NATIONAL FIRE SPRINKLER ASSOCIATION, INC.

Tuesday e-Tech Alert
August 8, 2006
Number 62

Follow-Up on Counterfeit Sprinklers

Globe Fire Sprinkler has issued a response to the UL alert regarding counterfeit Globe Sprinklers (*e-Tech Alert 60 – July 18, 2006*), noting that the counterfeit sprinklers in question were manufactured in China, shipped to India, and then reshipped to Kuwait. In general, the counterfeiting problem appears to only be an issue in the Middle East, Southeast Asia, Spain and parts of Eastern Europe. In the United States and Canada, a better developed sprinkler industry and more sophisticated regulatory system makes the appearance of counterfeit sprinklers highly unlikely.

Best Questions of July 2006

We have selected the following questions as the "Best of July 2006" answered by the NFSA Engineering staff:

Question 1 – ESFR Sprinklers in Light Hazard

A 3-tenant warehouse building is about 100,000 sq. ft. in area and 35 ft in height. One tenant uses his space for storage. The other two tenant spaces are taken up by a gym facility consisting of 6 basketball courts, a weight room, and party rooms. The general contractor wants to install all three systems as ESFR systems (K-14.0 at 75 psi) so that if the gym facility ever moves out they will have ESFR protection at the deck and could move in a storage tenant without any problems. Is it allowed to protect the gym facility with ESFR sprinklers even though it is not a storage type facility at this time? The only problem that we could see is that it is probably light hazard and light hazard occupancies require quick response sprinklers, which ESFR sprinklers are not.

Answer: In general there is no prohibition against protecting a light hazard occupancy as if it were ordinary hazard, with the exception of the "thermal sensitivity" Section 8.3.3.1 of NFPA 13 (2002 edition) that requires quick response or residential sprinklers to be used. However, because the definitions of quick response and ESFR sprinklers in 3.6.2.9 and 3.6.2.1 both refer to the same thermal sensitivity requirement of Section 3.6.1(a)(1), the Authority Having Jurisdiction should allow the use of the ESFR sprinklers as an equivalency in accordance with the wording of Section 1.5.

Question 2 – Low Fuel Alarms for Diesel Fuel Tanks

Is some type of float switch required to transmit a trouble alarm if the level of diesel fuel in a pump supply tank drops below 50%? If so, where does this requirement reside, in NFPA 20 or NFPA 72?

Answer: Yes, a low fuel alarm is required for diesel fuel tanks of a fire pump. Section 12.4.1.3, of NFPA 20 (2003 edition) states, "Separate visible indicators and a common audible alarm capable of being heard while the engine is running and operable in all positions of the main switch except the off position shall be provided to immediately indicate trouble caused by the following conditions:…(11) Low fuel level. Alarm at two-thirds tank capacity." This means that a trouble alarm must sound whenever the fuel level is lower than two-thirds of the tank.

Question 3 – Spaces Below Composite Wood Joists

A restaurant seating area is under a roof of 24-inch deep composite wood joists 32 inches on center, some of which are exposed and some of which are hidden behind gypsum board, with the distance from the top of the gypsum board to the underside of the composite wood joists varying from 2 to 10 inches.

There are several questions. 1.) How should the spaces above the partial gypsum board ceilings be classified? 2.) Are sprinklers required in the channels running parallel to and above the gypsum board? 3.) Can sprinklers be omitted where the distance between the gypsum board and the underside of the composite wood joists is less than 6 inches?

Answer: The questions can be addressed individually as follows based on the 2002 edition of NFPA 13:

1) Section 8.14.1.3 states, "Sprinklers in concealed spaces having no access for storage or other use shall be installed in accordance with the requirements for light hazard occupancy." In this situation, since the area above the gypsum board is not used for storage, light hazard sprinkler coverage areas can similarly be utilized. It should be noted, however, that for combustible construction where the structural members are less than 3 feet on center, the maximum allowed spacing is 130 square feet.

2) For composite wood joists that are 24 inches deep, sprinklers are generally required in each joist channel. Although composite wood joists are considered obstructed construction, sprinklers are only allowed to be a maximum of 22 inches below the deck, which in this case would not be sufficient to get below the members and protect more than one channel with an individual sprinkler. It is also important to remember that the channels created must be firestopped every 300 square feet in accordance with Section A.3.7.1(3). This was clearly a requirement of NFPA 13, but was placed in the annex of the document during a reorganization. If the spacing between the composite wood joists is such that the arrangement can comply with Section 8.6.4.1.2 (2) then it would be permissible to locate the sprinklers according to the Beam Rule (Section 8.6.5.1.2) and cover more than one channel space with a sprinkler. This situation is highly dependent on the width of the bottom flanges since the Beam Rule measures from the centerline of the sprinkler to the side of the obstruction as shown in Figure 8.6.5.1.2 (a). It should be possible (although flange widths should be checked) with the 32-inch spacing indicated to locate the sprinkler in a small window that would meet the Beam Rule and not be more than 22 inches below the deck as required in Section 8.6.4.1.2 (2). There are also modifications that can be made so that sprinklers can be located to protect more than one channel. An example of this would be laying insulation along the upper deck so that the channel depth based on the available space for smoke and heat to collect would be 21 inches or less so that sprinklers could be located 1 inch below the composite wood joists and still not be more than 22 inches below the deck.

3). Where there are less than 6 inches between the bottom of the composite wood joists and the gypsum board sprinklers are nevertheless required. NFPA 13 makes a distinction between wood joist construction (solid wood members) and composite wood joist construction. Even if the space were totally concealed, Section 8.14.1.2.6 would only permit omission of sprinklers where the ceiling was directly attached to the underside of the composite wood joists, or where insulation was used in conjunction with metal channels not exceeding 1 inch in depth. In this case, the space above the gypsum board is not concealed, allowing the transfer of heat and hot gases either to or from the
space, so concealed space rules do not apply.

Question 4 – Bypass Piping for a Fire Pump

NFPA #20 (2003), section 5.14.4.2 says that bypass piping shall be at least as large as the pipe size required for the discharge pipe per Section 5.25. However, the discharge pipe only includes the pipe and fittings up through the discharge valve per Section 5.15.1. After that, the system piping has no requirement. This appears to mean that a 2000 gpm pump requires a 10-inch bypass. That seems large to me, especially when the test header and the meter can be 8-inch, and the actual system has no required size. Does a 2000
gpm pump always require a 10-inch bypass?

Answer: Yes, for a 2000 gpm rated fire pump the bypass line would have to be the same size as the discharge piping, which in this case would be 10-inch diameter pipe. This may seem like a large value, but typically means that the system demand is high enough to require such a large pipe. The purpose of a bypass line is to allow some water to get out to the open sprinklers if there is a malfunction with the pump. With large demands it does call for a large diameter bypass pipe.

Question 5 – Attics Above NFPA 13R Spaces Protected per NFPA 13

A pool area in a hotel protected in accordance with NFPA 13R would require sprinkler spacing per NFPA 13. Would sprinklers be required in the wood framed attic above the hotel's pool? We note that NFPA 13R (2002 edition) Section A.6.7.2 states: "It is only the intent of NFPA 13R to reference the...requirements of NFPA 13. Other rules from NFPA 13 such as sprinklering of combustible concealed spaces, hose stream demand and water supply duration are not intended to be referenced by 6.7.2. In the explanatory material in the blue print of the Handbook it similarly states: "A common mistake is made in the application of the location (e.g., combustible concealed spaces) rules from NFPA 13."

Answer: The sections you cite from NFPA 13R are the correct references for the question you have asked. NFPA 13R only refers to NFPA 13 for such rules as spacing, positioning and water density requirements for areas outside of residential areas. The pool in a hotel should not change the residential nature or occupancy of that property. The Committee is clearly stating that no sprinklers are required in concealed spaces even in areas outside of the dwelling when the entire occupancy can be considered appropriate for an NFPA 13R system.

Question 6 – Rating of Bathroom Doors in NFPA 13

Is the door to a bathroom required to have a rating equivalent to the 15-minute thermal barrier in order to eliminate sprinklers from a bathroom per Section 6.8.2 of NFPA 13?

Answer: No. Section 6.8.2 (2) of NFPA 13 (2002 edition) is worded as follows: "The walls and ceiling, including walls and ceilings behind fixtures, are of noncombustible or limited-combustible materials providing a 15-minute thermal barrier." This statement does not include the door rating. The definition of a compartment (found in Section 4.1) recognizes that there will be openings, which are acceptable to define a compartment as long as there is a minimum lintel depth of 8 inches.

Question 7 – Intersecting Duct Obstructions

We have been asked to add sprinklers below intersections of ducts, where one HVAC duct tees off from another. Both the main trunk and the branch duct are less than 48 inches wide. Should the intersection point be is be considered an obstruction over four feet wide requiring a sprinkler below it?

Answer: No. A sprinkler would not be required to be installed at the intersection of ducts provided both are under 4 ft in width.

Question 8 – Sprinkler Location in Elevator Pits

The bottom of an elevator comes within 15 ft of the pit floor but does not go down to the floor. Should the sprinkler in the elevator pit be installed within 2 ft of the floor of the pit as stated in Section 8.14.5.1 of NFPA 13 (2002 edition) or should the sprinkler be raised to within 1 ft of the bottom of the elevator at the support beam?

Answer: The sprinkler should be installed at the bottom of the pit regardless of how low the elevator goes. This sprinkler is intended to deal with fires consisting of the debris and oils that might spill into the pit. The debris settles at the bottom, regardless of how low the elevator goes.

Question 9 – Variable Spacing for ESFR Sprinklers with Ceiling Height

A pre-engineered steel building has an eave height of 25 ft and a peak of 33 ft. Is it appropriate to space the sprinklers at a maximum of 12 ft for all portions of the building not exceeding 30 ft in height, then reduce the maximum spacing to 10 ft for those sections that do exceed 30 ft in height so as to comply with Table 8.12.2.2.1 of NFPA 13 (2002 edition)? Or am I limited to 10 ft spacing based on the building's highest point?

Answer: The best way to handle the situation would be to treat the whole system as if it were under a ceiling that was over 30 ft in height and space the sprinklers with a maximum of 10 ft between the sprinklers throughout the system. This would allow the system to be more easily be reviewed and installed. A case can be made for using the 12 ft distance between sprinklers for the portion of the building that is less than 30 ft in height and then switching to the 10 ft distance where the ceiling height exceeds 30 ft. Even if technically correct, however, it may take more effort to get the AHJ to agree and may cause coordination problems in the field when the distances between sprinklers are not uniform throughout the building.

Question 10 - Hydrostatic Testing of Recut Drops

A fire protection system was installed approximately 20 weeks ago. A few weeks later, a hydrostatic test on the fire protection system was performed. This test was witnessed and approved by the AHJ. The system sat idle with water inside for this period of time. At the time of the installation, all drops and sprinklers were installed. The original drops were cut to the specified ceiling heights utilizing a laser. Then the ceiling grid was installed, requiring a re-cut of 18 of the sprinkler drops.

Does the system needs to be hydrostatically tested again because the joints have been broken? NFPA13 requires that if more than 20 sprinklers are modified, a hydrostatic test is required, but if less than 20 sprinklers are modified, a test at normal system working pressure is all that is required. Furthermore, it states that in cases where a portion of the system cannot be isolated, such as relocating sprinklers, a test at system working pressure is all that is required. Is the exception applicable in this case? Is there any specific percentage of a system that can to be modified before a new hydrostatic test is required, such as the 20-sprinkler rule? Does the 20-sprinkler rule only refer to re-cutting drops or does this also relate to relocating sprinklers on return bends? When a system is hydrostatically tested and there is a pressure drop but no visible leaks, should the hydrostatic test fail?

Answer: With respect to the 18 drops being recut, the system should not require retesting at 200 psi. The drops that were changed should simply be checked with normal system pressure restored.

The hydrostatic test has multiple purposes. It is intended to make sure that the joints in the sprinkler system are put together correctly and that the pieces and parts, as they have been assembled, can handle the maximum system pressure, plus a safety margin. The maximum pressure that most systems are going to see is the 150 psi that is typically applied by a fire department to pump into a fire department connection. The 200 psi value for the test adds a safety margin of 50 psi. If system pressures are expected to exceed 150 psi, then the same 50 psi safety margin is used and the test is performed at the expected pressure plus 50 psi.

Once an entire system has been tested, the whole system does not need to be tested again if small changes are made. Many years ago, the standard used to have a section stating that minor changes did not need to be retested. But AHJ's disliked that language because there was no agreement as to what was "minor." So the committee revised the standard to present sections 16.2.1.4, 16.2.1.5 and 16.2.1.6 (2002 edition). The idea of these sections was to try and explain what the committee thought was "minor."

Note that section 16.2.1.4 reads, "Modifications affecting 20 or fewer sprinklers shall not require testing". It is a statement about the size of a change that requires the retest to be performed at 200 psi. For example, if I replace a piece of pipe on a branch line, and there are 7 sprinklers downstream of the pipe that I replaced, that work only affected 7 sprinklers, and I don't need to run a new hydrostatic test. But if I replace a piece of pipe on a cross main that feeds 3 branch lines, with each branch line having 7 sprinklers, then I have affected a portion of the system containing 21 sprinklers and I need to test that at 200 psi, unless that portion of the system cannot be isolated. Depending on the placement of sectional control valves, it may or may not be possible to isolate that portion of the system.

Section 16.2.1.6 specifically addresses the situation of drops. Regardless of how many drops are changed, you never need to test them at any pressure greater than normal system working pressure. It is just not practical to require a full hydrostatic test every time a drop is changed.

Sprinklers on return bends should be treated the same as drops. The specific language in section 16.2.1.6 is "Modifications that cannot be isolated". Drops are just used as a single example of a modification that cannot be isolated. Drops are not intended to be the only modifications that cannot be isolated, return bends are another good example. The committee does not want to be put into a position of having to create an exhaustive list here.

The last question is the most difficult. The purpose of the hydrostatic test is to make sure that the system is holding together and does not leak. In small systems, this can be determined by making sure that the pressure does not drop during the test. But in large systems, there are all kinds of situations that might cause the pressure to drop in the system, even though the system is well put together and is not leaking. For example, if the water changes temperature during the test, it will also change in volume (density of water changes with temperature), causing the pressure to decrease. Also, it is possible to trap air in the system when filling the pipes for the test. The air might contract during the test and allow the water to expand into the vacated space, causing the pressure to decrease. It is also possible for water to find its way out of a system during a test (air will escape from joints where water will not, it is a function of the difference between a gas and a liquid), causing the water to expand into the vacated space and decrease the pressure.

In evaluating the results from a hydrostatic test, the AHJ needs to take into account water temperature during the test, air temperature during the test, system volume and possible trapped air. Common sense needs to be used in making the determination as to whether or not the system passes or fails the test. There is no way that NFPA 13 can establish a tolerance with the number of variables that need to be quantified. We have to rely on people using good judgment.

Question 11 – Sprinklers for Outside Decks

Please let me know what the status is of sprinkler requirements for outside decks of second floor apartments. I have been informed by a code person that exterior decks on residences require sprinklers.

Answer: Unfortunately, the requirement for sprinklers on outside decks must be determined on the basis of the individual jurisdiction. Many local jurisdictions, in their building codes, have requirements to protect exterior balconies of apartment buildings. As for the sprinkler standards, NFPA 13R (for residential buildings up to and including 4 stories in height) does not require sprinkler protection on open balconies. The NFPA Committee on Sprinkler System Installation Criteria also discussed this in preparation for the next (2007) edition of NFPA 13. Although they decided against adding additional language to the standard, it was noted that typical patio/balcony type furniture that is expected to be stored on an open balcony is not a sufficient fuel load to warrant sprinkler coverage.

Question 12 – Hanging and Restraint of Long Drops

A looped fire system in a fully sprinklered building is located forty feet overhead. The branch lines are 15 ft apart and the metal beams of the metal building are located

halfway between each of the sprinkler lines. The horizontal mains will be braced to the beams, but where in NFPA 13 does it address the 40 ft drop to a sprinkler installed in a control room with a low ceiling? There is nothing to attach it to for the entire 40 ft, just the top and bottom.

Answer: The issue of the 40 ft drop has to be dealt with as two separate concerns: the support of the pipe due to gravity (hangers) and the bracing/flexibility of the pipe during earthquake events (restraint/flexibility). This response will assume that the drop only serves a single sprinkler. If the drop serves additional sprinklers, additional protection would be required.

For drops to single sprinklers, NFPA 13 currently only requires a special hanger where the horizontal portion of the arm-over to the drop (assuming steel pipe) exceeds 24 inches in length (Section 9.2.3.5.1). There is currently no information on the length of the vertical drop that kicks in a requirement for a special hanger. So, technically speaking, if the horizontal portion of the arm-over to the drop does not exceed 24 inches in length, there is no requirement for any hanger on the arm-over or drop. However, at some point common sense has to enter the picture. An unsupported arm-over and drop of 40 ft would place severe stress on the fitting and branch line of a sprinkler system and would not provide acceptable performance for the sprinkler system.

The reason that NFPA 13 does not include limitations on the length of an unsupported drop to a single sprinkler is simply that the Committee has never been able to agree on such a length.

Another consideration in some areas is earthquake protection. During an earthquake, the building will move and the sprinkler system needs to be flexible enough to withstand the building's movement. Section 9.3.2.3(6) of NFPA 13 requires a flexible coupling near the top of any drop that exceeds 15 ft in length when the drop serves more than one sprinkler. A single sprinkler was given an exception due to concerns that the flexible coupling would not allow the sprinkler to be removed from the ceiling for eventual replacement, since the entire drop would turn when an attempt was made to unscrew the sprinkler. In the case of a very long drop, there are undoubtedly other access points that would allow the drop to be secured against turning, and it would be a good idea to provide a flexible coupling near the top.

Due to the potential excessive movement of the drop during an earthquake, the drop should also be restrained in accordance with section 9.3.6.1. Restraint can be provided using the wire restraint method of Section 9.3.6.1(3). The building code may also require that the issue of clearance through a drop ceiling be addressed.

Upcoming NFSA "Technical Tuesday" Online Seminar

Topic: Sprinkler Obstructions
Instructor: Victoria B. Valentine, P.E, NFSA Manager of Product Standards
Date: August 22, 2006

Many guidelines detail the proper location for fire sprinkler installation with relation to common obstructions. This program will review those common obstructions including frequent problem areas, as the ceiling is shared space with other common features such as lights. In addition, different types of sprinklers will be covered with their specific rules. Recent research will also be discussed.

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

Upcoming NFSA "Business Thursday" Online Seminar

Topic: Insurance "Wrap-Up" Programs; OCIPs & CCIPs
Instructor: Buddy Dewar, NFSA Director of Regional Operations
Date: August 24, 2006

Owner Controlled Insurance Programs (OCIPs) and Contractor Controlled Insurance Programs (CCIPs), also known as "wrap-ups", are increasing in popularity with owners and general contractors to counter increasing insurance costs. This presentation explains the root causes leading to wrap-ups; the gamble assumed by the owner when wrap-ups are provided; the many gaps in coverage that are problematic for the subcontractor and its current insurer; potential umbrella coverage problems depending on the contractor; workers' compensation woes, and long-term completed operations coverage by a third party insurer. The course will present the key factors in identifying problems with wrap-up coverage and actions needed to protect your company from financial distress when signing unto a wrap-up program.

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2006 Basic and Advanced Technician Training, NICET Inspection Seminars

The NFSA is the only organization that offers two-week basic technician training seminars, 3-day advanced technician training seminars, and NICET-oriented inspection and testing review seminars at various locations across the United States. The 2006 schedule still includes the following dates and locations:

2-week Basic Technician Training

August 14-25, 2006 – Seattle, WA
October 16-27, 2006 – Philadelphia, PA

3-day Advanced Technician Training

October 3-5, 2006 – Minneapolis, MN

3-day NICET Inspection and Testing Certification Review

September 6-8, 2006 – Dallas, TX
November 14-16, 2006 – Anchorage, AK

For more information, contact Nicole Sprague using Sprague@nfsa.org.

NFSA In-Class Training Opportunities

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

Aug 9	Basic Seismic Protection (1/2 day)(AM)	Indianapolis, IN
Aug 9	Advanced Seismic Protection (1/2 day)(PM)	Indianapolis, IN
Aug 10	Inspection, Testing & Maintenance	Indianapolis, IN
Aug 15	Inspection, Testing & Maintenance	Rogers, AR
Aug 15	Inspection, Testing & Maintenance	Temecula, CA
Aug 16	Sprinkler Protection for General Storage	Rogers, AR
Aug 16	Residential: Homes to High-Rise	Temecula, CA
Aug 17	Underground Piping (1/2 day) (AM)	Rogers, AR
Aug 17	Underground Piping (1/2 day)	Temecula, CA
Aug 17	Standpipe Systems (1/2 day) (PM)	Rogers, AR
Aug 22	Inspection, Testing & Maintenance	Pharr, TX
Aug 23	Residential Sprinklers for Single Family Homes	Pharr, TX
Aug 24	Pumps for Fire Protection	Pharr, TX
Aug 30-31	Two-day NFPA 13 Overview & Intro to Plan Review	Carol Stream, IL
Sept 1	Hydraulics for Fire Protection	Carol Stream, IL
Sept 11-12	Two-day NFPA 13 Overview & Intro to Plan Review	Eugene, OR
Sept 13	Hydraulics for Fire Protection	Eugene, OR
Sept 14	Basic Seismic Protection (1/2 day)(AM)	Eugene, OR
Sept 14	Underground Piping (1/2 day) (PM)	Eugene, OR
Sept 19	Introduction to Sprinkler Systems (1/2 day) (AM)	Dublin, OH
Sept 19	Basic Seismic Protection (1/2 day) (PM)	Dublin, OH
Sept 20-21	Two-day NFPA 13 Overview & Intro to Plan Review	Dublin, OH
Sept 26-27	Two-day NFPA 13 Overview & Intro to Plan Review	Seattle, WA
Sept 26	Introduction to Sprinkler Systems (1/2 day) (AM)	Appleton, WI
Sept 26	Underground Piping (1/2 day) (PM)	Appleton, WI
Sept 26	Standpipe Systems (1/2 day) (AM)	Kansas City, MO
Sept 26	Underground Piping (1/2 day) (PM)	Kansas City, MO
Sept 27	Pumps for Fire Protection	Kansas City, MO
Sept 27	Pumps for Fire Protection	Appleton, WI
Sept 28	Inspection, Testing & Maintenance	Kansas City, MO
Sept 28	Inspection, Testing & Maintenance	Appleton, WI
Sept 28	Hydraulics for Fire Protection	Seattle, WA
Oct 3	Inspection, Testing & Maintenance	North Las Vegas, NV
Oct 4	Residential: Homes to High-Rise	North Las Vegas, NV
Oct 5	Standpipe Systems (1/2 day) (AM)	North Las Vegas, NV
Oct 5	Underground Piping (1/2 day) (PM)	North Las Vegas, NV

For more information or to register, visit www.nfsa.org or call Mike Repko at 845-878-4207.

In the promotion of the fire sprinkler concept, the National Fire Sprinkler Association represents all fire sprinkler industry interests including fire sprinkler contractors, manufacturers and suppliers of fire sprinklers and related equipment and fire protection professionals. Established in 1905, the National Fire Sprinkler Association provides publications, nationally accredited seminars, representation in codes and standards-making, market development, labor relations and other services to its membership. Headquartered in Patterson, New York, the National Fire Sprinkler Association has regional operations offices throughout the country.