



THERMINOL[®] SP

heat transfer fluid

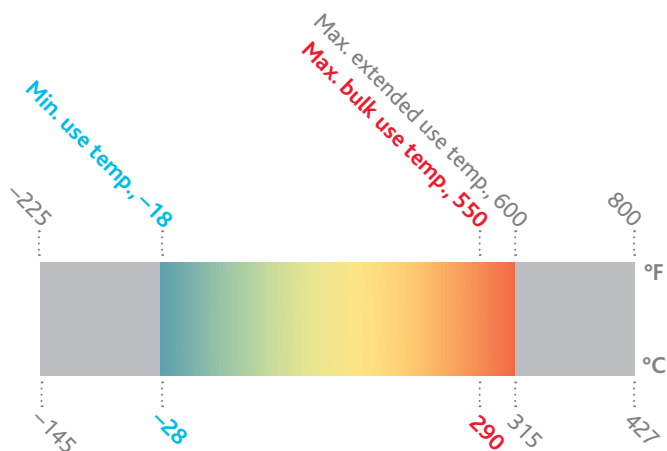
Efficient, reliable medium-
temperature-range fluid

-28° to 290°C
(-18° to 550°F)

THERMINOL.
Heat Transfer Fluids by Eastman

THERMINOL® SP

heat transfer fluid



Eastman Therminol® SP heat transfer fluid is a unique, synthetic fluid designed to provide reliable, consistent heat transfer performance over a long life at maximum bulk temperatures up to 290°C (550°F).

- Delivers excellent cost performance over the fluid life when compared to common mineral oil-based heat transfer fluids, even when operating temperatures reach a maximum extended use temperature of 315°C (600°F).
- More readily pumpable at low temperatures than the majority of other mineral oil-based heat transfer fluids.
- Savings in capital, operations, and maintenance costs are often achieved when used in applications that traditionally use steam as a heating medium.

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

Physical and chemical characteristics

Therminol SP 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 SP helps reduce the volatility and fluid leakage problems associated with other fluids.

The recommended maximum bulk and film temperatures for Therminol SP 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.

Therminol SP has been shown to be significantly less sensitive than mineral oils to the negative consequences (sludging, fouling) of thermal oxidation. Eastman recommends that systems utilizing Therminol SP 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 SP is noncorrosive to metals commonly used in the construction of heat transfer systems.

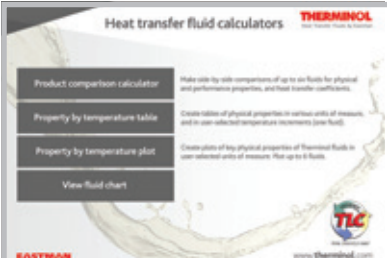
While Therminol SP has a relatively high flash point, it is not classified as a fire-resistant heat transfer fluid. Consequently, the use of protective devices may be required to minimize fire risk, and users of Therminol SP should check with their safety and risk management experts for specific instructions.



Typical properties^a

Appearance	Clear, yellow liquid
Composition	Synthetic hydrocarbon mixture
Maximum bulk temperature	290°C (550°F)
Maximum extended use temperature	315°C (600°F)
Maximum film temperature	335°C (635°F)
Normal boiling point	351°C (664°F)
Pumpability, at 300 mm ² /s (cSt)	-8°C (17°F)
Pumpability, at 2000 mm ² /s (cSt)	-28°C (-18°F)
Flash point, COC (ASTM D-92)	177°C (350°F)
Autoignition temperature (ASTM E-659)	366°C (691°F)
Autoignition temperature (DIN 51794)	382°C (719°F)
Pour point (ISO 3016)	-54°C (-65°F)
Minimum liquid temperatures for fully developed turbulent flow ($N_{Re} > 10000$)	
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	228 kJ/kg (98.1 Btu/lb)
Average molecular weight	320
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 E-203)	150 ppm
Dielectric constant @ 23°C (ASTM D-924)	2.23

^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 SP 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® SP 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
-28	-18	904	1.73	418.0	-18.8	0.1340	1820	2010	—
-20	-4	899	1.76	412.0	-3.9	0.1331	756	841	—
-10	14	892	1.80	405.0	13.9	0.1319	309	346	—
0	32	885	1.83	398.1	32.0	0.1307	143	162	—
10	50	878	1.87	391.3	50.6	0.1296	73.8	84.0	—
20	68	872	1.91	384.6	69.4	0.1284	41.6	47.7	—
30	86	865	1.94	377.9	88.7	0.1273	25.2	29.2	—
40	104	858	1.98	371.4	108.3	0.1261	16.3	19.0	—
50	122	852	2.01	364.9	128.2	0.1249	11.1	13.1	—
60	140	845	2.05	358.5	148.5	0.1238	7.93	9.39	—
70	158	838	2.08	352.2	169.2	0.1226	5.89	7.02	—
80	176	831	2.12	345.9	190.2	0.1214	4.52	5.43	0.011
90	194	825	2.16	339.8	211.6	0.1203	3.56	4.32	0.019
100	212	818	2.19	333.7	233.3	0.1191	2.88	3.52	0.032
110	230	811	2.23	327.8	255.4	0.1179	2.38	2.93	0.054
120	248	804	2.26	321.8	277.9	0.1168	2.00	2.49	0.088
130	266	797	2.30	316.0	300.7	0.1156	1.71	2.14	0.140
140	284	790	2.33	310.2	323.8	0.1144	1.48	1.87	0.219
150	302	784	2.37	304.5	347.3	0.1133	1.29	1.65	0.334
160	320	777	2.40	298.8	371.2	0.1121	1.14	1.47	0.501
170	338	770	2.44	293.2	395.4	0.1109	1.02	1.32	0.738
180	356	763	2.47	287.7	420.0	0.1098	0.913	1.20	1.07
190	374	755	2.51	282.2	444.9	0.1086	0.825	1.09	1.53
200	392	748	2.54	276.7	470.1	0.1074	0.749	1.00	2.15
210	410	741	2.58	271.3	495.7	0.1062	0.683	0.921	2.98
220	428	734	2.61	265.9	521.7	0.1051	0.625	0.852	4.07
230	446	726	2.65	260.5	548.0	0.1039	0.574	0.790	5.51
240	464	719	2.68	255.1	574.7	0.1027	0.528	0.735	7.37
250	482	711	2.72	249.7	601.7	0.1015	0.488	0.686	9.76
260	500	704	2.75	244.3	629.1	0.1004	0.451	0.641	12.8
270	518	696	2.79	239.0	656.8	0.0992	0.418	0.600	16.6
280	536	688	2.83	233.5	684.9	0.0980	0.387	0.563	21.3
290	554	680	2.86	228.1	713.3	0.0968	0.360	0.529	27.2
300	572	672	2.90	222.6	742.1	0.0957	0.334	0.497	34.4
310	590	663	2.93	217.1	771.2	0.0945	0.311	0.468	43.1
320	608	655	2.97	211.5	800.7	0.0933	0.289	0.441	53.7

^aMaximum recommended bulk temperature 290°C (550°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 SP fluid. ^bLiquid enthalpy basis is -17.8°C (0°F). ^c1 cSt = 1 mm²/s and 1 mPa·s = 1 cP. ^d100 kPa = 1 bar. ^eMaximum extended use temperature is 315°C (600°F).

Liquid properties of Therminol® SP 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
-18	-28	7.55	56.5	0.414	179.8	-8.1	0.0775	4400	2010	—
0	-18	7.49	56.0	0.423	176.6	0.0	0.0768	1480	683	—
20	-7	7.42	55.5	0.433	173.3	8.6	0.0760	571	265	—
40	4	7.36	55.1	0.442	170.0	17.3	0.0753	255	120	—
60	16	7.30	54.6	0.452	166.7	26.2	0.0745	128	60.7	—
80	27	7.24	54.1	0.461	163.5	35.4	0.0738	71.5	34.1	—
100	38	7.18	53.7	0.471	160.4	44.7	0.0731	43.2	20.8	—
120	49	7.11	53.2	0.480	157.3	54.2	0.0723	28.0	13.6	—
140	60	7.05	52.7	0.490	154.2	63.9	0.0716	19.2	9.39	—
160	71	6.99	52.3	0.499	151.2	73.8	0.0708	13.8	6.82	—
180	82	6.93	51.8	0.509	148.2	83.9	0.0701	10.3	5.15	0.0018
200	93	6.86	51.3	0.518	145.3	94.1	0.0693	8.01	4.03	0.0033
220	104	6.80	50.9	0.527	142.4	104.6	0.0686	6.39	3.24	0.0059
240	116	6.74	50.4	0.537	139.6	115.2	0.0678	5.22	2.67	0.010
260	127	6.67	49.9	0.546	136.8	126.1	0.0671	4.35	2.25	0.017
280	138	6.61	49.4	0.556	134.0	137.1	0.0663	3.69	1.92	0.029
300	149	6.55	49.0	0.565	131.3	148.3	0.0656	3.17	1.67	0.046
320	160	6.48	48.5	0.574	128.6	159.7	0.0648	2.76	1.47	0.073
340	171	6.42	48.0	0.584	125.9	171.3	0.0641	2.43	1.31	0.112
360	182	6.35	47.5	0.593	123.2	183.0	0.0633	2.16	1.17	0.168
380	193	6.28	47.0	0.602	120.6	195.0	0.0626	1.93	1.06	0.248
400	204	6.22	46.5	0.612	118.0	207.1	0.0618	1.74	0.964	0.360
420	216	6.15	46.0	0.621	115.4	219.5	0.0610	1.57	0.881	0.515
440	227	6.08	45.5	0.630	112.8	232.0	0.0603	1.43	0.810	0.724
460	238	6.01	45.0	0.640	110.3	244.7	0.0595	1.30	0.747	1.00
480	249	5.94	44.5	0.649	107.7	257.6	0.0588	1.19	0.691	1.37
500	260	5.87	43.9	0.658	105.1	270.6	0.0580	1.09	0.641	1.85
520	271	5.80	43.4	0.668	102.5	283.9	0.0573	1.00	0.596	2.47
540	282	5.73	42.8	0.677	100.0	297.3	0.0565	0.922	0.555	3.27
560	293	5.65	42.3	0.686	97.3	311.0	0.0558	0.849	0.518	4.27
580	304	5.58	41.7	0.696	94.7	324.8	0.0550	0.783	0.484	5.52
600 ^e	316	5.50	41.1	0.705	92.1	338.8	0.0542	0.722	0.453	7.07

TLC Total Lifecycle Care[®]

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, 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[®] 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[®] 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.

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