

# THERMINOL<sup>®</sup> VLT

heat transfer fluid

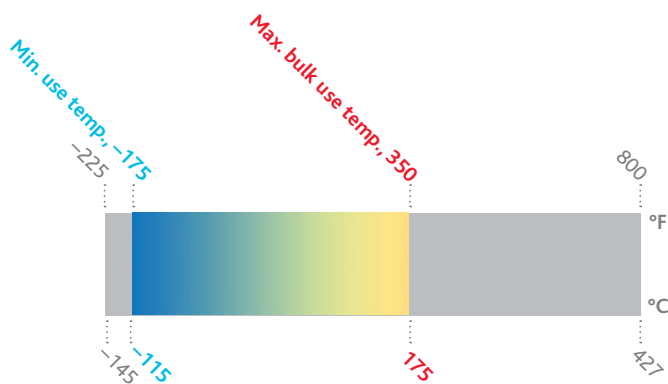
Very low-temperature  
coolant for single-fluid  
heating and cooling systems

**-115° to 175°C**  
(-175° to 350°F)

**THERMINOL.**  
Heat Transfer Fluids by Eastman

# THERMINOL<sup>®</sup> VLT

heat transfer fluid



Eastman Therminol<sup>®</sup> VLT heat transfer fluid is a uniquely formulated liquid phase fluid with excellent heat transfer and fluid properties for use in extremely low-temperature applications. This fluid offers exceptional low-temperature pumpability and thermal stability and is ideally suited for single-fluid heating and cooling systems between  $-115^{\circ}\text{C}$  ( $-175^{\circ}\text{F}$ ) and  $175^{\circ}\text{C}$  ( $350^{\circ}\text{F}$ ).

Therminol VLT is available globally. Contact your local Eastman Therminol sales representative for more information.

## Physical and chemical characteristics

Therminol VLT fluid is designed for use in medium-pressure indirect heating systems. While Therminol VLT has a relatively high normal boiling point ( $99^{\circ}\text{C}/211^{\circ}\text{F}$ ), the recommended maximum bulk ( $175^{\circ}\text{C}/350^{\circ}\text{F}$ ) and film ( $210^{\circ}\text{C}/410^{\circ}\text{F}$ ) temperatures are greater. Therefore, proper care should be taken in the design of the system to minimize leakage, especially when operating above a bulk fluid temperature of  $99^{\circ}\text{C}$  ( $211^{\circ}\text{F}$ ).

The recommended maximum bulk and film temperatures for Therminol VLT are based on industry-standard thermal studies and typical limitations of system equipment. Operation at or below these temperature maximums can provide long service life under most operating conditions.

Actual fluid life is dependent on the total system design and operation and can vary by heat transfer fluid chemistry. As fluid ages, the formation of low- and high-boiling compounds may result. Low-boiling compounds should be vented from the system as necessary to a safe location away from personnel and sources of ignition and in compliance with applicable regulations and laws. Significant overheating or fluid contamination will accelerate decomposition and may result in increased high-boiler and solids concentrations. Excess solids can typically be filtered for removal.

Eastman recommends that systems utilizing Therminol VLT fluid should be blanketed with an atmosphere of inert gas to protect against the effects of fluid oxidation on its performance and life expectancy. Pressure relief device(s) should be installed where required.

Therminol VLT is noncorrosive to metals commonly used in the construction of low-temperature heat transfer systems.

With a closed-cup flash point of  $-7^{\circ}\text{C}$  ( $20^{\circ}\text{F}$ ), Therminol VLT is a Class I flammable liquid under the definitions of the NFPA (National Fire Protection Association). Consequently, the use of protective devices may be required to minimize fire risk and users of Therminol VLT should check with their safety and risk management experts for specific instructions.

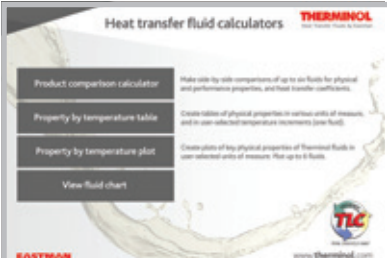
Therminol VLT is not listed as reportable under SARA Title III, Section 313. The fluid is water-white and has a characteristic hydrocarbon odor.



## Typical properties<sup>a</sup>

Appearance	Water-white liquid
Composition	Methylcyclohexane/trimethylpentane mixture
Maximum bulk temperature	175°C (350°F)
Maximum film temperature	210°C (410°F)
Normal boiling point	99°C (211°F)
Pumpability, at 300 mm <sup>2</sup> /s (cSt)	-126°C (-195°F)
Pumpability, at 2000 mm <sup>2</sup> /s (cSt)	-135°C (-211°F)
Cloud point	-135°C (-211°F)
Autoignition temperature (ASTM E-659)	264°C (507°F)
Autoignition temperature (DIN 51794)	294°C (562°F)
Pour point (ASTM D-97)	< -135°C (-211°F)
Minimum liquid temperatures for fully developed turbulent flow ( $N_{Re} > 10,000$ )	
10 ft/s, 1-in. tube (3.048 m/s, 2.54-cm tube)	-76°C (-105°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	-93°C (-135°F)
Minimum liquid temperatures for transitional region flow ( $N_{Re} > 2000$ )	
10 ft/s, 1-in. tube (3.048 m/s, 2.54-cm tube)	-108°C (-163°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	-118°C (-180°F)
Coefficient of thermal expansion at 200°C	0.00142/°C (0.000786/°F)
Heat of vaporization at maximum use temperature	252.3 kJ/kg (108.6 Btu/lb)
Total acidity (ASTM D-664)	<0.2 mg KOH/g
Average molecular weight	102
Pseudocritical temperature	299°C (570°F)
Pseudocritical pressure	35.0 bar (521.7 psia)
Pseudocritical density	267.80 kg/m <sup>3</sup> (16.72 lb/ft <sup>3</sup> )
Copper corrosion (ASTM D-130)	<<1a
Moisture content, maximum (ASTM E-203)	80 ppm
Dielectric constant @ 23°C (ASTM D-924)	1.99

<sup>a</sup>These data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications for Therminol VLT fluid. Does not constitute an express warranty. See disclaimer on the back page of this bulletin.



### To create your own customized table

with preferred properties, units of measure,  
and temperature intervals, visit

[www.therminol.com/resources](http://www.therminol.com/resources)

and download the Therminol heat transfer fluid calculator.

**For the technical service contact in your region,  
visit the CONTACT US page on our website, [www.therminol.com](http://www.therminol.com).**

# Liquid properties of Therminol® VLT heat transfer fluid by temperature<sup>a</sup> (SI units)

Temperature		Liquid density	Liquid heat capacity	Heat of vaporization	Liquid enthalpy <sup>b</sup>	Liquid thermal conductivity	Liquid viscosity <sup>c</sup>		Vapor pressure <sup>d</sup>
°C	°F	kg/m <sup>3</sup>	kJ/(kg·K)	kJ/kg	kJ/kg	W/(m·K)	cP (mPa·s)	cSt (mm <sup>2</sup> /s)	kPa
-135	-211	878	1.29	424.3	-22.8	0.1341	355	404	—
-130	-202	874	1.31	422.1	-16.3	0.1332	193	220	—
-120	-184	866	1.35	417.5	-3.0	0.1313	69.5	80.3	—
-110	-166	857	1.40	412.8	10.7	0.1294	31.0	36.1	—
-100	-148	849	1.44	408.1	24.9	0.1276	16.2	19.0	—
-90	-130	841	1.48	403.3	39.5	0.1257	9.49	11.3	—
-80	-112	833	1.53	398.4	54.6	0.1238	6.10	7.32	0.002
-70	-94	824	1.57	393.5	70.1	0.1218	4.20	5.10	0.006
-60	-76	816	1.62	388.6	86.1	0.1199	3.06	3.75	0.018
-50	-58	808	1.66	383.6	102.4	0.1179	2.32	2.88	0.049
-40	-40	799	1.70	378.6	119.2	0.1159	1.83	2.28	0.119
-30	-22	791	1.74	373.6	136.5	0.1139	1.48	1.87	0.264
-20	-4	783	1.79	368.5	154.1	0.1119	1.22	1.56	0.542
-10	14	774	1.83	363.4	172.2	0.1098	1.03	1.32	1.04
0	32	766	1.87	358.2	190.7	0.1078	0.876	1.14	1.90
10	50	757	1.91	353.1	209.6	0.1057	0.757	1.000	3.29
20	68	748	1.96	347.9	229.0	0.1036	0.661	0.883	5.45
30	86	740	2.00	342.6	248.7	0.1014	0.582	0.786	8.70
40	104	731	2.04	337.3	268.9	0.0993	0.516	0.705	13.4
50	122	722	2.08	331.9	289.5	0.0971	0.460	0.637	20.0
60	140	713	2.12	326.5	310.5	0.0949	0.412	0.578	29.1
70	158	704	2.16	320.9	331.9	0.0926	0.371	0.527	41.3
80	176	695	2.20	315.3	353.8	0.0903	0.336	0.483	57.2
90	194	686	2.25	309.6	376.0	0.0880	0.304	0.444	77.8
100	212	676	2.29	303.7	398.7	0.0856	0.277	0.409	104
110	230	666	2.33	297.7	421.7	0.0832	0.252	0.378	136
120	248	657	2.37	291.6	445.2	0.0808	0.230	0.351	176
130	266	646	2.41	285.2	469.1	0.0783	0.211	0.326	224
140	284	636	2.45	278.7	493.5	0.0758	0.193	0.304	281
150	302	626	2.50	271.9	518.2	0.0732	0.177	0.283	349
160	320	615	2.54	264.8	543.4	0.0706	0.163	0.265	429
170	338	603	2.59	257.5	569.1	0.0679	0.150	0.249	521
180	356	592	2.63	249.8	595.2	0.0651	0.138	0.234	628

<sup>a</sup>Maximum recommended bulk temperature 175°C (350°F). These data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications for Therminol VLT fluid. <sup>b</sup>Liquid enthalpy basis is -117.8°C (-180°F). <sup>c</sup>1 cSt = 1 mm<sup>2</sup>/s and 1 mPa·s = 1 cP. <sup>d</sup>100 kPa = 1 bar.

## Liquid properties of Therminol® VLT heat transfer fluid by temperature<sup>a</sup> (English units)

Temperature		Liquid density		Liquid heat capacity	Heat of vaporization	Liquid enthalpy <sup>b</sup>	Liquid thermal conductivity	Liquid viscosity <sup>c</sup>		Vapor pressure <sup>d</sup>
°F	°C	lb/gal	lb/ft <sup>3</sup>	Btu/(lb·°F)	Btu/lb	Btu/lb	Btu/(ft·h·°F)	lb/(ft·h)	cSt (mm <sup>2</sup> /s)	psia
-211	-135	7.33	54.8	0.307	182.6	-9.8	0.0775	859	404	—
-200	-129	7.29	54.5	0.314	181.4	-6.4	0.0769	411	195	—
-180	-118	7.21	53.9	0.326	179.2	0.0	0.0757	138	66.2	—
-160	-107	7.13	53.4	0.337	176.9	6.6	0.0745	59.4	28.7	—
-140	-96	7.06	52.8	0.349	174.6	13.5	0.0733	30.5	14.9	—
-120	-84	6.98	52.2	0.361	172.3	20.6	0.0720	17.8	8.79	—
-100	-73	6.90	51.6	0.372	170.0	27.9	0.0708	11.4	5.71	0.001
-80	-62	6.83	51.1	0.384	167.6	35.5	0.0696	7.91	4.00	0.002
-60	-51	6.75	50.5	0.395	165.3	43.3	0.0683	5.78	2.96	0.006
-40	-40	6.67	49.9	0.407	162.9	51.3	0.0670	4.42	2.28	0.017
-20	-29	6.59	49.3	0.418	160.5	59.5	0.0657	3.49	1.83	0.042
0	-18	6.52	48.7	0.429	158.0	68.0	0.0644	2.83	1.50	0.091
20	-7	6.44	48.1	0.441	155.6	76.7	0.0631	2.35	1.26	0.186
40	4	6.36	47.6	0.452	153.1	85.6	0.0618	1.98	1.08	0.354
60	16	6.28	47.0	0.463	150.6	94.8	0.0604	1.70	0.932	0.635
80	27	6.20	46.4	0.474	148.1	104.2	0.0591	1.47	0.816	1.08
100	38	6.12	45.8	0.485	145.6	113.7	0.0577	1.28	0.722	1.77
120	49	6.03	45.1	0.496	143.1	123.6	0.0563	1.13	0.644	2.78
140	60	5.95	44.5	0.507	140.5	133.6	0.0548	0.997	0.578	4.22
160	71	5.87	43.9	0.518	137.8	143.8	0.0534	0.888	0.522	6.22
180	82	5.78	43.2	0.529	135.1	154.3	0.0519	0.794	0.474	8.90
200	93	5.69	42.6	0.540	132.4	165.0	0.0504	0.713	0.432	12.4
220	104	5.61	41.9	0.551	129.5	175.9	0.0489	0.642	0.395	17.0
240	116	5.52	41.3	0.562	126.6	187.0	0.0474	0.580	0.363	22.8
260	127	5.42	40.6	0.573	123.6	198.4	0.0458	0.525	0.334	30.0
280	138	5.33	39.9	0.584	120.5	210.0	0.0442	0.476	0.308	38.8
300	149	5.23	39.1	0.596	117.3	221.8	0.0425	0.433	0.286	49.5
320	160	5.13	38.4	0.607	113.9	233.8	0.0408	0.394	0.265	62.2
340	171	5.03	37.6	0.619	110.4	246.1	0.0391	0.360	0.247	77.2
360	182	4.92	36.8	0.632	106.7	258.6	0.0373	0.329	0.231	94.8

# TLC Total Lifecycle Care<sup>®</sup>

## In-service heat transfer fluid sample analysis

When Therminol heat transfer fluids are used within suggested temperature limits, they may provide years of trouble-free service. To help users get maximum life, Eastman offers testing of in-service heat transfer fluids to detect contamination, moisture, thermal degradation, and other conditions that may impact system performance. This comprehensive analysis includes acid number, kinematic viscosity, insoluble solids, low boilers, high boilers, and moisture content. Additional special analyses are available on request. Sample analysis includes sample collection kits that are easy to use. Most systems should be sampled annually. Users should also sample anytime a fluid-related problem is suspected.

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Results of the test are presented in a detailed report that provides suggestions for corrective action. Test results are stored in a database for future reference. Customers can access their specific test information via [my.therminol.com](http://my.therminol.com).

## Technical service hotline

Experienced technical service specialists can help answer your questions regarding heat transfer fluid selection, system start-ups, system design, and operational issues.

## System design support

Eastman regularly assists some of the world's largest engineering, chemical, and equipment manufacturing companies on the design and operation of heat transfer systems. Our liquid phase and vapor phase design guide information and system design data have been field tested in numerous installations. Eastman also conducts engineering seminars for customers, engineering firms, and equipment manufacturers to cover a wide range of heat transfer fluid system design and operation issues. Customers can request a technical service visit to audit heat transfer systems for fluid loss and leak prevention opportunities.

## Operational training

Eastman believes that by sharing our experience with customers, we can help improve system design, promote safety, and reduce overall cost. Customers can take advantage of Eastman's heat transfer system operation and product training programs. These programs are customized to suit the varied needs of frontline technicians, operations supervisors, and maintenance technicians to design engineers. Customers can also receive training assistance for dealing with important topics like fluid safety and handling.

## Safety awareness training

At Eastman, we're "All in for Safety." We provide our customers safety awareness training that focuses on the design, start-up, operation, and maintenance of heat transfer fluid systems.

## Start-up assistance

Eastman provides start-up assistance by reviewing procedures and offering suggestions to reduce typical problems. Customers can also receive help by calling their local Eastman technical specialist or through on-site assistance.

## Flush fluid and fluid refill

Liquid phase heat transfer systems can be cleaned with Therminol<sup>®</sup> FF flushing fluid. After the system is flushed, the appropriate liquid phase Therminol heat transfer fluid can be added.

## Fluid trade-in program\*

As part of our commitment to sustainability and the environment, Eastman offers a trade-in program for used Therminol and competitive heat transfer fluids. Depending on the fluid and its condition, it may be turned in for potential credit towards the purchase of new Therminol heat transfer fluid.



\*Available in North America. Contact your local sales representative for more information.



Eastman's TLC Total Lifecycle Care<sup>®</sup> program is designed to support Therminol customers throughout their systems' life cycle. This comprehensive program includes system design support, start-up assistance, training, sample analysis, flush and refill fluids, and our fluid trade-in program. In North America, call our hotline at 1-800-433-6997 or contact your local sales or technical representative.

For more information or to find the sales or technical contact nearest you, visit the "Contact us" page on our website:  
[www.therminol.com](http://www.therminol.com).

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