

# DOWFROST HD

## HEAT TRANSFER FLUID

### Engineering Specifications for Closed-Loop HVAC Systems

#### MANUFACTURER

The Dow Chemical Company  
Thermal Fluids Business  
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#### GENERAL PRODUCT DESCRIPTION

DOWFROST<sup>®</sup> HD industrially inhibited propylene glycol-based heat transfer fluid is manufactured by The Dow Chemical Company. Aqueous solutions of DOWFROST HD fluid are designed to provide freeze/burst and corrosion protection, as well as efficient heat transfer, in water-based, closed-loop heating and air-conditioning systems.

DOWFROST HD fluid has an operating temperature range of -50°F to 325°F; with fluid freeze protection to below -60°F, and system burst protection to below -100°F. The fluid contains corrosion inhibitors that are specially formulated for HVAC systems to keep pipes free of corrosion without fouling. DOWFROST HD fluid can be specified for use in new HVAC systems, or as a replacement fluid for use in existing systems. The fluid is dyed bright yellow to facilitate system leak detection.

DOWFROST HD fluid is also suitable for ice storage systems — used either in the closed circulation loop from the chiller to the storage medium; or, in solution with water, in the medium itself.

Compared to DOWFROST fluid, DOWFROST HD fluid features a higher maximum operating temperature, higher reserve alkalinity and greater thermal stability for longer fluid life. Extra-strength corrosion inhibitors in DOWFROST HD fluid are formulated for high temperature use, resulting in reduced maintenance and longer inhibitor life in most applications.

DOWFROST fluid is recommended for use in applications where low acute oral toxicity is important or where incidental contact with drinking water is possible.

Since the toxicity of heat transfer fluids may be adversely altered in HVAC systems, used fluids should be handled with reasonable care, and not be taken internally.

#### HVAC SYSTEM FLUID SPECIFICATION

##### Closed-loop, water-based systems

##### 1. FLUID MATERIAL

The propylene glycol to be used in such a system must meet the following requirements:

- 1.1 The fluid must be an industrially inhibited propylene glycol (phosphate-based).
- 1.2 The fluid must be dyed [bright yellow] to facilitate leak detection.
- 1.3 The fluid must be easily analyzed for glycol concentration and inhibitor level.
- 1.4 For systems containing more than 250 gallons of fluid, annual analysis must be provided free of charge by the fluid manufacturer.
- 1.5 The fluid must pass ASTM D1384 (less than 0.5 mils penetration per year for all system metals).
- 1.6 The reserve alkalinity of the fluid must be at least 15 to provide long-term resistance to acidic pH.

#### 2. FLUID INSTALLATION

Follow these installation procedures:

- 2.1 Clean new or lightly corroded existing systems with a 1% to 2% solution of trisodium phosphate in water prior to the installation of industrially inhibited propylene glycol fluid.
- 2.2 Extensively corroded existing systems should be cleaned by an industrial cleaning company and all necessary replacements and repairs should be made.
- 2.3 **Use only good quality water in solution with the propylene glycol fluid. Use water with low levels (less than 25 ppm) of chloride and sulfate, and less than 50 ppm of hard water ions (Ca<sup>++</sup>, Mg<sup>++</sup>). Distilled or deionized water is recommended.** If good quality water is unavailable, purchase pre-diluted solutions of industrially inhibited propylene glycol fluid from the fluid manufacturer or, if available, from the distributor.

#### 3. SYSTEM DESIGN CONSIDERATIONS

- 3.1 Avoid use of automatic water make-up systems to prevent undetected dilution of the propylene glycol and possible contamination of the water system.

## 4. TECHNICAL DATA

### 4.1 DOWFROST HD Fluid, Product Description

Composition, % by weight

Glycols	94
Inhibitors and water	6
Color	Bright Yellow
Specific gravity at 60/60°F	1.053 - 1.063
pH of solution containing 50% glycol	9.5 - 10.5
Reserve alkalinity, minimum	15.0 ml

### 4.2 Typical Properties of Aqueous Solutions<sup>†</sup>

(Glycol percentage by volume)

Physical Property	Temp. °F	30% Glycol Solution	40% Glycol Solution	50% Glycol Solution	60% Glycol Solution
Thermal Conductivity	40	0.247	0.225	0.204	0.184
Btu/(hr•ft <sup>2</sup> )(°F/ft)	180	0.279	0.249	0.221	0.195
	325	0.268	0.238	0.210	0.184
Specific Heat, Btu/(lb•°F)	40	0.894	0.847	0.794	0.734
	180	0.947	0.916	0.878	0.833
	325	1.002	0.987	0.965	0.936
Viscosity, Centipoise	40	5.75	9.63	14.28	23.65
	180	0.68	0.85	1.08	1.29
	325	0.31	0.39	0.40	0.45
Density, (lb/ft <sup>3</sup> )	40	65.30	66.03	66.68	67.23
	180	62.60	63.09	63.50	63.83
	325	57.89	58.18	58.41	58.59

<sup>†</sup>Typical properties, not to be construed as specifications.

### 4.3 Freezing and Boiling Points of Aqueous Solutions

Freezing Temperature, °F	% Glycol by Volume	Boiling Temperature, °F
26	10	212
19	20	213
8	30	216
-7	40	219
-28	50	222
-60	60	225
<-60	70	230

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