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STEPHEN D. COAN
STATE FIRE MARSHAL

MEMORANDUM

TO: Heads of Fire Departments

FROM: Stephen D. Coan
State Fire Marshal

DATE: July 1, 2011

SUBJECT: Antifreeze Use in Fire Sprinkler Systems
Urgent Testing/Correction of Existing Systems

This is an update to the January 2011 memorandum that was issued to you regarding the use of antifreeze in fire sprinkler systems. This memorandum is intended to provide updated information that addresses existing systems.

It is highly recommended that fire officials work with their customers in their respective communities to advise those facilities that have utilized anti-freeze solutions in their buildings, of the need to have it tested, to determine their conformance with the latest NFPA guidelines for existing systems. If after testing, the facility is not in compliance, the head of the fire department should issue orders to correct the deficiency.

The *Massachusetts Fire Safety Code* - 527 CMR 1.06(1)(a) - is the correct citation when writing an order to correct the antifreeze system solution. If the facts support that a hazardous condition exists that is likely to contribute to the spread of fire (non-conformance with the anti-freeze standards), this section will allow for the application of the provisions for antifreeze solutions described in NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, as published in March 2011.

In requiring these provisions be met by order, be sure that the freeze point information from the antifreeze manufacturer or the generic information found in the Annex material of NFPA 25 are

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followed to determine concentrations. All antifreeze solutions newly placed into existing fire sprinkler systems must be premixed by the antifreeze manufacturer at the proper concentration.

In summary, the existing NFPA 13 and NFPA 13R Sprinkler Systems should be within the criteria outlined below.

- Antifreeze solutions systems must be tested annually, prior to the onset of freezing weather.
- If it is determined that the solution found in the system is no longer permitted or if the type of anti-freeze cannot be reliably determined, the system must be drained and replaced with an acceptable factory premixed solution.
- If all the initial tests indicate that the solution type is acceptable, test samples must be taken at the top and bottom of each system (in some cases, an additional sample must be taken).
- If all the test samples indicate a concentration of glycerin not greater than 50% by volume propylene glycol not greater than 40% by volume, then the solution is permitted and may remain in the system.
- If any of the samples indicate a concentration in excess of the permissible maximum concentrations (i.e. 50% glycerin / 40% propylene glycol), the system must be emptied and refilled with a factory premix solution.
- For newly introduced glycerine solutions, the solution is to be a factory premixed solution with a concentration not exceeding 48% by volume.
- For newly introduced propylene glycol solutions, the solutions must be factory premixed solutions with a concentration not exceeding 38% by volume.

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See www.nfpa.org/antifreeze for detailed information. If you have additional questions, you can contact Dana Haagensen (978) 567-3376 or Jacob Nunnemacher (978) 567-3377 in the Division of Fire Safety.

Updated NFPA Alert Regarding Antifreeze – April 5, 2011

Important safety information in NFPA sprinkler standards regarding antifreeze in new and existing fire sprinkler systems

NOTE: This NFPA Safety Alert replaces the previous antifreeze alerts dated July 2010 and August 2010.

Background

Following reports of a fire incident involving a sprinkler system that contained a high concentration antifreeze solution, research and standards development activities were begun to address concerns raised by the combustibility of antifreeze solutions in residential sprinkler systems. As information became available, NFPA published two successive Safety Alerts providing guidance from NFPA in its role as a safety advocate and announcing Tentative Interim Amendments (TIAs) to NFPA sprinkler standards that were issued by the NFPA Standards Council. The TIAs and the additional NFPA guidance offered in those Safety Alerts were interim actions while the responsible standards development Technical Committees reviewed the results of the research and reached consensus on further amendments to the NFPA sprinkler standards.

The sprinkler committees have now completed the review and consideration of the issues related to the use of antifreeze in sprinkler systems and, based on the available information, have reached consensus on four TIAs that were issued by the NFPA Standards Council (PDF, 81 KB) on March 1, 2011. The four TIAs achieve a more comprehensive approach to the treatment of antifreeze in NFPA sprinkler standards, and provide new requirements for the use of antifreeze in both new and existing residential occupancies and in non-residential occupancies as well.

The New Requirements for Sprinkler Systems Containing Antifreeze – A Summary

The four new TIAs apply, respectively, to: NFPA 13, Standard for the Installation of Sprinkler Systems (2010 edition), NFPA 13R, Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height (2010 edition), NFPA 13D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes (2010 edition), and NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (2011 edition). The previous TIAs that were issued by the Standards Council in August 2010 are no longer in effect.

What follows is a general summary of the main new antifreeze requirements that the TIAs have added to the NFPA sprinkler standards. This summary does not describe all the details or all of the provisions; the applicable sprinkler standard, as amended by the new TIAs, should be directly consulted for a complete and accurate understanding of the requirements related to the use of antifreeze.

New Sprinkler Systems Containing Antifreeze – NFPA 13, NFPA 13D and NFPA 13R Sprinkler Systems

- New systems are required to use only factory premixed antifreeze solutions. The maximum allowable concentration of glycerin for a new system is 48% by volume.
- The maximum allowable concentration of propylene glycol for a new system is 38% by volume.
- All factory premixed antifreeze solutions used in NFPA 13 and 13R systems must be provided with a certificate indicating the type of antifreeze, the concentration and the freezing point. Factory premixed antifreeze solutions of propylene glycol in excess of 40% by volume are permitted in ESFR (Early Suppression Fast Response) systems where the sprinklers are listed for such use in a specific application.
- Factory premixed antifreeze solutions other than propylene glycol and glycerin are permitted only where they are specifically listed for use in sprinkler systems.
- New systems, once installed, must be annually tested in the manner required for existing systems, summarized below.



For more information on this topic, visit <http://www.nfpa.org/antifreeze>.

Existing Sprinkler Systems Containing Antifreeze

Existing NFPA 13D Sprinkler Systems

- NFPA13D systems must be tested annually by a qualified individual. NFPA 13D provides two alternative test procedures. In the first alternative, the system is drained and two solution samples are taken, one near the beginning and one near the end of the draining process. In the second alternative, the system is not drained and two solution samples are taken, one at the highest practical elevation and one at the lowest practical elevation of the system.
- The two samples collected using either alternative procedure are then tested to verify that the specific gravity of both samples is similar. If the specific gravity of both samples is similar and if the system is found to contain factory premixed antifreeze solutions of either glycerin at a maximum concentration of 50% by volume or propylene glycol at a maximum concentration of 40% by volume (or other solutions listed specifically for use in fire protection systems), then the existing solution is allowed to remain in service. If these conditions are not met, the existing solution must be replaced with a premixed antifreeze solution of either glycerin at a maximum concentration of 50% by volume or propylene glycol at a maximum concentration of 40% by volume (or other solutions listed specifically for use in fire protection systems).
- The concentration of antifreeze solutions shall be limited to the minimum necessary for the anticipated minimum temperature.
- Following the annual test, a tag must be attached to the riser indicating the date of the last test, the type and concentration of antifreeze solution, the date the antifreeze was replaced (if applicable), the name and license number of the contractor that tested and/or replaced the antifreeze solution, a statement indicating if the entire system was drained and replaced with antifreeze and a warning to test the concentration of the solution at yearly intervals per NFPA 13D.

Existing NFPA 13 and NFPA 13R Sprinkler Systems

- Antifreeze solutions systems must be tested annually, prior to the onset of freezing weather.
- If it is determined that the solution found in the system is no longer permitted or if the type of antifreeze cannot be reliably determined, the system must be drained and replaced with an acceptable factory premixed solution.
- If the initial tests indicate that the solution type is acceptable, test samples must be taken at the top and bottom of each system (in some cases an additional sample must be taken).

- If all the test samples indicate a concentration of glycerin not greater than 50% by volume or propylene glycol not greater than 40% by volume, then the solution is permitted and may remain in the system.
- If any of the samples indicate a concentration in excess of the permissible maximum concentrations (i.e. 50% glycerin/40% propylene glycol), the system must be emptied and refilled with a factory premixed solution):
 - For newly introduced glycerin solutions, the solutions must be factory premixed solutions with a concentration not exceeding 48% by volume.
 - For newly introduced propylene glycol solutions, the solutions must be factory premixed solutions with a concentration not exceeding 38% by volume.

NFPA Further Recommends

Consider alternatives to antifreeze. It is important to remember that, while the TIAs to the NFPA sprinkler standards allow the limited use of antifreeze as an option to address freeze potential, they do not require the use of antifreeze in sprinkler systems. Both in designing new systems and evaluating existing systems, owners and contractors are encouraged to investigate other methods of maintaining wet pipe systems in environments where freezing of pipes may be a concern. Several alternative design options exist including the use of insulation, heating areas where sprinkler piping is run, or use of dry pipe and preaction systems in areas subject to freezing.

Use the minimum necessary concentration. Where antifreeze is used in sprinkler systems, the concentration of antifreeze solution used in the system should be limited to the minimum concentration necessary for the lowest anticipated temperatures. Of course, in no event should the minimum concentration ever exceed the concentrations permitted by the applicable NFPA sprinkler standard.

Initial testing. If not already completed, the testing required by the TIAs should be initiated as soon as possible and be conducted by a qualified individual. NFPA recommends that homeowners with residential sprinkler systems contact a local sprinkler contractor for assistance.

For the latest information, complete text of the recently issued TIA's, historical information, research, and reports please go to www.nfpa.org/antifreeze.



For more information on this topic, visit <http://www.nfpa.org/antifreeze>.