NFSA The Voice of the Fire Sprinkler Industry

e-TechNotes

Editor-Kenneth E. Isman, P.E. *Issue No. 257*
January 15, 2013

Best of December 2012

This month, we have selected the following dozen questions as the "Best of December 2012" answered by the engineering staff as part of the NFSA's EOD member assistance program. It should be noted that the following are the opinions of the NFSA Engineering Department staff, generated as members of the relevant NFPA technical committees and through our general experience in writing and interpreting codes and standards. These have not been processed as a formal interpretation in accordance with the NFPA Regulations Governing Committee Projects and should therefore not be considered, nor relied upon, as the official position of the NFPA or its Committees.

Question 1 – Sprinklers With Different Orifice Sizes

Can two sprinklers with different size orifices be installed in the same compartment?

Answer: Yes. All sprinklers in the same compartment must be of the same response type and must be provided with the required amount of water for their listing; however, they do not need to be of the same orifice size.

NFPA 13 prohibits the practice of installing increasingly smaller orifice sprinklers on the same branch line in order to limit over discharge and balance the system flows and pressures (see section 23.4.4.8.2 in the 2013 edition with similar sections in previous editions). But NFPA 13 allows different orifice sprinklers to be used for specific situations such as extended coverage sprinklers covering a portion of a room or where directional discharge within a room might be helpful. See sections 23.4.4.8.3 and 23.4.4.8.4 in the 2013 edition (similar sections in previous editions).

Question 2 – Gang Drains and Gridded Systems

If a double-interlock or dry-pipe system is installed with individual drains from each branch line tied together to a single drum drip and single drain valve, is this considered a "gridded system".

Answer: No. Drain piping is not the same as system piping and is not expected to carry water to sprinklers. Since the drain piping in your situation is tied together without control valves, you may need to install check valves in the drain lines so that water and air do not flow around backwards through the piping and delay water getting to the remote branch lines.

Question 3 – Wood Studs in Bathroom Walls

Are sprinklers permitted to be omitted from bathrooms in buildings protected by NFPA 13 that are less than 55 sq ft in area with dry-wall (minimum 15-minute rating) around the whole room (including behind the tub-shower enclose) if the walls have wood studs?

Answer: Yes. When section 8.15.8.1.1 of NFPA 13 requires non-combustible or limited-combustible material for the walls and ceilings to omit the sprinklers, it is talking about the outer material of the wall, not the studs.

The intent of this section is to make sure that there is at least a 15 minute thermal barrier behind fiberglass tub and shower enclosures so that a fire in an unsprinklered bathroom does not burn through a fiberglass unit directly into a concealed space. The construction of the studs does not prevent the fire from burning through a tub or shower into the concealed space, so the construction of the studs is not important to the intent of the section.

Question 4 – Residential Sprinklers and Ceiling Pockets

Can section 8.6.7.2 of NFPA 13 be used to omit sprinklers from a 1000 cubic foot ceiling pocket when residential sprinklers are used in the compartment?

Answer: No. Section 8.6.7.2 of NFPA 13 only applies to standard spray sprinklers. Residential sprinklers are NOT standard spray sprinklers. Residential sprinklers have to be installed in accordance with section 8.10 of NFPA 13. Within section 8.10 there is a pocket rule, but it is much more stringent than the rules for standard spray sprinklers. Section 8.10.8 allows sprinklers to be omitted from ceiling pockets where the maximum volume of the pocket is 100 cubic feet and the maximum depth of the pocket does not exceed 12 inches. Other rules apply, see section 8.10.8 in the 2013 edition for more details (similar section in 2010 edition). Prior to the 2010 edition, all pockets had to be protected with sprinklers if you were choosing to use residential sprinklers in the pocket.

The goal of fire protection is different for residential sprinklers (life safety in the room of fire origin). These sprinklers need to operate sooner in order to achieve their goal. The incentive that we give people to use residential sprinklers is the four sprinkler design. But this design area is only valid if most ceiling pockets are protected.

If you can't meet the rule, then don't use residential sprinklers. NFPA 13 does not require the use of residential sprinklers in dwelling units. You could use quick response standard spray sprinklers in the dwelling units with a minimum 1500 sq ft design area and then you could leave sprinklers out of the pockets.

Question 5 – FDC Pipe

What portion of a sprinkler system is considered the "fire department connection piping"?

NFPA 13 does not specifically contain a definition for "fire department connection piping". However, the portion of piping to which rules are applied can be inferred by the way the requirements of NFPA 13 are written. In the 2013 Edition, Section 8.17.2.5.2 specifically states that there shall be no shutoff valve in the fire department connection piping. Once you get past the check valve that keeps water out of the fire department connection there are configurations that allow for shutoff valves in the piping (such as shown in Figure A.8.16.1.1 and as described in sections 8.17.2.4.3 and 8.17.2.4.4. This would infer that the fire department connection piping ends at the check valve. Also section 10.1.3 allows steel pipe to be used for fire department connection piping from underground systems, but specifically states that this pipe can only be used up until the check valve. This would also imply that the fire department connection piping ends at the check valve.

Question 6 – Obstructed or Unobstructed Construction

If the exposed construction within a space consists of 24-inch deep solid beams that are 36 ft apart and solid 18-inch deep cross beams that are 10 ft apart, would this be protected as obstructed or unobstructed construction? Are we going to have to put sprinklers in each pocket formed by the intersection of the structural members?

Answer: This would need to be protected as unobstructed construction (even though the beams are solid) because the structural members are all more than 7.5 ft on center. Due to the size of the pockets, you will most likely end up with sprinklers in each pocket.

Question 7 – Restraint for Drops

Does a long drop (more than 4 ft) to a single sprinkler need to be restrained when the seismic protection rules of NFPA 13 are being followed?

Answer: No. When a single sprinkler is fed by a drop it is not required to be restrained. Branch line piping needs to be restrained, but a branch line is defined as piping that feeds two or more sprinklers. Since a drop to a single sprinkler is not a branch line, it does not need to be restrained. However, it is important to recognize that there may be other reasons to add restraint to a drop, such as minimizing the risk of impact with neighboring equipment.

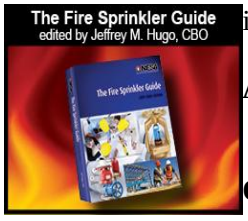
It is important to note that drops are not the same as sprigs. By definition, a sprig is a vertical piece of pipe feeding a sprinkler above a branch line. Sprigs in excess of 4 ft in height do need to be restrained because there is a chance during an earthquake that the spring will spin around and turn into a drop, which would put the sprinkler more than 8 ft down from the ceiling; a location that would not work very well during a fire after the earthquake.

Question 8 – Vertical and Horizontal Standpipes

In a building that contains a sprinkler system, a horizontal standpipe and vertical standpipes, is the maximum flow demand still 1000 gpm according to NFPA 14?

Answer: Yes. NFPA 14 allows for the required flow to be capped at 1000 gpm when the building is sprinklered. The demand for the vertical standpipes maxes out at 1000 gpm in a sprinklered building (assuming at least three risers). For a horizontal standpipe, the demand is 750 gpm (assuming at least 3 connections). But the water supply needs to meet the hydraulically most demanding scenario. Depending on the pipe size and configuration and the location of the water supply, it may not be obvious which situation is more demanding from a pressure perspective, but the system will need to be able to handle 1000 gpm.

Question 9 – Waterflow Switches on Standpipe Systems



NFPA 14 requires control valves at the base of each standpipe, but does it require waterflow switches to be installed downstream of each of these valves?

Answer: No. NFPA 14 only requires one waterflow device per standpipe system.

Question 10 – Screens for Wet Pits for Vertical Shaft Turbine Pumps

We have questions regarding the screens indicated in Figure A.7.2.2.2 of NFPA 20, particularly the type of material for the screens, framework, and size of screen holes.

Answer: According to section 4.14.8.6 of NFPA 20, the screens need to be made from brass, copper, Monel, stainless steel or other equivalent corrosion resistant metallic material. The section goes on to say that the wire screen must have a maximum of 0.5 inch mesh and No. 10 B&S gauge. The screens need to have at least 62.5% open area (see section 4.14.8.10) and you need to have at least 1 sq in of open area in the screen for each 1 gpm of flow accounting for the maximum flow of the pump (150% of rated flow) according to section 4.14.8.4.

Putting these sections together, if the pump is rated at 750 gpm and the screen is 65% open, you would need a screen that is 1731 sq inches in size (750 x 1.5 divided by 0.65 = 1731). This would be 12 sq ft (4 ft x 3 ft in area).

Question 11 – Pumps and Backflow Preventers

Figure A.6.3.1(b) has been added to NFPA 20 that shows a backflow preventer on the discharge side of the pump after the bypass connection. Is this permitted by the International Plumbing Code (IPC)?

Answer: We believe that it is, although many of the items in the IPC are subject to interpretation of the local plumbing official and many of the plumbing officials do not interpret the words of the code the same way we do.

The preference of NFPA 20 is to have the backflow preventer on the discharge side of the pump because the friction loss and turbulence created by the backflow preventer can do damage to the pump and impair the fire protection system if the backflow preventer is in the suction piping. Many plumbing authorities are concerned about having a backflow preventer on the discharge side of the pump because they believe that the pump will somehow contaminate their water supply.

But the pumps that we use in fire protection are the same pumps that they use in their water delivery systems, so the situation is not as dire as they make it out to be. The only source of a requirement in the IPC for a backflow preventer on the suction side of a pump comes from section 608.16.6, which reads, "Where a potable water connection is made to a nonpotable line, fixture, tank, vat, pump or other equipment subject to high-hazard back-pressure, the potable water connection shall be protected by a reduced pressure principle backflow prevention assembly." There are many pieces to this section. First, it only applies to potable connections made to nonpotable lines. This is a very rare occurrence. Typically, the sprinkler system is considered a nonpotable connection that is being made to the potable water line, but section 608.16.6 applies to the opposite.

Secondly, the point that section 608.16.6 is trying to make is that high-hazard situations need special protection. But a fire sprinkler system (without any chemical additives) is not a high hazard situation. There are certainly instances where the figure shown in NFPA 20 can be used, and should seriously be considered in order to improve the reliability of the fire pump and the fire protection system. But be sure to check with the local plumbing official fist to make sure that they interpret the code the same way we do and to make sure that they have not passed their own local amendment.

Question 12 – Dry Systems and NFPA 30

We are planning on protecting flammable and combustible liquids with a dry-pipe sprinkler system in accordance with NFPA 30. We see where NFPA 30 has protection criteria for the sprinkler system, but we do not see a rule to add 30% to the area for the dry-pipe system. Can we use the criteria of NFPA 30 and add 30% for the dry-pipe system?

Answer: No. NFPA 30 does not allow dry pipe systems. All systems are required to be wet, preaction or deluge. In the 2012 and 2008 editions, this rule is in section 16.4.2. In the 2003 edition, this rule is in section 6.8.2.

Regardless of which edition you are using, the delay associated with getting water to a dry pipe system is unacceptable when flammable or combustible liquids are burning. The fire will be too large and will have opened too many sprinklers once water arrives. You will need to select a different kind of system.

Upcoming NFSA "Technical Tuesday" Seminar – January 22

Topic: Basic Hydraulics
Instructors: TBA
Date: Tuesday, January 22, 2013- 10:30 am EST

The concepts of pressure and flow are vital to the performance of a sprinkler system. The relationship of these

two variables can be expressed in a few equations that are the basis for hydraulic calculations and the demand of the sprinkler system. Static and residual pressures to water supplies will be discussed along with flow concepts. Formulas will be explained covering pressure loss as water flows between points as well as flow from an orifice.

To register or for more information, click HERE or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Upcoming In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country, and in recognition of the current recession has adopted a new reduced fee structure. Here are some upcoming seminars:

Jan 15	Brea, CA	Commissioning & Acceptance Testing/Basic Seismic
Jan 16-17	Brea, CA	2-Day Protection of Storage
Jan 17	Meridian, ID	Fire Sprinkler Design Options in the IBC
Jan 19	Meridian, ID	Introduction to Fire Sprinklers, Standards & Codes
Jan 22-24	Wausau, WI	3-Day Inspection & Testing for the Sprinkler Industry
Jan 25	Wausau, WI	Inspection, Testing & Maintenance for the AHJ

These seminars qualify for continuing education as required by NICET, and meet mandatory Continuing Education Requirements for Businesses and Authorities Having Jurisdiction.

To register for these in-class seminars, click HERE. Or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org for more information.

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.