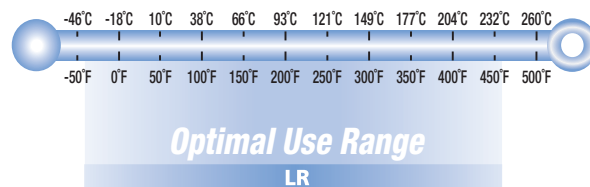


Paratherm[®]-LR[™]

Heat Transfer Fluid



Single Fluid Heating and Cooling—Non Aromatic—Non Aqueous

ENGINEERING BULLETIN LR 809

Paratherm LR[™] 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 480°F in electric and steam heaters and down to a -57°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 is completely stable up to its 500°F maximum film temperature. 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	550°F/288°C
Maximum Recommended Operating Temperature-Fired Heaters	450°F/232°C
Maximum Recommended Operating Temperature-All Others	480°F/249°C
Minimum Operating Temperature 20 cPs (20 mPa-s)	-57°F/-49°C
Minimum Start-up Temperature 300 cPs (300 mPa-s)	-112°F/-80°C
Viscosity at 60°F/15.5°C cSt (mm ² /sec)	2.4
Density at 60°F/15.5°C lb/gal (kg/m ³)	6.4 (766)
Flash Point Tag Closed Cup (D56)	>130°F/54°C
Autoignition Temperature (maximum 10 sec ignition delay)	>500°F/260°C
Vapor Pressure @ maximum operating temperature 450°F/232°C psia (kPa)	21(145)
Average Volume Expansion, %/100°F (100°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 ¹⁴
Heat of combustion (approximate) BTU/lb (kJ/kg)	20,000 (46,300)
Heat of vaporization (approximate) BTU/lb (kJ/kg)	113 (262)
Pour point D97	<-75°F/-59°C

* 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.



4 Portland Road
West Conshohocken PA 19428 USA
Phone: 610-941-4900
Fax: 610-941-9191
800-222-3611
E-mail: info@paratherm.com
Web: www.paratherm.com

Paratherm LR™

English

Temperature °F	Specific Gravity	Density		cSt	Viscosity		Specific Heat BTU/lb-°F	Thermal Conductivity BTU/hr-ft-°F	Vapor Pressure	
		lb/USG	lb/ft3		lb/(ft-hr)	cP			Psia	Torr
-120	0.8391	7.01	52.44	646.96	1313.21	542.85	0.3816	0.0920	0	0
-100	0.8309	6.94	51.93	166.32	334.30	138.19	0.3919	0.0915	0	0
-80	0.8227	6.87	51.42	59.55	118.50	48.99	0.4021	0.0910	0	0
-60	0.8145	6.80	50.90	26.95	53.10	21.95	0.4124	0.0905	0	0
-40	0.8061	6.73	50.38	14.43	28.14	11.63	0.4227	0.0901	0	0
-20	0.7981	6.67	49.88	8.73	16.85	6.97	0.4330	0.0896	0	0
0	0.7891	6.59	49.32	5.78	11.04	4.56	0.4433	0.0890	0	0
20	0.7817	6.53	48.86	4.10	7.76	3.21	0.4535	0.0884	0	0
40	0.7736	6.46	48.34	3.07	5.74	2.38	0.4638	0.0878	0	.05
60	0.7654	6.39	47.83	2.39	4.43	1.83	0.4741	0.0872	0	.16
80	0.7572	6.33	47.32	1.93	3.54	1.46	0.4844	0.0872	.01	.38
100	0.7490	6.26	46.81	1.60	2.89	1.20	0.4947	0.0867	.01	.67
120	0.7408	6.19	46.30	1.35	2.41	1.00	0.5050	0.0862	.04	1.89
140	0.7326	6.12	45.78	1.16	2.05	0.85	0.5152	0.0857	.06	3.10
160	0.7244	6.05	45.27	1.01	1.76	0.73	0.5255	0.0852	.12	5.97
180	0.7162	5.98	44.76	0.89	1.53	0.64	0.5358	0.0847	.20	10.50
200	0.7080	5.92	44.25	0.79	1.35	0.56	0.5461	0.0842	.29	15.03
220	0.6998	5.85	43.74	0.71	1.19	0.49	0.5564	0.0836	.56	29.06
240	0.6916	5.78	43.23	0.64	1.06	0.44	0.5666	0.0831	.83	43.09
260	0.6835	5.71	42.71	0.58	0.95	0.40	0.5769	0.0826	1.33	69.14
280	0.6753	5.64	42.20	0.53	0.86	0.36	0.5872	0.0820	2.07	107.22
300	0.6671	5.57	41.69	0.48	0.78	0.32	0.5975	0.0815	2.80	145.30
320	0.6589	5.50	41.18	0.45	0.71	0.29	0.6078	0.0810	4.58	237.49
340	0.6507	5.44	40.67	0.41	0.65	0.27	0.6181	0.0805	6.36	329.68
360	0.6425	5.37	40.15	0.39	0.60	0.25	0.6283	0.0800	8.61	445.92
380	0.6343	5.30	39.64	0.36	0.55	0.23	0.6386	0.0795	11.53	597.24
400	0.6261	5.23	39.13	0.34	0.51	0.21	0.6489	0.0790	15.09	781.62
420	0.6179	5.16	38.62	0.32	0.47	0.20	0.6592	0.0785	17.31	896.87
440	0.6097	5.09	38.11	0.30	0.44	0.18	0.6695	0.0780	19.53	1012.13
450	0.6056	5.06	37.85	0.29	0.42	0.18	0.6746	0.0778	20.65	1069.76

SI

Temperature °C	Density kg/m3	Density lb/USG	Density g/ml	Spec Heat KJ/kgK	Spec Heat cal/(g-°C)	Therm Co W/m-K	Viscosity cP	Vapor Pr kPa	Vapor Press mmHg
-80	836.72	6.98	0.8358	1.6137	0.3857	0.1597	299.61	0	0
-70	829.34	6.92	0.8284	1.6524	0.3949	0.1590	98.32	0	0
-60	821.96	6.86	0.8211	1.6911	0.4042	0.1582	41.06	0	0
-50	814.58	6.80	0.8137	1.7298	0.4134	0.1575	20.46	0	0
-40	807.00	6.73	0.8061	1.7686	0.4227	0.1567	11.63	0	0
-30	799.62	6.67	0.7987	1.8073	0.4320	0.1560	7.30	0	0
-20	792.44	6.61	0.7916	1.8460	0.4412	0.1552	4.94	0	0
-10	784.26	6.54	0.7834	1.8847	0.4505	0.1543	3.54	0	0
0	777.68	6.49	0.7768	1.9234	0.4597	0.1534	2.66	0	0.02
10	770.30	6.43	0.7695	1.9622	0.4690	0.1525	2.08	0.01	0.10
20	762.92	6.37	0.7621	2.0009	0.4782	0.1516	1.67	0.03	0.20
30	755.54	6.31	0.7547	2.0396	0.4875	0.1507	1.37	0.06	0.47
40	748.16	6.24	0.7473	2.0783	0.4967	0.1498	1.15	0.12	0.91
50	740.78	6.18	0.7400	2.1170	0.5060	0.1490	0.98	0.27	2.01
60	733.40	6.12	0.7326	2.1557	0.5152	0.1483	0.85	0.41	3.10
70	726.02	6.06	0.7252	2.1945	0.5245	0.1475	0.74	0.74	5.52
80	718.64	6.00	0.7179	2.2332	0.5337	0.1467	0.65	1.28	9.60
90	711.26	5.94	0.7105	2.2719	0.5430	0.1459	0.58	1.82	13.67
100	703.88	5.87	0.7031	2.3106	0.5522	0.1451	0.52	3.13	23.45
110	696.50	5.81	0.6957	2.3493	0.5615	0.1443	0.47	4.81	36.07
120	689.12	5.75	0.6884	2.3880	0.5708	0.1435	0.42	6.49	48.70
130	681.74	5.69	0.6810	2.4268	0.5800	0.1426	0.38	10.74	80.57
140	674.36	5.63	0.6736	2.4655	0.5893	0.1418	0.35	15.31	114.84
150	666.98	5.57	0.6663	2.5042	0.5985	0.1410	0.32	20.60	154.52
160	659.60	5.50	0.6589	2.5429	0.6078	0.1402	0.29	31.66	237.49
170	652.22	5.44	0.6515	2.5816	0.6170	0.1394	0.27	42.7	320.46
180	644.84	5.38	0.6441	2.6204	0.6263	0.1386	0.25	55.71	417.86
190	637.46	5.32	0.6368	2.6591	0.6355	0.1379	0.23	72.54	544.13
200	630.08	5.26	0.6294	2.6978	0.6448	0.1371	0.22	94.37	707.86

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.