

Specification



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Part 1 – General

1.0 Product Description

freezemaster™ antifreeze is a premixed freeze protection solution designed and UL listed for use in wet sprinkler systems in residential and commercial applications. freezemaster™ antifreeze has an expanded listing based on additional testing at UL. freezemaster™ antifreeze is designed for use in freezing temperatures that can cause damage to equipment or prevent proper function of the sprinkler system. freezemaster™ antifreeze was developed to meet the requirements of UL 2901 for compliance with the current editions of NFPA 13, 13R, 13D and 25.

1.1 Basic Use

- A. freezemaster™ antifreeze can be used in both new construction and existing system/retrofit. Listed and certified by Underwriters Laboratories (UL & C-UL) for use in:
 - 1. Light Hazard occupancies as defined in NFPA 13
 - 2. Residential occupancies
 - i. Up to four stories in height (NFPA 13R)
 - ii. One- and two-family dwellings and manufactured homes (NFPA13D)
 - 3. Ordinary Hazard installations
 - i. Group 1: Combustibility of materials present is low and the quantity is moderate, with no stockpiles of combustible material exceeding 8 feet (2.4 meters). Fire would release moderate rates of heat.
 - ii. Group 2: Spaces where the quantity and combustibility of contents are moderate to high, and which may have stockpiles of materials up to 12 feet high (3.7 meters) that could release moderate rates of heat release if ignited.
- B. Disposal: Any disposal of freezemaster™ antifreeze shall be in conformance with all federal, state and local waste regulations. Refer to the freezemaster™ antifreeze Safety Data Sheet for more details.
- C. All fire protection systems using freezemaster™ antifreeze shall conform to local, state and NFPA requirements.

Part 2 – Products

2.0 Materials

freezemaster™ antifreeze is manufactured by Lubrizol Advanced Materials and UL listed. Available in 5 gal pails, 55 gal drums, and 275 gal IBC.

Part 3 – Execution

Refer to the freezemaster™ antifreeze Installation Guide for specific listings, approvals, directions and limitations.

3.0 System Design

Flow rates, pipe sizing, sprinkler spacing, hanging methods and system design must be in accordance with NFPA 13, 13R and 13D. freezemaster™ antifreeze is not listed for use in protecting extra hazard occupancies or flammable liquids, or use with ESFR sprinklers.

A. System Limitations

1. Fire sprinkler systems utilizing freezemaster™ antifreeze shall meet the system size limitations as follows:

Designation	Use Temp Range	Application	Max Volume of Antifreeze in Sprinkler System
Antifreeze	-12°F to 150°F (-24°C to 66°C)	NFPA 13D ^[i]	≤500 gal; in accordance with NFPA 13D design criteria
		NFPA 13R – Residential Only (including corridors, garages that serve only a single dwelling unit, and compartmented Ordinary Hazard areas ≤500 sq ft) ^[i] Where NFPA 13R requires the use of NFPA 13 design criteria, refer to the NFPA 13 applications and volume limitations.	≤500 gal; in accordance with NFPA 13R design criteria Where NFPA 13 design criteria is required in areas of an NFPA 13R Occupancy, such as an attic, common and large garages, or a clubhouse; use the applicable volume limitation for the hazard area for NFPA 13.
		NFPA 13 – Light Hazard ^[i]	≤200 gal; in accordance with NFPA 13 design criteria or >200 gal to ≤500 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze.
		NFPA 13 – Ordinary Hazard Groups 1 & 2 ^[i]	≤40 gal; in accordance with NFPA 13 design criteria or >40 gal to ≤375 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze
		NFPA 13 – Storage ^[i]	≤40 gal; in accordance with NFPA 13 design criteria

B. Hydraulic Calculations

1. The viscosity of the antifreeze solution at the lowest anticipated temperature of the system shall be considered in the hydraulic design.
2. The friction loss shall be determined using the Hazen-Williams formula for water and the Darcy-Weisbach formula to account for the antifreeze solution fluid properties.
3. The K-factor of the sprinkler shall be adjusted to account for the density of the antifreeze.
4. Where the use of antifreeze in accordance with the listing requires the hydraulic design to be based on the dry system hydraulic design criteria, the hydraulic calculations are to be performed in accordance with the applicable NFPA Standard dry system design even though the system is filled with antifreeze.

C. Minimum Design Pressure

1. Pressure meets minimum required pressure for the sprinklers used.

D. Expansion

1. It is highly recommended for all systems, including existing, that an expansion tank be used. Without an expansion tank there is potential for system damage and the possibility for water to enter the system and alter the performance of freezemaster™ antifreeze. Reference NFPA 13 for guidance on the addition of expansion tanks in new and existing systems.

3.1 Installation Procedure

- A. Installation practices for new and existing systems shall be in accordance with the manufacturer's instructions and the UL listing.
- B. A system tag must be present on an antifreeze system main valve identifying the following:
 - 1. Type and manufacturer of the antifreeze solution used
 - 2. Volume of antifreeze used
 - 3. Percent concentration by volume of antifreeze used

3.2 Quality Assurance

Periodic testing of systems is critical to maintaining the proper concentration and freeze point of the fluid. Leaks, pressure surges, and temperature changes to the system can cause antifreeze to flow out of the system or water to flow into the system, changing the freeze temperature. It is recommended that automatic sprinkler antifreeze systems be inspected, tested, and maintained by a qualified inspection, testing, and maintenance service, as required by NFPA 25 or the local AHJ.

3.3 Technical Data

- A. Approvals: freezemaster™ antifreeze meets the requirements of UL 2901. UL and cUL Certified, UL and cUL listed, FBC System Compatible.
- B. Compatibility: Fire protection system made of any of the following materials (tested per UL 2901 for compatibility with freezemaster™ antifreeze):
 - 1. Steel piping
 - 2. Galvanized steel piping
 - 3. Brass materials
 - 4. Stainless steel piping
 - 5. Black steel
 - 6. Copper
 - 7. Bronze
 - 8. Cast iron
 - 9. Fusion-bonded epoxy coated ductile iron
 - 10. CPVC
 - 11. PEX
 - 12. EPDM
 - 13. Butyl rubber
 - 14. Natural rubber
 - 15. Nitrile rubber (NBR)
 - 16. Styrene-butadiene rubber (SBR)
- C. Typical Properties
 - 1. Appearance: blue liquid
 - 2. Freeze point: -15°F (-26.1°C)
 - 3. Pour point: -22.4°F (-30.2°C)
 - 4. Burst point: -58°F (-50°C)
 - 5. Refractive index and Specific Gravity – See Table A
 - 6. Viscosity – See Table B
 - 7. Density – See Table C
 - 8. pH: 7 – 8
 - 9. Conductivity: 4500 – 5500 µS/cm

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

Table B:
freezemaster™ antifreeze Viscosity
Across Temperature Ranges

Temperature °F (°C)	Viscosity, Centipoise
-12 (-24.4)	104
-10 (-23.3)	91
-5 (-20.6)	72
0 (-17.7)	55
5 (-15)	43
10 (-12.2)	36
15 (-9.4)	30
20 (-6.7)	25
25 (-3.9)	21
30 (-1.1)	19
35 (1.7)	16
40 (4.4)	13
45 (7.2)	11
50 (10)	9
55 (12.8)	8
60 (15.6)	7
68 (20)	6
150 (65.6)	2

Table C:
freezemaster™ antifreeze Density

Temperature °F (°C)	Density		
	lb/gal	kg/m³	lb/ft³*
-12 (-24.4)	9.3	1115.3	69.6
-10 (-23.3)	9.3	1114.6	69.6
-5 (-20.6)	9.3	1112.9	69.5
0 (-17.7)	9.3	1111.2	69.4
5 (-15)	9.3	1109.5	69.3
10 (-12.2)	9.2	1107.8	69.2
15 (-9.4)	9.2	1106.2	69.1
20 (-6.7)	9.2	1104.5	69
25 (-3.9)	9.2	1102.8	68.8
30 (-1.1)	9.2	1101.1	68.7
35 (1.7)	9.2	1099.4	68.6
40 (4.4)	9.2	1097.7	68.5
45 (7.2)	9.1	1096	68.4
50 (10)	9.1	1094.4	68.3
55 (12.8)	9.1	1092.7	68.2
60 (15.6)	9.1	1091	68.1
68 (20)	9.1	1088.3	67.9
104 (40)	9	1076.2	67.2
150 (65.6)	8.9	1060.6	66.2

3.4 Testing

At least once a year, an inspection, testing and maintenance service shall take a measurement of the specific gravity or refractive index of the freezemaster™ antifreeze in the system. The fluid must be replaced if either property deviates from that originally supplied within the allowed tolerance, as specified in Table A. Two test methods are acceptable per NFPA 25, and either may be used to verify that the antifreeze is within the specification limits. NFPA requires a tag to be affixed to the riser indicating the date tested or replaced, the type and concentration by volume of fluid used, system capacity (in volume), contractor name and license number, and a statement indicating if the entire system was drained and replaced with antifreeze.

3.5 Warranty

Consult the manufacturer for specific warranty information.

3.6 Detail Specification

Antifreeze must be a premixed freeze protection solution designed and UL listed for use in wet sprinkler systems in residential and commercial applications. Antifreeze must meet the requirements of UL 2901 for compliance with the current editions of NFPA 13, 13R, 13D and 25. Antifreeze must be tested per UL 2901 to be compatible with galvanized piping, be colored, have a use temperature range of at least -12°F – 150°F (-24°C – 66°C), and have a max volume up to 375 gal in ordinary hazard applications.

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