



TechNotes

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#484

03/22/2022

This edition of TechNotes was written by Vince Powers, ITM Specialist for the National Fire Sprinkler Association.

NFSA TechNotes #484 - The Hot Seat of Antifreeze

Protecting sprinkler systems from freezing can be a challenge in many parts of the country, specifically in areas of buildings that do not have climate control. NFPA requires water filled pipes be maintained at a minimum temperature of 40 degrees Fahrenheit. If the minimum temperature cannot be maintained, an alternative system must be installed, such as dry pipe or antifreeze systems.

Antifreeze Issues

In 2010, in Truckee, CA, a cooking fire activated sprinklers in an apartment with an antifreeze system installed. The antifreeze solution was at a high percentage by volume and when the sprinkler activated the elevated mixture caused an explosion. There have been other instances where a high mixture of antifreeze solution contributed to the fire as well. In 2010, NFPA launched an investigation into antifreeze which resulted in requirements to limit the percentages of glycerin and propylene glycol used in antifreeze fire sprinkler systems. This would be a suitable time to note that only glycerin can be used in CPVC (orange) sprinkler piping. Both glycol and glycerin can be used in steel piping and absolutely no automotive or marine antifreeze can be used in fire sprinkler systems.

[link to Antifreeze investigation and other information on NFPA website](#)



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Changes to the Standards

This investigation caused significant changes in the fire sprinkler industry. New antifreeze systems were no longer allowed to be installed after September 12, 2012, unless a listed antifreeze was available. There was an exception for in ESFR systems, where a non-listed premixed solution was permitted to be installed in accordance with NFPA 13, *The Standard for the Installation of Water-Based Fire Sprinkler Systems*.

[Link to Requirements for Antifreeze Systems, NFPA](#)

TIA to NFPA 25

This also caused many changes in NFPA 25, *The Standard for Inspection, Testing, and Maintenance of Water-Based Fire Sprinkler Systems*. Since the 2011 edition of NFPA 25 was ready to be released when the investigation by NFPA was completed, a tentative interim amendment (TIA) was created. A TIA is created when something can cause building or system damage or possible personal injury to amend a specific edition of an NFPA standard. Below is a link to the 2011 edition TIA's.

[Link to NFPA 25 2011 Edition TIA for Antifreeze Solutions](#)

The TIA limited the concentration of the antifreeze mixture in systems as well as led to several changes in the future editions of NFPA 25.



Changes to NFPA 25

Existing antifreeze systems are required to be tested for concentration levels annually. The systems must be maintained at the anticipated minimum temperature for a specific region. A chart can be found in Annex A of NFPA 25 that depicts the lowest one day mean temperatures across the United States.

For years, depending on what region the antifreeze was being installed, it was common practice for contractors to purchase concentrate antifreeze and mix the solution on site to the proper levels before pumping into the sprinkler system. A premix solution could also be purchased, but the premixed solutions typically only protected to about -15 F and this temperature does not work for all parts of the country.

With the TIA and other changes in NFPA 25, solutions were no longer allowed to be mixed on site. Only premixed solutions are allowed to be used in existing antifreeze systems. These changes also included a sunset date of September 30, 2022, for existing antifreeze systems. This means that if a listed antifreeze solution was not available by this date, then the existing antifreeze system would have to be changed or modified and the antifreeze solution would have to be removed. The common solution would require these systems to be changed to dry pipe systems, which would create additional issues of properly pitching the pipe or possibly heating the spaces, which is also not an easy task.

Included in these changes is a limitation on the percentage of antifreeze allowed in existing systems. The concentration of antifreeze solution is now limited to 38% by volume for glycerin 30% by volume for propylene glycol. If the existing solution type cannot be properly determined, the solution must be removed and replaced with a new premixed solution. There are also requirements to test the solution at multiple points in the system. A minimum of two points is required for systems that are 150 gallons or less and one additional point for every additional 100 gallons. For example, if testing a 300-gallon system, the solution would be required to be tested at a minimum of four points. Two for the first 150 gallons, one for the next 100 gallons, and one for the last 50 gallons. Requirements for testing existing antifreeze solutions can be found in the following sections for each edition of NFPA 25.

2011- TIA's

2014- Section 5.3.4

2017- Section 5.3.3

2020- Section 5.3.4

Also note that a new requirement in the 2017 edition of NFPA 25 is an antifreeze sign. The sign requires the name of the manufacturer, antifreeze type, brand, the concentration by volume, and the volume of the system.

ANTI-FREEZE SYSTEM

This automatic fire sprinkler system uses an anti-freeze solution to help protect it from freezing. In accordance with NFPA 25-2017 section 4.1.10 the following data is provided regarding the solution used.

Anti-freeze Type:

Brand:

Concentration by Volume:

Volume of System:

SIGN TO BE PLACED AT ANTI-FREEZE SYSTEM MAIN VALVE



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Listed vs Legacy Antifreeze

In 2019, the first listed antifreeze was released. There are now listed antifreeze solutions on the market. They can be used in CPVC and steel piping so this is certainly an improvement over the legacy antifreeze that can only be used with specific pipe materials. As of now, the listed antifreeze solutions can protect as low as -25 F.

The difference between legacy and listed antifreeze is that the newly listed antifreeze solutions must comply with UL 2901. Underwriters Laboratory in a nutshell sets the standards for safety, quality, and performance expectations. For a product to become “listed” it must pass specific testing criteria. For antifreeze solutions, they must pass the requirements of UL 2901.

[Link to UL 2901](#)

Currently the sunset date of September 30, 2022, for existing legacy (glycerin and glycol) systems, is still required and any existing antifreeze solutions must be replaced with a listed antifreeze. There could be some challenges with replacing the existing antifreeze solutions with a listed solution and the manufactures specifications must be followed when making these changes. Currently there are two manufactures with listed antifreeze solutions available.

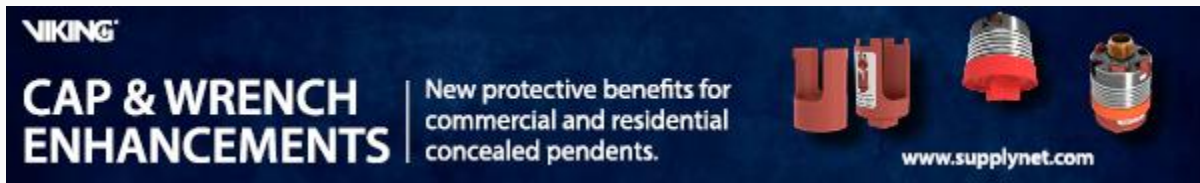
[Freezemaster \(Lubrizol\)](#)

[LFP Antifreeze \(Tyco\)](#)


2023 Edition of NFPA 25

The NFPA 25 committee has voted in the second draft for the 2023 edition to allow legacy antifreeze to remain provided it meets the percentage requirements currently listed in the standard. It is also proposed that during inspection, if for any reason the solution fails, it must be replaced with listed solutions. Essentially, if the current solution tests within the requirements of the standard, it can remain, but under no circumstances for both existing and new antifreeze systems, could the legacy antifreeze be refilled or introduced to the system.

If no notice of intent to make a motion are submitted (NITMAM), then legacy antifreeze will be allowed to remain as stated above. All NITMAMS for NFPA 25 were due by February 22, 2022, and the posting of the NITMAM is due May 2, 2022. This is when we will know if a NITMAM was submitted and if so, it will then become a certified amending motion (CAM) and will be debated and voted on at the annual NFPA conference in June.



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