

**EXPRESS TERMS
FOR
FINAL EMERGENCY BUILDING STANDARDS
OF THE
OFFICE OF THE STATE FIRE MARSHAL
REGARDING THE 2010 CALIFORNIA RESIDENTIAL CODE
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2.5
USE AND CONCENTRATION OF ANTIFREEZE SOLUTIONS IN FIRE SPRINKLER SYSTEMS
MODIFICATIONS TO NFPA 13, AND 13D FIRE SPRINKLER STANDARDS**

The Office of the State Fire Marshal (OSFM) proposes to make necessary changes to the 2010 edition of the California Residential Code adopted reference standards 2010 editions NFPA 13 and 13D.

Legend for Express Terms:

1. California amendments brought forward without modification: Not shown for clarity
2. New California amendment: *California language appears underlined and in Italics.*
3. Repealed text: Shown as ~~Strikeout~~.

[The SFM proposes to amend Chapter 44 with the following amendments and California regulations.]

**CHAPTER 44
REFERENCED STANDARDS**

Notwithstanding California laws and regulations, these referenced standards shall be applicable only to those California Residential Code sections that are adopted.

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| Standard reference number | Title | Referenced in code section number |
|---------------------------|---|-----------------------------------|
| 13—10 | Installation of Sprinkler Systems <i>as amended</i> * | R302.3 |
| | <i>See CCR, Title 24 Part 2 California Building Code, Chapter 35 or CCR, Title 24, Part 9 California Fire Code, Chapter 47 for amendments to NFPA 13.</i> | |
| | <i>*NFPA 13, Amended Sections as follows:</i> | |
| | <i>Revise Section 7.6.2.2 as follows:</i> | |
| | 7.6.2.2 Glycerine water and propylene glycol water mixtures shown in Table 7.6.2.2 shall be considered suitable for use. Antifreeze solutions exceeding 50% by volume of glycerine water or 40% by volume of propylene glycol water mixtures shall not be permitted within dwelling unit portions of the sprinkler system. | |
| | <i>Revise Section 7.6.2.3 as follows:</i> | |

~~7.6.2.3 If potable water is not connected to sprinklers, the commercially available materials indicated in Table 7.6.2.3 shall be permitted for use in antifreeze solutions. Antifreeze solutions of diethylene glycol water or ethylene glycol water mixtures shall not be permitted within dwelling unit portions of the sprinkler system.~~

Add new Section 7.6.2.5.1 as follows:

~~7.6.2.5.1 Antifreeze solutions shall be factory premix solutions within dwelling unit portions of the sprinkler system.~~

Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes *as amended**..... R313.1.1, R313.2.1, R313.3.1, R313.3.2, R313.3.2.3.1, R313.3.2.4.2, R313.3.6.1

**NFPA 13D, Amended Sections as follows:*

Revise Section 8.3.3.2.3 as follows:

~~8.3.3.2.3 Percent solution by volume of glycerine water and propylene glycol water mixtures shall be in accordance with Table 8.3.3.2.3, Figure 8.3.3.2.3(a), and Figure 8.3.3.2.3(b). Antifreeze solutions exceeding 50% by volume of glycerine water or 40% by volume of propylene glycol water mixtures shall not be permitted within dwelling unit portions of the sprinkler system.~~

Revise Section 8.3.3.2.5 as follows:

~~8.3.3.2.5 Percent solution by volume of diethylene glycol water and ethylene glycol water shall be in accordance with Table 8.3.3.2.5. Antifreeze solutions of diethylene glycol water or ethylene glycol water mixtures shall not be permitted within dwelling unit portions of the sprinkler system.~~

Add new Section 8.3.3.2.7 as follows:

~~8.3.3.2.7.1 Antifreeze solutions shall be factory premix solutions~~

Add a new definition as 3.3.9.1.1 and related annex note to read as follows:

3.3.9.1.1* 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.

A.3.3.9.1.1 Where a tank is used as the water supply for the sprinkler system, the tank is not permitted to be filled with antifreeze.

Revise 4.1.4 and related annex note to read as follows:

4.1.4* Antifreeze Systems.

A.4.1.4 Sampling from the top and bottom of the system helps to determine if the solution has settled. Antifreeze solutions are heavier than water. If the antifreeze compound is separating from the water due to poor mixing, it will exhibit a higher concentration in the lower portion of the system than in the upper portions of the system. If the concentration is acceptable near the top, but too low near the water connection, it may mean that the system is becoming diluted near the water supply. If the concentration is either too high or too low in both the samples, it may mean that the wrong concentration was added to the system.

On an annual basis, test samples should be drawn from test valve B as shown in Figure 8.3.3.2.1(1), especially if the water portion of the system has been drained for maintenance or repairs. A small hydrometer can be used so that a small sample is sufficient. Where water appears at valve B, or where the sample indicates that the solution has become weakened, the entire system should be emptied and refilled with acceptable solution as previously described.

Where systems are drained in order to be refilled, it is not typically necessary to drain drops that are less than 36 inches in length. Most systems with drops have insufficient volume to cause a problem, even if slightly higher concentration solutions collect in the drops. For long drops with significant volume, consideration should be given to draining drops if there is evidence that unacceptably high concentrations of antifreeze have collected in these long drops.

When emptying and refilling antifreeze solutions, every attempt should be made to recycle the old solution with the antifreeze manufacturer rather than discarding it.

4.1.4.1 Annual Antifreeze Solution Test and Replacement Procedure.

4.1.4.1.1 Samples of antifreeze solution should be collected by qualified individuals in accordance with 4.1.4.1.1.1 or 4.1.4.1.1.2 on an annual basis.

4.1.4.1.1.1 The system shall be drained to verify that (a) the solution is in compliance with 8.3.3, and (b) the solution provides the necessary freeze protection. Solution samples shall be taken near the beginning and near the end of the draining process.

4.1.4.1.1.2* Solution samples shall be taken at the highest practical elevation and the lowest practical elevation of the system.

A.4.1.4.1.1.2 If not already present, test connections (valves) for collection of solution samples should be installed at the highest and lowest practical locations of the system or portion of the system containing antifreeze solution.

4.1.4.1.2 The two samples collected in accordance with the procedures specified in 4.1.4.1.1.1 or 4.1.4.1.1.2 shall be tested to verify that the specific gravity of both samples is similar and that the solution is in compliance with 8.3.3. The specific gravity of each solution shall be checked using a hydrometer with a suitable scale or a refractometer having a scale calibrated for the antifreeze solution.

4.1.4.1.3* If concentrations of the two samples collected in accordance with the procedures above are similar and in compliance with 8.3.3, then (a) the solution drained in accordance with 4.1.4.1.1.1 can be used to refill the system, or (b) the existing undrained solution tested in accordance with 4.1.4.1.1.2 shall be permitted to continue to be used. If the two samples are not similar and not in compliance with 8.3.3, then a solution in compliance with 8.3.3 shall be used to refill the system.

A.4.1.4.1.3 In the past, for some existing systems subject to extremely low temperatures, antifreeze solutions with concentrations greater than what is now permitted by NFPA 13D were used. Such high concentrations of antifreeze are no longer permitted. In situations where extremely low temperatures are anticipated, refilling the fire sprinkler system with a concentration of antifreeze solution currently permitted by the standard might not provide sufficient freeze protection without additional measures. Such measures might include converting the antifreeze system to another type of sprinkler system.

4.1.4.1.4 A tag shall be attached to the riser indicating the date the antifreeze solution was tested. The tag shall also indicate the type and concentration of antifreeze solution (by volume) with which the system is filled, the date the antifreeze was replaced (if applicable), the name of the contractor that tested and/or replaced the antifreeze solution, the contractor's license number, a statement indicating if the entire system was drained and replaced with antifreeze, and a warning to test the concentration of the antifreeze solutions at yearly intervals per NFPA 13D.

Add an asterisk to 8.3.3 and add a new A.8.3.3 to read as follows:

8.3.3* Antifreeze Systems.

A.8.3.3 Where protection of pipes from freezing is a concern, options other than antifreeze are available. Such alternatives include running the piping in warm spaces, tenting insulation over pipe, dry-pipe systems, and preaction systems.

Revise 8.3.3.2.1 to read as follows:

8.3.3.2.1* Unless permitted by 8.3.3.2.1.1, antifreeze solutions shall be limited to premixed antifreeze solutions of glycerine (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 50% by volume, propylene glycol at a maximum concentration of 40% by volume, or other solutions listed specifically for use in fire protection systems.

Add a new 8.3.3.2.1.1 to read as follows:

8.3.3.2.1.1. For existing systems, antifreeze solutions shall be limited to premixed antifreeze solutions of glycerine (chemically pure or United States Pharmacopoeia 96.5%) at a maximum concentration of 50% by volume, propylene glycol at a maximum concentration of 40% by volume, or other solutions listed specifically for use in fire protection

systems.

Delete 8.3.3.2.2 and 8.3.3.2.3 and related Annex material A.8.3.3.2.3.

Move Table 8.3.3.2.3 to the annex and renumber as Table A.8.3.3.2.1 while deleting the rows in the table dealing with glycerine and 40% water, glycerine and 30% water, propylene glycol and 50% water and propylene glycol and 40% water. Add an annex note so that the annex and Table would appear as follows:

A.8.3.3.2.1 See Table A.8.3.3.2.1.

Table A.8.3.3.2.1 Properties of Glycerine and Propylene Glycol

| Material | Solution (by volume) | Specific Gravity at 60°F (15.6°C) | Freezing Point | |
|--|----------------------|-----------------------------------|----------------|-------|
| | | | °F | °C |
| Glycerine (C.P. or U.S.P. grade) | 50% water | 1.145 | -20.9 | -29.4 |
| Hydrometer scale 1.000 to 1.200 | | | | |
| Propylene glycol | 60% water | 1.034 | -6 | -21.1 |
| Hydrometer scale 1.000 to 1.200 (subdivisions 0.002) | | | | |

C.P.: Chemically Pure; U.S.P.: United States Pharmacopoeia 96.5%.

Renumber 8.3.3.2.3.1 to 8.3.3.2.2.

8.3.3.2.2 The concentration of antifreeze solutions shall be limited to the minimum necessary for the anticipated minimum temperature.

Delete 8.3.3.2.4, 8.3.3.2.5 and Table 8.3.3.2.5.

Renumber 8.3.3.2.6 as 8.3.3.2.3 and renumber A.8.3.3.2.6 as A.8.3.3.2.3. Also renumber Figure A.8.3.3.2.6 as Figure A.8.3.3.2.3.

8.3.3.2.3* An antifreeze solution with a freezing point below the expected minimum temperature for the locality shall be installed.

A.8.3.3.2.3 Beyond certain limits, an increased proportion of antifreeze does not lower the freezing point of the solution (see Figure A.8.3.3.2.3). Glycerine, diethylene glycol, ethylene glycol, and propylene glycol never should be used without mixing with water in the proper proportions, because these materials tend to thicken near 32°F (0°C).

Renumber 8.3.3.2.7 as 8.3.3.2.4 and revise to read as follows:

8.3.3.2.4 The specific gravity of the antifreeze shall be checked by a hydrometer with a scale having 0.002 subdivisions in accordance with Figure 8.3.3.2.4(a) and 8.3.3.2.4(b).

Renumber Figure 8.3.3.2.3(a) as Figure 8.3.3.2.4(a) and delete the 50% curve.

Renumber Figure 8.3.3.2.3(b) as Figure 8.3.3.2.4(b) and delete the 60% and 70% curves.

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See California Building Code Chapter 35 for amendments to NFPA 13R. See CCR, Title 24 Part 2 California Building Code, Chapter 35 or CCR, Title 24, Part 9 California Fire Code, Chapter 47 for amendments to NFPA 13.

Notation:

Authority: Health and Safety Code Sections 13100.1, 13108, 13143, 13210, 13211, 17921(b), 18928(a), 18949.2(b) and (c)

References: 13108, 13113, 13211, 17921(b) 18949.2(b) and (c)