



Tentative Interim Amendment

NFPA[®] 13

Standard for the Installation of Sprinkler Systems

2013 Edition

Reference: 3.4.1.1 Premixed Antifreeze Solution, 7.6.1, 7.6.2, 7.8.3.4, 23.1.3(42), 23.4.2.1.3, and A.7.6.1, A.7.6.2.1, A.7.6.2.2 and A.7.6.3.1

TIA 13-1

(SC 12-8-25/TIA Log #1066)

Note: Text of the TIA issued and incorporated into the text of 3.4.1.1 Premixed Antifreeze Solution, 7.6.1, 7.6.2, 7.8.3.4, 23.1.3(42), 23.4.2.1.3, and A.7.6.1, A.7.6.2.1, A.7.6.2.2 and A.7.6.3.1, therefore no separate publication is necessary.

1. *Revise 3.4.1.1 to read as follows:*

3.4.1.1 Premixed Antifreeze Solution. A mixture of an antifreeze material with water that is prepared and factory mixed by the manufacturer with a quality control procedure in place that ensures that the antifreeze solution remains homogeneous and that the concentration is as specified.

2. *Revise 7.6.1 to read as follows:*

7.6.1.1 The use of antifreeze solutions shall be in conformity with state and local health regulations.

7.6.1.2 Antifreeze shall not be used in ESFR systems unless ~~at least one of the following two conditions is met~~ the ESFR sprinkler is listed for use with the antifreeze solution.

3. *Revise 7.6.2 to read as follows and delete existing 7.6.2.2 through 7.6.2.4:*

7.6.2.1 Except as permitted in 7.6.2.2, antifreeze solutions shall be listed for use in sprinkler systems.

7.6.2.2* Premixed antifreeze solutions of propylene glycol shall be permitted to be used with ESFR sprinklers where the ESFR sprinklers are listed for such use in a specific application.

4. *Revise 7.8.3.4 to read as follows:*

7.8.3.4 Automatic sprinklers in areas subject to freezing shall be on dry pipe systems conforming to Section 7.2, on antifreeze systems conforming to Section 7.6, or be dry sprinklers of an adequate length connected to wet pipe systems located in heated areas.

5. *Revise 23.1.3(42) to read as follows:*

23.1.3(42) Information about listed antifreeze solution used (type and amount).

6. *Revise 23.4.2.1.3 to read as follows:*

23.4.2.1.3 For antifreeze systems greater than 40 gal (151 L) in size, the friction loss shall also be calculated using the Darcy–Weisbach formula:

(no change to Equation)

7. *Revise A.7.6.1, A.7.6.2, and A.7.6.2.1 to read as follows:*

A.7.6.1 The definition of an antifreeze system states that water will discharge after the antifreeze leaves the pipes. Systems that are all antifreeze, including tanks of antifreeze solution that will not discharge plain water, are not true antifreeze systems. Such systems should not be used without consideration to issues such as the combustibility of the antifreeze solution and the friction loss in the piping during cold conditions. Any listing associated with an antifreeze sprinkler system should address the inability for the specific antifreeze solution tested to ignite when discharged from specific sprinklers.

A.7.6.2 Listed nonmetallic sprinkler pipe and fittings should be protected from freezing with compatible listed solutions only. In addition, due to antifreeze solution limitations other methods of freeze protection such as electric heat-tracing, or insulated coverings, which are approved for use on nonmetallic piping may be used to protect nonmetallic pipes from freezing.

The following is a list of research reports that have been issued by the Fire Protection Research Foundation related to the use of antifreeze in sprinkler systems:

1. *Antifreeze Systems in Home Fire Sprinkler Systems – Literature Review and Research Plan*, Fire Protection Research Foundation, June 2010.
2. *Antifreeze Systems in Home Fire Sprinkler Systems – Phase II Final Report*, Fire Protection Research Foundation, December 2010.
3. *Antifreeze Solutions Supplied through Spray Sprinklers – Interim Report*, Fire Protection Research Foundation, February 2012.

The following tables provide a summarized overview of the testing.

Topic	Information
Scope of Sprinklers Tested	<p>The following sprinklers were used during the residential sprinkler research program described in the report dated December 2010:</p> <ul style="list-style-type: none"> • Residential pendent style having nominal K-factors of 3.1, 4.9 and 7.4 gpm/psi^{1/2} • Residential concealed pendent style having a nominal K-factor of 4.9 gpm/psi^{1/2} • Residential sidewall style having nominal K-factors of 4.2 and 5.5 gpm/psi^{1/2} <p>The following sprinklers were used during the spray sprinkler research program described in the report dated February 2012:</p> <ul style="list-style-type: none"> • Residential pendent style having a nominal K-factor of 3.1 gpm/psi^{1/2} • Standard spray pendent style having nominal K-factors of 2.8, 4.2, 5.6 and 8.0 gpm/psi^{1/2} • Standard spray concealed pendent style having a nominal K-factor of 5.6 gpm/psi^{1/2} • Standard spray upright style having a nominal K-factor of 5.6 gpm/psi^{1/2} • Standard spray extended coverage pendent style having a nominal K-factor of 5.6 gpm/psi^{1/2}
Antifreeze Solution Concentration	<p><50% Glycerine and <40% Propylene Glycol Antifreeze Solutions—Solutions were not tested.</p> <p>50% Glycerine and 40% Propylene Glycol Antifreeze Solutions—Large scale ignition of the sprinkler spray did not occur in tests with sprinkler discharge onto a fire having a nominal Heat Release Rate (HRR) of 1.4 MW. Large scale ignition of the sprinkler spray occurred in multiple tests with sprinkler discharge onto a fire having a nominal HRR of 3.0 MW.</p> <p>55% Glycerine and 45% Propylene Glycol Antifreeze Solutions – Large scale ignition of the sprinkler spray occurred in tests with sprinkler discharge onto a fire having a nominal HRR of 1.4 MW.</p> <p>>55% Glycerine and >45% Propylene Glycol Antifreeze Solutions -- Large scale ignition of the sprinkler spray occurred in tests with sprinkler discharge onto a fire having a HRR of less than 500 kW.</p> <p>70% Glycerine and 60% Propylene Glycol Antifreeze Solutions – Maximum antifreeze solution concentrations tested.</p>
Sprinkler Inlet Pressure	Large scale ignition of the sprinkler discharge spray was not observed when the sprinkler inlet pressure was 50 psi or less for tests using 50% glycerine or 40% propylene glycol.
Ceiling Height	<p>When discharging 50% glycerine and 40% propylene glycol antifreeze solutions onto fires having a HRR of 1.4 MW, no large scale ignition of the sprinkler spray was observed with ceiling heights up to 20 ft.</p> <p>When discharging 50% glycerine and 40% propylene glycol antifreeze solutions onto fires having a HRR of 3.0 MW, large scale ignition of the sprinkler spray was observed at a ceiling height of 20 ft.</p>
Fire Control	<p>The test results described in the test reports December 2010 and February 2012 indicated that discharging glycerine and propylene glycol antifreeze solutions onto a fire can temporarily increase the fire size until water is discharged.</p> <p>As a part of the residential sprinkler research described in report dated December 2010, tests were conducted to evaluate the effectiveness of residential sprinklers to control fires involving furniture and simulated furniture. The results of these tests indicated that 50% glycerine and 40% propylene glycol antifreeze solutions demonstrated the ability to control the furniture type fires in a manner similar to water.</p> <p>For standard spray type sprinklers, no tests were conducted to investigate the ability of these sprinklers to control the types and sizes of fires that these sprinklers are intended to protect.</p>

A.7.6.2.1 Where existing antifreeze systems have been analyzed and approved to remain in service, antifreeze solutions should be limited to premixed antifreeze solutions of glycerin (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 48% by volume, or propylene glycol at a maximum concentration of 38% by volume. The use of antifreeze solutions in all new sprinkler systems should be restricted to listed antifreeze solutions only. Where existing antifreeze systems are in service, the solution concentration should be limited to those noted in A.7.6.2.1 and the system requires an analysis and approval of the AHJ to remain in service.

8. *Delete A.7.6.2.2 and A.7.6.3.1.*

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(Note: For further information on NFPA Codes and Standards, please see www.nfpa.org/codelist)

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