



Amy Beasley Cronin
Secretary, Standards Council

30 August 2012

To: Interested Parties

Subject:

Standards Council Decision (Final): D#12-3
Standards Council Agenda Item: SC#12-8-25, 26, 27, 28, 30, 31, 32 and 33
Date of Decision: 9 August 2012
Eight TIAs on NFPA 13 (2013 Edition), NFPA 13D (2010 and 2013 Editions), NFPA 13R, (2013 Edition) and NFPA 25 (2011 Edition)

Dear Interested Parties:

At its meeting of August 7-9, 2012, the Standards Council issued a decision on the above-referenced matter. On August 16, 2012, NFPA issued the Council's decision on the appeal in the form of a "Short" decision which briefly stated the outcome of the appeal and which indicated that full a Final decision on the appeal would be issued in due course and sent to all interested parties as soon as it became available.

The Council's Final decision is now available and is attached herewith.

Sincerely,

A handwritten signature in black ink that reads "Amy Beasley Cronin".

Amy Beasley Cronin
Secretary, NFPA Standards Council

- c: D. Berry, M. Brodoff, L. Fuller, M. Klaus, E. Carroll
Members, TC on Residential Sprinkler Systems (AUT-RSS)
Members, TC on Sprinkler System Installation Criteria (AUT-SSI)
Members, TCC Automatic Sprinkler Systems (AUT-AAC)
Members, TC on Inspection, Testing, and Maintenance of Water-Based Systems (INM-AAA)
Members, NFPA Standards Council (AAD-AAA)
Individuals Providing Appeal Commentary



Standards Council Decision (Final): **D#12-3**

Standards Council Agenda Item: **SC#12-8-25, 26, 27, 28, 30, 31, 32 and 33**

Date of Decision: 9 August 2012

Eight TIAs on NFPA 13 (2013 Edition), NFPA 13D (2010 and 2013 Editions), NFPA 13R, (2013 Edition) and NFPA 25 (2011 Edition)

SUMMARY ACTION: *The Standards Council voted to issue TIA Nos. 1066, 1067, and 1065 on NFPA 13, NFPA 13D, NFPA 13R, respectively on the 2013 editions. The Council issued a modified TIA No. 1068 on NFPA 25, 2011 edition. TIA Nos. 1062, 1061/1060, 1046 on 13R, 13D and 25 respectively were not issued.*

At its meeting of August 7-9, 2012, the Standards Council considered eight proposed Tentative Interim Amendments (TIAs) regarding antifreeze in fire sprinkler installations and took the following actions:

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 Edition:

- TIA No. 1066 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13.
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NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, 2013 Edition:

- TIA No. 1065 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13.
- TIA No. 1062 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.
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NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2013 Edition:

- TIA No. 1067 passed ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted to issue the TIA, concurrently with the issuance of the 2013 edition of NFPA 13D.
- TIA No. 1061 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.
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NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2010 Edition:

- TIA No. 1060 failed the ballot of the responsible Technical Committee (TC) and Technical Correlating Committee (TCC) and the Council voted not to issue the TIA.

NFPA 25, *Standard for the Inspection Testing and Maintenance of Water-Based Fire Protection Systems*, 2011 Edition:

- TIA No. 1046 had originally passed ballot of the responsible Technical Committee (TC) but was superseded by the passage of TIA 1068 and the Council, therefore, voted not to issue the TIA.
- TIA No. 1068 passed ballot of the responsible Technical Committee (TC). The Council voted to issue the TIA with the following revisions displayed in legislative text as follows:

5.3.4.2.1*

....

(3)* Antifreeze systems with concentration in excess of 30% propylene glycol and 38% glycerine shall be permitted base upon an approved deterministic risk assessment ~~except where explicitly permitted under 5.3.4.2.1(4).~~

~~(4) A risk assessment shall not be required for the following applications:~~

~~(a) Light hazard occupancies with ceiling heights not exceeding 20 ft (6.1m) where Quick Response sprinklers are installed~~

~~(b) Dwelling Units where residential or other fast response sprinklers are installed~~

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 ~~(or TIA XXX, 2010 Edition).~~

~~Subject to the approval of the AHJ, small installations in normally occupied areas such as dust collectors and similar spaces may utilize concentrations in excess of the limits established in 5.3.4.2.1. Where concentrations in excess of 5.3.4.2.1 are desired for larger systems, an equivalency should be approved by the AHJ.~~

As noted above, four of the processed TIAs either failed ballot (TIA No. 1062 on 13R, TIA No. 1061 on 13D, 2013 edition and TIA No. 1060 on 13D, 2010 edition) or, one case (TIA No. 1046 on NFPA 13R) was replaced by a superseding TIA (TIA No. 1068). By reason of their lack of committee support and in the absence of any appeals, the Council has voted not to issue these TIAs. The remainder of this decision, after providing a brief background, discusses the four TIAs that the responsible committees have passed and submitted to the Council for issuance. As detailed above, the Council has voted to issue three of the TIAs, as submitted, and to issue the remaining TIA, with the revisions set forth above.

Background

The development and consideration of the TIAs currently before the Council is part of ongoing activities within the NFPA standards development process relating to the use of antifreeze in automatic sprinkler systems to protect piping in unheated areas subject to freezing temperatures. The background relating to this subject can be accessed in greater detail in previous decisions of the Council. See Standards Council Decision #10-10 (SC Agenda Items #10-8-15 thru 10-8-20, August 5, 2010); Standards Council Decision #11-5 (SC Agenda Items #11-3-3-e, 11-3-4-e and

11-3-5-d, March 1, 2011) and Standards Council Decision #12-2 (SC Agenda Item #12-3-8, March 6, 2012). See also SC Minute Items 10-10-21 (October 2010), 11-3-6 & 7 (March 2011), and 11-8-48 (August 2011). This and other information, including Research Foundation reports discussed in the Council decisions can be found at www.nfpa.org/antifreeze.

Of these decisions, the most recent one, Decision #12-2 (March 2012), is most relevant to the current TIA development activities. That decision discussed newly available results of full scale fire tests with antifreeze in standard spray sprinklers. These results were reported in a February 2012 Fire Protection Research Foundation report, “*Antifreeze Solutions Supplied through Spray Sprinklers: Interim Report*” (hereafter Non-residential Report) authored by Steve Wolin, Code Consultants. While previous testing and standards development activities on antifreeze in sprinkler systems had focused on residential applications, the testing reported in the Non-residential Report related to standard spray sprinklers generally used in commercial, non-residential applications. The results of the testing were summarized in the Council Decision #12-2 as follows:

As documented in the Non-Residential Report, however, spray sprinklers did not perform well in many of the tests. In the earlier residential sprinkler tests using 50% glycerine, ignition of the spray pattern was not seen. In the Non-Residential Report, however, ignition of the spray pattern occurred in 4 of the 15 fire tests, and in many of the 15 tests substantial increases in heat release rates were recorded. For example, tests 2 and 15 experienced spray pattern ignition. See Non-Residential Report at pp. 6 and 8. In addition to the tests noted at 8 feet and 15 feet, tests at 20 feet experienced ignition of the solution and substantial increases in heat release rates, including increases as high as 8 MW and 22 MW. As the Non-Residential Report noted with respect to the 20 foot tests, “substantial ignition of the antifreeze spray and flames extending away from the ignition source were observed during two of the tests with the sprinkler positioned at 20 ft above the floor.” See Non-Residential Report at p. 6.

The Council stressed that its discussion of the Non-Residential Report was not meant to describe or analyze that report in depth or set forth all its results or areas of concern, but the discussion, in the Council’s view “does illustrate . . . that the Non-Residential Report raises serious concerns that need to be reviewed and addressed.” See Non-Residential Report at p. 10.

In conclusion, the Council directed the responsible TCs to review the Non-Residential Report and take necessary action through developing TIAs for submission to the Council by its August 2012 meeting. Specifically, the Council directed as follows:

The Council, therefore, is requesting that the responsible committees meet and review the Non-Residential Report (and any supplemental report, as it becomes available) as soon as possible.

The Automatic Sprinkler Project and the NFPA 25 TC should take one of the following steps. These technical committees should process Tentative Interim Amendments (TIAs) for submission to the Council no later than its August 2012 meeting. Should the Committees wish to act prior to the August 2012 Council meeting, the Council will make every effort to expedite its consideration of the

matter through a special meeting or letter ballot. If TIAs are not proposed, the committees should provide the Council with a full report detailing why the current antifreeze requirements do not require revision based on the findings of the Non-Residential Report (and any supplement), and why the findings of the Non-Residential Report do not present safety concerns requiring emergency action.

The sprinkler committees, thereafter, proceeded to review and act in accordance with the Standards Council Decision #12-2. The results, as indicated earlier in this decision, are four TIAs that have passed ballot and achieved consensus within the responsible committees and that now come to the Standards Council for consideration. The Council accords great respect and deference to the results yielded by the standards development process. Indeed, it is generally the responsibility of technical committees to assess the technical issues and available substantiation to arrive at consensus judgments about the content of NFPA standards, and absent exceptional circumstances, the Council will issue TIAs that have passed the ballot of the responsible technical committees. It is, moreover, particularly evident here that the responsible committees have made sustained efforts to grapple with the difficult technical issues associated with antifreeze and to rapidly incorporate new knowledge about antifreeze into the sprinkler standards in a way that addresses the safety issues while affording consideration to the problems of freeze protection, particularly in existing systems. The Council respects the difficulty of the tasks placed before the sprinkler committees and in large part has deferred to the judgment of the committees. In respect to portions of one TIA, however, the Council has found the exceptional circumstances in which it must take corrective action. As this decision now discusses, the Council is issuing three of the four TIAs as submitted. In the case of the fourth, it is issuing the TIA, but has found a clear and substantial basis to issue it with certain revisions.

Issuance of TIAs 1065, 1066 and 1067, as submitted

While the Council has reviewed and considered all the TIAs in their entirety, this decision does not attempt a full or complete description of the TIAs which should be consulted directly for a full understanding of their provisions. Generally speaking, TIA No. 1066 on NFPA 13 and TIA No. 1065 on NFPA 13R take the significant step of requiring that all antifreeze solutions used in new fire sprinkler installations must be listed. Similarly, TIA No. 1067 also requires the use of listed antifreeze in new NFPA 13D systems, but allows a limited exemption for Authority Having Jurisdiction (AHJ) approval for a non-listed solution in the case of antifreeze concentrations for premixed glycerine at or below 48% or premixed propylene glycol at or below 38% where documentation justifies the use of those concentrations for specific portions of the home. Apart from this limited exception, the TIAs, through the new listing requirement (hereafter, “the Listing Requirement”), effectively prohibit the use of antifreeze in new sprinkler systems unless and until antifreeze products are available that can achieve a third-party listing that “address[es] the inability for the specific antifreeze solution tested to ignite when discharged from specific sprinklers” (See NFPA 13, A.7.6.1, as amended by TIA No. 1066). These TIAs, moreover, apply to residential applications (13, 13R and 13D) as well as nonresidential 13 systems, so while the Council, in Decision #12-2, had asked the committees to focus on the nonresidential applications investigated in the Nonresidential Report, the committees went further and revised and strengthened their previous treatment of residential systems. In the Council’s view, these TIAs are based on reasonable judgments that have been reasonably substantiated. Having achieved the consensus of the responsible committees, the Council has voted to issue them.

Issuance of TIA No. 1068, with revisions

TIA No. 1068 on NFPA 25 proposes several revisions that expand upon or revise the committee's previous antifreeze TIA (TIA #11-1; Log No. 1014, March 2011). The TIA will not be described in detail here and should be directly consulted for a full understanding of its provisions. The TIA, in principal part, sets in place a timetable for the maintenance of sprinkler systems that will phase in, over time for existing sprinkler systems, the Listing Requirement now being required for new sprinkler system installations, per the NFPA 13 and NFPA 13R TIAs described above. The Council has found no basis on which to question most of the TIA, including the phase-in approach. After considering the entire record, however, the Council has found that, in two respects, the responsible technical committee has materially failed to sufficiently support its conclusions to such a degree that the Council is unwilling to issue the TIA as written.

The Exemptions to the Risk Assessment Provision

First, the TIA requires that, for systems installed prior to September 20, 2012, listed antifreeze solutions shall not be required until September 30, 2022, where certain conditions are met. See NFPA 25, at 5.3.4.2.1, as amended by TIA No. 1068. One of these conditions provides that antifreeze systems with concentrations in excess of 30% propylene glycol and 38% glycerine (but no higher than 50% glycerine or 40% propylene glycol per 5.3.4.2.1[1]) shall be permitted "based upon and approved deterministic risk assessment." See 5.3.4.2.1(3) ("the Risk Assessment Provision"). This Risk Assessment Provision, however, goes on to exempt from any risk assessment certain light hazard occupancies and certain dwelling units. See 5.3.4.2.1(4). The Council has been unable to conclude that the exemptions from the Risk Assessment Provision are supported by reasonable substantiation.

As to the exemption for light hazard occupancies, there is insufficient data to deem that, in all situations, light hazard occupancies with ceiling heights not exceeding 20 ft (6.1 m) are safe with the higher concentrations of antifreeze set forth in 5.3.4.2.1(1). Second, the exemption for dwelling units where residential or other fast response sprinklers are installed is apparently based on the assumption that a credible fire scenario would never encounter a fire with a peak heat release rate greater than 1.4 MW. This assumption is flawed because there are realistic scenarios where the fire can exceed this intensity, such as a Christmas tree or clustered upholstered furniture fire. The test results reported in the Foundation Reports, particularly the Non-residential Report, simply do not merit so a high degree of confidence as to forego a risk assessment in the case of the stated exemptions. The exemptions are particularly concerning when it is considered that they would apply to a broad array of light hazard and dwelling units occupancies, including board and care facilities, nursing homes, and high-rise apartment buildings. Moreover, during the hearing before the Council, there was discussion about "DETECT" modeling of relevant scenarios that was not fully available to the TC during its consideration of the TIA. The discussion of the modeling and other factors raised serious doubts that the exemptions were appropriate. The Council concludes that, based on the record, the more conservative, case-by-case risk assessment approach required by the Risk Assessment Provision, should be applied without this exemption, and the Council has accordingly issued the TIA with the exemptions deleted.

The Unoccupied Spaced Exemption

Second, the Council has concluded that a provision contained in annex note A.5.3.4.2.1 has not been adequately supported. That provision instructs AHJs that it is appropriate to allow, in their discretion, small sprinkler installations in normally unoccupied areas to contain concentrations of antifreeze in excess of the maximum limits set in NFPA 25. Although this exemption is included as Annex material and is therefore guidance only, it is guidance that is inconsistent with the section of NFPA 25 to which it corresponds. More importantly, it fails to take into account how normally unoccupied spaces might impact adjacent occupied areas, and, more generally, it serves to minimize the potential dangers of antifreeze concentrations prohibited in NFPA 25. Allowing unlimited concentrations of antifreeze is inconsistent with the dangers confirmed through actual fire incidents and through Fire Protection Research Foundation fire testing data. Accordingly the Council has voted to issue the TIA as revised to delete the unoccupied space exemption portion of A.5.3.4.2.1

Conclusion and further Directions

The issuance of TIAs does not, as those who spoke at the hearing made clear, end the consideration of the issues concerning antifreeze. In particular with respect to TIA No. 1068 on NFPA 25, the Technical Committee on Inspection, Testing, and Maintenance of Water-Based Systems (TC) is still in its revision cycle, and its members have indicated that the TC plans to continue to refine the work reflected in TIA No. 1068 as the TC continues its review during the Comment stage of the revision cycle. As it does so, the Council wishes the TC to address a final concern of the Council regarding TIA No. 1068. As described above, the Risk Assessment Provision in the TIA at 5.3.4.2.1(3), requires that, for systems installed prior to September 30, 2012, an exemption from the listing requirement may be obtained in certain circumstances provided that it is “based upon an approved deterministic risk assessment.” As written, this provision provides insufficient guidance on how such a deterministic risk assessment should be conducted and who should conduct it. Should the TC retain this exemption during its current revision cycle, it should work on making the Risk Assessment Provision more robust by including greater specificity as to matters such as the method, interpretation and evaluation of results leading to the assessment as well as the qualifications or competencies of those who may conduct and submit the assessment for AHJ approval.

Council Member Roland Huggins recused himself during the hearings, deliberations and vote on the issue.