code. As long as the water supply complies with the plumbing code, as interpreted by your plumbing commissioner, it is acceptable to use for fire protection as well.

Question 5 – Dishwasher Heat Zones

I have a question about a dishwashing room in the cafeteria of a new hospital. The room is about 50 ft x 20 ft and has a dishwasher in the middle of the room. There are dedicated dishwasher exhaust diffusers and ductwork in the ceiling. The sprinklers installed are rated 155° F and are spaced for ordinary hazard. The AHJ has asked my opinion whether we need to provide higher temperature sprinklers in the ceiling near the dishwashing machine.

Answer: Although the heat from a dishwasher would not be expected to be worse than that from a stove or an oven, those appliances often have exhaust collection hoods as mitigating factors. Table 8.3.2.5(c) in NFPA 13 advises that fast response, ordinary temperature, sprinklers are fine as long as they are at least 18 inches away from the unit horizontally. The sprinklers can be closer if you go with intermediate temperature sprinklers.

If you wanted to be really conservative, you could use the rules for fireplaces (same table), which allow fast response, ordinary temperature, sprinklers as long as they are at least 60 inches away from the front of a fireplace. Intermediate temperature sprinklers can be used between 36 and 60 inches of the fireplace face. Certainly the dishwasher would not generate more heat than a fireplace.

The ultimate guidance is to make sure that the ambient temperature around the ordinary temperature sprinkler does not exceed 100°F (see 8.3.2.2).

Question 6 – Sprinklers under Deep Concrete Beams

I am designing a wet pipe system to protect the basement of a municipal water pump facility. The roof structure above technically meets the definition of "unobstructed construction" in NFPA 13 Section 3.7.1 because the beams are greater than 7-1/2 feet on center. This would require that the sprinkler deflectors be located within 12 inches of the deck.

However, these beams are 36 inches wide, and 42 inches deep, and typically on 9 ft. centers. Placing sprinklers only at the roof deck with deflectors 12 inches below the deck as required for unobstructed construction would create a lot of spray pattern blockage by the large beams. Because the beams are so large, it would not be possible to position the sprinklers in compliance with Table 8.6.5.1.2, but Section 8.6.5.1.2(2) allows sprinklers to be spaced on opposite sides of obstructions not exceeding 4 ft in width where the sprinkler spacing does not exceed half the allowable distance between sprinklers.

In particular, for the beams spaced 9 ft apart on center, would it be permissible to install sprinklers centered in the bay and with their deflectors located at or above 1-inch below the bottom of the concrete beams similar to the method described in 8.6.4.1.2(5) for concrete tee construction with tees greater than 36 inches and less than 7-1/2 ft on center? The pockets between these beams would be 6 ft wide, which would create a similar situation. The only alternative I know would be to install sprinklers both at the roof deck and below every beam, which seems excessive and inefficient.

Answer: No, you are not allowed to space the sprinklers using the concrete tee rules, the structural members are too far apart. Just put the sprinklers in the middle of the channels formed by the structural members so that the deflectors are 1 to 12 inches below the upper portion of the ceiling. You don't have to worry about spraying under the structural members because you

have sprinklers on the other side. You meet section 8.6.5.1.2(2), so you can ignore 8.6.5.1.2(1). The only place that you may have a problem is the end section where the structural member forms a soffit against the wall. There, you may need to put a sprinkler under the last structural member since it is more than 30 inches wide and cannot meet 8.6.5.1.2(3).

Question 7 – Storage of Class IIIB Combustible Liquids in Tanks

I need help determining a density and remote area size. The building is a shop/warehouse storage facility with Class IIIB combustible liquids (flash point > 200°F). I have been searching NFPA 30 for the design criteria, but have not been successful.

Answer: You did not say which edition of NFPA 30 you are using, but we will assume you are using the current 2008 edition. The concepts are all the same in previous editions, but the chapter numbers were reorganized in the 2008 edition.

Chapter 16 contains specific information on the sprinkler densities and design criteria for certain size tanks containing flammable and combustible liquids. This is generally supposed to be used for storage of small containers, although there are some criteria given for 55 gal drums and IBC's (intermediate bulk containers) meeting certain specifications. If the storage or use of flammable or combustible liquids is not listed in Chapter 16, then the user has to go to Section 6.4. Specifically, Section 6.4.1.1 requires an engineering evaluation of the hazard and an extent of fire protection unique to each facility. This would involve an engineer working with the building owner, insurance agent and local fire and building officials to determine goals and objectives of the fire protection system and then developing a comprehensive plan on how those goals and objectives are going to be met.

Question 8 – Use of ¾-Inch Nipples for Copper and CPVC in Earthquake Areas

Referencing the 2002 edition of NFPA-13, we note that ¾-inch copper and CPVC are allowed for design, yet Section 8.14.19.4.4 says that ¾-inch nipples are not allowed in areas subject to earthquakes. It would seem reasonable that if ¾-inch pipe is allowed, then ¾-inch nipples should be acceptable. Any thoughts or guidance?

Answer: First of all, the section you are referring to is only applicable to Section 8.14.19 criteria for "revamping" of systems, i.e. dropping pendent sprinklers below a ceiling from an existing system with upright sprinklers. It is not intended as a general rule, so ¾-inch nipples are generally permitted for copper tube and CPVC, even in earthquake areas. The reason ¾-inch steel pipe is not allowed is out of concern for long-term corrosion. Secondly, this is one of those unfortunate instances where the committee developed criteria while thinking of the common circumstance of threaded steel pipe, without specifically addressing other types of pipe such as copper or CPVC. While steel pipe nipples of less than 1-inch are not normally allowed, it must be recognized that the "revamping" rules were intended to allow the use of the upright sprinkler outlets to serve the piping to the new pendent sprinklers below the ceiling. The concern with threaded steel pipe nipples is that the remaining wall at the first exposed thread root is very thin for ½-inch and even ¾-inch pipe nipples. Since this joint would be exposed to shaking in areas subject to earthquakes, the committee didn't want to allow a weak point in the system and added the restriction.

Question 9 – Flow Alarm Requirements for Parts of 13R Occupancies

We have a question on the water flow alarm device required by NFPA 13R, 1999 edition. When viewed from the street this is a typical apartment structure with a left wing, then a breezeway, a center wing, then a breezeway, then a right wing, with all three wings under one roof, side to side and front to back. The entire building is about 8,000 sq ft per floor. The fire marshal is now requiring a vane type water flow switch per vertical section. I have been through all of NFPA 13 (1999), NFPA 13R (1999), the IBC (2003) and the IFC (2003) but cannot find any such requirement for an R-2 occupancy. Does it exist?

Answer: The answer to this question depends on whether or not the structure is considered a single building, or three separate (connected) buildings under the code. You need to find out from the architect or engineer that designed the building whether or not the structure is considered a single building. If the structure is considered a single building, water flow switches are required on each floor under the IBC, but a single switch can service the whole building, which would include all three parts. If

the structure is considered three separate (connected) buildings, then there will need to be a flow switch on each floor for each separate building.

Question 10 – Dry System 30-minute Air Refill Rule

A property has passed its testing for last 20 years, but at the request of the inspection company they had a new air compressor installed last month. Now the company is saying they need to subdivide the dry system into three systems because they cannot charge the system in less than 30 minutes, work that carries a very large price tag. As the AHJ, I question whether this is necessary for an open parking garage, knowing the codes do not require open parking garages to be sprinklered throughout, but only below ground and the first floor. Any thoughts?

Answer: This falls into the category of "previously approved" systems, which is always difficult for AHJ's. You don't know if the previous AHJ consciously made the decision to waive the 30-minute refill requirement at the time the system was built, or if they just missed the fact that the 30-minute refill was required. Another possibility is that the system can be filled in 30 minutes during warm weather, but during the cold weather it takes longer to compress enough air to build up the pressure. For this reason, NFPA 13 gives freezer systems 60 minutes to fill.

The 30-minute refill rule is in NFPA 13 for a number of reasons, but none of them have to do with the operation of the system during a fire. We have previously tried to provide guidance to contractors on how large the compressors should be to make sure that systems could be returned to service in reasonable times so that people did their testing and maintenance without being concerned that they were paying a contractor to stand around and wait for the system to fill. These rules are consumer protection rules, and long-term maintenance concerns, but they are not fire safety issues. As such, as the AHJ, you can grant a variance to this property for this situation, as long as the owner realizes that it will take longer to refill the system when it is tested, and they are going to pay for a contractor to do that.

Question 11 - Sizing Pump Suction Piping from a Suction Tank

I am trying to size the suction pipe for the pump, i.e. the pipe between the tank and pump. The system requires 300 gpm at 55 psi, and will be supplied by a 40,000 gallon tank and a pump rated at 100 psi at 200 gpm. I do not know what the elevation of the tank will be. Can you tell me what size to make the suction on the tank and do you have anything we can use to size this?

Answer: Table 5.25(a) of NFPA 20 requires the suction pipe for pumps rated at 200 gpm to be at least 3-inch. Also, Section 5.14.3.2 states that the maximum allowable friction loss in the suction piping is 3 psi (at maximum flow of 300 gpm) when the elevation of the bottom of the tank is the same as the pump. If you exceed 3 psi with 3-inch pipe, you either need to increase the pipe size or elevate the tank to overcome any excess friction loss.

Question 12 – Single-Interlock Preaction System Design Area

Can you tell me if a single-interlock preaction system is required to have the 30% increase added to the remote design area as with the double-interlock preaction system? NFPA 13 Section 12.5 (2007 edition) does not break down the two types of preaction systems and therefore it seems this section applies to both. However, there are several sections of the standard that seem to treat a single-interlock preaction system like a wet pipe system.

Answer: The answer depends on the hazard you are trying to protect. The rules for light, ordinary and extra hazard occupancies are found in Chapter 11. Section 11.2.3.2.5 requires the 30% increase for double-interlock systems. Since there is no requirement in Chapter 11 for single-interlock systems, no such increase is required.

The rules for protecting storage start in Chapter 12. As you have noted, section 12.5.1 requires the 30% increase for all preaction systems, including single interlock. There used to be an exception for situations where you could prove that you could get water to the most remote sprinkler before it opened using the difference between the sensitivities of the detectors and the sprinklers. This exception was eliminated in the 2007 edition of NFPA 13 because so few people know how to do such a calculation correctly. You could still do the calculation if you wanted to avoid the 30% increase and get the AHJ to accept it under the "alternate arrangement" provisions of Sections 1.5 and 1.6.

So, in summary, yes the 30% increase is required for single-interlock preaction systems protecting storage.

Upcoming "Technical Tuesday" Online Seminar – March 10th

Topic: Applying the Seismic Load Tables
Instructor: Victoria B. Valentine, P.E., NFSA Director of Product Standards
Date: March 10, 2009

The seismic requirements introduced in the 2007 Edition of NFPA 13 are intended to simplify the sway brace calculation method for the user. This seminar will examine the load tables that were added and their application in the sway brace calculation process. In addition, the seismic coefficient, C_p, will be discussed including its applications. Examples will be utilized to understand the intent and process of determining the different loads that relate to sway bracing.

Upcoming "Business Thursday" Online Seminar – March 19th

Topic: Starting a State or Local Residential Fire Sprinkler Coalition
Instructor: Dan Gengler, NFSA North Central Regional Manager
Date: March 19, 2009

The adoption of residential sprinkler language in the 2009 International Residential Code requires a formula and plan for understanding. With a January 1, 2011 effective date, educating the public on the benefits of residential fire sprinklers and indoctrinating state and local policy makers will be necessary to pass legislation requiring total IRC adoption and compliance. Partnerships with the fire service, building officials and the sprinkler industry to name a few will be needed for success. Participating in this session will help set a course of coalition development to outreach stakeholders like the general public, developers, home builders, elected officials and new home buyers.

Information and registration for the above "Technical Tuesday" and "Business Thursday" seminars are available at www.nfsa.org or by calling Dawn Fitzmaurice at 845-878-4200 ext. 133.

Additional training opportunities available through the NFSA engineering department include…

Two-Week Layout Technician Training

March 23-April 3, 2009	Cincinnati, OH
August 10-21, 2009	Omaha, NE
September 14-25, 2009	Baltimore, MD
October 12-23, 2009	Phoenix, AZ

Inspection and Testing for the Sprinkler Industry

April 7-9, 2009	Champaign, IL
April 14-16, 2009	Long Island, NY
April 21-23, 2009	Nashville, TN
June 16-18, 2009	Leominster, MA

Advanced Technician Training

June 23-25, 2009	Denver, CO

For more information on the above classes, 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 upcoming seminars:

March 5	Inspection, Testing & Maintenance	Brockton, MA
March 24-25	NFPA 13 Overview & Intro to Plan Review (2 Day)	Bettendorf, IA
March 26	Plan Review Policies & Procedures	Bettendorf, IA
March 24-25	NFPA 13 Overview & Intro to Plan Review (2 Day)	Fairbanks, AK
March 26	Inspection, Testing & Maintenance	Fairbanks, AK
March 27	General Storage	Fairbanks, AK
March 24	Inspection, Testing & Maintenance	Freeport, ME
March 25	Sprinklers for Dwellings	Freeport, ME
March 26	CPVC Sprinkler Piping (1/2 Day AM)	Freeport, ME
March 26	Commissioning & Acceptance Testing (1/2 Day PM)	Freeport, ME
March 30	Introduction to Sprinklers (1/2 Day AM)	Anchorage, AK
March 30	CPVC Sprinkler Piping (1/2 Day PM)	Anchorage, AK
March 31	Pumps Layout & Sizing (1/2 Day AM)	Anchorage, AK
March 31	Commissioning & Acceptance Testing (1/2 Day PM)	Anchorage, AK
March 31	NFPA 13 Update	Willoughby, OH
April 1	Hydraulics for Fire Protection	Willoughby, OH
April 2	General Storage	Willoughby, OH

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