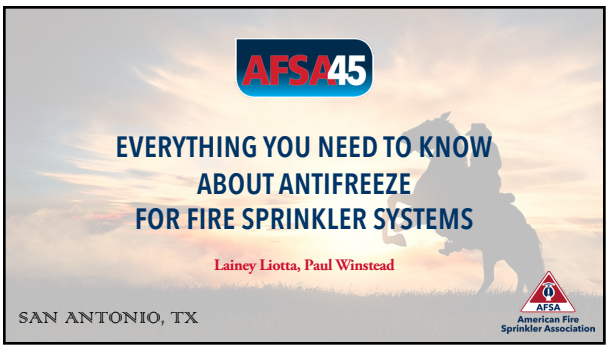
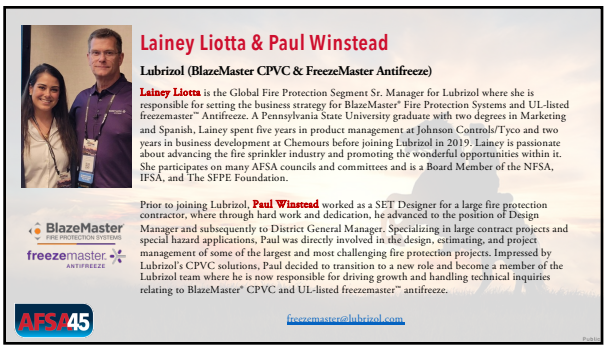

AFSA45
EVERYTHING YOU NEED TO KNOW
ABOUT ANTIFREEZE
FOR FIRE SPRINKLER SYSTEMS
Lainey Liotta, Paul Winstead
SAN ANTONIO, TX
AFSA
American Fire Sprinkler Association

1


Lainey Liotta & Paul Winstead
Lubrizol (BlazeMaster CPVC & FreezeMaster Antifreeze)
Lainey Liotta is the Global Fire Protection Segment Sr. Manager for Lubrizol where she is responsible for setting the business strategy for BlazeMaster® Fire Protection Systems and UL-listed freezemaster™ Antifreeze. A Pennsylvania State University graduate with two degrees in Marketing and Spanish, Lainey spent five years in product management at Johnson Controls/Tyco and two years in business development at Chemours before joining Lubrizol in 2019. Lainey is passionate about advancing the fire sprinkler industry and promoting the wonderful opportunities within it. She participates on many AFSA councils and committees and is a Board Member of the NFSA, IFSA, and The SFPE Foundation.
Prior to joining Lubrizol, Paul Winstead worked as a SET Designer for a large fire protection contractor, where through hard work and dedication, he advanced to the position of Design Manager and subsequently to District General Manager. Specializing in large contract projects and special hazard applications, Paul was directly involved in the design, estimating, and project management of some of the largest and most challenging fire protection projects. Impressed by Lubrizol's CPVC solutions, Paul decided to transition to a new role and become a member of the Lubrizol team where he is now responsible for driving growth and handling technical inquiries relating to BlazeMaster® CPVC and UL-listed freezemaster™ antifreeze.
BlazeMaster
freezemaster
AFSA45
freezemaster@lubrizol.com

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HOUSEKEEPING ITEMS
TO RECEIVE CREDIT FOR THIS SEMINAR, YOU MUST:
1) scan badge upon entry,
2) attend seminar in its entirety, and,
3) submit evaluation within 14 days
No individual or entity - including a presenting author - may electronically record or broadcast any portion of this AFSA training without prior written consent of AFSA. Unauthorized recording (audio, video, still photography, etc.) of this presentation without the express written consent of AFSA is strictly prohibited.
National Fire Protection Association
The authority on fire, electrical, and building safety
DISCLAIMER
This seminar and its content is not a formal interpretation issued pursuant to NFPA regulations.
Any opinion expressed is the personal opinion of the author and presenter and does not necessarily present the official position of the NFPA and its Technical Committees.
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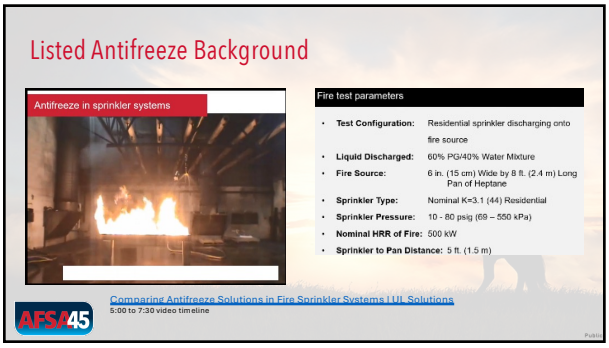
Topics
Background of listed antifreeze
NFPA Standards
Antifreeze listings
Installation & ITM Tips
AFSA45

5


Listed Antifreeze Background
Antifreeze in sprinkler systems
Fire test parameters
Test Configuration: Residential sprinkler discharging onto fire source
Liquid Discharged: 60% PG/40% Water Mixture
Fire Source: 6 in. (15 cm) Wide by 8 ft. (2.4 m) Long Pan of Heptane
Sprinkler Type: Nominal K=3.1 (44) Residential
Sprinkler Pressure: 10 - 80 psig (69 – 550 kPa)
Nominal HRR of Fire: 500 kW
Sprinkler to Pan Distance: 5 ft. (1.5 m)
Comparing Antifreeze Solutions in Fire Sprinkler Systems | UL Solutions
5:00 to 7:30 video timeline
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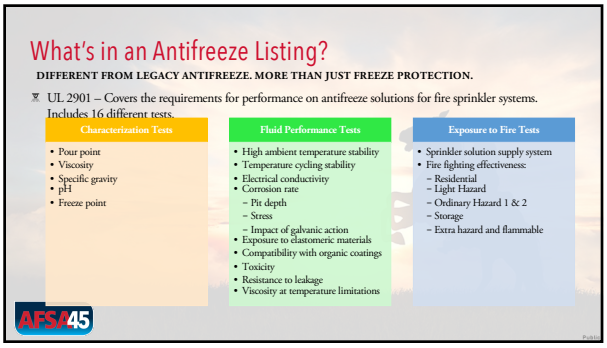
What's in an Antifreeze Listing?
DIFFERENT FROM LEGACY ANTIFREEZE. MORE THAN JUST FREEZE PROTECTION.
UL 2901 – Covers the requirements for performance on antifreeze solutions for fire sprinkler systems.
Includes 16 different tests.
Characterization Tests
Pour point
Viscosity
Specific gravity
pH
Freeze point
Fluid Performance Tests
High ambient temperature stability
Temperature cycling stability
Electrical conductivity
Corrosion rate
– Pit depth
– Stress
– Impact of galvanic action
Exposure to elastomeric materials
Compatibility with organic coatings
Toxicity
Resistance to leakage
Viscosity at temperature limitations
Exposure to Fire Tests
Sprinkler solution supply system
Fire fighting effectiveness:
– Residential
– Light Hazard
– Ordinary Hazard 1 & 2
– Storage
– Extra hazard and flammable
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Listed Antifreeze Terms

- **Minimum use temperature**
  - Lowest usable temperature as provided by UL, including a safety factor for outside influences. UL defines as "the freeze point plus the test reproducibility plus an additional -1°F safety factor"
- **Freeze point**
  - Temperature at which ice crystals begin to form
- **Pour point**
  - Lowest temperature at which solution will flow / remain pourable
- **Burst point**
  - Temperature at which frozen solution expands and bursts the vessel
- **Compatibility**
  - Materials that have been tested per UL 2901 and are compatible with the antifreeze. Includes non-exhaustive list of material for piping, gaskets, seals, etc.
  - Galvanized piping is an additional test!
- **Design Requirements such as….**
  - System volume limitations
  - Minimum design pressure
  - Hydraulic calculations
  - Expansion and contraction tables
  - Installation and maintenance requirements

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Like Sprinklers, Listings Differ Amongst Antifreezes

- Here are the most common critical differences
  - Minimum use temperature
  - System volume size limitations per occupancy/application
  - Minimum design pressure
  - Compatibility with piping systems and other system materials
- Always reference the antifreeze's TDS for critical listing and design parameters. The TDS is part of the antifreeze's UL listing!

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NFPA Requirements

Since the 2013 Edition of NFPA 13…

New systems

must be installed with a

listed antifreeze

13: 19, 8.6.2
13D: 19, 9.2.2
13R: 19, 5.4.2

Per the 2014-2023 Editions of NFPA 25…

Existing systems

must be drained & refilled with a

listed antifreeze

or retrofitted with another freeze protection method

2023 Edition of NFPA 25

permits use of listed solution outside of listing parameters only if:

-Replacing nonlisted solution
-Temperature range is met

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UL Listed Antifreezes on Market Today

Lubrizol

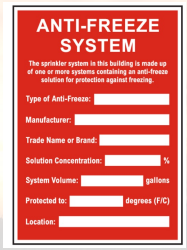
- freezemaster™ antifreeze

Tyco/Johnson Controls

- LFP® Antifreeze
- LFP® Antifreeze+

Noble

- FireFighter® ELIMINATOR 1330™



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Listed Antifreeze Comparison

Antifreeze Brand	Min Use Temp	Freeze Point Temp	UL-Listed for use with galv pipe?	Ordinary Hazard System 1 & II Volume Limitation	NFPA 13 Light Hazard System Volume Limitation	NFPA 13 Storage System Volume Limitation	NFPA 13R Residential System Volume Limitation	NFPA 13D Residential System Volume Limitation	Minimum Pressure Requirement	Liquid Color
Tyco® LFP®	(-10°F)	(-13°F)	No	500 gal	500 gal	40 gal	500 gal	500 gal	None	Clear
freezemaster™ antifreeze	(-12°F)	(-15°F)	Yes	500 gal	500 gal	40 gal	500 gal	500 gal	None	Blue
Noble Firefighter® Eliminator 1330™	(-17° F)	(-20°F)	Yes	500 gal	500 gal	40 gal	500 gal	500 gal	20 psi below (-13.3F)	Orange
Tyco® LFP®+	(-25°F)	(-28.5°F)	No	40 gal	500 gal	40 gal	500 gal	500 gal	20 psi	Clear

Source: UL ProductIQ. Current as of 07/30/2026.

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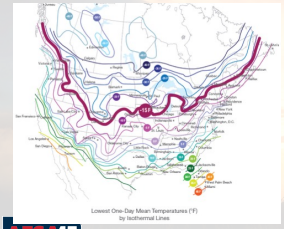
Minimum Use Temperature



- The one-day mean temperature is the average of temperatures taken each hour over 24 hours.
- For example, for points along the maroon line, the lowest one-day mean temperature is -15°F. This includes major cities like:
  - Cleveland
  - Chicago
  - Buffalo
  - Detroit
  - Omaha
  - Salt Lake City
  - Detroit
  - Philadelphia
  - Boise
  - Pittsburgh
  - New York

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Ideal Applications for Antifreeze Systems

- Small walk-in freezers
- Small parking garages
- Small cold storage facilities
- Loading docks
- Breezeways
- Porte cochere
- Tunnels in heated industrial applications
- Attic spaces

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FIELD TIPS

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Field Tips

- Follow the **installation manual**… to a T!
- Use **Darcy Weisbach for antifreeze** and **Hazen Williams for water**.
- Properly **account for expansion.** Use of an **expansion tank** and an **air vent** is highly recommended.
- Drain and flush the system, **especially the low points**.
- **Calibrate refractometer** correctly.

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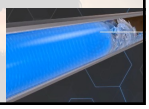
Field Tip – Hydraulic Calcs

- Darcy Weisbach for antifreeze
  - Darcy Weisbach is a friction loss calc for fluids (not just water) that expand and contract with temperature changes
- Hazen Williams for water
- Account for viscosity of antifreeze at lowest anticipated temperature
- Adjust K-factor of sprinkler head to account for antifreeze density

Always refer to the antifreeze's installation instructions.



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Field Tip – Expansion

NOT RECOMMENDED

NFPA 13: 22, 8.6.3.1

NOT RECOMMENDED

NFPA 13: 22, 8.6.3.4

RECOMMENDED

NFPA 13: 22, 8.6.3.3

- Correctly sized expansion tank
- Backflow preventer or check valve without hole

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Field Tip – Expansion

- Size the expansion tank correctly!
  - Formula for sizing tank is in NFPA 13: 22, 8.6.3.3.1
  - Recommend using **expansion tank** instead of check valve with hole.
  - Account for **upper limit of temperature** when sizing expansion tank.
  - Account for trapped air. **Air vents are important!**
- AMTROL has calculator on website for all listed antifreezes. Coefficients figured in their calcs. Relief valve required.
  - Amtrol.com → Resources → Selection Tools

Always refer to the antifreeze's installation instructions.

$$V_f = V_i \frac{[(v_2/v_1)-1]-3\alpha\Delta t}{(P_a/P_1)-(P_a/P_2)}$$

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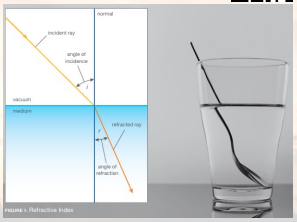
Field Tip – Refractometer

- Refractometer must have a RI scale covering a range of ~1.3 to 1.5
- Do not use BRIX, glycol, or glycerin scales
- Calibrate clean, dry device in environment it's being used with deionized water
- Device and antifreeze should be close to same temperature
- Follow the refractometer manufacturer's instructions!

Download our refractometer guide here!



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Field Tip – Testing

- The concentration of antifreeze solution should always be no more than the least amount necessary for the anticipated minimum temperature.
- If concentration conditions deviate from allowable tolerances, as illustrated by the chart below for freezemaster™ antifreeze, the fluid must be replaced.

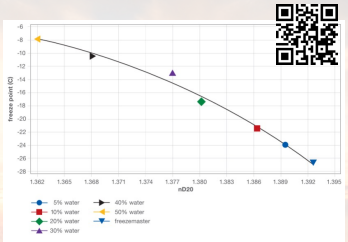

FIGURE 2. freeze point (ASTM D6660) vs. refractive index (nD20) for freezemaster™ antifreeze diluted with water

Lubrizol's Research & Development and Quality Assurance teams have expertise on the science of refractometry and have established a validated, corporate test method. When used correctly, the refractometer is quite the detective in finding where your antifreeze's composition is.

Table A:
Acceptable Property Ranges of freezemaster™ Antifreeze for Minimum Use Temperature -12°F (-24.4°C)

Concentration of freezemaster™ Antifreeze %	Specific Gravity at 68°F (20°C)	Refractive Index at 68°F (20°C)
100	1.087 – 1.093	1.390 – 1.394

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Questions?

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REQUIRED

FOR CEU CREDIT:

- ✓ Badge scanned at start of seminar
- ✓ Attend full seminar
- ✓ Complete survey 1 of 2 ways:
  - ✓ Survey link is emailed to attendees with scanned badges
  - ✓ Event app by EventsAir
    - Login to app
    - Navigate to seminar survey
  - ✓ Surveys close 10/31/26

Thank you!

Lainey Liotta

Paul Winstead

Lubrizol (BlazeMaster CPVC & FreezeMaster Antifreeze)

freezemaster@lubrizol.com

Scan QR code to submit questions for **Ask the Experts!**

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2027 Training Schedule

WEBINARS

1/6	Updates to NFPA 20
1/20	Calculating Pressure Reducing Hose Valves
2/3	Consumer Alert: Nitrogen in Sprinkler Systems
2/17	Reviewing Hydraulic Calculations
3/3	Updates to NFPA 13, 2028 Ed.
3/17	Updates to NFPA 13R & 13D, 2028 Eds.
4/7	Topic Coming Soon
4/21	NFPA 25: Roles & Responsibilities
5/5	Standpipe Flow Test Procedures
5/19	Storage 101
6/2	NFPA Technical Meeting - Voting Guide
6/16	Topic Coming Soon
6/30	Topic Coming Soon
7/7	Updates to NFPA 14, 2027 Edition
7/21	Adjacent Hazards & Design Methods
8/4	Acceptance Testing
8/18	Modifications to Existing Systems
9/22	Topic Coming Soon
10/6	Seismic 101
10/20	Proposed Updates to NFPA 25, 2029 Ed.
11/3	Evaluating Fire Pump Flow Tests
11/17	Top 10 Tech Reviews
12/1	Designing Water Storage Tanks
12/15	Pump Room Layout

PROGRAMS

Feb 9 - Mar 5 Apr 20 - May 14 Aug 3 - Aug 27** Oct 26 - Nov 19	Beginning Design School*
Apr 26 - May 7 Nov 1 - 12	Intermediate Design School*
Feb 8 - 10** Apr 12 - 14 Jul 12 - 14 Oct 11 - 13	Sprinkler Hydraulics Calculations Workshop
Apr 19 - 21 Oct 18 - 20	Advanced Hydraulics Calculations Workshop
Feb 11** Apr 30 Jul 23 Sep 24	Introduction to the Fire Sprinkler Industry
Mar 1 - 3 May 17 - 19 Aug 16 - 18 Oct 18 - 20**	NFPA 25 Essentials Workshop
Jun 7 - 10 Sep 20 - 23	Experienced Inspector Skills Lab
Mar 4 - 5 May 20 - 21 Aug 19 - 20 Oct 21 - 22**	NFPA 25 Fire Pump Workshop
Spring Summer Fall	ITM Inspector Development Program* *This program is 20 months.*

** Hybrid course **At General Air Products Lab, Exton, PA*

AFSA46

September 8-11	Manchester Grand Hyatt San Diego, CA

For More Details Visit:
firesprinkler.org

AFSA
American Fire Sprinkler Association

Dates subject to change. Programs subject to minimum registrations.

rev 9/14/2026

Virtual Instruction Path (VIP)

for Sprinkler Fitting Apprentices

Level 1 - Begins January 2027

Level 2 - Begins February 2027

Level 3 - Begins January 2027

Level 4 - Begins March 2027

www.firesprinkler.org/VIP

AFSA
American Fire Sprinkler Association

HANDS-ON WORKSHOPS FOR 2027

FEATURING AFSA'S TRAINING LAB

NFPA 25 Essentials Workshop

Mar | May | Aug | Oct

Description: Understand roles, responsibilities, and NFPA 25 ITM procedures through hands-on testing of wet systems, dry systems, and fire pumps.

NFPA 25 Fire Pump Workshop

Mar | May | Aug | Oct

Description: Develop practical NFPA 25 fire pump ITM skills, including no-flow and full-flow testing, water supply graphing, and performance evaluation.

Introduction to the Fire Sprinkler Industry

Feb | Apr | Jul | Sep

Description: This course is designed for those new to the industry. An introductory, wide-ranging 8-hour course that provides a broad overview of core fire sprinkler industry concepts for those new to the field.

Experienced Inspector Skills Lab NEW

Mar | Sep

Description: Take your ITM expertise beyond the basics. Designed for experienced technicians, this course combines focused classroom instruction with hands-on system lab training to strengthen your application of current NFPA 25 inspection, testing, and maintenance requirements. Refine fire sprinkler testing practices, improve documentation, deliver more consistent service, and help reduce liability while reinforcing knowledge commonly covered on certification exams.

Learn more about AFSA's fire sprinkler lab featuring functional risers, a spray room, fire pumps, and an interactive classroom.

firesprinkler.org/lab