



THERMINOL[®] 75

heat transfer fluid

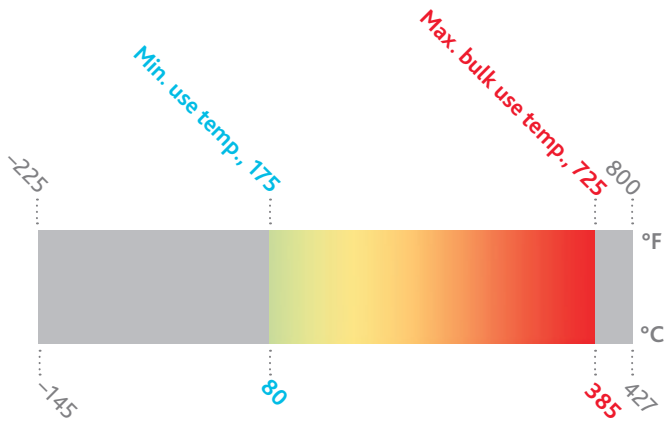
Ultrahigh temperature
at low pressure

80° to 385°C
(175° to 725°F)

THERMINOL
Heat transfer fluids by Eastman

THERMINOL[®] 75

heat transfer fluid



Eastman Therminol[®] 75 heat transfer fluid offers excellent thermal stability. It was developed for use at temperatures up to 385°C (725°F) in typical liquid phase heat transfer systems which operate at low pressure. Static pressure of about 1½ atmospheres should maintain the liquid phase at high temperatures.

Therminol 75 is available globally. Contact your local Eastman Therminol sales representative for more information.

Physical and chemical characteristics

Therminol 75 fluid has heat transfer coefficients that are equivalent to or higher than other natural or synthetic liquids in the same boiling range. Because of its high boiling point (343°C/649°F), Therminol 75 generates very little vapor pressure above ambient pressure at 385°C (725°F) and can be used in low-pressure systems. Under ambient conditions, Therminol 75 is a soft solid material with a slurry point of about 75°–80°C (165°–175°F). It has low odor and low mammalian toxicity.

The recommended maximum bulk and film temperatures for Therminol 75 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 75 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 75 is noncorrosive to metals commonly used in the construction of heat transfer systems.

While Therminol 75 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 75 should check with their safety and risk management experts for specific instructions.


Typical properties^a

Appearance	Soft solid melting to yellow liquid
Composition	Terphenyl/quaterphenyl
Maximum bulk temperature	385°C (725°F)
Maximum film temperature	410°C (770°F)
Normal boiling point	343°C (649°F)
Pumpability, at 300 mm ² /s (cSt)	80°C (175°F)
Pumpability, at 2000 mm ² /s (cSt)	80°C (175°F)
Slurry point	75°–80°C (165°–175°F)
Flash point, COC (ASTM D-92)	185°C (365°F)
Autoignition temperature (ASTM E-659)	567°C (1052°F)
Coefficient of thermal expansion at 200°C	0.000803/°C (0.000446/°F)
Heat of vaporization at maximum use temperature	236 kJ/kg (101 Btu/lb)
Total acidity (ASTM D-664)	<0.2 mg KOH/g
Average molecular weight	230
Pseudocritical temperature	579°C (1074°F)
Pseudocritical pressure	25.3 bar (367 psia)
Pseudocritical density	323 kg/m ³ (20.2 lb/ft ³)
Moisture content, maximum (ASTM E-203)	200 ppm
Dielectric constant @ 23°C (ASTM D-924)	2.32

^aThese data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications for Therminol 75 fluid. Does not constitute an express warranty. See disclaimer on the back page of this bulletin.

Heat transfer fluid calculators THERMINOL

- Product comparison calculator** Make side-by-side comparisons of up to six fluids for physical and performance properties, and heat transfer coefficients.
- Property by temperature table** Create tables of physical properties in various units of measure, and in user-selected temperature increments (over fluids).
- Property by temperature plot** Create plots of key physical properties of Therminol fluids in user-selected units of measure. Plot up to 10 fluids.
- View fluid chart**

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To create your own customized table

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

Therminol.com/resources

and download the Therminol heat transfer fluid calculator.

For technical service, visit the contact page of our website, **Therminol.com**.

Liquid properties of Therminol® 75 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/m ³	kJ/(kg·K)	kJ/kg	kJ/kg	W/(m·K)	cP (mPa·s)	cSt (mm ² /s)	kPa
71	160	1050	1.68	393.9	-14.3	0.1314	5.07	4.84	0.014
80	176	1040	1.71	388.9	0.9	0.1307	4.29	4.12	0.022
90	194	1030	1.74	383.3	18.2	0.1300	3.60	3.48	0.038
100	212	1030	1.77	377.8	35.8	0.1292	3.04	2.96	0.063
110	230	1020	1.80	372.3	53.6	0.1285	2.60	2.55	0.101
120	248	1010	1.83	366.9	71.8	0.1277	2.24	2.21	0.159
130	266	1000	1.86	361.5	90.2	0.1269	1.94	1.93	0.244
140	284	998	1.89	356.2	108.9	0.1262	1.69	1.70	0.369
150	302	991	1.92	350.9	128.0	0.1254	1.49	1.50	0.548
160	320	983	1.94	345.6	147.2	0.1246	1.32	1.34	0.800
170	338	976	1.97	340.4	166.8	0.1238	1.17	1.20	1.15
180	356	968	2.00	335.3	186.6	0.1230	1.05	1.08	1.62
190	374	961	2.02	330.2	206.7	0.1221	0.939	0.977	2.27
200	392	953	2.05	325.1	227.1	0.1213	0.847	0.889	3.12
210	410	945	2.07	320.1	247.7	0.1204	0.767	0.812	4.24
220	428	938	2.10	315.1	268.5	0.1196	0.698	0.744	5.69
230	446	930	2.12	310.1	289.6	0.1187	0.637	0.685	7.56
240	464	922	2.15	305.2	311.0	0.1179	0.584	0.633	9.94
250	482	914	2.17	300.3	332.5	0.1170	0.537	0.587	12.9
260	500	906	2.19	295.5	354.3	0.1161	0.495	0.546	16.7
270	518	898	2.21	290.7	376.4	0.1151	0.458	0.510	21.3
280	536	889	2.24	285.9	398.6	0.1142	0.425	0.478	27.0
290	554	881	2.26	281.1	421.1	0.1133	0.395	0.448	34.0
300	572	872	2.28	276.4	443.7	0.1123	0.368	0.422	42.4
310	590	864	2.30	271.6	466.6	0.1113	0.344	0.398	52.6
320	608	855	2.32	266.9	489.7	0.1103	0.322	0.377	64.7
330	626	846	2.34	262.1	513.0	0.1093	0.303	0.358	79.0
340	644	837	2.36	257.4	536.5	0.1082	0.285	0.340	96.0
350	662	828	2.38	252.6	560.2	0.1072	0.268	0.324	116
360	680	818	2.40	247.9	584.1	0.1061	0.254	0.310	139
370	698	809	2.42	243.0	608.1	0.1049	0.240	0.297	166
380	716	799	2.43	238.2	632.4	0.1038	0.227	0.285	197
385	725	794	2.44	235.8	644.6	0.1032	0.221	0.279	215

^aMaximum recommended bulk temperature 385°C (725°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 75 fluid. ^bLiquid enthalpy basis is 79.4°C (175°F). ^c1 cSt = 1 mm²/s and 1 mPa·s = 1 cP. ^d100 kPa = 1 bar

Liquid properties of Therminol® 75 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/ft ³	Btu/(lb·°F)	Btu/lb	Btu/lb	Btu/(ft·h·°F)	lb/(ft·h)	cSt (mm ² /s)	psia
160	71	8.74	65.4	0.402	169.4	-6.1	0.0760	12.2	4.83	—
180	82	8.68	64.9	0.410	166.8	2.0	0.0755	9.97	3.96	—
200	93	8.61	64.4	0.418	164.1	10.3	0.0750	8.22	3.29	0.007
220	104	8.54	63.9	0.426	161.5	18.8	0.0745	6.86	2.77	0.011
240	116	8.48	63.4	0.434	158.9	27.4	0.0740	5.78	2.35	0.019
260	127	8.41	62.9	0.442	156.3	36.1	0.0735	4.92	2.02	0.031
280	138	8.34	62.4	0.450	153.7	45.1	0.0730	4.22	1.75	0.049
300	149	8.27	61.9	0.457	151.2	54.1	0.0725	3.65	1.52	0.076
320	160	8.21	61.4	0.464	148.7	63.3	0.0720	3.18	1.34	0.116
340	171	8.14	60.9	0.471	146.2	72.7	0.0715	2.80	1.19	0.173
360	182	8.07	60.3	0.478	143.8	82.2	0.0710	2.47	1.06	0.254
380	193	8.00	59.8	0.485	141.3	91.8	0.0705	2.19	0.946	0.366
400	204	7.93	59.3	0.492	138.9	101.6	0.0699	1.96	0.853	0.519
420	216	7.85	58.8	0.499	136.5	111.5	0.0694	1.76	0.773	0.725
440	227	7.78	58.2	0.505	134.1	121.6	0.0688	1.59	0.704	0.999
460	238	7.71	57.7	0.511	131.8	131.7	0.0683	1.44	0.644	1.36
480	249	7.63	57.1	0.518	129.4	142.0	0.0677	1.31	0.592	1.82
500	260	7.56	56.6	0.524	127.1	152.4	0.0671	1.20	0.546	2.42
520	271	7.48	56.0	0.530	124.8	163.0	0.0665	1.10	0.506	3.18
540	282	7.41	55.4	0.535	122.5	173.6	0.0659	1.01	0.471	4.13
560	293	7.33	54.8	0.541	120.3	184.4	0.0653	0.933	0.439	5.31
580	304	7.25	54.2	0.547	118.0	195.3	0.0647	0.864	0.411	6.77
600	316	7.17	53.6	0.552	115.7	206.3	0.0640	0.803	0.386	8.56
620	327	7.09	53.0	0.557	113.5	217.4	0.0634	0.748	0.364	10.7
640	338	7.00	52.4	0.563	111.2	228.6	0.0627	0.698	0.344	13.3
660	349	6.92	51.7	0.568	108.9	239.9	0.0620	0.654	0.326	16.5
680	360	6.83	51.1	0.573	106.6	251.3	0.0613	0.613	0.310	20.2
700	371	6.74	50.4	0.578	104.3	262.8	0.0606	0.577	0.295	24.6
720	382	6.65	49.7	0.583	102.0	274.4	0.0598	0.543	0.282	29.7
725	385	6.62	49.6	0.584	101.4	277.3	0.0596	0.536	0.279	31.1

Design recommendations

In addition to the design and operation guidance given in the *Liquid phase systems design guide* (publication TF-04), Therminol 75 heat transfer fluid, with its 75°–80°C (165°–175°F) slurry point, will require:

- Heat tracing of system components for thawing the heat transfer medium to the liquid state
- Continuous heat tracing of instrumentation and control lines, system vents, and other components which are cold during system operation and would not be operable with solid heat transfer media
- A heatable storage vessel that can accommodate the heat transfer system volume in case of emergency shutdown of utilities or drum storage, which could be thawed out at a later time
- All system low spots to have drains to facilitate fluid discharge and system cleaning

Operation procedures

Start-up

In addition to suggested start-up procedures in the *Liquid phase systems design guide*, systems using Therminol 75 heat transfer fluid must be preheated along with the Therminol 75 to a temperature above the 80°C (175°F) slurry point and not be allowed to fall below this temperature. While Therminol 75 is reluctant to crystallize, the best operating practice is to have the system start-up temperature above 80°C (175°F). Two methods or combinations have been employed for preheating the system:

1. The first method is to have all components heat traced and the system preheated by the tracing.
2. The second method is to introduce low-pressure steam into the expansion tank and allow internal steam heating with condensate and steam exiting the system through the system drains and vents. This is especially useful where heat tracing of large heaters and user components is impractical.

All system component temperatures should be monitored to ensure complete heating. Therminol 75 is charged at a temperature above 80°C (175°F) to the system from thermally heated bulk storage or heated drums. The continuous heat tracing of instrumentation lines, system vents, and pump shaft seals must be in operation before the system pumps and heaters are started. The expansion tank vents should be open to allow moisture to exit the system from the hot fluid moving through the expansion tank. After the free moisture has left the system, the expansion tank should be blanketed with inert gas and normal operation commenced.

Shutdown

For shutdowns of systems which are not totally heat traced where the minimum system temperature is less than 80°C (175°F), Therminol 75 must be removed from the system and placed in a heatable storage vessel. All low-point drains must be opened to remove Therminol 75.



TLC Total Lifecycle Care® program

Eastman's TLC Total Lifecycle Care® 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.

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.

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, maintenance technicians, and 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® 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.

For more information, visit our website, Therminol.com.

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