Technical Data Sheet

DOWFROST™ LC Heat Transfer Fluid

Product Type

Inhibited propylene glycol-based heat transfer fluid.

Application

Heat management and corrosion protection in datacenter direct-to-chip liquid cooling applications.

Recommended Use Temperature Range

0°F[1](-20°C) to 195°F (90°C)
[1]Lowest operating temperature is normally considered ~0°F (-20°C) due to the viscosity increase at this temperature. Freeze protection down to 14°F (-10°C) can be achieved using DOWFROST™ LC 25 Heat Transfer Fluid or down to -40°F (-40°C) using DOWFROST™ LC 55 Heat Transfer Fluid.

Description

With continual advancements of micro-processor technology, leading to increasingly higher heat loads, DOWFROST™ LC Heat Transfer Fluid is the optimal fluid for efficient heat removal in Datacom Equipment Cooling Systems (DECS). With a customized inhibitor package, DOWFROST™ LC Heat Transfer Fluid provides superior corrosion protection for liquid cooled, direct-to-chip applications with high surface area copper components.

Typical Product Specifications[1] of DOWFROST™ LC Heat Transfer Fluids

Fluid Parameter	Units	DOWFROST™ LC 25 Heat Transfer Fluid (PG25)	DOWFROST™ LC 55 Heat Transfer Fluid (PG55)
Propylene Glycol Concentration	Volume %	25	55
Freezing Point	°F	14	-40
	°C	-10	-40
pH		8.0–10.5	8.0–10.5
Reserve Alkalinity	mL 0.1N HCl	> 6.0	> 6.0
Thermal Conductivity	W/mK at 50°C	0.485	0.336
Specific Heat	kJ/kg-K at 50°C	3.94	3.43
Viscosity	mPa sec at 20°C	2.8	8.8
	mPa sec at 50°C	1.3	2.9
Volume Expansion	% from -40 to 90°C	5.2	7.7
Boiling Point	°C at 760 mmHg	101.4	105
Electrical Conductivity	micromho/cm	> 2,000	> 2,000

1. Typical properties, not the be construed as specifications.

Freezing Point[1] of DOWFROST™ LC Heat Transfer Fluid based on Glycol Concentration and Refractive Index[1]

The propylene glycol concentration and, therefore, freezing point can be determined by measuring refractive index and consulting the table below. DOWFROST™ LC 25 Heat Transfer Fluid contains 25% propylene glycol, by volume, while DOWFROST™ LC 55 Heat Transfer Fluid contains 55% propylene glycol, by volume. Fluids should be used as-is and not further diluted.

Freezing Point		Propylene Glycol		Refractive Index	
°F	°C	Weight %	Volume %	20°C	25°C
15.6	-9.1	24.0	23.5	1.3622	1.3613
14.7	-9.6	25.0	24.5	1.3634	1.3625
13.7	-10.2	26.0	25.5	1.3646	1.3637
12.6	-10.8	27.0	26.5	1.3658	1.3649
11.5	-11.4	28.0	27.5	1.3670	1.3661
Freezing Point		**Propylene Glycol**		**Refractive Index**	
°F	**°C**	**Weight %**	**Volume %**	**20°C**	**25°C**
-36.7	-38.2	53.0	52.8	1.3949	1.3936
-39.7	-39.8	54.0	53.8	1.3960	1.3947
-42.8	-41.6	55.0	54.8	1.3971	1.3957
-46	-43.3	56.0	55.9	1.3982	1.3968
-49.3	-45.2	57.0	56.9	1.3993	1.3979

1. Typical properties, not the be construed as specifications.

Physical Properties[1] of DOWFROST™ LC 25 Heat Transfer Fluid

Temperature °C	Density kg/m^3	Specific Heat kJ/kg K	Thermal Conductivity W/mK	Viscosity mPa sec	Vapor Pressure kPa
-5	1041.9	3.81	0.425	7.80	0.004
0	1040.5	3.82	0.432	6.32	0.006
5	1038.8	3.83	0.438	5.13	0.009
10	1036.9	3.84	0.444	4.17	0.012
15	1034.9	3.85	0.450	3.42	0.017
20	1032.7	3.87	0.456	2.84	0.023
25	1030.3	3.88	0.462	2.39	0.031
30	1027.8	3.89	0.467	2.05	0.042
35	1025.2	3.90	0.472	1.78	0.055
40	1022.5	3.92	0.476	1.58	0.072
45	1019.7	3.93	0.481	1.41	0.093

1. Typical properties, not the be construed as specifications.

Physical Properties of DOWFROST™ LC 25 Heat Transfer Fluid (Cont.)

Temperature °C	Density kg/m³	Specific Heat kJ/kg K	Thermal Conductivity W/mK	Viscosity mPa sec	Vapor Pressure kPa
50	1016.8	3.94	0.485	1.27	0.119
55	1013.7	3.95	0.488	1.15	0.152
60	1010.6	3.97	0.492	1.04	0.191
65	1007.3	3.98	0.495	0.93	0.239
70	1003.9	3.99	0.497	0.83	0.297
75	1000.4	4.00	0.500	0.75	0.367
80	996.7	4.01	0.502	0.69	0.450

Physical Properties[1] of DOWFROST™ LC 55 Heat Transfer Fluid

Temperature °C	Density kg/m³	Specific Heat kJ/kg K	Thermal Conductivity W/mK	Viscosity mPa sec	Vapor Pressure kPa
-40	1085.9	2.98	0.280	1413.58	
-35	1083.9	3.01	0.283	703.58	
-30	1081.9	3.03	0.287	376.40	
-25	1079.8	3.06	0.291	214.54	0.001
-20	1077.5	3.08	0.294	129.29	0.001
-15	1075.1	3.11	0.298	81.85	0.002
-10	1072.7	3.13	0.302	54.11	0.002
-5	1070.1	3.16	0.305	37.18	0.004
0	1067.4	3.18	0.309	26.42	0.005
5	1064.7	3.21	0.312	19.36	0.007
10	1061.8	3.23	0.315	14.57	0.010
15	1058.8	3.26	0.318	11.23	0.015
20	1055.7	3.28	0.321	8.84	0.020
25	1052.5	3.30	0.324	7.09	0.027
30	1049.2	3.33	0.327	5.79	0.036
35	1045.8	3.35	0.329	4.80	0.048
40	1042.2	3.38	0.332	4.03	0.062
45	1038.6	3.40	0.334	3.43	0.081
50	1034.9	3.43	0.336	2.95	0.104
55	1031	3.45	0.338	2.56	0.132
60	1027.1	3.48	0.339	2.24	0.167

1. Typical properties, not the be construed as specifications.

Physical Properties of DOWFROST™ LC 55 Heat Transfer Fluid (Cont.)

Temperature °C	Density kg/m^3	Specific Heat kJ/kg K	Thermal Conductivity W/mK	Viscosity mPa sec	Vapor Pressure kPa
65	1023	3.50	0.341	1.98	0.209
70	1018.9	3.53	0.342	1.76	0.260
75	1014.6	3.55	0.343	1.58	0.320
80	1010.2	3.58	0.344	1.42	0.395

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