



National Fire Protection Association

1 Batterymarch Park, Quincy, MA 02169-7471
Phone: 617-770-3000 • Fax: 617-770-0700 • www.nfpa.org

MEMORANDUM

To: NFPA Technical Committee on Inspection, Testing and Maintenance of Water-Based Systems

From: Elena Carroll, Administrator, Technical Projects

Date: September 6, 2012

Subject: NFPA 25 Proposed Tentative Interim Amendment (TIA) No. 1077

The attached proposed Tentative Interim Amendment (TIA) is being submitted to you for letter ballot. This proposed TIA was submitted by Cecil Bilbo, Academy of Fire Sprinkler Technology and endorsed by Roland Huggins, American Fire Sprinkler Association.

This proposed TIA will be published for public comment in the September 7, 2012 issue of *NFPA News* with a Public Comment Closing Date of October 4, 2012. Any public comments received will be circulated to the committee. The Standards Council will consider the issuance of this TIA at their October 29 – 30, 2012 meeting.

In addition to being balloted on the technical merits of the proposed TIA, the Committee is also being balloted on whether or not this matter is of an emergency nature. Please see Section 5 (copy enclosed) regarding the processing of TIAs from the *NFPA Regulations Governing Committee Projects*.

Please complete and return your ballot as soon as possible but no later than **September 20, 2012**. As noted on the ballot form, please return the ballot to Elena Carroll either via e-mail to ecarroll@nfpa.org or via fax to 617-984-7110. You may also mail your ballot to the attention of Elena Carroll at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

Note: Please remember that the return of ballots and attendance at committee meetings are required in accordance with the NFPA Regulations Governing Committee Projects.

Attachments

Section 5 Tentative Interim Amendments.

5.1 Preliminary Determination of Compliance.

A Tentative Interim Amendment (TIA) to any Document may be processed if the Council Secretary determines, after a preliminary review, and consultation with the appropriate Chair, that the Amendment appears to be of an emergency nature requiring prompt action and has the endorsement of at least two Members of the involved TC or TCC. If processed, the question of emergency nature shall be considered by the TC and TCC. The text of a proposed Tentative Interim Amendment may be processed as submitted or may be changed, but only with the approval of the submitter.

5.2 Evaluation of Emergency Nature. Determination of an emergency nature shall include but not be limited to one or more of the following factors:

(a) The document contains an error or an omission that was overlooked during a regular revision process.

(b) The document contains a conflict within the document or with another NFPA document.

(c) The proposed TIA intends to correct a previously unknown existing hazard.

(d) The proposed TIA intends to offer to the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

(e) The proposed TIA intends to accomplish a recognition of an advance in the art of safeguarding property or life where an alternative method is not in current use or is unavailable to the public.

(f) The proposed TIA intends to correct a circumstance in which the revised document has resulted in an adverse impact on a product or method that was inadvertently overlooked in the total revision process, or was without adequate technical (safety) justification for the action.

5.3 Publication of Proposed Tentative Interim Amendment.

A proposed Tentative Interim Amendment that meets the provisions of 5.1 shall be published by the Association in appropriate media with a notice that the proposed Tentative Interim Amendment has been forwarded to the responsible TC and TCC for processing and that anyone interested may comment on the proposed Tentative Interim Amendment within the time period established and published.

5.4 Technical Committee and Technical Correlating Committee Action.

(a) The proposed Tentative Interim Amendment shall be submitted for ballot and comment of the TC in accordance with 3.3.4. The TC shall be separately balloted on both the technical merits of the amendment and whether the amendment involves an issue of an emergency nature. Such balloting shall be completed concurrently with the public review period. Any public comments inconsistent with the vote of any TC Member shall be circulated to the TC to allow votes to be changed. A recommendation for approval shall be established if three-fourths of the voting Members calculated in accordance with 3.3.4.5 have voted in favor of the Tentative Interim Amendment.

(b) The proposed Tentative Interim Amendment shall be submitted for ballot and comment of the TCC, if any, which shall make a recommendation to the Council with respect to the disposition of the Tentative Interim Amendment. The TCC shall be separately balloted on both the merits of the amendment (as it relates to the TCC

authority and responsibilities in accordance with 3.4.2 and 3.4.3) and whether the amendment involves an issue of an emergency nature. Any public comments inconsistent with the vote of any TC or TCC Member shall be circulated to the 28 TCC to allow votes to be changed. A recommendation for approval shall be established if three-fourths of the voting Members calculated in accordance with 3.3.4.5 have voted in favor of the Tentative Interim Amendment.

(c) All public comments, ballots, and comments on ballot on the proposed Tentative Interim Amendment shall be summarized in a staff report and forwarded to the Council for action in accordance with 5.5.

5.5 Action of the Council. The Council shall review the material submitted in accordance with 5.4(c), together with the record on any Appeals (see 1.6, 1.6.1), and shall take one of the following actions:

(a) Issue the proposed Tentative Interim Amendment

(b) Issue the proposed Tentative Interim Amendment as amended by the Council

(c) Where acted on concurrently with the issuance of a new edition of the Document to which it relates, issue the Tentative Interim Amendment as part of the new edition;

(d) Reject the proposed Tentative Interim Amendment

(e) Return the proposed Tentative Interim Amendment to the TC with appropriate instruction

(f) Direct a different action

5.6 Effective Date of Amendment. Tentative Interim Amendments shall become effective 20 days after Council issuance unless the President determines, within his or her discretion, that the effective date shall be delayed pending the consideration of a Petition to the Board of Directors (see 1.7). The President may also, within his or her discretion, refer the matter of a delay in the effective date of the TIA to the Executive Committee of the Board of Directors or to the Board of Directors.

5.7 Publication of Amendment. The Association shall publish in one of its publications sent or accessible to all Members notice of the issuance of each Tentative Interim Amendment and may, as appropriate, issue a news release to applicable and interested technical journals. The notice and any news release shall indicate the tentative character of the Tentative Interim Amendment. In any subsequent distribution of the Document to which the Tentative Interim Amendment applies, the text of the Tentative Interim Amendment shall be included in a manner judged most feasible to accomplish the desired objectives.

5.8 Applicability. Tentative Interim Amendments shall apply to the document existing at the time of issuance. Tentative Interim Amendments issued after the proposal closing date shall also apply, where the text of the existing document remains unchanged, to the next edition of the Document. Tentative Interim Amendments issued concurrently with the issuance of a new edition shall apply to both the existing and new edition.

5.9 Subsequent Processing. TC responsible for the Document or part of the Document affected shall process the subject matter of any Tentative Interim Amendment as a proposal for the next edition of the Document (see 3.3).

5.10 Exception. When the Council authorizes other procedures for the processing and/or issuance of Tentative Interim Amendments, the provisions of this Section shall not apply.

NFPA 25-2011

Standard for the Inspection, Testing, and Maintenance of Water-based Fire Protection Systems

TIA Log No. 1077

Reference: 5.3.4.2.1, A.5.3.4.2.1 and A.5.3.4.2.1(3)

Comment Closing Date: October 4, 2012

Submitter: Cecil Bilbo, Academy of Fire Sprinkler Technology

1. *Revise 5.3.4.2.1 as follows:*

5.3.4.2.1* For systems installed prior to September 30, 2012, listed antifreeze solutions shall not be required until September 30, 2022 where all of the following conditions are met:

- (1)* The concentration of the antifreeze solution shall be limited to 50% glycerin by volume or 40% propylene glycol by volume.
- (2) Newly introduced solutions shall be factory premixed antifreeze solutions (chemically pure or United States Pharmacopoeia 96.5%).
- (3)* Antifreeze systems with concentrations in excess of 30% propylene glycol and 38% glycerine shall be permitted based upon an approved deterministic risk assessment prepared by a qualified person approved by the AHJ.

2. *Revise A.5.3.4.2.1 as follows:*

A.5.3.4.2.1 It is assumed that all antifreeze systems installed after September 30, 2012 will meet the minimum requirements of NFPA 13, 2013 Edition. For systems installed after September 30, 2012, that do not meet the requirements of the 2013 edition of NFPA 13, consideration should be given to applying 5.3.4.2.1.

3. *Revise A.5.3.4.2.1 (3) as follows:*

A.5.3.4.2.1(3) Antifreeze solutions with a maximum concentration of 38% glycerine or 30% propylene glycol do not require a deterministic hazard analysis. The risk assessment should be prepared by individual(s) who can demonstrate an ability to prepare a risk assessment by education and experience and who can demonstrate an understanding of the issues associated with antifreeze sprinkler systems, including the available related fire tests. For additional information regarding the risk assessment process, documentation to be submitted, and the AHJ's role, refer to NFPA 551, *Guide for the Evaluation of Fire Risk Assessments*, and the SFPE *Engineering Guide: Fire Risk Assessment*.

Propylene glycol and glycerin antifreeze solutions discharged from sprinklers have the potential to ignite under certain conditions. Research testing has indicated that several variables may influence the potential for large-scale ignition of the antifreeze solution discharged from a sprinkler. These variables include, but are not limited to, the concentration of antifreeze solution, sprinkler discharge characteristics, inlet pressure at the sprinkler, ceiling height, and size of fire at the time of sprinkler discharge. All relevant data and information should be carefully reviewed and considered in the deterministic risk assessment.

As appropriate, the risk assessment should consider factors such as:

1. Occupancy use group per NFPA 13
2. Ceiling height
3. Antifreeze solution concentration and type
4. Maximum system pressure (normal static pressures)
5. Sprinkler type, including k Factor
6. Potential and actual fuel load (Christmas trees)
7. Type of structure (construction types)
8. Size of structure
9. Ability of the sprinkler system to control the fire
10. Occupied spaces -vs- unoccupied spaces (such as trash enclosures, dust collectors...etc)
 - a) Adjacent occupancies (spaces adjacent to the area protected by antifreeze systems)
 - b) Separation between areas protected with an antifreeze system and other areas
 - c) Ventilation of areas protected with an antifreeze system to prevent damage to adjacent areas
 - d) Duration of antifreeze discharge

Tests summarized in Table A.5.3.4.2.1(3) show that large-scale ignition of the sprinkler spray did not occur in tests with 50% glycerine and 40% propylene glycol antifreeze solutions discharging onto a fire having a nominal Heat Release Rate (HRR) of 1.4 MW. A deterministic risk assessment that demonstrates that the heat release rate for reasonably credible fire scenarios will be less than 1.4 MW at the time of sprinkler activation should be acceptable. The risk assessment should also address issues associated with management of change, such as change in occupancy and temporary fuel loads. A natural Christmas tree can result in a HRR well above 1.4 MW at the time of sprinkler activation.

In addition to the variables identified above, the deterministic risk assessment should include the overall occupancy, quantity of solution, impact on life safety and potential increase in heat release rate.

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 that should be considered in the development of the deterministic risk assessment:

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 Table A.5.3.4.2.1(3) provides an overview of the testing

Table A.5.3.4.2.1(3)

Topic	Information
Scope of Sprinklers Tested	The following sprinklers were used during the residential sprinkler research program described in the report dated December 2010: • Residential pendent style having nominal K-factors of 3.1, 4.9 and 7.4 gpm/psi • 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 ½. The following sprinklers were used during the spray sprinkler research program described in the report dated February 2012: 1/2 • Residential pendent style having a nominal K-factor of 3.1 gpm/psi • 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 1/2
Antifreeze Solution Concentration	<50% Glycerine and <40% Propylene Glycol Antifreeze Solutions —Solutions were not tested. 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. 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. >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. 70% Glycerine and 60% Propylene Glycol Antifreeze Solutions – Maximum antifreeze solution concentrations tested.
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	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. 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.
Fire Control	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. 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. 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.

Submitter's Substantiation: In response to the Standards Council's Final Decision on TIA 1068 (D #12-3), the above changes to that decision are being recommended by the NFPA 25 committee members. The Standards Council stated that there were two areas of concern that prevented them from issuing the TIA as written. The committee agreed to further discuss these concerns and address them more fully in their upcoming ROC meeting in Chicago. However, the committee did want to respond to two major points made by the Standards Council under the portion of the decision, "Conclusion and Further Directions".

First, the Standards Council indicated that more guidance is needed regarding "how such a deterministic risk assessment should be conducted". The committee understands why the Standards Council has chosen to eliminate certain *absolute* language regarding criteria that would have led to exemptions of the risk assessment. We also understand why the Council would seek further guidance regarding occupied and unoccupied spaces. However, we would emphatically state that the committee never contemplated any situation wherein any increased danger to occupants would be allowed. It has always been our intent to require evaluation in any case where this could be considered possible. The Committee proposes adding at least 10 items that should be taken into consideration during the risk assessment, including language that should limit the "occupied vs unoccupied" evaluation to those portions of buildings that would be completely unoccupied ("*such as trash enclosures, dust collectors... etc*"). The Committee has diligently attempted to include items that were discussed during the original development of the TIA and some items that have been recommended by the Council. We have included references to NFPA 551 and to the SFPE Engineering Guide for additional direction to the AHJ that will be required to allow and approve any risk evaluation that may be performed.

Second, the Standards Council indicated that more guidance is needed as to who may perform the work described in the "Risk Assessment Provision". The committee has chosen the following language to describe the entity that is to perform this Assessment: "*...prepared by a qualified person approved by the AHJ.*" Currently, there is no single standard or qualification for entities that may be qualified to perform this assessment. Rather, many jurisdictions have different levels of minimum experience and knowledge required for these assessments. Therefore, the Committee feels that the AHJ should determine the acceptability of the entity that will be performing this evaluation. The Committee has added language to the Annex material for this section that will advise the AHJ regarding appropriate levels of knowledge, experience and reporting that should be required of these entities. This closely tracks with language currently found in NFPA 25, NFPA 3, NFPA 72 and other standards regarding qualifications. Additionally, many jurisdictions will have laws and regulations in place that govern the qualifications of these entities.

Emergency Nature: The Standards Council stated that "*as written, this provision provides insufficient guidance on how such a deterministic risk assessment should be conducted and who should conduct it.*" The NFPA 25 Committee feels that the actions proposed in this TIA will remedy much of this concern. It is important to have this minimal guidance released by the NFPA so that AHJ's and Owners will understand the committee's intention for existing water-based fire protection systems that may need evaluation or alteration to comply with a minimum level of safety regarding antifreeze solutions.