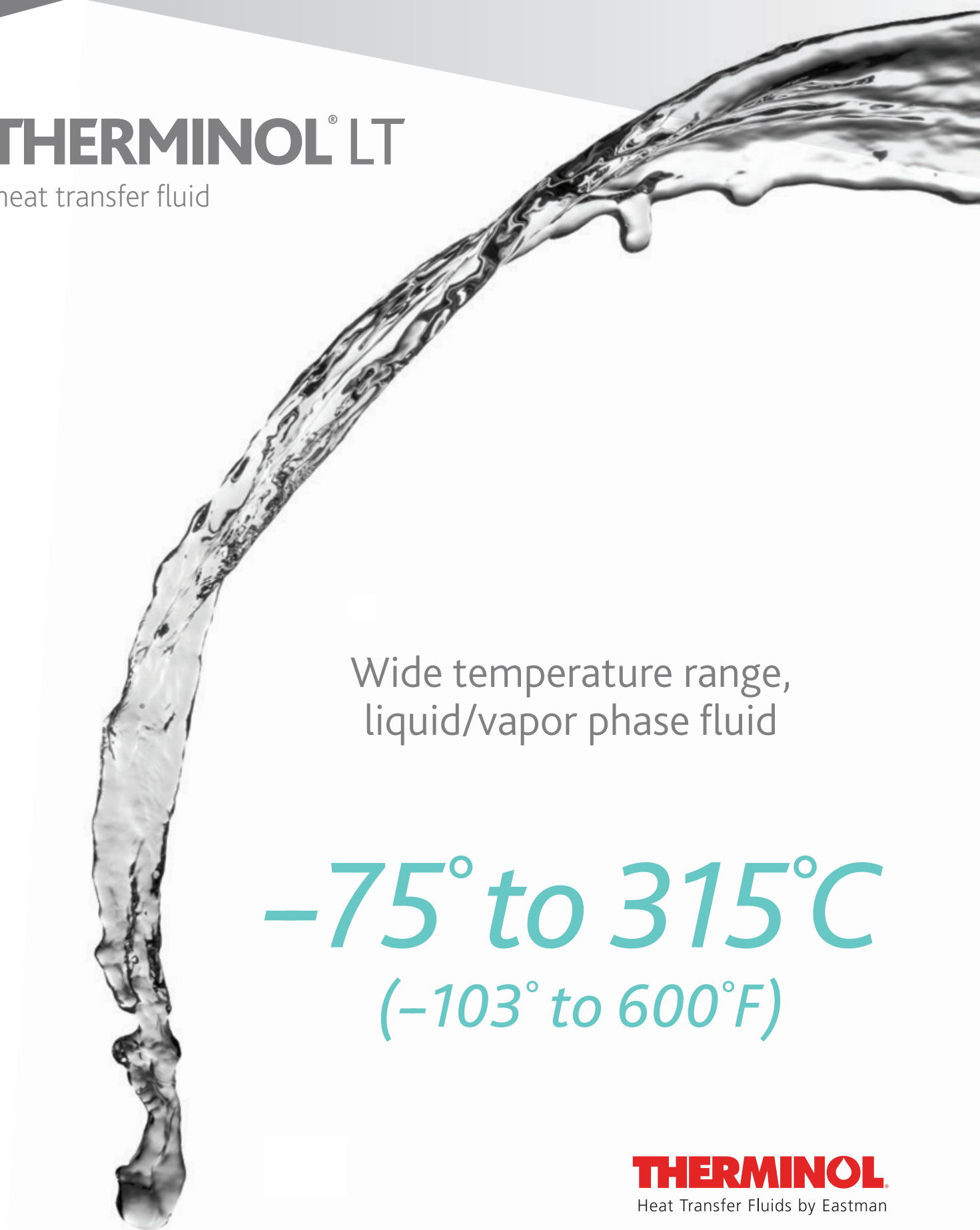
THERMINOL® LT

heat transfer fluid



Wide temperature range,
liquid/vapor phase fluid

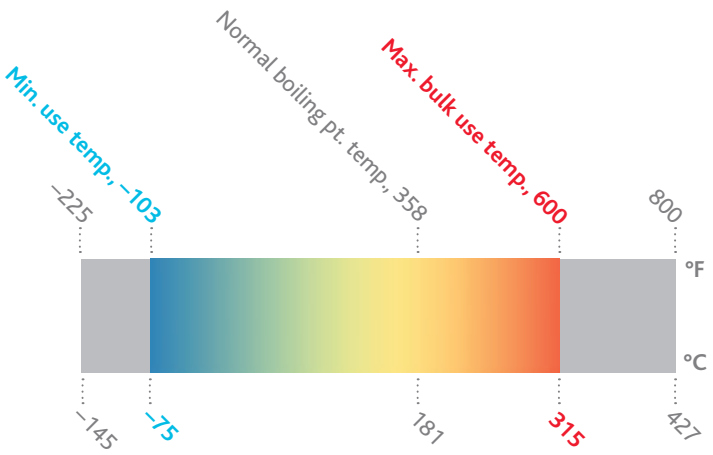
–75°C to 315°C

(–103°F to 600°F)

THERMINOL®
Heat Transfer Fluids by Eastman

THERMINOL® LT

heat transfer fluid



Eastman Therminol® LT is a synthetic aromatic heat transfer fluid. It can be used in both the liquid and vapor phase. With a boiling point of 181°C (358°F), Therminol LT can be used in the liquid phase from –75° to 181°C (–103° to 358°F) at ambient pressure or above 181°C (358°F) with system pressurization. This fluid has a flash point of 57°C (134°F) (Pensky-Martens) and appropriate fire safety should be included in system designs. Therminol LT is easily pumpable down to its minimum use temperature.

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

For more information about vapor phase system design, operation, and safety, refer to the *Vapor phase design guide* or the Therminol LT safety data sheet (SDS).

Physical and chemical characteristics

Therminol LT fluid is designed for use in nonpressurized/low-pressure indirect heating systems. While Therminol LT has a relatively high normal boiling point (181°C/358°F), the recommended maximum bulk (315°C/600°F) and film (345°C/650°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 315°C (600°F).

The recommended maximum bulk and film temperatures for Therminol LT are based on industry-standard thermal studies. 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. The high-boiling compounds can be very soluble in the fluid. 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 LT 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.

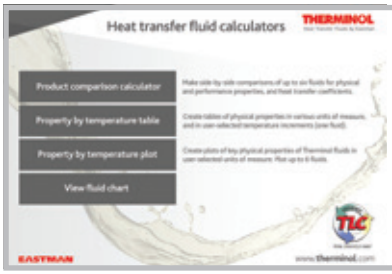
Therminol LT is noncorrosive to metals commonly used in the construction of heat transfer systems.

While Therminol LT has a relatively high flash point, it is not classified as a fire-resistant heat transfer fluid. Consequently, the use of protective devices may be required to minimize fire risk and users of Therminol LT should check with their safety and risk management experts for specific instructions.

Typical properties[a]

Appearance	Clear, light yellow liquid
Composition	Alkyl-substituted aromatic
Maximum bulk temperature	315°C (600°F)
Maximum film temperature	345°C (650°F)
Normal boiling point	181°C (358°F)
Crystallizing point	–75°C (–103°F)
Autoignition temperature (ASTM E-659)	412°C (774°F)
Autoignition temperature (DIN 51794)	429°C (804°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)	–66°C (–87°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	<–73°C (–100°F)
Minimum vapor temperatures for fully developed turbulent flow (N_{Re} > 10,000)	
10 ft/s, 1-in. tube (3.048 m/s, 2.54-cm tube)	139°C (283°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	116°C (241°F)
Coefficient of thermal expansion at 100°C	0.001080/°C (0.000600/°F)
Heat of vaporization at maximum use temperature	223 kJ/kg (95.7 Btu/lb)
Average molecular weight	134
Pseudocritical temperature	377°C (710°F)
Pseudocritical pressure	34.5 bar (500 psia)
Pseudocritical density	298 kg/m^3 (2.49 lb/ft^3)
Moisture content, maximum (ASTM E-203)	80 ppm
Surface tension in air at 25°C	28 dynes/cm
Dielectric constant @ 23°C (ASTM D-924)	2.3

[a]*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 LT 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
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.**

Liquid properties of Therminol® LT heat transfer fluid by temperature[a] (SI units)

Temperature		Liquid density	Liquid heat capacity	Heat of vaporization	Liquid enthalpy[b]	Liquid thermal conductivity	Liquid viscosity[c]		Vapor pressure[d]
°C	°F	kg/m³	kJ/(kg·K)	kJ/kg	kJ/kg	W/(m·K)	cP (mPa·s)	cSt (mm²/s)	kPa
–73	–100	938	1.44	492.7	–86.0	0.1426	10.1	10.8	—
–70	–94	936	1.45	490.4	–81.2	0.1420	8.53	9.12	—
–60	–76	928	1.49	483.7	–66.5	0.1401	5.51	5.94	—
–50	–58	920	1.53	477.1	–51.4	0.1382	3.84	4.17	—
–40	–40	913	1.57	470.4	–35.9	0.1362	2.84	3.11	—
–30	–22	905	1.61	463.8	–20.0	0.1343	2.19	2.42	0.002
–20	–4	897	1.65	457.2	–3.7	0.1324	1.75	1.95	0.005
–10	14	890	1.69	450.7	13.0	0.1305	1.43	1.61	0.012
0	32	882	1.73	444.2	30.1	0.1285	1.20	1.36	0.027
10	50	874	1.76	437.7	47.5	0.1266	1.03	1.18	0.056
20	68	866	1.80	431.3	65.3	0.1246	0.889	1.03	0.113
30	86	858	1.84	424.9	83.5	0.1227	0.779	0.909	0.215
40	104	850	1.88	418.5	102.1	0.1207	0.690	0.812	0.393
50	122	842	1.91	412.2	121.0	0.1188	0.616	0.732	0.690
60	140	833	1.95	405.9	140.3	0.1168	0.554	0.665	1.17
70	158	825	1.99	399.7	160.0	0.1148	0.501	0.607	1.91
80	176	817	2.02	393.5	180.0	0.1129	0.456	0.558	3.05
90	194	808	2.06	387.3	200.4	0.1109	0.417	0.516	4.72
100	212	800	2.09	381.1	221.2	0.1089	0.383	0.479	7.14
110	230	791	2.13	375.0	242.3	0.1069	0.353	0.446	10.5
120	248	782	2.16	368.8	263.8	0.1049	0.326	0.417	15.3
130	266	773	2.20	362.7	285.6	0.1029	0.303	0.392	21.7
140	284	764	2.23	356.5	307.8	0.1009	0.282	0.369	30.3
150	302	755	2.27	350.4	330.3	0.0989	0.263	0.348	41.5
160	320	746	2.30	344.2	353.2	0.0969	0.246	0.329	56.1
170	338	736	2.34	337.9	376.4	0.0948	0.230	0.313	74.8
180	356	727	2.37	331.6	400.0	0.0928	0.216	0.297	98.4
190	374	717	2.41	325.1	423.9	0.0908	0.203	0.284	128
200	392	707	2.45	318.6	448.2	0.0887	0.192	0.271	164
210	410	696	2.48	312.0	472.8	0.0867	0.181	0.260	209
220	428	685	2.52	305.2	497.8	0.0846	0.171	0.249	263
230	446	674	2.55	298.1	523.1	0.0826	0.162	0.240	327
240	464	663	2.59	290.9	548.9	0.0805	0.153	0.231	404
250	482	651	2.63	283.4	575.0	0.0784	0.145	0.223	495
260	500	639	2.67	275.6	601.5	0.0763	0.138	0.216	601
270	518	626	2.72	267.4	628.4	0.0742	0.131	0.210	725
280	536	613	2.76	258.7	655.8	0.0722	0.125	0.204	869
290	554	598	2.82	249.4	683.8	0.0701	0.119	0.199	1030
300	572	583	2.88	239.4	712.2	0.0680	0.114	0.195	1220
310	590	567	2.96	228.5	741.4	0.0658	0.109	0.192	1440
315	599	559	3.00	222.5	756.3	0.0648	0.106	0.190	1560

[a]Maximum recommended bulk temperature 315°C (600°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 LT fluid. [b]Enthalpy basis is liquid at –17.8°C (0°F). [c]1 cSt = 1 mm²/s and 1 mPa•s = 1 cP [d]100 kPa = 1 bar

Liquid properties of Therminol® LT heat transfer fluid by temperature[a] (English units)

Temperature		Liquid density		Liquid heat capacity	Heat of vaporization	Liquid enthalpy[b]	Liquid thermal conductivity	Liquid viscosity[c]		Vapor pressure[d]
°F	°C	lb/gal	lb/ft³	Btu/(lb·°F)	Btu/lb	Btu/lb	Btu/(ft·h·°F)	lb/(ft·h)	cSt (mm²/s)	psia
–100	–73	7.83	58.6	0.344	212.0	–37.0	0.0825	24.4	10.8	—
–80	–62	7.76	58.0	0.354	208.7	–30.0	0.0812	14.6	6.48	—
–60	–51	7.69	57.5	0.365	205.6	–22.8	0.0800	9.64	4.33	—
–40	–40	7.62	57.0	0.375	202.4	–15.4	0.0788	6.86	3.11	—
–20	–29	7.55	56.4	0.386	199.2	–7.8	0.0775	5.16	2.36	0.0003
0	–18	7.47	55.9	0.396	196.1	0.0	0.0763	4.04	1.86	0.0009
20	–7	7.40	55.4	0.406	192.9	8.0	0.0751	3.27	1.52	0.0023
40	4	7.33	54.8	0.416	189.8	16.3	0.0738	2.71	1.27	0.0054
60	16	7.26	54.3	0.426	186.8	24.7	0.0726	2.29	1.09	0.012
80	27	7.18	53.7	0.436	183.7	33.3	0.0713	1.97	0.945	0.025
100	38	7.11	53.2	0.446	180.7	42.1	0.0701	1.71	0.832	0.050
120	49	7.03	52.6	0.456	177.6	51.2	0.0688	1.51	0.740	0.094
140	60	6.96	52.0	0.466	174.6	60.4	0.0675	1.34	0.665	0.169
160	71	6.88	51.5	0.475	171.7	69.8	0.0663	1.20	0.602	0.293
180	82	6.80	50.9	0.485	168.7	79.4	0.0650	1.08	0.548	0.488
200	93	6.72	50.3	0.495	165.7	89.2	0.0637	0.980	0.503	0.788
220	104	6.64	49.7	0.504	162.8	99.2	0.0624	0.893	0.464	1.23
240	116	6.56	49.1	0.514	159.9	109.4	0.0612	0.817	0.430	1.88
260	127	6.48	48.5	0.523	156.9	119.7	0.0599	0.751	0.400	2.80
280	138	6.40	47.8	0.532	154.0	130.3	0.0586	0.693	0.374	4.08
300	149	6.31	47.2	0.542	151.0	141.0	0.0573	0.641	0.350	5.82
320	160	6.22	46.6	0.551	148.1	151.9	0.0560	0.594	0.329	8.14
340	171	6.14	45.9	0.560	145.1	163.0	0.0547	0.553	0.311	11.2
360	182	6.05	45.2	0.569	142.0	174.3	0.0534	0.516	0.294	15.1
380	193	5.95	44.5	0.579	138.9	185.8	0.0521	0.482	0.279	20.2
400	204	5.86	43.8	0.588	135.8	197.5	0.0508	0.451	0.266	26.5
420	216	5.76	43.1	0.598	132.6	209.4	0.0494	0.424	0.254	34.4
440	227	5.66	42.3	0.607	129.3	221.4	0.0481	0.398	0.243	44.1
460	238	5.55	41.5	0.617	125.9	233.7	0.0468	0.375	0.233	56.0
480	249	5.45	40.7	0.628	122.3	246.1	0.0455	0.354	0.224	70.2
500	260	5.33	39.9	0.639	118.6	258.8	0.0441	0.334	0.216	87.2
520	271	5.21	39.0	0.651	114.6	271.7	0.0428	0.316	0.209	107
540	282	5.09	38.1	0.663	110.4	284.8	0.0414	0.299	0.203	131
560	293	4.95	37.1	0.678	105.9	298.2	0.0401	0.284	0.198	159
580	304	4.81	36.0	0.696	101.0	312.0	0.0387	0.270	0.193	191
600	316	4.66	34.8	0.719	95.4	326.1	0.0374	0.256	0.190	228

Vapor properties of Therminol® LT heat transfer fluid by temperature[a] (SI units)

Temperature		Vapor density	Vapor heat capacity	Vapor enthalpy[b]	Vapor thermal conductivity	Vapor viscosity[c]	
°C	°F	kg/m³	kJ/(kg·K)	kJ/kg	W/(m·K)	mPa·s	cSt
–73	–100	—	0.767	406.6	0.0051	0.00435	—
–70	–94	—	0.780	409.2	0.0053	0.00442	—
–60	–76	—	0.823	417.2	0.0058	0.00463	—
–50	–58	—	0.865	425.7	0.0064	0.00484	—
–40	–40	—	0.908	434.5	0.0069	0.00506	—
–30	–22	0.0001	0.950	443.8	0.0075	0.00527	—
–20	–4	0.0003	0.992	453.5	0.0080	0.00549	—
–10	14	0.0007	1.03	463.7	0.0086	0.00571	—
0	32	0.0016	1.08	474.2	0.0092	0.00593	3750
10	50	0.0032	1.12	485.2	0.0098	0.00615	1910
20	68	0.0062	1.16	496.6	0.0104	0.00637	1020
30	86	0.0115	1.20	508.4	0.0110	0.00660	575
40	104	0.0203	1.24	520.6	0.0117	0.00682	337
50	122	0.0345	1.28	533.2	0.0123	0.00705	204
60	140	0.0566	1.33	546.3	0.0130	0.00727	128
70	158	0.0901	1.37	559.7	0.0136	0.00750	83.2
80	176	0.139	1.41	573.5	0.0143	0.00772	55.4
90	194	0.210	1.45	587.7	0.0150	0.00795	37.8
100	212	0.310	1.49	602.3	0.0157	0.00817	26.4
110	230	0.446	1.52	617.3	0.0164	0.00840	18.8
120	248	0.631	1.56	632.6	0.0171	0.00863	13.7
130	266	0.875	1.60	648.3	0.0178	0.00885	10.1
140	284	1.19	1.64	664.3	0.0185	0.00908	7.60
150	302	1.61	1.68	680.7	0.0193	0.00930	5.79
160	320	2.13	1.72	697.3	0.0200	0.00952	4.47
170	338	2.79	1.76	714.3	0.0208	0.00975	3.50
180	356	3.60	1.79	731.5	0.0216	0.00997	2.77
190	374	4.61	1.83	749.0	0.0223	0.01019	2.21
200	392	5.84	1.87	766.8	0.0231	0.01041	1.78
210	410	7.33	1.91	784.8	0.0239	0.01063	1.45
220	428	9.13	1.94	802.9	0.0248	0.01085	1.19
230	446	11.3	1.98	821.3	0.0256	0.01107	0.981
240	464	13.9	2.02	839.8	0.0264	0.01129	0.814
250	482	16.9	2.06	858.4	0.0273	0.01151	0.680
260	500	20.6	2.10	877.1	0.0281	0.01172	0.570
270	518	24.9	2.14	895.8	0.0290	0.01194	0.480
280	536	30.0	2.18	914.5	0.0299	0.01215	0.405
290	554	36.0	2.23	933.2	0.0308	0.01236	0.343
300	572	43.3	2.27	951.6	0.0317	0.01257	0.290
310	590	52.0	2.33	969.9	0.0326	0.01279	0.246
316	600	57.6	2.36	979.7	0.0331	0.01290	0.224

[a]Vapor properties given are for saturated vapor. 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 LT fluid. *[b]Vapor enthalpy basis is liquid at –17.8°C (0°F).* *[c]1 cSt = 1 mm²/s and 1 mPa•s = 1 cP*

Vapor properties of Therminol® LT heat transfer fluid by temperature[a] (English units)

Temperature		Vapor density	Vapor heat capacity	Vapor enthalpy[b]	Vapor thermal conductivity	Vapor viscosity[c]	
°F	°C	lb/ft³	Btu/(lb·°F)	Btu/lb	Btu/(ft·h·°F)	lb/(ft·h)	mPa·s
–100	–73	—	0.183	174.9	0.0030	0.0105	0.00434
–80	–62	—	0.186	178.7	0.0033	0.0111	0.00458
–60	–51	—	0.197	182.7	0.0036	0.0117	0.00482
–40	–40	—	0.207	186.9	0.0040	0.0122	0.00506
–20	–29	—	0.217	191.4	0.0044	0.0128	0.00530
0	–18	0.00002	0.239	196.1	0.0047	0.0134	0.00554
20	–7	0.00006	0.251	201.0	0.0051	0.0140	0.00578
40	4	0.00014	0.263	206.1	0.0055	0.0146	0.00603
60	16	0.00029	0.272	211.4	0.0059	0.0152	0.00628
80	27	0.00059	0.284	217.0	0.0063	0.0158	0.00652
100	38	0.00112	0.294	222.8	0.0067	0.0164	0.00677
120	49	0.00203	0.306	228.8	0.0071	0.0170	0.00702
140	60	0.00353	0.318	235.0	0.0075	0.0176	0.00727
160	71	0.00591	0.327	241.4	0.0079	0.0182	0.00752
180	82	0.00956	0.337	248.1	0.0083	0.0188	0.00777
200	93	0.0150	0.349	254.9	0.0088	0.0194	0.00802
220	104	0.0228	0.359	262.0	0.0092	0.0200	0.00827
240	116	0.0338	0.370	269.2	0.0097	0.0206	0.00853
260	127	0.0491	0.380	276.6	0.0101	0.0212	0.00878
280	138	0.0697	0.390	284.2	0.0106	0.0218	0.00903
300	149	0.0971	0.402	292.0	0.0111	0.0224	0.00928
320	160	0.133	0.411	300.0	0.0116	0.0230	0.00952
340	171	0.179	0.421	308.1	0.0121	0.0236	0.00977
360	182	0.238	0.430	316.4	0.0126	0.0242	0.01002
380	193	0.312	0.440	324.8	0.0131	0.0248	0.01027
400	204	0.404	0.452	333.3	0.0136	0.0254	0.01051
420	216	0.518	0.461	341.9	0.0141	0.0260	0.01076
440	227	0.657	0.471	350.7	0.0146	0.0266	0.01100
460	238	0.827	0.480	359.5	0.0152	0.0272	0.01124
480	249	1.03	0.490	368.4	0.0157	0.0278	0.01148
500	260	1.28	0.502	377.3	0.0163	0.0284	0.01172
520	271	1.59	0.511	386.3	0.0168	0.0289	0.01196
540	282	1.95	0.523	395.2	0.0174	0.0295	0.01220
560	293	2.39	0.535	404.1	0.0180	0.0301	0.01243
580	304	2.93	0.550	412.9	0.0185	0.0306	0.01267
600	316	3.60	0.564	421.5	0.0191	0.0312	0.01290

TLC Total Lifecycle Care® program

Our TLC Total Lifecycle Care program is designed to support Therminol heat transfer fluid customers throughout their systems' lifecycle. This comprehensive program includes system design support, start-up assistance, training, sample analysis, flush and refill fluids, and more. In North America, call our hotline at 1-800-433-6997 or contact your local sales or technical representative in the "Contact us" section of our website.

In-service heat transfer fluid sample analysis

To help users get maximum fluid life, Eastman offers testing of in-service heat transfer fluids to detect contamination, moisture, thermal degradation, and other conditions that may impact system performance. Customers can access their specific test information via the myTherminol site portal. Sample analysis includes all-inclusive sample kits that are easy to use.

myTHERMINOL

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*.

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.

Operational training

Eastman customers can take advantage of our 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.

Safety awareness training

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 FF flush fluid. Therminol FF can be circulated at temperatures up to 177°C (350°F) and is compatible with mechanical system components and perfluoroelastomer O-rings found in heat transfer systems.

Fluid trade-in program

(available in North America)

As part of our commitment to sustainability and the environment, Eastman offers a trade-in program for used Therminol and competitive heat transfer fluids.

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

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