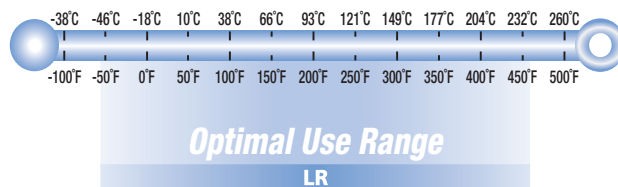


# Paratherm<sup>®</sup>-LR<sup>™</sup>

## Heat Transfer Fluid



### Single Fluid Heating and Cooling—Non Aromatic—Non Aqueous

ENGINEERING BULLETIN LR 613

Paratherm LR<sup>™</sup> heat transfer fluid is an aliphatic-hydrocarbon based heat transfer fluid designed for use in closed-loop, liquid-phase heating and cooling systems up to 450°F in electric and steam heaters and down to a -58°F surface temperature in direct-expansion exchangers.

#### Applications include:

- Specialty chemical batch heating and cooling
- Pharmaceutical production

#### Reduce process hazards when processing water-sensitive product

Many products undergo a violent exothermic reaction when exposed to water. Paratherm LR can be used safely for temperature control in these reactions because, unlike water/glycols, it's not mixed with water. And because it contains no double bonds or bonded oxygen molecules, it's extremely stable.

#### Wider temperature range than glycols

Paratherm LR has higher heat-transfer coefficients than 50% ethylene-glycol and 50% propylene-glycol solutions below -22°F and -4°F respectively. And while glycol solutions have a maximum operating temperature of 320°F, Paratherm LR's stability tests showed less than 3% degradation after 500 hours at 550°F.

#### Fluid storage

Drums should be stored inside to prevent water from getting into the heat transfer fluid. If sealed drums must be left outdoors, they should be stored on their sides. While unopened totes are weatherproof, they should not be stacked if left outdoors. If the fluid is to be stored outside below its minimum pumpable temperature, the containers should be moved indoors to warm up before charging the fluid into the system.

#### Typical Properties\*

Chemical name	Paraffinic hydrocarbon
Appearance	Water white liquid
Odor	Odorless
Maximum Recommended Film Temperature	500°F/260°C
Maximum Recommended Operating Temperature	450°F/232°C
Minimum Operating Temperature 20 cPs (20 mPa-s)	-58°F/-50°C
Minimum Start-up Temperature 300 cPs (300 mPa-s)	-112°F/-80°C
Viscosity cSt:	
40°C (104°F)	1.5
100°C (212°F)	0.76
232°C (450°F)	0.3
Density at 60°F/15.5°C lb/gal (kg/m <sup>3</sup> )	6.4 (766)
Flash Point Closed Cup (D56)	>130°F/54°C
Autoignition Temperature (maximum 10 sec ignition delay)	>500°F/260°C
Boiling Point (14.7 psia/101 kPa)	397°F/203°C
Vapor Pressure @ maximum operating temperature psia (kPa)	21 (145)
% Volume expansion over recommended operating temperature per 100 °F (°C)	6.8 (12.2)
Average Molecular Weight	160
Dielectric Breakdown voltage D1816-04 (kV, 0.1" gap)	22.15
Dielectric Constant (1 KHz) D924-04	2.03
Dissipation Factor (1 KHz) D924-04	0.00001
Volume Resistivity at 100V (Ω-cm) D257-07	1.84X10 <sup>14</sup>
Heat of combustion (approximate) BTU/lb (kJ/kg)	20,000 (46,300)
Heat of vaporization (approximate) Btu/lb (kJ/kg)	113 (262)

\* These are typical laboratory values, and are not guaranteed for all samples

#### Replacing existing fluid

In many cases, changing fluid involves a straightforward drain and fill. There are very few fluids that are so incompatible that 10-15% residue will affect the new Paratherm. If you have any questions, contact us.

#### Charging new systems

Unless required for product-quality reasons, new systems do not need to be cleaned before Paratherm is charged. The amount of chemical coatings, oils, and other manufacturing residues are usually not enough to affect the fluid life. All that is necessary is to install a Y-strainer with a minimum 60-mesh screen upstream of the pump to catch any metal or welding residue. The screen can be removed once the system has been cycled twice through its operating temperature.

#### Fluid analysis

The fluid in new systems should be tested within the 9 to 12 months of start-up. New fluid in existing systems should be tested within the first month of operation to establish a baseline for future testing.



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Visit <http://paracalc.paratherm.com> for detailed properties in a choice of temperature increments.

## Paratherm LR™

Temperature °F	Temperature °C	Viscosity cPs	Viscosity cSt	Viscosity lb/ft-hr	Density g/cc	Density lb/gal	Density lb/ft <sup>3</sup>	Thermal Conductivity BTU/hr-ft-°F	Specific Heat BTU/lb-°F	Vapor Pressure mmhg	Vapor Pressure psia
-100	-73	154	185	372	0.83	6.9	52	0.092	0.39		
-75	-59	38	46	91	0.82	6.8	51	0.092	0.41		
-50	-46	16	19	38	0.81	6.8	51	0.091	0.42		
-25	-32	8	9.9	19	0.80	6.7	50	0.090	0.43		
0	-18	5	5.9	11	0.79	6.6	49	0.089	0.44		
25	-4	3	3.8	7.2	0.78	6.5	49	0.089	0.46		
50	10	2.1	2.70	5.0	0.77	6.4	48	0.088	0.47		
75	24	1.5	2.00	3.8	0.76	6.3	47	0.087	0.48		
100	38	1.1	1.50	2.8	0.75	6.3	47	0.086	0.49		
125	52	0.9	1.20	2.2	0.74	6.2	46	0.086	0.51		
150	66	0.8	1.00	1.8	0.73	6.1	46	0.085	0.52		
175	79	0.7	0.90	1.6	0.72	6.0	45	0.084	0.53		
200	93	0.6	0.79	1.4	0.71	5.9	44	0.083	0.54		
225	107	0.5	0.71	1.2	0.70	5.8	44	0.083	0.56	30	0.6
250	121	0.42	0.61	1.0	0.69	5.8	43	0.082	0.57	50	1.0
275	135	0.36	0.53	0.87	0.68	5.7	42	0.081	0.58	81	1.6
300	149	0.32	0.48	0.77	0.67	5.6	42	0.080	0.59	145	2.8
325	163	0.29	0.44	0.70	0.66	5.5	41	0.080	0.61	243	4.7
350	177	0.26	0.40	0.63	0.65	5.4	41	0.079	0.62	375	7.3
375	191	0.23	0.36	0.56	0.64	5.3	40	0.078	0.63	592	11.5
400	204	0.21	0.33	0.51	0.63	5.3	39	0.077	0.64	780	15.1
425	218	0.20	0.32	0.48	0.62	5.2	39	0.077	0.66	938	18.1
450	232	0.18	0.30	0.44	0.61	5.1	38	0.076	0.67	1066	20.6

Visit <http://paracalc.paratherm.com> for detailed properties in a choice of temperature increments.

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.