



Product Information

11.05.2012

MARLOTHERM FG

Product description

MARLOTHERM FG is an economical, non-toxic, NSF registered (HT1 approval) organic heat transfer fluid for use in the high temperature heating and cooling of closed circuit, non-pressurized heat transfer systems under forced circulation. It exhibits excellent thermal stability and efficient heat transfer from about 60 to 300 °C bulk outlet temperature range with an allowable film temperature to 325 °C.

MARLOTHERM FG fluid is stable to air compared to other organic heat transfer fluids of similar chemical structure. It does not contain any antioxidants as they are unstable and become ineffective above 200 °C. Therefore, like all organic media, it will oxidize at temperatures over 80 °C. Optimum circuit operations can be achieved with a low inert gas back pressure of 100 mbar on the expansion vessel at bulk outlet temperatures to 300 °C. Nitrogen has proven to be a successful inert gas to impede oxidation. With that protective measure, MARLOTHERM FG can be used in applications where air contact cannot be completely avoided because of constructional and operational conditions.

MARLOTHERM FG fluid is particularly suited for use in the heating and cooling of process and handling equipment in the pharmaceutical, food, die casting, and plastic as well as the chemical industry. Its favorable viscosity behavior allows it to be circulated using standard centrifugal pumps down to temperatures of -7 °C and ease of circuit temperature cycling such as weekly shutdowns and start-ups or frequent process equipment changes. The start-up procedures for heat transfer systems should always include incremental temperature increases to ensure that turbulent flow is established before higher temperatures are applied to the fluid. See the MARLOTHERM Newsletter No. 16 - MARLOTHERM Heat Transfer System Start-up Procedures.

MARLOTHERM FG fluid is extremely stable to thermal stress over the recommended bulk outlet temperature range. As with any organic heat transfer fluid, high operating temperatures will lead to the formation of low and high boiling secondary products in tolerated amounts. The lowest boiling fractions can be removed via the expansion vessel continuously or at suitable maintenance intervals, as accumulation must be avoided to ensure safe operating conditions. As the proportion of high boilers increases, the viscosity rises to the point where change out is recommended as turbulent flow could be lost.

MARLOTHERM FG fluid, when used in accordance with the guidelines, does not form any viscous or solid deposits leading to fouling on heat exchanger surfaces or clogging the heat transfer circuit. To ensure problem-free operations, the condition of the heat transfer fluid charge should be regularly checked by means of specific analytical quality control methods. See the MARLOTHERM Newsletter No. 2 - Quality Inspection of MARLOTHERM -Charges.

Sasol Germany GmbH

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Sitz der Gesellschaft: Hamburg Registergericht: Amtsgericht Hamburg HRB 78475



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Typical Physical and Chemical Properties

MARLOTHERM FG fluid is a clear liquid of naphthenic and paraffinic chemical structure with a bland odours.

Specification

Property	Value	Unit	Test method
Kinematic viscosity at 20 °C	33.0 - 42.0	mm ² /s	DIN 51562-01
Kinematic viscosity at 40 °C	14.0 - 19.0	mm ² /s	DIN 51562-01
Density at 20°C	839.0 - 853.0	kg/m ³	DIN 51757 method 3

General product description

Property	Value	Unit	Test method
Boiling range at 1013 mbar	about 300 - 500	°C	ASTM D 10160
Pour point	< - 12	°C	DIN ISO 3016
Density at 20 °C	850	kg/m ³	DIN 51757
Kinematic viscosity at 20 °C	38	mm ² /s	DIN 51562
Flash point	about 190	°C	DIN ISO 2592
Ignition temperature	about 330	°C	DIN 51 794
Permissible heater outlet temperature	300	°C	-
Permissible heater film temperature	325	°C	-
Pumpability limit	-7	°C	-

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Material data for MARLOTHERM FG

Temperature °C	Density kg/m ³	Specific heat kJ/kg K	Thermal conductivity W/m K	Kinematic viscosity mm ² /s	Vapour pressure hPa
0	862	1.84	0.1383	115.0	-
20	850	1.92	0.1367	37.5	-
40	838	2.01	0.1353	16.4	-
60	826	2.09	0.1310	8.7	-
80	814	2.12	0.1336	5.3	-
100	802	2.25	0.1306	3.6	-
120	790	2.34	0.1275	2.6	-
140	778	2.42	0.1258	1.9	1.9
160	766	2.50	0.1250	1.5	4.5
180	754	2.58	0.1244	1.2	9.7
200	742	2.67	0.1228	1.0	19.7
220	730	2.75	0.1211	0.88	37.8
240	718	2.83	0.1197	0.76	68.7
260	706	2.91	0.1180	0.67	119
280	694	3.00	0.1167	0.60	200
300	682	3.08	0.1150	0.54	322

Material compatibility

MARLOTHERM FG fluid is non-corrosive to the metals used in heat transfer system construction. For flange connection sealing where preferred welded joints are not feasible, gasket choice should be based on operating temperatures and whether the circuit is frequently temperature cycled.

Moderate temperature operations to about 230 °C work satisfactorily with spiral metal insert types, fluorinated elastomer, or oil-resistant mineral fiber reinforced rubber elastomer gaskets. At higher heat loadings and where the circuit temperatures are widely cycled, metal-insert reinforced graphite gaskets are used successfully to ensure heat transfer system integrity. The gasket manufacturer's recommendations should guide the selection of the proper sealing material. See the MARLOTHERM Manual - The Design of Heat Transfer Systems for Plants and Processes for more details.

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Application

MARLOTHERM FG fluid is suitable for a broad array of indirect heating and cooling applications where a high temperature heat transfer fluid of a non-aromatic structure is preferred:

Asphalt and coal tar	Compounding, transport, storage
Chemicals/resins	Batch or continuous reactors, transfer lines
Energy	Heat recovery, storage
Flooring/roofing	Coating, forming
Food	Oil and fat refining, transportation transfer, storage, baking
Laundry	Indirect heating
Lumber	Drying, laminating
Metals	Die casting, laminating
Paper and paper products	Production processes
Pharmaceuticals	Multi-purpose batch reactors
Plastics	Calenders, extruders, molds, transfer lines
Rubber	Molds, calenders, curing
Textiles	Calenders, coating, drying

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Fluid Selection Criteria

MARLOTHERM FG fluid stands out among the heat transfer fluids operating in circuits to bulk outlet temperatures of 300 °C. Its attributes are:

High boiling point under normal pressure	Initial point at >300 °C
Low pour point and viscosity for ease of start-up	Yes, pump able to <0 °C
Low vapour pressure in use range	Yes, <500 hPa at 300 °C
Good thermal stability	Yes, maintains turbulent flow over use life
Non-corrosive to material of construction	Yes, provides some lubricity
No or minimal reactivity with user side products	Usually no, depends on application
High flash point	open cup: >190 °C
Material with low risk	NSF Approval HT1, USP29/NF24, FDA 178.3620 A
Low sensitivity to oxidation	Equivalent or superior to commercial products
Economical over use life	Yes

Toxicological properties and safety aspects

MARLOTHERM FG is intended for use in closed systems, therefore the leakage of heat transfer fluid from the plant has to be prevented or minimised for safety and environmental reasons using suitable design measures.

Details on toxicological, ecological and safety aspects of the heat transfer fluid are to be found in the latest EC safety data sheet for MARLOTHERM FG.

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Storage and transport

MARLOTHERM FG fluid can be stored virtually indefinitely in sealed steel containers and no special safety precautions are required during storage. Normal care in handling and good personal hygiene should be practiced to avoid bodily contact when transferring fluid to the circuit from drum or bulk modes of transportation and performing heat transfer system maintenance. Care should be taken so that the fluid cannot enter the soil or the sewer system. MARLOTHERM FG can be disposed of or reclaimed under EPA used oil regulations found in 40 CFR 279. The safety and handling data contained herein are for general information purposes only. Please refer to the Sasol Germany GmbH to get a Material Safety Data Sheet for specific, complete information regarding the safety and handling of this product.

Customer service

MARLOTHERM FG fluid is just one of the comprehensive range of high performance heat transfer fluids offered by Sasol. The MARLOTHERM products cover the temperature range from -90 to 360 °C. Detailed information is available on request. Sasol has almost 50 years of experience in the field of heat transfer technology. This know-how is available to you, should you as our customer have any questions or problems. Whether you have questions about the choice of a heat transfer fluid for a certain application, system design, troubleshooting, safety issues or specifications problems, our experts are here to help you. Just give us a call! (Phone: +492365 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 assessment 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.

www.marlotherm.com

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