



# TECHNICAL DATA

## FIREFIGHTER ELIMINATOR F 50% Propylene Glycol/Water Solution

### 1. PRODUCT NAME

Firefighter Eliminator F 50% Propylene Glycol/Water Solution

- Viking Part Numbers:  
12967-55 = 55 gallon drum  
12967-250 = 250 gallon drum  
12967-BULK = tanker delivery

### 2a. MANUFACTURED BY

**The Noble Company**  
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### 2b. MANUFACTURED FOR

**THE VIKING CORPORATION**

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### 3. DESCRIPTION

Viking Firefighter Eliminator F is a certified premixed 50% propylene glycol/water antifreeze solution required for use with the Viking ESFR Cold Storage System. The system provides fixed fire protection for refrigerated or cold warehouse storage and is also appropriate for unheated storage applications in areas subject to freezing, to a minimum temperature of -21 °F (-29.4 °C). The piping system is filled with pressurized propylene glycol and water solution maintained from a pressure pump system that controls and maintains the desired solution pressure. This is a wet pipe system that utilizes a Viking Model J-1 Wet Pipe Alarm Check Valve with special trim to isolate the antifreeze in the system from the water supply.

NOTE: The Viking ESFR Cold Storage System shall be designed by qualified fire protection technicians, in conjunction with requirements of the Authorities Having Jurisdiction. These systems are designed to meet the UL Listing requirements described in Viking technical data for ESFR K25.2 Sprinkler VK510 for use with propylene glycol/water solution, and the standards of NFPA 13 or other organizations, and also with the provisions of governmental codes, ordinances, and standards where applicable.

### 4. TYPICAL PROPERTIES

(Not for specification purposes)

#### Concentration

- 50% by weight propylene glycol
- plus <5% dipotassium phosphate (corrosion inhibitor)
- plus <3% coloring

### HYDRAULIC CALCULATIONS

At -20 °F (-28.9 °C), the propylene glycol/water solution will have an approximate viscosity of 180 centipoise, as opposed to water at 1 centipoise at 70 °F (21.1 °C). The Darcy-Weisbach method of determining friction loss shall be utilized in the hydraulic calculations, as it takes into account the higher viscosity of the propylene glycol/water solution premix. Specific information required for the Darcy-Weisbach calculation is as follows:

#### Firefighter Eliminator F 50% Propylene Glycol/Water Solution by Weight

Temperature	Specific Gravity	Viscosity Centipoise	Freeze Point	Applicable Temperature	Density (lbs/cu ft)
60 °F (15.6 °C)	1.041	8.13	-26 °F (-32.2 °C)	-20 °F (-28.9 °C)	64.96
0 °F (-17.8 °C)	1.056	61	-26 °F (-32.2 °C)	-20 °F (-28.9 °C)	65.89
-20 °F (-28.9 °C)	1.085	180	-26 °F (-32.2 °C)	-20 °F (-28.9 °C)	67.70

#### Darcy Weisbach procedure

1. Calculate Reynolds Number
2. Calculate relative roughness of pipe
3. Use Moody Diagram to find "f"
4. Calculate friction loss

#### Reynolds Number

Re = 50.6Qp/dv  
 p = density (lbs/cu ft)  
 d = internal pipe diameter (in.);  
 D = internal pipe diameter (ft.)  
 v = dynamic viscosity (centipoise)  
 Q = flow gpm

Pipe roughness c-120 steel pipe = e = 0.00015, relative roughness e/D

If Re > 2000, f = Moody Diagram NFPA 750 fig 6-2.2 or fire pump handbook pg 16  
 If Re < 2000, f = 64/Re

Friction Loss if Re > 2000 = Delta P = 0.000216fLpQ<sup>2</sup>/d<sup>5</sup>

Friction Loss if Re < 2000 = Delta P = 0.000273vLQ/d<sup>4</sup>

L = pipe length

- plus remainder - deionized water

#### Specific Gravity

- 1.041 @ 60 °F (15.6 °C)
- 1.056 @ 0 °F (-17.8 °C)
- 1.085 @ -20 °F (-28.9 °C)

#### Density

- 64.96 lbs./cu ft @ 60 °F (15.6 °C)
- 65.89 lbs./cu ft @ 0 °F (-17.8 °C)
- 67.70 lbs./cu ft @ -20 °F (-28.9 °C)

#### Viscosity

- 8.13 CPS @ 60 °F (15.6 °C)
- 61 CPS @ 0 °F (-17.8 °C)
- 180 CPS @ -20 °F (-28.9 °C)

#### Minimum use temperature

-21 °F (-29.4 °C)

#### Freeze point: -26 °F (-32.2 °C)

pH: 9

**Appearance:** Fluorescent Green color  
 For further details, see the Viking Firefighter Eliminator F Material Safety Data Sheet (page 49 e-h).

### 5. FEATURES

Viking Firefighter Eliminator F:

- Has a freeze temperature rating (freeze point) of -26 °F (-32.2 °C).
- Is a ready-to-use solution pre-mixed in the proper 50% propylene glycol concentration for the Viking ESFR Cold Storage System, in areas sub-

ject to freezing, to a minimum temperature of -21 °F (-29.4 °C).

- Was utilized in the full-scale research fire tests for the Viking ESFR Cold Storage System.
- Includes corrosion inhibitors to provide corrosion control and microbiological control of the system piping and components.

### 6. AVAILABILITY & SERVICE

Viking products are available through a network of domestic, Canadian, and international distributors. See the Viking Corp. Web site for your closest distributor or contact The Viking Corporation.

Viking Technical Data may be found on The Viking Corporation's Web site at <http://www.vikingcorp.com>. The Web site may include a more recent edition of this Technical Data page.

### 7. APPLICATION

Firefighter Eliminator F antifreeze solution is used in the Viking ESFR Cold Storage System to protect refrigerated or unheated warehouse areas and unheated storage applications in areas subject to freezing, to a minimum temperature of -21 °F (-29.4 °C). The 50% by weight mixture of propylene gly-



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col/water premix solution is used to pre-charge the system and control the fire, followed by water to suppress the fire. This system must be limited in volume to 1,100 gallons (4 163 liters) total from the alarm check valve in order to expel the propylene glycol water mixture and flow 100% water from the sprinklers as rapidly as possible to control or suppress the fire.

The propylene glycol and water mixture cools and adds wetting ability to control the fire until the water is applied to suppress the fire. The area of coverage for a single system is dependent on the volume of the system required to cover the area being protected. The hydraulic calculations are necessary in order to properly size the system piping (refer to data page 45 a-j for hydraulic calculation requirements).

### 8. ENVIRONMENTAL & TOXICOLOGICAL INFORMATION

Viking Firefighter Eliminator F is virtually harmless to animals or plants; however, as with any substance, care should be taken to prevent discharge from entering ground water, surface water, or storm drains. Disposal of this solution should be made in accordance with federal, state, and local regulations.

Propylene glycol/water solutions are designed to be installed on systems supplied by potable water supplies. Local authorities should be consulted prior to

draining system to storm sewers or to natural drainage areas.

### 9. MAINTENANCE

Field mixing of propylene glycol and site water is strictly prohibited, as the control of the mixture cannot be assured. Improper field mixing of solution can result in reduced capability to prevent freezing or to control a fire. Firefighter Eliminator F is already premixed and ready to use.

#### Filling the System

In the main drain line between the valve and alarm valve inlet, a tee is provided with a 1" NPT connection for supply and maintenance of the antifreeze solution to the system above the alarm check valve. A suitable portable pump can be utilized to fill the system to the static water pressure. (The CS-1 pump can be used for filling the system initially at 15 GPM (56 l/min) to 100 ft. head pressure or system static pressure, however, it is a less efficient pump for filling the system because of the duration of time required to do so. The CS-1 pump is to be utilized to bring the solution to maintenance pressure, [normally a minimum of 20 PSI (137.9 kPa) greater than static pressure] and is designed to maintain system pressure once the system is initially filled. When filling the system with antifreeze solution, all air must be bled from the system (as described in data page 45 a-j) in order to make final and maintained antifreeze solution pressure non-compressible.

### Testing the Solution

(Also refer to the table at left.)

Antifreeze solution shall be checked quarterly (for gridded systems), or semi-annually (for tree type configurations) with a refractometer to detect the concentration of antifreeze solution and effectiveness against freezing. Sampling shall be taken from multiple points within the freezer system (refer to the instructions on data pages 45 e and 45 i for fluid sampling). When draining sample antifreeze solution from the system, be sure to shut off the system control valve directly upstream of the alarm check valve so that water doesn't enter the system. After the CS-1 pump has restored the antifreeze solution pressure, ensure that the water supply control valve is returned to the fully open position once fluid sampling is completed. Multiple propylene glycol/water solution test valves are to be installed in several areas on the system piping for testing with a refractometer (refer to data page 45 a-j for testing requirements and procedures).

If the propylene glycol/water solution becomes diluted or does not pass the refractometer test, the entire system is to be drained. All sections of trapped piping are to be drained. Five percent (5%) of the pendent ESFR sprinklers in all locations throughout the system are to be removed and inspected for frozen solution. If any of the pendent ESFR sprinklers are found with frozen solution, all the pendent ESFR sprinklers are to be removed and replaced with new Viking K25.2 Pendent ESFR VK510 Sprinklers prior to re-charging system with new 50% premix propylene glycol/water solution. If the 5% of removed sprinklers are not damaged, they can be re-installed in the system.

**Firefighter Eliminator F Propylene Glycol Refractive Index**

Freezing Point	Volume % Propylene Glycol	Refractive Index 71.6 °F (22 °C)
-25.8 °F (-32.1 °C)	48.9	1.3892
-28.3 °F (-33.5 °C)	49.9	1.3903
-31 °F (-35.0 °C)	50.9	1.3914

**Propylene Glycol Compatibility Chart**

<b>Thermoplastics</b>	PVC	C
	CPVC	C
	Polyethylene (PE)	B
	Polyethylene Cross Linked (XLPE)	A
	Teflon	A
<b>Gaskets</b>	ABS	B
	Viton	A
	EPDM	A
	Neoprene	C
	Buna N (Nitrile)	A
	Hypalon	A

A = Excellent resistance, B = Fair, C = Poor

Information provided by:

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