



## DOWFROST™ HD Heat Transfer Fluid

### Product Type

Inhibited propylene glycol-based heat transfer fluid

### Applications

- Single fluid process heating and cooling
- Closed-loop
- Water-based HVAC applications where propylene glycol solutions are preferred or required

### Recommended Use Temperature Range

-45°C (-50°F) to 160°C (325°F)

### Description

DOWFROST™ HD Heat Transfer Fluid is a formulation of 94.0 percent propylene glycol and a specially designed package of industrial corrosion inhibitors. The fluid is dyed bright yellow to aid in leak detection. Solutions in water provide freeze protection to below -50°C (-60°F) and burst protection to below -73°C (-100°F).

### Typical Properties<sup>1</sup>

Composition (% by weight)	
Propylene Glycol	94
Performance Additives	6
Color	Fluorescent yellow
Specific Gravity 15/15°C (60/60°F)	1.053–1.063
pH of Solution (50% Glycol)	9.5–10.5
Reserve Alkalinity (min.)	15.0 ml

1. Typical properties, not to be construed as specifications. Complete sales specifications are available on request.

## Typical Concentrations of DOWFROST™ HD Heat Transfer Fluid Required to Provide Freeze and Burst Protection at Various Temperatures

Temperature		Percent DOWFROST™ HD Heat Transfer Fluid Concentration Required	
°C	(°F)	For Freeze Protection Volume %	For Burst Protection Volume %
-7	(20)	19.1	12.8
-12	(10)	30.9	21.3
-18	(0)	38.3	25.5
-23	(-10)	44.7	29.8
-29	(-20)	48.9	31.9
-34	(-30)	53.2	35.1
-40	(-40)	57.4	37.2
-46	(-50)	60.6	37.2
-51	(-60)	63.8	37.2

Note: These figures are examples only and may not be appropriate to your situation. Generally, for an extended margin of protection, you should select a temperature in this table that is at least 3°C (5°F) lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions of less than 20% glycol. Contact Dow for information on specific cases or further assistance.

Attention: These are typical numbers only and are not to be regarded as specifications. As use conditions are not within its control, Dow does not guarantee results from use of the information or products herein; and gives no warranty, express or implied.

## Typical Freezing and Boiling Points of DOWFROST™ HD Heat Transfer Fluid<sup>1</sup>

Wt. % Propylene Glycol	Vol. % Propylene Glycol	Wt. % DOWFROST™ HD Heat Transfer Fluid	Vol. % DOWFROST™ HD Heat Transfer Fluid	Freezing Point		Boiling Point		Degree Brix <sup>2</sup>	Refractive Index 22°C (72°F)
				°C	(°F)	°C @ 101 kPa (°F @ 760 mmHG)			
0.0	0.0	0.0	0.0	0	(32.0)	100.0	(212)	0.0	1.3328
5.0	4.8	5.3	5.1	-1.6	(29.1)	100.0	(212)	4.8	1.3383
10.0	9.6	10.7	10.2	-3.3	(26.1)	100.0	(212)	8.4	1.3438
15.0	14.5	16.0	15.4	-5.1	(22.9)	100.0	(212)	12.9	1.3495
20.0	19.4	21.3	20.6	-7.1	(19.2)	100.6	(213)	15.4	1.3555
25.0	24.4	26.6	26.0	-9.6	(14.7)	101.1	(214)	19.0	1.3615
30.0	29.4	31.9	31.3	-12.7	(9.2)	102.2	(216)	22.0	1.3675
35.0	34.4	37.2	36.6	-16.4	(2.4)	102.8	(217)	26.1	1.3733
40.0	39.6	42.6	42.1	-21.1	(-6.0)	103.9	(219)	29.1	1.3790

1. Typical properties, not to be construed as specifications.
2. Degree Brix is a measure of the sugar concentration in a fluid and is important in fermentation and syrups applications. Although there is no sugar present in DOWFROST™ heat transfer fluids, the glycol affects the refractive index of the fluid in a similar fashion.

NOTE: Generally for an extended margin of protection, you should select a temperature in this table that is at least 3°C (5°F) lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions of less than 20% glycol. Contact Dow for information on specific cases or further assistance.

## Typical Freezing and Boiling Points of DOWFROST™ HD Heat Transfer Fluid (Cont.)

Wt. % Propylene Glycol	Vol. % Propylene Glycol	Wt. % DOWFROST™ HD Heat Transfer Fluid	Vol. % DOWFROST™ HD Heat Transfer Fluid	Freezing Point		Boiling Point		Degree Brix <sup>2</sup>	Refractive Index 22°C (72°F)
				°C	(°F)	°C @ 101 kPa (°F @ 760 mmHG)			
45.0	44.7	47.9	47.6	-26.7	(-16.1)	104.4	(220)	31.8	1.3847
50.0	49.9	53.2	53.1	-33.5	(-28.3)	105.6	(222)	34.7	1.3903
55.0	55.0	58.5	58.5	-41.6	(-42.8)	106.1	(223)	38.0	1.3956
60.0	60.0	63.8	63.8	-51.1	(-59.9)	107.2	(225)	40.6	1.4008
65.0	65.0	69.1	69.1	b	b	108.3	(227)	42.1	1.4058
70.0	70.0	74.5	74.5	b	b	110.0	(230)	44.1	1.4104
75.0	75.0	79.8	79.8	b	b	113.9	(237)	46.1	1.4150
80.0	80.0	85.1	85.1	b	b	118.3	(245)	48.0	1.4193
85.0	85.0	90.4	90.4	b	b	125.0	(257)	50.0	1.4235
90.0	90.0	95.7	95.7	b	b	132.2	(270)	51.4	1.4275
95.0	95.0	a	a	b	b	154.4	(310)	52.8	1.4315

<sup>a</sup>Propylene glycol concentrations greater than 94% are not attainable with DOWFROST™ HD Heat Transfer Fluid.

<sup>b</sup>Freezing points are below -50°C (-60°F).

## Saturation Properties of DOWFROST™ HD Heat Transfer Fluid at 30% Propylene Glycol Concentration by Volume

Temperature		Specific Heat		Density		Therm. Cond.		Viscosity	
°C	(°F)	kJ/(kg)(K) (Btu/lb. °F)		kg/m <sup>3</sup> (lb./ft. <sup>3</sup> )		W/mK [Btu/hr. ft. <sup>2</sup> (°F/ft.)]		mPa·s (cps)	
10	(50)	3.756	(0.898)	1043.85	(65.17)	0.4344	(0.2510)	4.5068	(4.51)
40	(104)	3.841	(0.918)	1029.85	(64.29)	0.4622	(0.2670)	1.6295	(1.63)
65	(149)	3.913	(0.935)	1014.87	(63.36)	0.4771	(0.2757)	0.9144	(0.91)
90	(194)	3.984	(0.952)	996.86	(62.23)	0.4846	(0.2800)	0.6040	(0.60)
120	(248)	4.070	(0.973)	971.26	(60.63)	0.4838	(0.2795)	0.4246	(0.42)

## Saturation Properties of DOWFROST™ HD Heat Transfer Fluid at 40% Propylene Glycol Concentration by Volume

Temperature		Specific Heat		Density		Therm. Cond.		Viscosity	
°C	(°F)	kJ/(kg)(K) (Btu/lb. °F)		kg/m <sup>3</sup> (lb./ft. <sup>3</sup> )		W/mK [Btu/hr. ft. <sup>2</sup> (°F/ft.)]		mPa·s (cps)	
-20	(-4)	3.453	(0.825)	1066.76	(66.60)	0.3635	(0.2100)	48.9043	(48.90)
10	(50)	3.564	(0.852)	1055.38	(65.89)	0.3936	(0.2274)	7.2173	(7.22)
40	(104)	3.675	(0.878)	1039.77	(64.91)	0.4150	(0.2398)	2.2389	(2.24)
65	(149)	3.767	(0.900)	1023.55	(63.90)	0.4262	(0.2463)	1.1762	(1.18)
90	(194)	3.859	(0.922)	1004.39	(62.70)	0.4313	(0.2492)	0.7462	(0.75)
120	(248)	3.970	(0.949)	977.53	(61.03)	0.4294	(0.2481)	0.5084	(0.51)

## Saturation Properties of DOWFROST™ HD Heat Transfer Fluid at 50% Propylene Glycol Concentration by Volume

Temperature		Specific Heat		Density		Therm. Cond.		Viscosity	
°C	(°F)	kJ/(kg)(K) (Btu/lb. °F)		kg/m <sup>3</sup> (lb./ft. <sup>3</sup> )		W/mK [Btu/hr. ft. <sup>2</sup> (°F/ft.)]		mPa·s (cps)	
-30	(-22)	3.165	(0.756)	1081.98	(67.55)	0.3246	(0.1875)	172.8273	(172.83)
-20	(-4)	3.210	(0.767)	1078.51	(67.33)	0.3336	(0.1917)	73.0193	(73.02)
10	(50)	3.346	(0.800)	1065.40	(66.51)	0.3560	(0.2057)	10.6481	(10.65)
40	(104)	2.481	(0.832)	1048.23	(65.44)	0.3716	(0.2147)	3.1103	(3.11)
65	(149)	3.564	(0.859)	1030.83	(64.35)	0.3792	(0.2191)	1.5483	(1.55)
90	(194)	3.707	(0.886)	1010.61	(63.09)	0.3821	(0.2208)	0.9339	(0.93)
120	(248)	3.843	(0.919)	982.63	(61.34)	0.3792	(0.2191)	0.6029	(0.60)

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