

MARLOTHERM® SH

heat transfer fluid



High boiling point,
low-viscosity
heat transfer fluid

-15° to 325°C
(5° to 620°F)

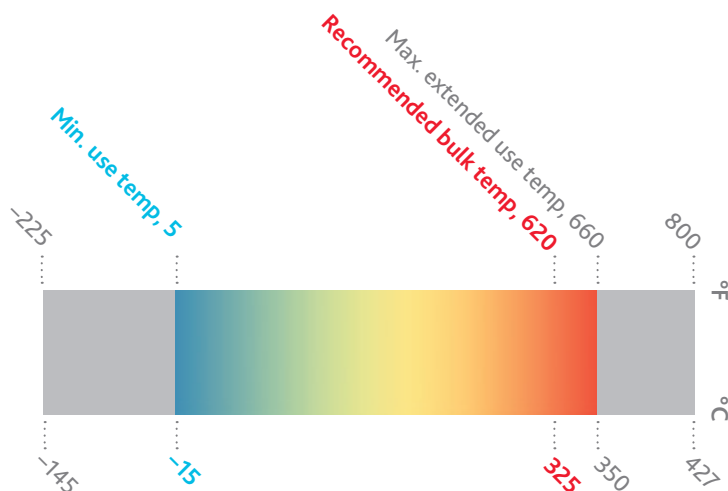
Max. extended use temp.: 350°C (660°F)

MARLOTHERM

Heat transfer fluids by Eastman

MARLOTHERM® SH

heat transfer fluid



Eastman Marlotherm® SH heat transfer fluid is a synthetic heat transfer fluid that offers outstanding performance during both low-temperature start-up and high-temperature operation. It performs over the entire temperature range without being kept under pressure. When operating in a well-maintained heat transfer system, Marlotherm SH provides reliable, consistent performance over long periods of time.

Marlotherm SH is available globally. Contact your local Eastman sales representative for more information.

Physical and chemical characteristics

Marlotherm SH is a low-viscosity, synthetic organic heat transfer medium for use in the liquid phase in closed, forced-circulation heat transfer systems.

While there are industry standards for measuring the thermal stability of heat transfer fluids, there is no established standard for deriving a recommended bulk temperature limit.* The recommended bulk (325°C [620°F]) and maximum film (380°C [715°F]) temperatures are based on industry-standard thermal studies. We provide this recommended bulk temperature at which, in well-designed and maintained systems, the stability of the fluid will enable several years of operation without fluid exchange. The maximum extended use temperature would still be suitable for operating the fluid but with a significantly reduced lifetime.

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 using Marlotherm SH fluid 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.

Marlotherm SH is noncorrosive to metals commonly used in the construction of heat transfer systems. To ensure optimal fluid life in use, annual fluid sampling and analysis is recommended for all heat transfer fluid systems.

While Marlotherm SH 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 Marlotherm SH should check with their safety and risk management experts for specific instructions.

*DIN 4754 stipulates that the supplier shall indicate the permissible feed temperature "at which the heat transfer medium will remain for use for at least one year." However, an exchange of the fluid after only a year of operation isn't economical, and increased maintenance is expected once the fluid reaches the end of its service life. Therefore, the maximum operating temperature should be recommended at a level that usually allows the user to operate the fluid permanently for several years.

Typical properties^a

Appearance	Liquid, clear
Composition	Dibenzyltoluene
Recommended bulk temperature	325°C (620°F)
Maximum extended use temperature	350°C (660°F)
Maximum film temperature	380°C (715°F)
Normal boiling point	392°C (738°F)
Pumpability, at 300 mm ² /s (cSt)	-1°C (30°F)
Pumpability, at 2000 mm ² /s (cSt)	-15°C (5°F)
Flash point, COC (ASTM D92)	219°C (426°F)
Autoignition temperature (ASTM E659)	459°C (858°F)
Autoignition temperature (DIN 51794)	500°C (932°F)
Pour point (DIN ISO 3016)	-34°C (-29.2°F)
Minimum liquid temperatures for fully developed turbulent flow ($N_{Re} > 10,000$)	
10 ft/sec, 1-in. tube (3.048 m/s, 2.54-cm tube)	61°C (142°F)
20 ft/sec, 1-in. tube (6.096 m/s, 2.54-cm tube)	42°C (108°F)
Minimum liquid temperatures for transitional region flow ($N_{Re} > 2000$)	
10 ft/sec, 1-in. tube (3.048 m/s, 2.54-cm tube)	23°C (73°F)
20 ft/sec, 1-in. tube (6.096 m/s, 2.54-cm tube)	13°C (55°F)
Heat of vaporization at 350°C	322 kJ/kg (138 Btu/lb)
Coefficient of thermal expansion @ 200°C	0.000784°C (0.000435°F)
Kinematic viscosity at 100°C (ASTM D445)	3.18 mm ² /s (cSt)
Kinematic viscosity at 40°C (ASTM D445)	16.4 mm ² /s (cSt)
Average molecular weight	272
Pseudocritical temperature	587°C (1089°F)
Pseudocritical pressure	24.4 bar (354.2 psia)
Pseudocritical density	331.3 kg/m ³ (20.68 lb/ft ³)
Liquid density at 25°C (ASTM D4052)	1039 kg/m ³ (8.67 lb/gal)
Copper corrosion (ASTM D130)	1a
Moisture content, maximum (ASTM E203)	300 ppm
Dielectric constant @ 23°C (ASTM D924)	2.7

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

Heat transfer fluid calculators

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Heat transfer fluids by Eastman

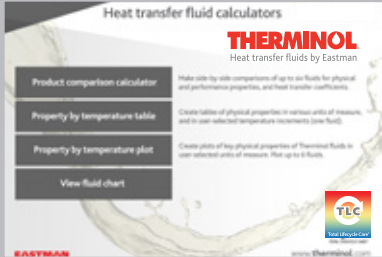
- Product comparison calculator
- Property by temperature table
- Property by temperature plot
- View fluid chart

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, **Marlotherm.com**.

Liquid properties of Marlotherm® SH heat transfer fluid by temperature^a (SI UNITS)

Temperature		Liquid density	Liquid heat capacity	Liquid enthalpy ^b	Heat of vaporization	Liquid thermal conductivity	Liquid viscosity ^c		Vapor pressure ^d
°C	°F	kg/m ³	kJ/(kg·K)	kJ/kg	kJ/kg	W/(m·K)	cSt (mm ² /s)	cP (mPa·s)	kPa
0	32	1055	1.49	26.0	530	0.1331	261	276	—
10	50	1048	1.53	41.1	524	0.1318	99.6	104	—
20	68	1042	1.56	56.5	518	0.1305	47.3	49.3	—
30	86	1035	1.60	72.3	513	0.1292	26.3	27.2	—
40	104	1029	1.63	88.5	507	0.1279	16.4	16.9	—
50	122	1022	1.67	105	501	0.1266	11.1	11.4	—
60	140	1015	1.71	122	496	0.1253	8.02	8.14	—
70	158	1009	1.74	139	490	0.1240	6.07	6.12	—
80	176	1002	1.78	157	485	0.1227	4.76	4.77	—
90	194	995	1.81	175	479	0.1214	3.85	3.83	—
100	212	989	1.85	193	474	0.1201	3.18	3.15	—
110	230	982	1.89	212	468	0.1188	2.68	2.63	0.015
120	248	975	1.92	231	463	0.1175	2.29	2.24	0.025
130	266	968	1.96	250	457	0.1162	1.99	1.92	0.040
140	284	961	2.00	270	452	0.1149	1.74	1.67	0.065
150	302	954	2.03	290	446	0.1136	1.54	1.47	0.101
160	320	947	2.07	311	440	0.1123	1.37	1.30	0.156
170	338	940	2.11	331	435	0.1110	1.23	1.15	0.235
180	356	933	2.14	353	429	0.1096	1.11	1.03	0.347
190	374	926	2.18	374	424	0.1083	1.01	0.931	0.505
200	392	919	2.22	396	418	0.1070	0.917	0.843	0.723
210	410	912	2.25	419	412	0.1057	0.840	0.766	1.02
220	428	904	2.29	441	406	0.1044	0.773	0.699	1.42
230	446	897	2.33	464	400	0.1030	0.714	0.640	1.95
240	464	890	2.37	488	394	0.1017	0.661	0.588	2.65
250	482	882	2.40	512	388	0.1004	0.615	0.542	3.56
260	500	874	2.44	536	382	0.0990	0.573	0.501	4.72
270	518	867	2.48	561	376	0.0977	0.536	0.465	6.20
280	536	859	2.52	586	370	0.0964	0.503	0.432	8.07
290	554	851	2.55	611	363	0.0950	0.472	0.402	10.4
300	572	843	2.59	637	356	0.0937	0.445	0.375	13.3
310	590	835	2.63	663	350	0.0923	0.420	0.351	16.8
320	608	827	2.67	689	343	0.0910	0.398	0.329	21.1
330	626	818	2.71	716	336	0.0896	0.378	0.309	26.4
340	644	810	2.75	743	329	0.0883	0.359	0.291	32.7
350	662	801	2.78	771	322	0.0869	0.342	0.274	40.2
360	680	792	2.82	799	314	0.0856	0.326	0.258	49.2

^aRecommended bulk temperature 325°C (620°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 Marlotherm 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

Liquid properties of Marlotherm SH heat transfer fluid by temperature^a (ENGLISH UNITS)

Temperature		Liquid density		Liquid heat capacity	Liquid enthalpy ^b	Heat of vaporization	Liquid thermal conductivity	Liquid viscosity ^c		Vapor pressure
°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
20	-7	8.84	66.1	0.351	6.93	230	0.0774	1510	588	—
40	4	8.78	65.7	0.360	14.0	227	0.0766	419	165	—
60	16	8.72	65.2	0.370	21.3	224	0.0758	163	64.4	—
80	27	8.66	64.8	0.379	28.8	221	0.0749	79.1	31.5	—
100	38	8.60	64.3	0.389	36.5	219	0.0741	45.0	18.1	—
120	49	8.54	63.9	0.398	44.4	216	0.0733	28.6	11.6	—
140	60	8.47	63.4	0.408	52.4	213	0.0725	19.7	8.02	—
160	71	8.41	62.9	0.417	60.7	211	0.0716	14.4	5.90	—
180	82	8.35	62.5	0.427	69.1	208	0.0708	11.0	4.53	—
200	93	8.29	62.0	0.436	77.8	205	0.0700	8.66	3.60	0.001
220	104	8.23	61.5	0.446	86.6	203	0.0691	7.02	2.94	0.002
240	116	8.16	61.1	0.456	95.6	200	0.0683	5.81	2.45	0.003
260	127	8.10	60.6	0.465	105	197	0.0674	4.89	2.08	0.005
280	138	8.04	60.1	0.475	114	195	0.0666	4.17	1.79	0.008
300	149	7.97	59.6	0.485	124	192	0.0658	3.60	1.56	0.014
320	160	7.91	59.1	0.494	134	189	0.0649	3.14	1.37	0.023
340	171	7.84	58.7	0.504	144	187	0.0641	2.76	1.21	0.036
360	182	7.78	58.2	0.514	154	184	0.0632	2.44	1.08	0.055
380	193	7.71	57.7	0.524	164	181	0.0624	2.18	0.975	0.083
400	204	7.64	57.2	0.534	175	179	0.0615	1.95	0.882	0.123
420	216	7.57	56.7	0.544	186	176	0.0607	1.76	0.802	0.178
440	227	7.51	56.2	0.554	196	173	0.0598	1.59	0.733	0.255
460	238	7.44	55.6	0.563	208	170	0.0590	1.45	0.672	0.360
480	249	7.37	55.1	0.573	219	167	0.0581	1.32	0.620	0.500
500	260	7.30	54.6	0.583	231	164	0.0573	1.21	0.573	0.685
520	271	7.23	54.1	0.593	242	161	0.0564	1.11	0.532	0.926
540	282	7.15	53.5	0.603	254	158	0.0555	1.03	0.496	1.24
560	293	7.08	53.0	0.614	266	155	0.0547	0.950	0.463	1.64
580	304	7.01	52.4	0.624	279	152	0.0538	0.881	0.434	2.14
600	316	6.93	51.8	0.634	291	149	0.0530	0.819	0.408	2.77
620	327	6.85	51.3	0.644	304	146	0.0521	0.763	0.384	3.56
640	338	6.77	50.7	0.654	317	142	0.0512	0.713	0.363	4.52
660	349	6.69	50.1	0.665	330	139	0.0504	0.667	0.344	5.70
680	360	6.61	49.5	0.675	344	135	0.0495	0.625	0.326	7.13

^aRecommended bulk temperature 325°C (620°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 Marlotherm fluid. ^bLiquid enthalpy basis is -17.8°C (0°F) ^c1 cSt = 1 mm²/s and 1 mPa·s = 1 cP.

TLC Total Lifecycle Care[®]

Eastman's TLC Total Lifecycle Care[®] program is designed to support Marlotherm 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-service heat transfer fluid sample analysis

When Marlotherm 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. For questions in North America, call 800-433-6997. For questions in other regions, contact your local technical support representative.

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.

Flushing fluid and fluid refill

Liquid phase heat transfer systems can be cleaned with special cleaning fluids. After the system is flushed, the appropriate liquid phase heat transfer fluid can be added. For cleaning options, contact your local Eastman heat transfer fluid specialist.

Eastman's fluid sustainability support*

As part of our commitment to sustainability and the environment, Eastman offers a trade-in program for used Marlotherm 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 Marlotherm heat transfer fluid.

*Marlotherm reclamation service is only offered at our Germany location.

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

EASTMAN
The results of **insight**™

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