



Issue Number: 184
Issued: July 13, 2010

NFPA Calls for Draining of Dwelling Unit Antifreeze Systems

The National Fire Protection Association has issued a safety alert on the subject of antifreeze in fire sprinkler systems protecting dwelling units, and is recommending that all such antifreeze solutions be drained and replaced with water until ongoing research can confirm safe antifreeze concentrations. The alert can be found through the following link:

<http://www.nfpa.org/antifreeze>

Here are some of the most likely questions on the subject:

Q: Is this intended to apply only to NFPA 13D systems containing antifreeze?

A: No, it also includes NFPA 13R systems as well as NFPA 13 systems protecting dwelling units. The definition of dwelling unit within NFPA 13 contains the statement: *“For purposes of this standard, dwelling unit includes hotels rooms, dormitory rooms, apartments, condominiums, sleeping rooms in nursing homes, and similar living units.”*

Q: Does this mean we need to drain all antifreeze systems protecting dwelling units? Is this a requirement?

A: No, the NFPA recommendation can only be enforced if enacted by a state or local fire marshal or some other Authority Having Jurisdiction.

Q: Why is NFPA making such a recommendation?

A: The NFPA alert is in reaction to a fire/explosion that took place in Truckee, California, last year. Reportedly, a pan that had caught on fire on a stovetop was being moved toward a sink when it set off a sprinkler. A subsequent explosion injured the man moving the pan and killed a woman in an adjacent room open to the kitchen. Photos indicate actual fire damage was almost nonexistent. The NFPA safety alert suggests glycerine in the sprinkler system may have been responsible. Although the proposed system design concentration was 50%, the actual concentration was reported to be 71.2% glycerin.

Q: Have there been other reports of incidents involving spray fires or explosions from antifreeze in sprinkler systems?

A: In 2001 in Highlands, New Jersey, a restaurant suffered a fire that reportedly originated when a sprinkler spray activated due to improper proximity to a unit heater. There were no deaths but several injuries.

The only other reported incident took place late last month in Herriman, Utah. A child playing with matches was severely injured, along with his mother, by a spray fire/explosion that accompanied the sprinkler response to the fire he had started. The system contained a 60 percent glycerine solution both by design and as tested in adjacent units.

Q: What is causing the spray fires and explosions?

A: It has been known for some time that high concentration antifreeze solutions are combustible liquids. To this point in time, all indications suggest that the potential for a combustible sprinkler spray or explosion relate to the use of antifreeze concentrations in excess of 50 percent in combination with high system operating pressures. Testing conducted within the last two months at UL involving the use of a 70 percent glycerine solution, a 60 percent propylene glycol solution, and 50 percent solutions of both types of antifreeze, utilizing sprinklers at 100 psi pressures, has been able to recreate the spray fire phenomenon, but only for the solutions with concentrations exceeding 50 percent.

Q: If the phenomenon has only been observed with solutions exceeding 50 percent, why is NFPA calling for all antifreeze systems protecting dwelling units to be drained?

A: NFPA is admittedly being conservative. They may believe that even where antifreeze concentrations do not exceed 50 percent, there is the possibility that inadequate mixing took place. While proper mixing ensures that the antifreeze will stay in solution, inadequate mixing can lead to higher concentrations of antifreeze at lower elevations, such as in drops.

Q: What is the NFPA Technical Committee on Automatic Sprinklers doing to address the issue?

A: Both the NFPA Committee on System Installation Criteria and the NFPA Committee on Residential Systems are currently considering the issuance of Tentative Interim Amendments (TIAs) to the sprinkler standards affecting the use of antifreeze in systems protecting dwelling units. For all three standards, NFPA 13, 13D and 13R, two separate TIAs are being balloted. One proposed set of TIAs would ban antifreeze solutions from dwelling units altogether, while the other would limit concentrations to 50 percent and require the use of factory premixed solutions. Decisions on these TIAs will not be known until after the NFPA Standards Council meets in early August.

Q: Is there any testing that would indicate 50 percent antifreeze solutions can be used successfully against fire?

A: In some of the UL testing, the 50 percent solutions worked as effectively as pure water. Similarly, a residential sprinkler test conducted in accordance with the UL 1626 standard years ago by the Viking Corporation using a 50 percent propylene glycol solution showed roughly the same success as with 100 percent water.

Q: Isn't NFPA concerned that systems refilled with pure water could freeze when cold weather returns?

A: NFPA expects research to be further along such that additional advice will be available prior to the onset of freezing weather.

Q: Who is conducting the research?

A: A project has been organized through the Fire Protection Research Foundation, the research arm of the NFPA. The NFSA has indicated its willingness to help provide funding and direction for the research.

Q: Should we be notifying our customers?

A: While this is obviously a company decision that can be made in consultation with legal counsel, NFSA is recommending that contractors bring the NFPA safety alert to the attention of their affected customers, and provide an offer to test the system to determine the concentration of antifreeze. This will enable the owner to make a more informed decision about whether to drain their system(s). A proposed sample letter is as follows:

Dear (Owner):

Like many thousands of fire sprinkler systems, yours is protected with an antifreeze solution to help ensure against freezing of the water in the piping during extremely cold weather. The National Fire Protection Association (NFPA), the organization that publishes the standards by which sprinkler systems are designed and installed, recently issued a safety alert for systems containing antifreeze. The full NFPA safety alert can be viewed at www.nfpa.org/antifreeze.

The NFPA is suggesting that all antifreeze be drained from sprinkler systems and replaced with water until research can be completed to clearly identify safe limits for antifreeze concentrations, possibly related to system operating pressures.

The alert was in response to a fire last year in which sprinkler activation and discharge of a combustible antifreeze solution are believed to have led to spray ignition and an explosion. An individual was killed in the explosion, and another seriously injured. Although reports of such antifreeze combustibility have been extremely rare, there have been at least two other incidents reported over the years, and some recent research has confirmed the potential for ignition of sprinkler spray containing high amounts of antifreeze. To date, all reported incidents and tests that have resulted in a spray ignition/explosion have involved antifreeze concentrations exceeding 50 percent. Conversely, there is test data available showing that solutions containing 50 percent or less antifreeze can be effective against fires and no spray ignition has taken place.

As a consequence, if your sprinkler system contains an antifreeze solution, we are recommending that you have your system tested. Based on the results of the test, we further recommend you take one of the following actions:

- 1. For owners with antifreeze solutions exceeding 50 percent:*

We are recommending that you follow the NFPA advice to have your system temporarily drained and refilled with water. The piping should be protected by other means such as heating the space or with proper insulation techniques.

- 2. For owners with antifreeze solutions NOT exceeding 50 percent:*

You will need to decide whether you wish to take action at this time to have your system temporarily drained and refilled with water.

If the system is drained and refilled with plain water, it obviously will be more vulnerable to cold weather. Therefore it is imperative that steps be taken prior to the onset of freezing weather to either restore a safe level of antifreeze solution to the piping, or make some other modifications to the system that will adequately protect it against freezing. In the coming months, additional research will investigate the antifreeze concentrations that can be used safely. Other technologies are also expected to be welcomed into use, such as listed heat-tape systems and dry-pipe systems.

If you would like us to test your system for antifreeze concentration, please sign below and return this form to our offices. Based on the test results further action and decisions as outlined above will be required. We shall be available for consultation and to further quote on the actions you desire.

Yours truly,

Please sign below if you would like us to proceed to test your system:

I HAVE REVIEWED THE ABOVE INFORMATION AND WOULD LIKE YOU TO TEST THE ANTIFREEZE SOLUTION IN MY FIRE SPRINKLER SYSTEM.

Signed _____

Date _____

Q: If a system is drained, how can we ensure that the homeowner will take the proper steps to protect the system prior to cold weather?

A: In the event the decision is made to drain the system, NFSA is recommending that contractors have the owner sign a statement similar to the following:

Please sign below if you would like us to proceed to provide a quote for the work:

I HAVE REVIEWED THE ABOVE INFORMATION AND WOULD LIKE YOU TO PROVIDE ME WITH A QUOTE TO TEMPORARILY DRAIN ANTIFREEZE SOLUTION FROM MY FIRE SPRINKLER SYSTEM AND REPLACE IT WITH WATER. I UNDERSTAND THAT IN REQUESTING THIS WORK TO BE COMPLETED I WILL BE MAKING MY FIRE SPRINKLER SYSTEM MORE VULNERABLE TO FREEZING TEMPERATURES, AND AGREE TO TAKE ADDITIONAL STEPS TO REMEDY THE SITUATION PRIOR TO THE ONSET OF FREEZING WEATHER.

Signed _____

Date _____

NFSA “Technical Tuesday” Seminar – July 20th

Topic: Calculating Sprinklers Under Obstructions

Instructor: Cecil Bilbo, Jr., CET

Date: July 20, 2010

Design technicians frequently ask about the hydraulic calculation procedures for calculating sprinkler systems where additional sprinklers are added under obstructions. The 2010 Edition of NFPA 13 has clarified the rules for when to include sprinklers below obstructions in the sprinkler system demand. The proper hydraulic calculation procedures will vary based on the kind of sprinkler being used at the ceiling, such as spray sprinklers, control mode specific application sprinklers, and ESFR sprinklers. This seminar will discuss the different procedures that need to be followed for each type of ceiling sprinkler when additional sprinklers are added under obstructions.

NFSA/FSI “Best Practices Thursday” Seminar – July 22nd

Topic: Managing Job Costs

Instructor: Paul Johnson

Date: July 22, 2010

Now more than ever, it is important to understand where and how we are making or losing money. During this 45-minute presentation we will overview components and steps involved in comparing budgeted estimates versus actual expenses for use in developing your own Job Cost Review procedure. One-on-one follow-up is available after the call at no additional charge.

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

Additional training opportunities through the NFSA Engineering Department include the following...

Inspection & Testing for the Sprinkler Industry (3-day course)

New Castle, DE – September 28-30, 2010

Delaware State Fire School’s Regional Center

2311 McArthur Drive, New Castle, DE 19720

Layout Technician Training Course (2-week course)

Champaign, IL – August 2-13, 2010

Academy of Fire Sprinkler Technology, Inc.

1617 Interstate Dr., Champaign, IL 61822

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

Additional In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country. Here are some seminars scheduled for 2010:

Aug 9	Wailuku, HI	CPVC Piping (1/2 day a.m.)
Aug 9	Wailuku, HI	Underground Piping (1/2 day p.m.)
Aug 10	Wailuku, HI	Standpipe Systems (1/2 day a.m.)
Aug 10	Wailuku, HI	Commissioning & Acceptance Testing (1/2 day p.m.)
Aug 11	Wailuku, HI	Inspection, Testing & Maintenance
Aug 24	Menasha, WI	NFPA 13 Update 2007
Aug 25	Menasha, WI	Sprinkler Protection for General Storage
Aug 26	Menasha, WI	Foam Water Systems (1/2 day)
Aug 26	Menasha, WI	Commissioning & Acceptance Testing (1/2 day)
Aug 31	Rochester Hills, MI	NFPA 13 Update 2007

Sept 1	Rochester Hills, MI	Plan Review Policies & Procedures
Sept 2	Rochester Hills, MI	Commissioning & Acceptance Testing (1/2 day)
Sept 2	Rochester Hills, MI	Introduction to Sprinklers (1/2 day)
Sept 14	Dayton, OH	Plan Review Policies & Procedures
Sept 15	Dayton, OH	Inspection, Testing & Maintenance
Sept 16	Dayton, OH	Basic Seismic Protection (1/2 day a.m.)
Sept 16	Dayton, OH	Standpipe Systems (1/2 day p.m.)
Sept 16	Concord, NH	Sprinkler Protection for General Storage
Sept 17	Concord, NH	Sprinkler Protection for Rack Storage
Sept 18	Concord, NH	Plan Review Policies & Procedures

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

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

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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.