THERMINOL®
from Eastman

THERMINOL® XP

heat transfer fluid

High purity with FDA/NF/NSF status

–20° to 315°C
(–4° to 600°F)

THERMINOL® XP
heat transfer fluid

Physical and chemical characteristics

Therminol XP heat transfer fluid has outstanding regulatory status for those seeking heat transfer fluids which have minimum environmental reporting requirements:

- Meets the purity specifications in U.S. Food and Drug Administration Regulation 21 CFR 172.878
- Meets the requirements of National Formulary (NF)
- Listed as a registered nonfood compound by NSF International (Category Code HT-1: Heat transfer fluids — Incidental contact)

NSF
Nonfood Compounds
Program Listed (HT1)
(127162)

Heat transfer fluids are intended only for indirect heating purposes. Under no circumstances should Therminol XP come into contact or in any way contaminate food, animal feed, food products, food packaging materials, food chemicals, pharmaceuticals or any items which ultimately may be directly or indirectly ingested by humans. Any contact may contaminate these items to the extent that their destruction may be required. Carefully review the information contained in a properly prepared Safety Data Sheet prior to making a fluid decision.

The recommended maximum bulk and film temperatures for Therminol XP are based on industry-standard thermal studies. Operation at or below these temperature maximums can provide long service life under most operating conditions.

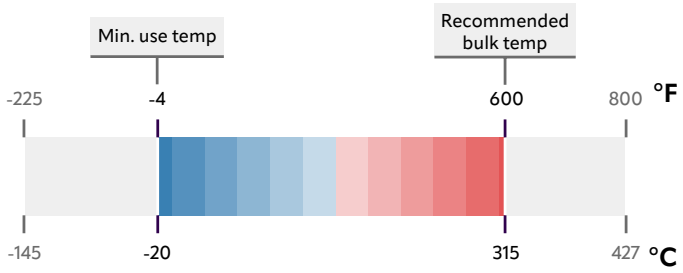
Actual fluid life is dependent on the total system design and operation and can vary by heat transfer fluid chemistry. As fluid ages, the formation of low- and high-boiling compounds may result. Low-boiling compounds should be vented from the system as necessary to a safe location away from personnel 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 XP 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 XP is noncorrosive to metals commonly used in the construction of heat transfer systems.

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

Eastman Therminol® XP heat transfer fluid is an extremely pure white mineral oil which provides low toxicity and reliable heat transfer at moderate temperatures. When operating temperatures prohibit the use of steam or steam is not readily available, Therminol XP can provide safe and efficient operation in heat transfer systems.

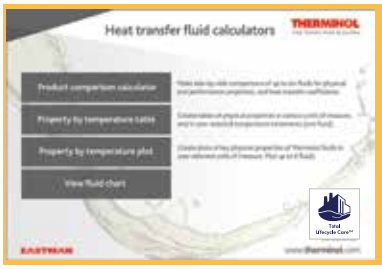


Therminol XP is available globally. Contact your local Eastman Therminol sales representative for more information.

Typical properties[a]

Appearance	Colorless, odorless liquid
Composition	White mineral oil
Maximum bulk temperature	315°C (600°F)
Maximum film temperature	330°C (625°F)
Normal boiling point	358°C (676°F)
Pumpability, at 300 mm^2/s (cSt)	–1°C (30°F)
Pumpability, at 2000 mm^2/s (cSt)	–20°C (–4°F)
Flash point, COC (ASTM D-92)	199°C (390°F)
Autoignition temperature (ASTM E-659)	346°C (655°F)
Pour point (ISO 3016)	–29°C (–20°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)	72°C (162°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	51°C (123°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)	30°C (85°F)
20 ft/s, 1-in. tube (6.096 m/s, 2.54-cm tube)	17°C (63°F)
Coefficient of thermal expansion at 200°C	0.000892/°C (0.000495/°F)
Heat of vaporization at maximum use temperature	214 kJ/kg (91.9 Btu/lb)
Average molecular weight	350
Pseudocritical temperature	542°C (1007°F)
Pseudocritical pressure	15.2 bar (220 psia)
Pseudocritical density	280 kg/m^3 (17.5 lb/ft^3)
Dielectric constant @ 23°C (ASTM D-924)	2.14

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 XP 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 on **therminol.com.**

Liquid properties of Therminol XP 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
–20	–4	904	1.62	443.9	–3.6	0.1180	1,840	2,030	—
–10	14	897	1.67	437.5	12.8	0.1174	601	670	—
0	32	891	1.72	431.1	29.7	0.1168	238	267	—
10	50	885	1.77	424.6	47.2	0.1161	110	124	—
20	68	878	1.82	418.1	65.1	0.1155	57.3	65.2	—
30	86	872	1.86	411.5	83.5	0.1148	32.9	37.8	—
40	104	866	1.91	404.9	102.3	0.1141	20.5	23.7	—
50	122	859	1.96	398.3	121.7	0.1133	13.6	15.9	—
60	140	853	2.00	391.6	141.5	0.1125	9.56	11.2	—
70	158	847	2.05	384.9	161.8	0.1118	7.01	8.28	—
80	176	840	2.10	378.2	182.5	0.1109	5.33	6.34	—
90	194	834	2.14	371.5	203.7	0.1101	4.18	5.01	0.01
100	212	827	2.18	364.7	225.3	0.1093	3.36	4.06	0.02
110	230	821	2.23	357.9	247.4	0.1084	2.76	3.37	0.03
120	248	814	2.27	351.1	269.9	0.1075	2.31	2.84	0.05
130	266	808	2.31	344.2	292.8	0.1065	1.97	2.44	0.09
140	284	801	2.36	337.4	316.2	0.1056	1.70	2.12	0.15
150	302	795	2.40	330.5	340.0	0.1046	1.48	1.86	0.24
160	320	788	2.44	323.6	364.1	0.1036	1.30	1.65	0.36
170	338	782	2.48	316.7	388.7	0.1025	1.15	1.48	0.55
180	356	775	2.52	309.8	413.7	0.1015	1.03	1.33	0.82
190	374	768	2.56	302.8	439.1	0.1004	0.929	1.21	1.19
200	392	761	2.60	295.8	464.9	0.0993	0.841	1.10	1.71
210	410	755	2.63	288.8	491.0	0.0982	0.764	1.01	2.41
220	428	748	2.67	281.8	517.6	0.0970	0.698	0.933	3.35
230	446	741	2.71	274.8	544.5	0.0959	0.640	0.863	4.58
240	464	734	2.75	267.7	571.8	0.0947	0.588	0.801	6.20
250	482	727	2.78	260.6	599.4	0.0934	0.542	0.746	8.27
260	500	720	2.82	253.5	627.4	0.0922	0.502	0.697	10.9
270	518	712	2.85	246.3	655.7	0.0909	0.465	0.653	14.2
280	536	705	2.89	239.2	684.4	0.0896	0.432	0.613	18.4
290	554	698	2.92	231.9	713.5	0.0883	0.402	0.576	23.6
300	572	690	2.95	224.7	742.8	0.0869	0.375	0.543	29.9
310	590	682	2.99	217.4	772.5	0.0856	0.350	0.513	37.5
320	608	675	3.02	210.1	802.5	0.0842	0.327	0.485	46.8
330	626	667	3.05	202.7	832.9	0.0828	0.306	0.459	57.9

[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 XP fluid. [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 XP 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
–4	–20	7.54	56.4	0.387	191.0	–1.6	0.0682	4,443	2,032	—
0	–18	7.53	56.3	0.389	190.4	0.0	0.0681	3,400	1,560	—
20	–7	7.47	55.9	0.403	187.3	7.9	0.0678	1,050	484	—
40	4	7.41	55.4	0.416	184.2	16.1	0.0673	402	187	—
60	16	7.35	55.0	0.429	181.1	24.5	0.0669	183	85.7	—
80	27	7.29	54.6	0.442	178.0	33.2	0.0665	94.9	44.9	—
100	38	7.24	54.1	0.454	174.8	42.2	0.0660	54.8	26.1	—
120	49	7.18	53.7	0.467	171.7	51.4	0.0656	34.4	16.5	—
140	60	7.12	53.2	0.479	168.5	60.9	0.0651	23.1	11.2	—
160	71	7.06	52.8	0.491	165.3	70.6	0.0646	16.4	8.02	—
180	82	7.00	52.4	0.503	162.1	80.5	0.0640	12.2	6.01	—
200	93	6.94	51.9	0.515	158.8	90.7	0.0635	9.38	4.66	0.0018
220	104	6.88	51.5	0.527	155.6	101.1	0.0629	7.43	3.73	0.0034
240	116	6.82	51.0	0.538	152.3	111.8	0.0624	6.04	3.06	0.0063
260	127	6.76	50.6	0.550	149.1	122.7	0.0618	5.02	2.56	0.0112
280	138	6.70	50.1	0.561	145.8	133.8	0.0612	4.23	2.18	0.0194
300	149	6.64	49.7	0.572	142.5	145.1	0.0605	3.63	1.89	0.0325
320	160	6.58	49.2	0.583	139.2	156.7	0.0599	3.15	1.65	0.0528
340	171	6.52	48.7	0.594	135.9	168.4	0.0592	2.76	1.46	0.0837
360	182	6.45	48.3	0.604	132.6	180.4	0.0585	2.44	1.30	0.129
380	193	6.39	47.8	0.614	129.3	192.6	0.0578	2.17	1.17	0.195
400	204	6.33	47.3	0.625	125.9	205.0	0.0571	1.95	1.06	0.289
420	216	6.27	46.9	0.635	122.6	217.6	0.0564	1.76	0.967	0.420
440	227	6.20	46.4	0.645	119.2	230.4	0.0556	1.59	0.886	0.600
460	238	6.14	45.9	0.654	115.8	243.4	0.0549	1.45	0.815	0.841
480	249	6.07	45.4	0.664	112.5	256.5	0.0541	1.32	0.752	1.16
500	260	6.01	44.9	0.673	109.1	269.9	0.0533	1.21	0.697	1.58
520	271	5.94	44.4	0.683	105.6	283.5	0.0525	1.12	0.648	2.13
540	282	5.87	43.9	0.692	102.2	297.2	0.0516	1.03	0.604	2.82
560	293	5.80	43.4	0.701	98.7	311.1	0.0508	0.950	0.565	3.70
580	304	5.73	42.9	0.709	95.3	325.2	0.0499	0.879	0.529	4.80
600	316	5.66	42.3	0.718	91.8	339.5	0.0490	0.815	0.497	6.16
620	327	5.58	41.8	0.726	88.3	354.0	0.0481	0.757	0.468	7.83

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.**

EASTMAN

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

eastman.com/locations

SFE-HTF-20245 4/26