



# THERMINOL<sup>®</sup> 54

heat transfer fluid

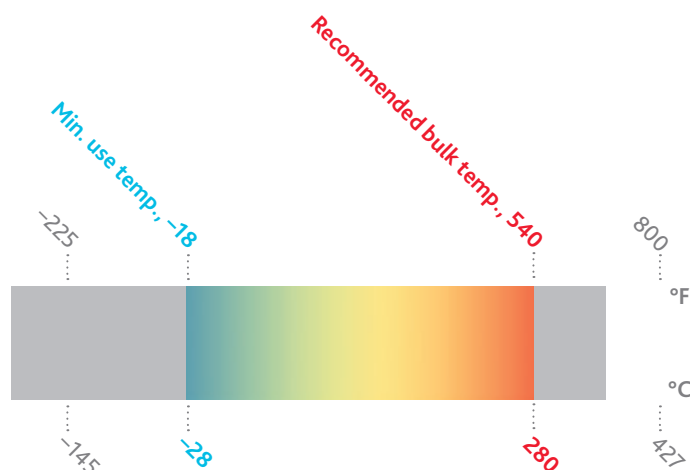
Efficient, reliable medium-  
temperature-range fluid

***–28° to 280°C***  
***(–18° to 540°F)***

**THERMINOL<sup>®</sup>**  
Heat transfer fluids by Eastman

# THERMINOL® 54

heat transfer fluid



Eastman Therminol® 54 heat transfer fluid is a synthetic fluid designed to provide reliable, consistent heat transfer performance over a long service life at a recommended bulk temperature of 280°C (540°F).

Therminol 54 provides an excellent alternative to mid-temperature, mineral oil-based fluids by capturing the performance and nonfouling attributes highly desired of synthetic fluids.

- Excellent pumpability supports operations to temperatures lower than possible with many other mineral oils.
- Non-sludge-producing chemistry enables life cycle operational cost efficiencies, including optimal pump seal life, fewer system cleanings between refills, and superior fluid life.

**Therminol 54 is available in Europe, the Middle East, and Africa. Contact your local Eastman Therminol sales representative for more information.**

## Physical and chemical characteristics

Therminol 54 is designed for use in nonpressurized/low-pressure, indirect heating systems. It delivers efficient, dependable, uniform process heat with no need for high pressures. The high boiling point of Therminol 54 helps reduce the volatility and fluid leakage problems associated with other fluids.

The recommended bulk and maximum film temperatures for Therminol 54 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.

The synthetic chemistry of Therminol 54 has been shown to be significantly less sensitive than mineral oils to the negative consequences (sludging, fouling) of thermal oxidation, yet heated fluid in contact with the oxygen in air may still produce some oxidation. Therefore, when the fluid in the expansion tank may be heated above 80°C, the fluid should be protected from air contact. Eastman recommends that systems using Therminol 54 fluid be blanketed with an atmosphere of inert gas to protect against the effects of fluid oxidation on its performance and life expectancy. However, other approaches may also be considered, including ensuring the fluid temperature in the expansion tank remains < 80°C or provisioning a cold seal trap (see *Therminol Information Bulletin No. 4—Heat transfer system expansion tank design*). Pressure relief device(s) should be installed where required.

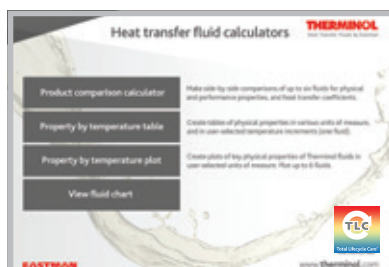
Therminol 54 is noncorrosive to metals commonly used in the construction of heat transfer systems.

While Therminol 54 has a relatively high flash point, it is not classified as a fire-retardant heat transfer fluid. Consequently, the use of protective devices may be required to minimize fire risk and users of Therminol 54 should check with their safety and risk management experts for specific instructions.

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

Appearance	Clear, yellow liquid
Composition	Synthetic hydrocarbon mixture
Recommended bulk temperature	280°C (540°F)
Maximum film temperature	310°C (590°F)
Normal boiling point	351°C (664°F)
Pumpability, at 300 mm <sup>2</sup> /s (cSt)	–8°C (17°F)
Pumpability, at 2000 mm <sup>2</sup> /s (cSt)	–28°C (–18°F)
Flash point, COC (ASTM D-92)	> 170°C (340°F)
Autoignition temperature (ASTM E-659)	> 330°C (625°F)
Pour point (ISO 3016)	< –45°C (–50°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)	67°C (152°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	45°C (114°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)	24°C (75°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	11°C (52°F)
Coefficient of thermal expansion @ 200°C	0.000961/°C (0.000534/°F)
Heat of vaporization at maximum use temperature	234 kJ/kg (100 Btu/lb)
Average molecular weight	310
Pseudocritical temperature	512°C (953°F)
Pseudocritical pressure	13.2 bar (191 psia)
Pseudocritical density	258 kg/m <sup>3</sup> (16.1 lb/ft <sup>3</sup> )
Moisture content, maximum (ASTM E-203)	150 ppm
Dielectric constant @ 23°C (ASTM D-924)	2.23

<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 54 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

**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® 54 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
-28	-18	904	1.73	418.0	-18.8	0.134	1820	2010	—
-20	-4	899	1.76	412.0	-3.9	0.133	756	841	—
-10	14	892	1.80	405.0	13.9	0.132	309	346	—
0	32	885	1.83	398.1	32.0	0.131	143	162	—
10	50	878	1.87	391.3	50.6	0.130	73.8	84.0	—
20	68	872	1.91	384.6	69.4	0.128	41.6	47.7	—
30	86	865	1.94	377.9	88.7	0.127	25.2	29.2	—
40	104	858	1.98	371.4	108.3	0.126	16.3	19.0	—
50	122	852	2.01	364.9	128.2	0.125	11.1	13.1	—
60	140	845	2.05	358.5	148.5	0.124	7.93	9.39	—
70	158	838	2.08	352.2	169.2	0.123	5.89	7.02	—
80	176	831	2.12	345.9	190.2	0.121	4.52	5.43	—
90	194	825	2.16	339.8	211.6	0.120	3.56	4.32	0.02
100	212	818	2.19	333.7	233.3	0.119	2.88	3.52	0.03
110	230	811	2.23	327.8	255.4	0.118	2.38	2.93	0.05
120	248	804	2.26	321.8	277.9	0.117	2.00	2.49	0.09
130	266	797	2.30	316.0	300.7	0.116	1.71	2.14	0.14
140	284	790	2.33	310.2	323.8	0.114	1.48	1.87	0.22
150	302	784	2.37	304.5	347.3	0.113	1.29	1.65	0.33
160	320	777	2.40	298.8	371.2	0.112	1.14	1.47	0.50
170	338	770	2.44	293.2	395.4	0.111	1.02	1.32	0.74
180	356	763	2.47	287.7	420.0	0.110	0.91	1.20	1.07
190	374	755	2.51	282.2	444.9	0.109	0.83	1.09	1.53
200	392	748	2.54	276.7	470.1	0.107	0.75	1.00	2.15
210	410	741	2.58	271.3	495.7	0.106	0.68	0.92	2.98
220	428	734	2.61	265.9	521.7	0.105	0.63	0.85	4.07
230	446	726	2.65	260.5	548.0	0.104	0.57	0.79	5.51
240	464	719	2.68	255.1	574.7	0.103	0.53	0.74	7.37
250	482	711	2.72	249.7	601.7	0.102	0.49	0.69	9.76
260	500	704	2.75	244.3	629.1	0.100	0.45	0.64	12.8
270	518	696	2.79	239.0	656.8	0.099	0.42	0.60	16.6
280	536	688	2.83	233.5	684.9	0.098	0.39	0.56	21.3
290	554	680	2.86	228.1	713.3	0.097	0.36	0.53	27.2
300	572	672	2.90	222.6	742.1	0.096	0.33	0.50	34.4
310	590	663	2.93	217.1	771.2	0.095	0.31	0.47	43.1

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 54 fluid.

<sup>a</sup>Recommended bulk temperature 280°C (540°F)

<sup>b</sup>Liquid enthalpy basis is -17.8°C (0°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® 54 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
-18	-28	7.55	56.5	0.41	179.8	-8.1	0.078	4400	2010	—
0	-18	7.49	56.0	0.42	176.6	0.0	0.077	1480	683	—
20	-7	7.42	55.5	0.43	173.3	8.6	0.076	571	265	—
40	4	7.36	55.1	0.44	170.0	17.3	0.075	255	120	—
60	16	7.30	54.6	0.45	166.7	26.2	0.075	128	60.7	—
80	27	7.24	54.1	0.46	163.5	35.4	0.074	71.5	34.1	—
100	38	7.18	53.7	0.47	160.4	44.7	0.073	43.2	20.8	—
120	49	7.11	53.2	0.48	157.3	54.2	0.072	28.0	13.6	—
140	60	7.05	52.7	0.49	154.2	63.9	0.072	19.2	9.39	—
160	71	6.99	52.3	0.50	151.2	73.8	0.071	13.8	6.82	—
180	82	6.93	51.8	0.51	148.2	83.9	0.070	10.3	5.15	—
200	93	6.86	51.3	0.52	145.3	94.1	0.069	8.01	4.03	—
220	104	6.80	50.9	0.53	142.4	104.6	0.069	6.39	3.24	0.01
240	116	6.74	50.4	0.54	139.6	115.2	0.068	5.22	2.67	0.01
260	127	6.67	49.9	0.55	136.8	126.1	0.067	4.35	2.25	0.02
280	138	6.61	49.4	0.56	134.0	137.1	0.066	3.69	1.92	0.03
300	149	6.55	49.0	0.57	131.3	148.3	0.066	3.17	1.67	0.05
320	160	6.48	48.5	0.57	128.6	159.7	0.065	2.76	1.47	0.07
340	171	6.42	48.0	0.58	125.9	171.3	0.064	2.43	1.31	0.11
360	182	6.35	47.5	0.59	123.2	183.0	0.063	2.16	1.17	0.17
380	193	6.28	47.0	0.60	120.6	195.0	0.063	1.93	1.06	0.25
400	204	6.22	46.5	0.61	118.0	207.1	0.062	1.74	0.96	0.36
420	216	6.15	46.0	0.62	115.4	219.5	0.061	1.57	0.88	0.52
440	227	6.08	45.5	0.63	112.8	232.0	0.060	1.43	0.81	0.72
460	238	6.01	45.0	0.64	110.3	244.7	0.060	1.30	0.75	1.00
480	249	5.94	44.5	0.65	107.7	257.6	0.059	1.19	0.69	1.37
500	260	5.87	43.9	0.66	105.1	270.6	0.058	1.09	0.64	1.85
520	271	5.80	43.4	0.67	102.5	283.9	0.057	1.00	0.60	2.47
540	282	5.73	42.8	0.68	100.0	297.3	0.057	0.92	0.56	3.27
560	293	5.65	42.3	0.69	97.3	311.0	0.056	0.85	0.52	4.27
580	304	5.58	41.7	0.70	94.7	324.8	0.055	0.78	0.48	5.52
600	316	5.50	41.1	0.71	92.1	338.8	0.054	0.72	0.45	7.07

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 54 fluid.

<sup>a</sup>Recommended bulk temperature 280°C (540°F)

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<sup>d</sup>100 kPa = 1 bar



# TLC Total Lifecycle Care®

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.



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, 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](http://Therminol.com).



**Eastman Corporate Headquarters**

P.O. Box 431  
Kingsport, TN 37662-5280 U.S.A.

U.S.A. and Canada, 800-EASTMAN (800-327-8626)  
Other Locations, +(1) 423-229-2000

[www.eastman.com/locations](http://www.eastman.com/locations)

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