Pub. No. 7239171
Version C

D-12

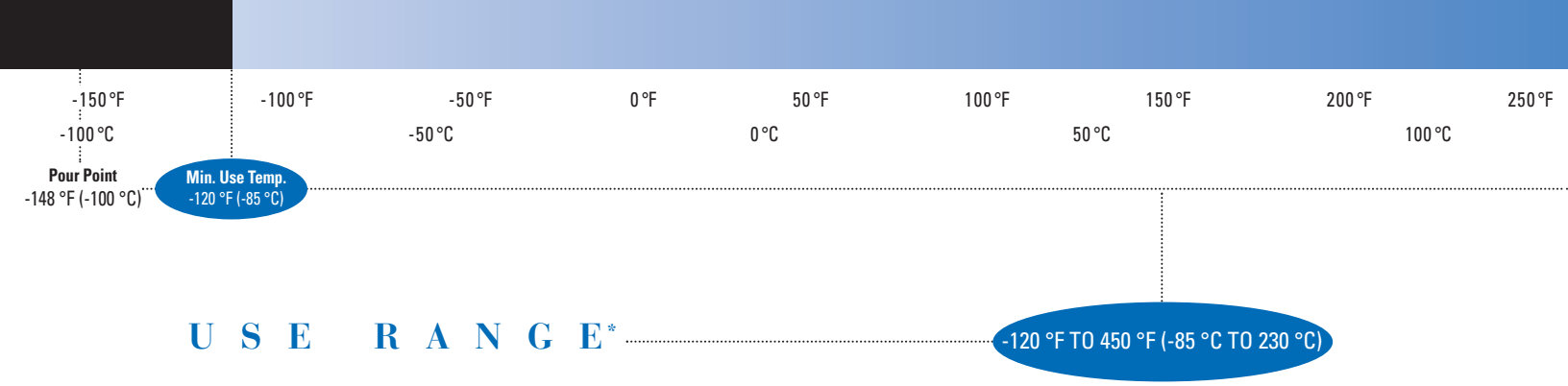
THERMINOL® D-12

Heat Transfer Fluid by **Solutia**

Low Odor, FDA Grade, Cooling/Heating Fluid

-120 °F to 450 °F

+400 °C
+700 °F
+350 °C
+600 °F
+300 °C
+500 °F
+250 °C
+400 °F
+200 °C
+150 °C +300 °F
+100 °C
+200 °F
+50 °C
+100 °F
0 °C
0 °F
-50 °C
-100 °F



USE RANGE*

-120 °F TO 450 °F (-85 °C TO 230 °C)

Therminol® D-12 is a liquid phase heat transfer fluid with excellent heat transfer properties over a wide temperature range. This fluid is ideally suited for applications of both efficient cooling and heating between -50 °F and 450 °F. Therminol D-12 also may be used as a secondary coolant or "brine" in refrigeration loops where a broad range of properties is desired.

Therminol D-12 is especially suited to the above applications where a low order of acute toxicity and odor are desired. This product meets the requirements established by the FDA at 21 CFR 172.882, 172.884, 178.3530 and 178.3650. For complete information regarding the safety of Therminol D-12, please consult the Material Safety Data Sheet.

THERMINOL® D-12

Heat Transfer Fluid by **Solutia**

Therminol D-12 is not classified as a fire-resistant heat transfer fluid. The use of protective devices may be required to minimize fire risk. The insurer of your property should be consulted relative to this matter.

To minimize fluid oxidation, Therminol D-12 should be blanketed with an inert atmosphere. A system pressure relief valve also should be provided.

Therminol D-12 generally is not corrosive to nor affected by metals and alloys commonly used in heat transfer systems.

The maximum bulk and film operating temperatures are based on thermal studies and the autoignition temperature of the fluid. These temperature maximums provide long service life under most operating conditions. Actual fluid life is quite dependent on system design and operation.

D-12

PROPERTIES OF THERMINOL D-12® HEATING FLUID*†

Temperature		Liquid Density			Liquid Heat Capacity		Liquid Enthalpy**		Liquid Thermal Conductivity		
°F	°C	lb/gal	lb/ft³	kg/m³	Btu/ (lb. °F)	kJ/ (kg·K)	Btu/lb	kJ/kg	Btu/ (h·ft· °F)	kcal/ (h·m· °C)	W/(m·K)
-120	-84	6.97	52.1	835	0.405	1.70	-52.2	-121.4	0.0719	0.1070	0.1243
-100	-73	6.90	51.6	827	0.415	1.74	-44.0	-102.3	0.0711	0.1058	0.1230
-80	-62	6.84	51.2	820	0.425	1.78	-36.0	-82.8	0.0703	0.1046	0.1216
-60	-51	6.78	50.7	812	0.435	1.82	-27.0	-62.8	0.0694	0.1034	0.1201
-40	-40	6.71	50.2	805	0.445	1.86	-18.2	-42.3	0.0686	0.1021	0.1186
-20	-29	6.65	49.7	797	0.455	1.90	-9.2	-21.4	0.0677	0.1008	0.1171
0	-18	6.59	49.3	789	0.465	1.95	0.0	0.0	0.0668	0.0994	0.1156
20	-7	6.52	48.8	781	0.476	1.99	9.4	21.8	0.0659	0.0981	0.1140
40	4	6.46	48.3	774	0.486	2.03	19.0	44.2	0.0650	0.0967	0.1123
60	16	6.39	47.8	766	0.496	2.08	28.8	67.0	0.0640	0.0952	0.1107
80	27	6.32	47.3	758	0.506	2.12	38.9	90.3	0.0630	0.0937	0.1089
100	38	6.26	46.8	750	0.517	2.16	49.1	114.1	0.0620	0.0922	0.1072
120	49	6.19	46.3	741	0.528	2.21	59.5	138.4	0.0609	0.0907	0.1054
140	60	6.12	45.8	733	0.538	2.25	70.2	163.1	0.0599	0.0891	0.1035
160	71	6.05	45.2	725	0.549	2.30	81.1	188.4	0.0588	0.0875	0.1017
180	82	5.98	44.7	716	0.560	2.34	92.1	214.2	0.0577	0.0858	0.0997
200	93	5.91	44.2	708	0.570	2.39	103.4	240.4	0.0565	0.0841	0.0978
220	104	5.83	43.6	699	0.581	2.43	115.0	267.2	0.0554	0.0824	0.0958
240	116	5.76	43.1	690	0.592	2.48	126.7	294.5	0.0542	0.0807	0.0938
260	127	5.68	42.5	681	0.603	2.52	138.6	322.2	0.0530	0.0789	0.0917
280	138	5.61	41.9	672	0.614	2.57	150.8	350.6	0.0518	0.0771	0.0896
300	149	5.53	41.4	662	0.628	2.62	163.2	379.4	0.0505	0.0752	0.0874
320	160	5.45	40.7	653	0.637	2.67	175.9	408.7	0.0493	0.0733	0.0852
340	171	5.36	40.1	643	0.649	2.71	188.7	438.6	0.0480	0.0714	0.0830
360	182	5.28	39.5	633	0.660	2.76	201.8	469.0	0.0467	0.0694	0.0807
378	192	5.20	38.9	623	0.671	2.81	213.6	496.4	0.0455	0.0677	0.0786
380	193	5.19	38.8	622	0.672	2.81	215.1	500.0	0.0453	0.0674	0.0784
400	204	5.10	38.1	611	0.684	2.86	228.7	531.5	0.0440	0.0654	0.0760
420	216	5.01	37.4	600	0.696	2.91	242.5	563.6	0.0426	0.0634	0.0736
440	227	4.91	36.7	588	0.709	2.97	256.6	596.3	0.0412	0.0613	0.0712
450	232	4.86	36.3	582	0.716	2.99	263.7	612.9	0.0404	0.0602	0.0700
460	238	4.80	35.9	576	0.722	3.02	270.9	629.6	0.0397	0.0591	0.0687
480	249	4.70	35.1	563	0.736	3.08	285.4	663.4	0.0383	0.0570	0.0662

* Maximum recommended bulk temperature 450 °F (230 °C).
† These data are based upon samples tested in the laboratory and are not guaranteed for all samples. Write us for complete sales specifications for Therminol D-12 fluid.
** The liquid enthalpy basis is zero at 0 °F.

Liquid Viscosity			Vapor Pressure			
lb/ (ft·h)	cSt [mm²/s]	cP [mPa·s]	psia	mmHg	kgf/cm²	kPa
799	396	330				
193	96.3	79.7				
68.0	34.3	28.1				
31.1	15.8	12.9				
17.1	8.77	7.06				
10.7	5.53	4.41				
7.30	3.82	3.02	0.0002	0.013	0.00002	0.002
5.35	2.83	2.23	0.0008	0.043	0.00006	0.006
4.13	2.21	1.71	0.0024	0.125	0.00017	0.017
3.30	1.78	1.37	0.0063	0.327	0.00044	0.044
2.72	1.49	1.13	0.0149	0.772	0.00105	0.103
2.29	1.26	0.948	0.0324	1.68	0.00228	0.224
1.96	1.10	0.812	0.0656	3.39	0.00461	0.452
1.71	0.961	0.705	0.125	6.45	0.00876	0.859
1.50	0.853	0.618	0.224	11.6	0.0158	1.55
1.32	0.764	0.547	0.384	19.9	0.0270	2.65
1.18	0.689	0.488	0.632	32.7	0.0444	4.36
1.06	0.625	0.437	1.00	51.7	0.0703	6.90
0.952	0.570	0.393	1.53	79.2	0.108	10.6
0.860	0.522	0.356	2.28	118	0.160	15.7
0.780	0.480	0.322	3.29	170	0.232	22.7
0.709	0.443	0.293	4.65	241	0.327	32.1
0.646	0.409	0.267	6.43	332	0.452	44.3
0.591	0.380	0.244	8.70	450	0.612	60.0
0.541	0.353	0.224	11.6	599	0.814	79.8
0.501	0.332	0.207	14.7	760	1.03	101
0.496	0.329	0.205	15.1	783	1.07	104
0.455	0.308	0.188	19.5	1010	1.37	135
0.419	0.289	0.173	24.8	1280	1.74	171
0.386	0.271	0.159	31.1	1610	2.19	215
0.370	0.263	0.153	34.7	1800	2.44	239
0.356	0.255	0.147	38.6	2000	2.71	266
0.328	0.241	0.136	47.4	2450	3.33	327

TECHNICAL ASSISTANCE WHEN YOU NEED IT: 1-800-433-6997

With Solutia, technical guidance is only a phone call away. Any time during the normal business day, we'll answer questions about heat transfer fluids, system start-ups, proper fluid selection, general trouble-shooting and similar matters. Solutia specialists also are available to assist you on-site at your plant and will even conduct operation and safety seminars.

FREE SAMPLE KIT SERVICE

Our free fluid sampling kit is the easiest way ever to take a fluid sample and get it analyzed by Solutia. Each kit contains an aluminum sample bottle, instructions, a system description form, a handy pre-addressed mailer and an order form for more free kits.

A FLUID TESTING PROGRAM THAT TELLS A LOT MORE AT NO EXTRA COST

At Solutia, we routinely do testing that tells you far more than whether your fluid is "good" or "bad." Instead, we give you detailed analyses so you can quickly trouble-shoot system problems, extend your fluid life, and improve your overall system performance. We even track the ongoing performance of your system over time with data stored in our technical service data base. Our routine fluid analysis includes:

Total Acid Number

To measure the degree of oxidation or possible contamination of a fluid.

Moisture Content

To identify system component failures and to specify corrective action.

Acetone Insoluble Solids

To identify contamination, solids build-up or severe oxidation.

Viscosity Measurement

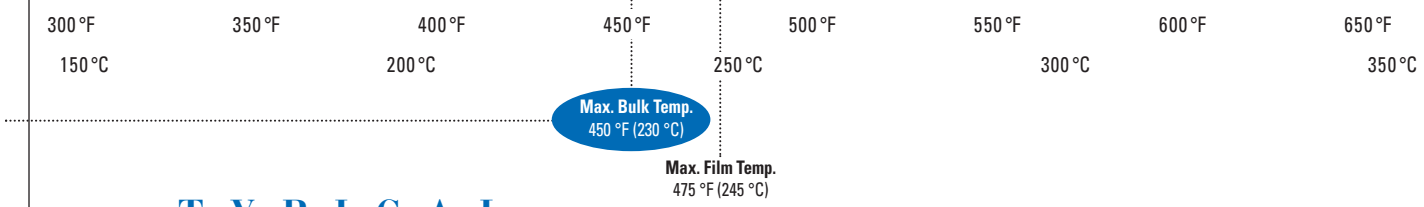
To pinpoint viscosity changes that can impact heat transfer efficiency.

Low Boilers and High Boilers

To measure the degree of thermal degradation, to determine fitness for use and remaining fluid life, and to identify potential corrective action.

Special Tests

Solids analysis, fluid compatibility, material compatibility and others as required. Free fluid analysis is routinely completed within three weeks of sample receipt. In an emergency, analysis can be provided within 48 hours.



TYPICAL PROPERTIES*†

Appearance	Clear, water-white liquid
Composition	Synthetic hydrocarbons
Moisture Content, Maximum	80 ppm
Chlorine	< 10 ppm
Sulfur	< 10 ppm
Neutralization Number	< 0.2 mg KOH/g
Copper Corrosion (ASTM D-130)	<< 1 a
Color (ASTM D-156)	30
Flash Point, Closed Cup (Pensky-Martens)	59 °C (138 °F)
Fire Point (ASTM D-92)	71 °C (160 °F)
Autoignition Temperature (ASTM E-659)	247 °C (477 °F)
Kinematic Viscosity at -50 °C	14.8 mm^2/s (cSt)
at 40 °C	1.23 mm^2/s (cSt)
at 100 °C	0.65 mm^2/s (cSt)
Density at 25 °C	756 kg/m^3 (6.31 lb/gal)
Specific Gravity (60 °F/60 °F)	0.763
Coefficient of Thermal Expansion at 100 °C	0.001116/°C (0.00062/°F)
Average Molecular Weight	162
Pour Point	< -100 °C (-148 °F)
Pumpability, at 2000 mm^2/s	-94 °C (-137 °F)
at 300 mm^2/s	-82 °C (-116 °F)
Minimum Temperatures for Fully Developed Turbulent Flow, (Re = 10000):	
10 ft/sec, 1-in tube (3.048 m/s, 2.54-cm tube)	-37 °C (-35 °F)
20 ft/sec, 1-in tube (6.096 m/s, 2.54-cm tube)	-51 °C (-59 °F)
Minimum Temperatures for Transition Region Flow (Re = 2000):	
10 ft/sec, 1-in tube (3.048 m/s, 2.54-cm tube)	-64 °C (-82 °F)
20 ft/sec, 1-in tube (6.096 m/s, 2.54-cm tube)	-71 °C (-96 °F)
Boiling Range, 10%	190 °C (374 °F)
90%	204 °C (400 °F)
Normal Boiling Point	192 °C (378 °F)
Heat of Vaporization at Maximum Use Temperature 230 °C	198 kJ/kg (85.2 Btu/lb)
Maximum Film Temperature	245 °C (475 °F)
Pseudocritical Temperature	360 °C (680 °F)
Pseudocritical Pressure	16.2 bar (235 psia)
Pseudocritical Density	229 kg/m^3 (14.1 lb/ft^3)

* These data are based upon samples tested in the laboratory and are not guaranteed for all samples. Write us for complete sales specifications for Therminol D-12 heat transfer fluid.

† Does not constitute an express warranty. See NOTICE on the back page of this bulletin.

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For technical assistance
Please call our Technical Service Hotline, toll free at (800) 433-6997.

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Visit our Web site at
www.therminol.com.

SAFETY AND HANDLING: Material Safety Data Sheets may be obtained from Environmental Operations, Industrial Products Group, Solutia Inc. Heat transfer fluids are intended only for indirect heating purposes. Under no circumstances should this product contact or in any way contaminate food, animal feed, food products, food packaging materials, food chemicals, pharmaceuticals or any items which may directly or indirectly be ultimately ingested by humans. Any contact may contaminate these items to the extent that their destruction may be required. Precautions against ignitions and fires should be taken with this product.

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