



MARLOTHERM[®] LH

Product description

MARLOTHERM LH is a high-performance synthetic, organic heat-transfer medium for use in the liquid phase and in the vapor-liquid phase in closed, forced circulation heat transfer systems. The upper use limit lies at a heater outlet temperature of 360°C. The film temperature should not exceed the limit of 380°C either significantly or for a prolonged period.

MARLOTHERM LH in the liquid phase is preferably used in unpressurized systems at working temperatures from 0° to 280°C. Due to its favourable viscosity behaviour, MARLOTHERM LH is the ideal heat-transfer medium for heating and cooling processes.

In customary heat exchangers, MARLOTHERM LH provides good heat transfer down to temperatures around 0°C. At working temperatures below 0°C, the heat-exchange surface is to be matched to the technical characteristics of MARLOTHERM LH and the flow conditions.

MARLOTHERM LH is best suited to the temperature control of vessels, reactors and processing machines which are both heated and cooled by means of a central heat-transfer system, and in systems in which several consumers have to be supplied at very different temperature levels. The heat-transfer systems should be designed and operated in accordance with the recommendations of DIN 4754 "heat-transfer installations working with organic heat-transfer fluids".

MARLOTHERM LH can be used at working temperatures above 280°C in pressurized systems. The advantage offered by the use of MARLOTHERM LH in this temperature range compared with "pressureless" use of MARLOTHERM SH has to be assessed in each individual case. Owing to its narrow boiling range of about 4°C, MARLOTHERM LH can also be used in the vapor-liquid phase, e.g. for reactor cooling in exothermic processes. Heat-transfer plants containing MARLOTHERM LH can be started up without difficulty at temperatures down to about -30°C using centrifugal pumps with a rotating mechanical seal or permanent magnet drive, or using canned motor pumps.

At operating temperatures below the boiling point of the heat-transfer medium, MARLOTHERM LH circuits are advantageously operated using an inert gas back pressure of less than 100 mbar at the expansion vessel. Nitrogen has proven to be suitable as an inert gas. Inert gas blanketing is the best protection against changes in the heat-transfer charge caused by oxidation. Antioxidants are unstable at operating temperatures above 200°C and are ineffective even after short operating times.

At operating temperatures above the boiling point of MARLOTHERM LH, it is necessary to apply an inert gas back pressure which is sufficient to keep the heat-transfer medium in the liquid state and prevent vaporization via the expansion vessel.

MARLOTHERM LH is thermally stable up to an operating temperature of 300°C. The MARLOTHERM LH charge can be used for several years without significant changes. At higher temperatures, low-boiling and high-boiling decomposition products are formed.

Sasol Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg
Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



MARLOTHERM[®] LH

Their degree of formation rises with increasing operating temperature. The decomposition products remain completely dissolved in the MARLOTHERM LH charge. The low ends should however be removed via the expansion vessel in order to maintain reliable operation of the heat-transfer system. To assist this measure, the temperature of the expansion vessel should be raised to about 150°C.

If used according to the recommended operation parameters, MARLOTHERM LH forms no deposits on the walls and does not lead to accumulation of solids in the heat transfer circuit.

MARLOTHERM LH circuits can be operated reliably and without high maintenance costs. In pressurized plants using MARLOTHERM LH above its boiling point, stricter operating instructions must be observed.

To check the operating condition of heat-transfer systems, quality controls should be carried out at appropriate intervals on representative samples from the main stream of the circuit. Scope of testing and sampling have to be individually matched to the charge volume and the operating temperature of the heat transfer plant. The analysis can be carried out on request by Sasol Customer Service.

Product data (specification)

| Property | Value | Unit | Test method |
|---------------------|---------------|--------------------|-------------|
| Appearance at 20 °C | liquid, clear | - | visual |
| Chlorine | < 10 | ppm | DIN 51408 |
| Acid number | ≤ 0.02 | mg KOH/g | DIN EN 2114 |
| Density at 20 °C | 0.99 - 1.00 | g/ml | ASTM D 941 |
| Viscosity at 20 °C | 3.6 - 4.4 | mm ² /s | DIN 51562 |

General product description

| Property | Value | Unit | Test method |
|---------------------------------------|-----------------|------|--|
| Boiling range at 1013 mbar | about 278 - 282 | °C | ASTM D 1078 |
| Pour point | about -30 | °C | DIN ISO 3016 |
| Flash point | about 130 | °C | EN 22719 |
| Ignition temperature | about 510 | °C | Regulation (EU) 440/2008; Method A.15. |
| Permissible heater outlet temperature | 360 | °C | - |
| Permissible heater film temperature | 380 | °C | - |
| Pumpability limit | about - 30 | °C | - |

Sasol Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg
Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



Product Information

04.06.2014

MARLOTHERM[®] LH

Phys. data of MARLOTHERM LH

| Temperature | | Density | | Specific heat | | Thermal conductivity | | Viscosity kinematic | | Vapor pressure | |
|-------------|-----|-------------------|--------------------|---------------|-----------|----------------------|--------------|---------------------|------|----------------|-------|
| °C | °F | kg/m ³ | lb/ft ³ | kJ/kg K | Btu/lb °F | W/m K | Btu/ft*hr °F | mm ² /s | cSt | hPa | psi |
| - 20 | - 4 | 1026 | 64.1 | 1.48 | 0.353 | 0.136 | 0.079 | 17 | 17 | - | - |
| 0 | 32 | 1010 | 63.1 | 1.55 | 0.370 | 0.134 | 0.077 | 8.30 | 8.30 | - | - |
| 20 | 68 | 996 | 62.2 | 1.62 | 0.387 | 0.132 | 0.076 | 4.00 | 4.00 | - | - |
| 40 | 104 | 980 | 61.2 | 1.68 | 0.401 | 0.129 | 0.075 | 2.60 | 2.60 | - | - |
| 60 | 140 | 966 | 60.3 | 1.75 | 0.418 | 0.127 | 0.073 | 1.90 | 1.90 | - | - |
| 80 | 176 | 950 | 59.3 | 1.82 | 0.435 | 0.125 | 0.072 | 1.50 | 1.50 | - | - |
| 100 | 212 | 936 | 58.4 | 1.88 | 0.449 | 0.122 | 0.070 | 1.10 | 1.10 | 2.2 | 0.03 |
| 120 | 248 | 920 | 57.4 | 1.95 | 0.466 | 0.120 | 0.069 | 0.86 | 0.86 | 6 | 0.09 |
| 140 | 284 | 906 | 56.6 | 2.02 | 0.482 | 0.118 | 0.068 | 0.71 | 0.71 | 15 | 0.22 |
| 160 | 320 | 890 | 55.6 | 2.08 | 0.497 | 0.115 | 0.066 | 0.61 | 0.61 | 33 | 0.48 |
| 180 | 356 | 873 | 54.5 | 2.15 | 0.514 | 0.113 | 0.065 | 0.54 | 0.54 | 68 | 0.99 |
| 200 | 392 | 856 | 53.4 | 2.22 | 0.530 | 0.111 | 0.064 | 0.47 | 0.47 | 131 | 1.90 |
| 220 | 428 | 839 | 52.4 | 2.29 | 0.547 | 0.109 | 0.063 | 0.43 | 0.43 | 237 | 3.44 |
| 240 | 464 | 822 | 51.3 | 2.35 | 0.561 | 0.106 | 0.061 | 0.39 | 0.39 | 408 | 5.92 |
| 260 | 500 | 804 | 50.2 | 2.42 | 0.578 | 0.104 | 0.060 | 0.36 | 0.36 | 672 | 9.75 |
| 280 | 536 | 786 | 49.1 | 2.49 | 0.595 | 0.102 | 0.059 | 0.32 | 0.32 | 1061 | 15.39 |
| 300 | 572 | 766 | 47.8 | 2.55 | 0.609 | 0.099 | 0.057 | 0.30 | 0.30 | 1619 | 23.49 |
| 320 | 608 | 747 | 46.6 | 2.62 | 0.626 | 0.097 | 0.056 | 0.28 | 0.28 | 2394 | 34.73 |
| 340 | 644 | 726 | 45.3 | 2.69 | 0.642 | 0.095 | 0.055 | 0.27 | 0.27 | 3442 | 49.93 |
| 360 | 680 | 703 | 43.9 | 2.75 | 0.657 | 0.092 | 0.053 | 0.26 | 0.26 | 4826 | 70.01 |

Sasol Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg

Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



Product Information

04.06.2014

MARLOTHERM[®] LH

Material compatibility

MARLOTHERM LH does not corrode the usual metallic materials used in construction of plants und machinery. MARLOTHERM LH is compatible with pure graphite, PTFE und fluoroelastomers. These materials can be used as base materials for seals. In selecting the seals, note must be taken of the seal manufacturer's data for temperature resistance und mechanical strength of the material. Seals made of pure graphite have proven useful in heat-transfer plants using MARLOTHERM LH, even when the operating temperatures regularly change greatly, e.g. as a result of frequent switching between heating und cooling processes. Of the materials which can be used, graphite provides the best compensation for operational temperature changes. To increase the strength und dimensional stability, the seals are advantageously provided with a metal insert, e.g. a sheet metal core. Rubber-elastic binders swell on contact with MARLOTHERM LH und should not be used in the seals for heat-transfer plants using MARLOTHERM LH.

Toxicological properties and safety

MARLOTHERM LH is intended for use as a heat-transfer medium in closed plants. For safety and environmental reasons, escape of the heat-transfer medium is to be prevented or limited to a minimum amount by means of appropriate construction measures. When handling MARLOTHERM LH, the usual guidelines and recommendations for handling organic liquids should be observed.

Details are to be found in the latest safety data sheet for MARLOTHERM LH.

Sasol Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg
Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



Product Information

04.06.2014

MARLOTHERM[®] LH

Storage and transport

MARLOTHERM LH has a virtually unlimited storage life when stored in closed metal containers (e.g. aluminium or steel). No special protective measures are necessary during storage of the heat-transfer medium. When handling MARLOTHERM LH and when filling and operating a heat-transfer-system with MARLOTHERM LH, care must be taken that the heat-transfer medium cannot enter the soil or sewer system. The product is almost insoluble in water. If necessary, used MARLOTHERM LH can be recycled or used for energy recovery observing local regulations. Experience has shown that MARLOTHERM LH charges do not have to be replaced even after many years of use. The limits for reliable use of the heat-transfer medium will only be reached after long-term use of MARLOTHERM LH above its boiling point. In this case, the used MARLOTHERM LH can be reclaimed by fractional distillation for reuse as a heat-transfer medium. However, for economic reasons, amounts of approximately 10 t or more are required for distillation. The values of the residue content of MARLOTHERM LH, the viscosity and the chlorine content of the goods; the values are to be determined beforehand.

With regards to the classification of MARLOTHERM LH under the regulations governing the transport of dangerous goods, reference should be made to the EU Safety Data Sheet.

In general the waste code number for MARLOTHERM LH will be determined by its application according to the EWC. In those cases in which it has not been used as heat transfer fluid follow your local regulations.

Sasol Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg
Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



Product Information

04.06.2014

MARLOTHERM[®] LH

Customer service

MARLOTHERM LH is just one of the comprehensive range of high performance heat transfer fluids offered by Sasol for the temperature range from – 90 to 360 °C: Detailed information is available on request. Sasol has more than 50 years experience in the field of heat transfer technology. This know-how is available to you, should you have any questions or problems. Whether you have questions about the choice of heat transfer medium for a certain application, about system design, troubleshooting, safety issues or specification problems, our experts are here to help you. Just give us a call! (Phone: +492365 49 2214 / 49 5371; fax +49 2365 49 9180)

An analytical routine check of the heat transfer medium should be part of the maintenance regulations. This check should be carried out at least once a year and is offered by Sasol to all users of MARLOTHERM. The system parameters which are measured will allow our experts an accurate assesment of the condition of the material. This way, prolonged and trouble-free operation of the plant can be ensured. Faults in the plant are quickly detected and can be avoided in due time before more extensive damage and costs occur.

This information is based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party patent rights. In particular, no guarantee of properties in the legal sense is implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Reference to trade names used by other companies is neither a recommendation, nor is it intended to suggest that similar products could not be used. All our business transactions shall exclusively be governed by our General Sales Conditions.

Sasol Germany GmbH [®] is a registered Trademark of SASOL Germany GmbH

Anckelmannsplatz 1, 20537 Hamburg Postanschrift: Postfach 26 18 05, 20508 Hamburg

Telefon: +49 40 63 684-1000 Telefax: +49 40 63 684-3700 info@de.sasol.com www.marlotherm.com

Geschäftsführung: Dr. Kay Luttmann (Vorsitzender) Arno Klegin Vorsitzender des Aufsichtsrats: Dr. Jens Straatmann
Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475