



Paratherm HE[®] HEAT TRANSFER FLUID

High Flash & Fire Points, Thermally Stable

ENGINEERING BULLETIN HE 302

Precise, Uniform Temperature Control™ in Closed-Loop Heat Transfer Systems

The Paratherm HE[®] high flash and fire point heat transfer fluid is rated for an optimal service range of 150°F to 600°F (66°C to 316°C). Engineered for higher thermal and oxidative stability, it is efficient and cost effective. Its greater purity allows it to strongly resist degradation while holding thermal properties and maintaining efficiency. This provides for low maintenance and solid performance over an extended operating life. Non-toxic, the HE fluid is safe to use and easy to dispose. It can be safely combined with spent lubricating oils and recycled locally. Found in a broad variety of applications, the fluid is recommended, specified and/or approved by a host of equipment manufacturers and thermal fluid heater OEMs for continuously operated systems. Recognized by U.L. (*Underwriters Laboratories, Inc., No. MH17163-N*), the durable HE fluid has a proven record of success under demanding conditions and yet is safe and easy to handle.

Safety in Operation

The Paratherm HE fluid has among the highest flash and fire points of any high temperature heat transfer fluid. With a flash point of 440°F, and a fire point of 500°F, it is an extremely safe fluid to have in your system. In many cases, these flash and fire points exceed the system's operating temperature.

The HE fluid is Coast Guard approved for molten sulfur service and has passed rigorous Bioassay with 3 species.

Human/Environmental Safety

The Paratherm HE fluid is virtually non-toxic. With an Oral LD₅₀ rating of >35 (the higher the number, the lower the toxicity), the HE fluid is actually safer than most oils. In the event of a release, it can be treated using the same simple clean-up procedures used for light lubricating oils. Once gathered and placed in a container, the HE fluid can be combined with the plant's used lubricating oils and sent to the local recycler. Have the Material Safety Data Sheet available for the recycler. Note that the HE fluid contains no chlorinated hydrocarbons, and virtually no polar compounds, sulphur, oxides of nitrogen or heavy metals.

Corrosion in the System

The HE fluid is manufactured from natural feedstocks, and provides similar metal-coating

Typical Properties*

Physical Properties

Feedstock	Paraffinic Hydrocarbon (Single Cut)
Appearance	Transparent, Pale Yellow
Odor	Faint (oily)
Optimum Use Range	150° to 600°F (66°C to 316°C)
Flash Point (coc)	ASTM-D-92 440°F (227°C)
Fire Point (coc)	ASTM-D-92 500°F (260°C)
Autoignition	ASTM-D-2155 700°F (371°C)
Atmospheric Boiling Point, 10% Fraction,	ASTM-D-1160 779°F (415°C)
Vapor Pressure, psia @	300°F 0.00039
	350°F 0.00193
	400°F 0.0097
	450°F 0.0387
	500°F 0.1350
	550°F 0.3870
	600°F 0.8700
Coefficient of Thermal Expansion**	0.000592/°F
	0.001066/°C
Heat of Vaporization (Calculated)	77.19 Btu/lb
Heat of Combustion	19,550 Btu/lb
API Gravity ASTM D-287	31.7
Specific Gravity @ 15°C	0.8651
Density, lb/gal @ 60°F (16°C)	7.22
Viscosity, cSt @ 40°C	ASTM-D-445 40.25
Pour Point (Crystal Point)	ASTM-D-97 5°F (-15°C)
HE-L/P™ Fluid	-35°F
Pumpability: Centrifugal @ 2,000 centipoise, nominal	20°F (-7°C)
Color	ASTM-D-1500 1.0
Molecular Weight	ASTM-D-2502 445g/mole
Corrosivity (3hr Cu Strip @ 100°C)	ASTM-D-130 1A
Total Sulphur (Mass %) J-140	0.002
Total Acid Number (T.A.N.)	ASTM-D-974 0.01

Electrical Properties

Dielectric Strength @20°C, nominal	>30 KV/cm
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Optical Properties

Refractive Index	ASTM-D-1747 1.4722
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* These are typical laboratory values, and are not guaranteed for all samples.

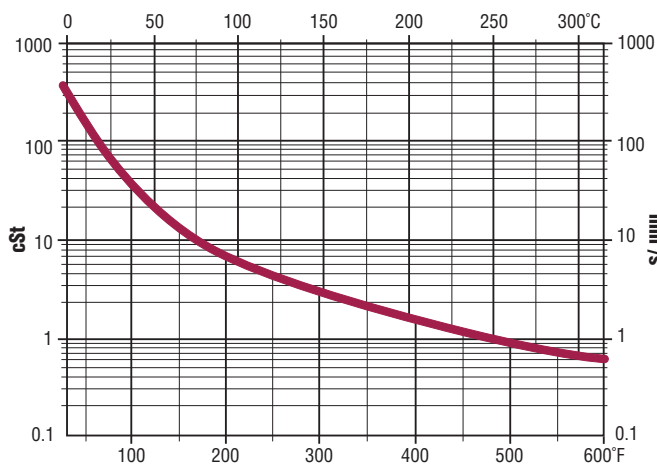
** Note: Normal practice is to size expansion tanks so that they are 1/4 to 1/3 full when the system is cold, and 2/3 to 3/4 full when the system is at the maximum normal operating temperature.

and lubricating properties as the finest natural oils. However, any water allowed to stand in piping, components or especially expansion tanks of thermal oil systems can cause corrosion. Because the Paratherm HE fluid is immiscible with water and also slightly less dense, any water can be easily drained from the system's low point drains. Crack the low-point valve and allow fluid to drain into a beaker or clear water glass. If you see a phase separation (one liquid "floating" on top of the other), continue to drain until no separation is observed.

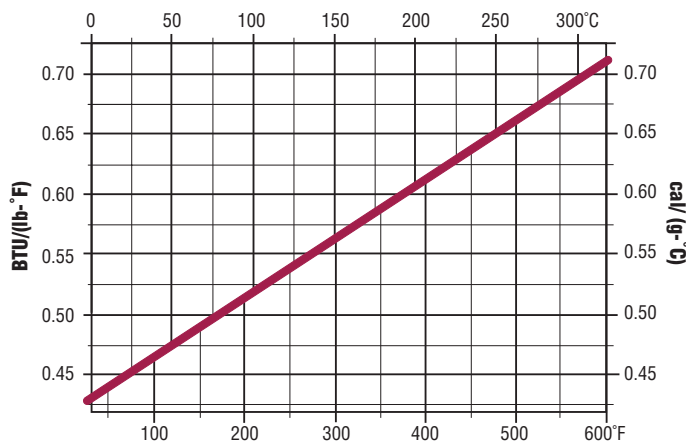
Storing Your Fluid

Drums of heat transfer fluid should be kept in non-hazardous dry areas. Until ready for use, the container's tamper evident safety seals *must* remain intact. Liquids should not be allowed to pool on the tops of the drums. In the afternoon and evening when temperatures cool, the heat transfer fluid will cool and contract slightly. A partial vacuum is created in the drum, and, if the bung's elastomeric seal is not perfect, liquid standing on the top of the drum can be drawn through, contaminating the fluid. If drums must be temporarily stored outside, store them on their sides.

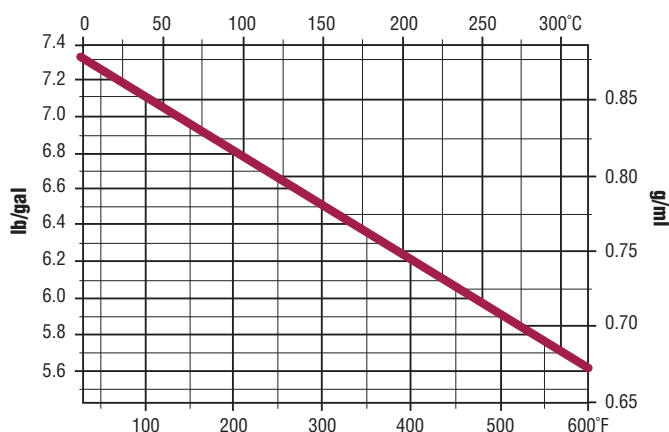
VISCOSITY



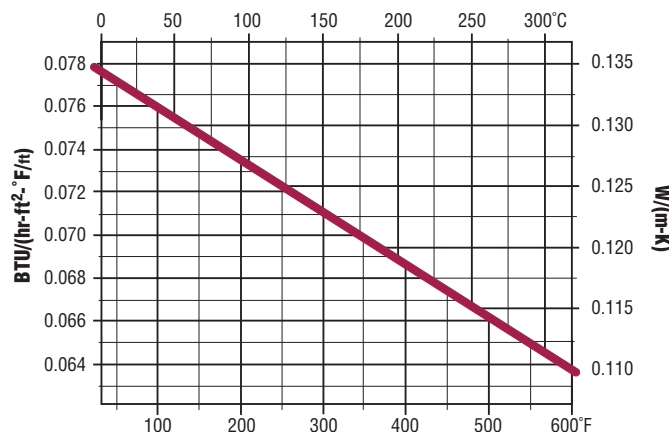
SPECIFIC HEAT



DENSITY



THERMAL CONDUCTIVITY



Pre-Cleaning the System

For optimal performance of both system and its heat transfer fluid, we strongly suggest that piping, valves and other components be thoroughly cleaned before installation. Mill scale, weld spatter and slag, quench oils, protective lacquer and varnish coatings, and dust and dirt can act to degrade the fluid, and can damage pumps and valves. And lodging in restrictions, these contaminants can easily create the same low flow conditions that cause premature failure of systems and fluid.

Inerting the System

Immediately after completing installation of the system, we suggest you purge with inert gas. Such purging can eliminate air and water vapor, and can substantially reduce corrosion. And while purging, you can leak test the system using simple soap-bubble detection. Finally, when you charge the system, any gas that becomes dissolved in the fluid will be inert, and fluid oxidation at start-up will be almost nil.

Charging the System

When charging the system, we suggest you fill from the bottom (a point near pump suction)

using a small positive displacement pump — not the system pump. Charging from the system's low point can help reduce trapped air in the system, which will substantially reduce the entrainment of gas bubbles and resultant pump cavitation.

Fluid Disposal

Because Paratherm heat transfer fluids are produced from natural feedstocks, they are exceptionally safe to use. Easy to dispose, used or contaminated Paratherm fluids can be safely combined with spent lubricating oils and recycled locally (EPA, citation 57FR21524). Paratherm strongly encourages recycling of used heat transfer fluid to conserve natural resources and to minimize the problem of liquid waste in landfills. We suggest you check local, state and federal regulations first, of course. *(Note: liquids contaminated with chlorinated solvents or other regulated materials may require special handling, and may not be accepted by recyclers.)*

Fluid Analysis

Overheating, oxidation and contamination of your heat transfer fluid can significantly reduce its ability to perform. Product quality will suffer, and in severe cases considerable damage to your thermal oil system can result. Periodic analysis of your fluid can allow you to detect problems in the early stages and achieve substantial savings.

Quality Control

We thoroughly test each batch of heat transfer fluid to ensure absolute conformance to tight production specifications. Each shipment is traceable to the master batch, with test results archived at Paratherm.



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Note: The information and recommendations in this literature are made in good faith and are believed to be correct as of the below date. You, the user or specifier, should independently determine the suitability and fitness of Paratherm heat transfer fluids for use in your specific application. We warrant that the fluids conform to the specifications in Paratherm literature. Because our assistance is furnished without charge, and because we have no control over the fluid's end use or the conditions under which it will be used, we make no other warranties—expressed or implied, including the warranties of merchantability or fitness for a particular use or purpose (recommendations in this bulletin are not intended nor should be construed as approval to infringe on any existing patent). The user's exclusive remedy, and Paratherm's sole liability is limited to refund of the purchase price or replacement of any product proven to be otherwise than as warranted. Paratherm Corporation will not be liable for incidental or consequential damages of any kind.

