**NFPA Bans Use of Antifreeze in Sprinkler Systems**

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Fire protection sprinkler systems have become an increasingly common component of modern buildings—both in commercial structures and residential homes. According to the National Fire Protection Association (NFPA), the home is the place where most fire fatalities occur. NFPA reports that when sprinklers are present, the risk of dying in a home fire decreases by 83%.

While sprinkler systems provide an added layer of fire protection, they also carry the risk that water within the system will freeze in cold temperatures and property damage will result. Many sprinkler systems therefore employ antifreeze solutions mixed into the sprinkler system water to combat the risk of freeze damage. According to NFPA Vice President & Chief Engineer Chris Dubay, antifreeze solutions have been successfully used in both commercial and residential sprinkler systems for over sixty years.

As the result of a 2009 fire, however, NFPA has changed its view regarding the use of antifreeze in fire protection sprinkler systems. The subject incident occurred on August 18, 2009 when a fire and explosion occurred in a kitchen at the 92 unit Henness Flats Apartment Complex in Truckee, California. A Truckee Fire Protection District report in October of 2009 concluded the fire was caused when water was poured onto a grease cooking fire. A sprinkler system with a reported 71.2% concentration of glycerin antifreeze deployed during the fire. In the aftermath of the fire, a question arose whether the antifreeze in Henness’ fire sprinkler system ignited and created the explosion. The incident resulted in a single fatality and serious injury to another individual.

Following this incident, NFPA initiated a research project in conjunction with the Fire Protection Research Foundation. Simultaneously, Underwriters Laboratory undertook an independent investigation which included testing. The results of NFPA’s investigation showed that there was a possibility of flash fires associated with various concentrations of antifreeze solutions.

On July 6, 2010, NFPA issued a safety alert recommending that residential fire sprinkler systems containing antifreeze be drained and the antifreeze be replaced with water. NFPA reported that initial test results showed antifreeze solutions consisting of 70/30% glycerin and 60/40% propylene glycol may provide an unacceptable risk of harm to occupants in certain types of fire scenarios, in particular kitchen grease fires. There were successful tests where kitchen grease fires were extinguished or contained with a 50/50% glycerin solution, but NFPA felt there should be additional testing to more fully understand if there is a risk associated with a 50/50% glycerin solution. NFPA then initiated a Phase 2 research project which called for full scale testing to evaluate various concentrations of antifreeze solutions and various arrangements of sprinklers. The Phase 2 research project was completed in the following months.

On August 18, 2010, NFPA issued an updated safety alert regarding antifreeze in new and existing residential sprinkler systems. NFPA President James M. Shannon said the key findings from the new report were:

- Antifreeze solutions with concentrations of propylene glycol exceeding 40% and concentrations of glycerin exceeding 50% have the potential to ignite when discharged through automatic sprinklers.
- Both the 40% propylene glycol and 50% glycerin solutions demonstrated similar performance to that of water alone for fire control throughout the series of tests.
- Based on the results of this research, antifreeze solutions of propylene glycol exceeding 40% and glycerin exceeding 50% are not appropriate for use in residential fire sprinkler systems.
- Consideration should be given to reducing the acceptable concentrations of these antifreeze solutions by an appropriate safety factor.

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As a result of these findings, NFPA took action. NFPA Standards Council, the body that oversees the NFPA standards development process, issued tentative interim amendments banning the use of antifreeze solution in residential fire sprinkler systems for new construction until further action by NFPA consensus standards committees. NFPA’s Standards Council issued amendments to NFPA 13, Standard for the Installation of Sprinkler Systems; NFPA 13D, Standard for Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes; and NFPA 13R, Standard for Installation of Sprinkler Systems in Residential Occupancies Up To and Including Four Stories in Height.

NFPA also provided the following guidance on the use of antifreeze in existing residential fire sprinkler systems:

- Fire sprinklers are extremely effective fire protection devices, significantly reducing deaths, injuries and property loss from fire. These systems should not be disconnected.
- Residential fire sprinkler systems, whenever possible, should not contain an antifreeze solution.
- If you have, or are responsible for, an existing residential occupancy with a fire sprinkler system, contact a sprinkler contractor to check and see if there is antifreeze solution in the system.
- If there is antifreeze solution in the system, determine if other means, such as insulation, can be used to provide adequate freeze protection.

- If there is no viable alternative to antifreeze solutions, NFPA recommends the following:
  - Use only propylene glycol or glycerin antifreeze solution.
  - The antifreeze solution should be the lowest possible concentration required for the needed freeze potential but under no circumstance should the antifreeze solution exceed a maximum concentration of 40% of propylene glycol or a maximum concentration of 50% of glycerin. Consideration should be given to reducing these concentrations by an additional safety factor.
  - The antifreeze solution should only be a factory pre-mixed; use of factory pre-mixed solutions is essential to ensure the proper concentration level and solution integrity.
  - Antifreeze solutions should only be used with the approval of the local authority having jurisdiction.

The Fire Protection Research Foundation’s reports and additional information from the NFPA on this issue can be downloaded at NFPA’s website: www.nfpa.org. In addition, Cozen O’Connor is available to consult regarding possible subrogation opportunities arising from these new changes.

3 http://www.nfpa.org/itemDetail.asp?categoryID=2064&itemID=48038