THERMINOL®
from Eastman

THERMINOL® 54

heat transfer fluid

Efficient, reliable medium-temperature-range fluid

–28° to 280°C
(-18° to 540°F)

THERMINOL® 54
heat transfer fluid

Physical and chemical characteristics

Therminol 54 heat transfer fluid 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.

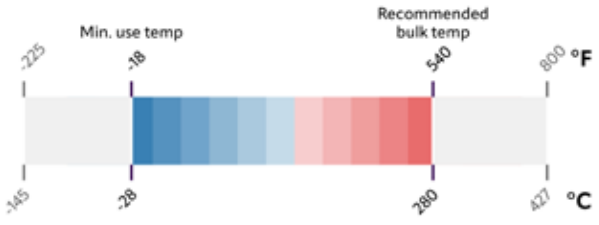
Therminol 54 is noncorrosive to metals commonly used in the construction of heat transfer systems.

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.

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.**

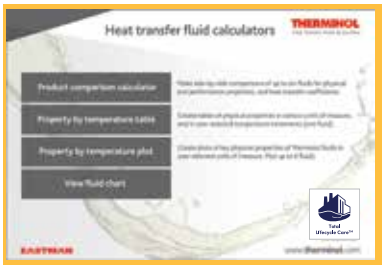


Therminol 54 is available in Europe, the Middle East and Africa. Contact your local Eastman Therminol sales representative for more information.

Typical properties[a]

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^2/s (cSt)	–8°C (17°F)
Pumpability, at 2,000 mm^2/s (cSt)	–28°C (–18°F)
Flash point, COC (ASTM D92)	> 170°C (340°F)
Autoignition temperature (ASTM E659)	> 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} > 2,000)	
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^3 (16.1 lb/ft^3)
Moisture content, maximum (ASTM E203)	150 ppm
Dielectric constant @ 23°C (ASTM D924)	2.23

[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 54 fluid. Does not constitute an express warranty. See disclaimer on the back page of this brochure.



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 on therminol.com.

Liquid properties of Therminol 54 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
–28	–18	904	1.73	418.0	–18.8	0.134	1,820	2,010	—
–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.

[a]Recommended bulk temperature 280°C (540°F)
[b]Liquid enthalpy basis is –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 54 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
–18	–28	7.55	56.5	0.41	179.8	–8.1	0.078	4,400	2,010	—
0	–18	7.49	56.0	0.42	176.6	0.0	0.077	1,480	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

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[a]Recommended bulk temperature 280°C (540°F)
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[c]1 cSt = 1 mm²/s and 1 mPa•s = 1 cP
[d]100 kPa = 1 bar

Total Lifecycle Care™

Total Lifecycle Care is a comprehensive service that uses analytics, sampling and training to prevent heat transfer system failures, ensuring safe, efficient and uninterrupted operations.

- Offers industry-leading technical support
- Provides data through Fluid Genius™ for informed decision-making
- Helps minimize unexpected downtime and maintenance costs
- Assists in maximizing fluid life
- Enables safe working environments through tailored safety training
- Helps keep systems running smoothly

Comprehensive support services

- **In-service heat transfer fluid sample analysis**
  Eastman provides comprehensive testing services to extend heat transfer fluid life and ensure system performance by detecting contamination, moisture and degradation through key tests like acid number, viscosity, insoluble solids and moisture content.

- **Fluid Genius™**
  Fluid Genius is a web-based portal and sampling service that simplifies fluid sample management by providing expert analysis, fluid condition monitoring, lifespan prediction, early maintenance alerts, technical support and access to a comprehensive knowledge base. Learn more at fluidgenius.net.

Operational efficiency

- **System design support**
  Eastman collaborates with leading manufacturers to provide expert support in heat transfer system design, performance, fluid selection, and compliance, offering seminars, technical visits, and on-site audits to improve system reliability and efficiency.

- **Start-up assistance**
  Eastman offers start-up assistance by reviewing procedures and recommending improvements to streamline systems and reduce common issues, with support available from local technical specialists or on-site visits.

- **Flush and refill guidance**
  Therminol FF is specially formulated to clean liquid-phase heat transfer systems. After flushing with Therminol FF, refill the system with the appropriate Eastman heat transfer fluid to ensure optimal performance. Contact your local Eastman technical specialist to learn more and get expert guidance.

- **Compliance support**
  Our team provides guidance to help you achieve and maintain regulatory compliance related to safety, health and environmental standards, ensuring your operations meet the necessary requirements.

- **Environmental impact**
  Eastman supports your sustainability goals by advising on waste heat recovery and water-lean utility deployments using Therminol products to reduce CO_2 emissions and water consumption.

Operational and safety awareness training

- **Operational training**
  Eastman's customized training programs improve expertise in fluid selection and heat transfer system operation for technicians, supervisors, maintenance staff and engineers through core and specialized sessions to enhance design, improve safety and reduce costs.

- **Safety awareness training**
  At Eastman, we approach safety with a zero-incident mindset. We offer our customers safety awareness training that focuses on the design start-up, operation and maintenance of heat transfer fluid systems to help ensure safe, efficient operations.

- **Expert global assistance**
  Get direct access to experienced technical service specialists who can help answer questions regarding heat transfer fluid selection, system start-ups, system design and operational issues.

For more information, visit **therminol.com**

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