

ANTIFREEZE AND AUTOMATIC FIRE SPRINKLERS UPDATE

Presented by: Jerry Schultz
The FPI Consortium, Inc.
July 28, 2017



OUTLINE

- History
- What happened?
- NFPA Response
- Current Status



HISTORY

- 1940 – Non-Freezing Solutions (Not over 20 sprinklers)
- 1953 – Glycerine, Propylene Glycol, Diethylene Glycol, Ethylene Glycol, Calcium Chloride Flake. Instructions on installation and testing
- 1955 – Name Change to Anti-Freeze Solutions
- 1956 to 1976 – No Changes



HISTORY

- 1976 – A System Defined

Antifreeze system means a system employing automatic sprinklers attached to a piping system containing an antifreeze solution and connected to a water supply. The antifreeze solution, followed by water, discharge immediately from sprinklers opened by a fire.

- 1978 to 1985 – No Changes



HISTORY

- 1991 – Definition Revised and Other Changes

A wet pipe sprinkler system employing automatic sprinklers attached to a piping system containing an antifreeze solution and connected to a water supply. The antifreeze solution is discharged, followed by water, immediately upon operation of sprinklers opened by heat from a fire.

- 1994 - Testing Requirements moved from NFPA 13 to NFI



HISTORY

- 1996 – Arrangement of Piping Revised
 - 1999 – Calcium Chloride Flake Removed
 - 2002 – Antifreeze specifically listed for ESFR
 - 2007 – Antifreeze for ESFR Clarified
 - 2010 – Listed Expansion Chambers
 - 2010+ – Antifreeze Required to be Listed
- NFPA 25 restricts antifreeze concentrations



WHAT HAPPENED?

- Bethel, ME-1997
- Monmouth Beach, NJ-2002—restaurant, propylene glycol. Heaters at ceiling of outside porch activated sprinklers, discharged solution, flash fire resulting in flames across ceiling, when water followed-fire extinguished, very limited damage to building, several patrons treated for smoke and thermal skin burns
- Denver, CO-2006
- Truckee, CA-2009—apartment, tenant cooking onions when contents in pan caught on fire. Tenant turned around to kitchen sink to put water on fire when sprinkler actuated, Glycerin based antifreeze discharged causing “explosion”. Window glass in the unit blown more than 86 feet across parking lot. Tenant died.
- Herriman, UT-2010—apartment, 3 year old boy playing with matches, sprinkler system actuated, polypropylene glycol in system, mother and son with second and third degree burns



NFPA RESPONSE

- 2010—TIA issued
 - Prohibited antifreeze in new residential systems
 - Prohibited the use of antifreeze in the dwelling unit portion of mixed occupancy
 - Did not address commercial
 - Did not address existing
- 2011—TIA
 - Required annual testing
 - Limited concentration to 38% glycerine and 45% polypropylene glycol
 - ESFR can use 45% pg
 - Factory Premixed
 - NFPA 13R—same



NFPA RESPONSE (CONT.)

- NFPA 13D (2011)
 - Same but limited concentration to 40% PG and 50% glycerine in existing
- NFPA 25 (2011)
 - Same as 13D requirements
- NFPA 13 and 13R (2012)
 - Listed solution only
 - Listing must show that solution will not ignite
 - ESFR listing still acceptable
- NFPA 13D Listed solutions only
 - AHJ exception for Specific Areas
 - Must link “specific area” to test data



NFPA RESPONSE (CONT.)

- NFPA 25 TIA from 8/2012
 - All non listed out by 2022
 - Always less than 30% PG and 38% glycerine
 - Never above 40% PG and 50% glycerine
 - Sometimes when a deterministic risk assessment supports a value in between
- NFPA 25 TIA from 10/2012
 - Defined parameters in the risk assessment factors



CURRENT

- NFPA 13
 - Antifreeze solutions must be listed
 - Premixed solutions allowed with ESFR if ESFR sprinkler is listed
- NFPA 13D
 - Antifreeze solutions must be listed
 - Existing systems limited to premix concentration of 50% for glycerine and 40% of PG or 48% glycerine and 38% PG if specific area
- NFPA 13R
 - Listed


NOTE—AS OF TODAY, THERE IS NO LISTED ANTIFREEZE SOLUTION

HOWEVER: (Du, du, duuuuuuH)



- These standards apply to new construction so must look at NFPA 25 for existing systems!



- 
- 5.3.3 Antifreeze to be tested annually
 - If of the type that is no longer permitted, it shall be replaced
 - If cannot determine type, it shall be replaced
 - If concentration greater than 5.3.3.4 was necessary to prevent freezing then, alternative methods to prevent freezing shall be provided.

NFPA 25 (2017 EDITION)

- 5.3.3.4 Listed or if not:
 - 5.3.3.4.1 If installed prior to September 30, 2012, listed not required until September 30, 2022 if one of the following is met:
 - Concentration limited to 30% PG or 38% glycerine
 - If over 30% but not more than 40% for PG and over 38% not more than 50% glycerine, an approved deterministic risk assessment prepared by a qualified person approved by the ahj
 - 5.3.3.4.2 Premixed



DETERMINISTIC RISK ASSESSMENT

- A.5.3.3.4.1 (2)
 - Occupancy use group per [NFPA 13](#)
 - Ceiling height
 - Antifreeze solution concentration and type
 - Maximum system pressure (normal static pressures)
 - Sprinkler type, including K-factor
 - Potential and actual fuel load (Christmas trees)
 - Type of structure (construction types)
 - Size of structure
 - Ability of the sprinkler system to control the fire



DETERMINISTIC RISK ASSESSMENT (CONT.)

- Ability of the sprinkler system to control the fire
- Occupied spaces versus unoccupied spaces such as trash enclosures and dust collectors as follows:
 - Adjacent occupancies (spaces adjacent to the area protected by antifreeze systems)
 - Separation between areas protected with an antifreeze system and other areas
 - Ventilation of areas protected with an antifreeze system to prevent damage to adjacent areas
 - Duration of antifreeze discharge



Thank you,
Jerry Schultz

