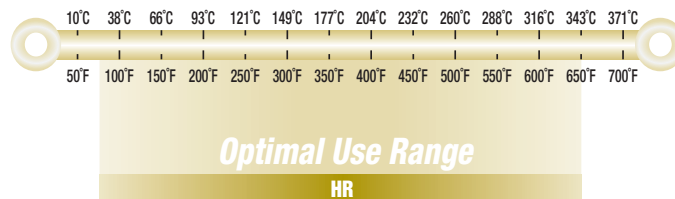


Paratherm-HR™

Heat Transfer Fluid



ENGINEERING BULLETIN HR 309

Paratherm HR Heat Transfer Fluid

Paratherm HR™ Heat Transfer Fluid is an alkylated-aromatic based heat transfer fluid formulated for closed loop liquid phase heating to 650°F in fired heaters and 675°F in waste heat recovery and full convection heaters.

Applications include:

- Gas processing
- Chemical processes
- Waste oil recovery
- Biodiesel production
- Plastic processing

High Temperature Stability

Paratherm HR Heat Transfer Fluid offers greater thermal stability than competitive aromatic based fluids that cover similar temperature ranges. Testing (ASTM D6743) shows that, compared to its closest competitor, Paratherm HR Heat Transfer Fluid experiences ½ the amount of fluid degradation when maintained at 700°F for 500 hours. Less degradation means less maintenance and longer fluid life.

Low Temperature Start-Up

Centrifugal pumps are generally specified around the fluid viscosity at the desired operating temperature (usually less than 2 cps). Capacity falls off significantly above 300 cps. So the actual minimum start-up temperature of a fluid is where the viscosity curve crosses the 300 cps line. Paratherm HR Heat Transfer Fluid's lower cold start-up temperature of 13°F (-11°C) offers a significant advantage over other high temperature fluids.

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

Typical Properties*

Base	Alkylated Aromatic
Appearance	Almost Colorless
Odor	Slight
Maximum Recommended Film Temperature	700°F/371°C
Maximum Recommended Operating Temperature-Fired Heaters	650°F/343°C
Maximum Recommended Operating Temperature-All Others	675°F/357°C
Minimum Operating Temperature 20 cPs (20 mPa-s)	77°F/24°C
Minimum Start-up Temperature 300 cPs (300mPa-s)	13°F/-11°C
Viscosity at 60°F/15.5°C cSt (mm²/sec)	35 (35)
Density at 60°F/15.5°C lb/gal (kg/m³)	8.0 (963)
Flash Point Open Cup (D92)	>330°F/166°C
Flash Point Closed Cup (D93)	>320°F/160°C
Autoignition Temperature (E659)	>780°F/417°C
Vapor Pressure@Max Operating Temp. 650°F/343°C psia (kPa)	17 (96)
% Average Volume Expansion per 100°F (100°C)	5.5 (9.9)
Average Molecular Weight	240
Pour point D97	<-30°F/-34°C

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

below its minimum pumpable temperature, the containers should be moved indoors to warm up before charging the fluid into the system.

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



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Physical Properties

°F	°C	Viscosity			Density			Thermal Conductivity BTU/(hr-ft-F)	Specific Heat BTU/lb-°F	Vapor Pressure	
		cSt	cPs	lb/ft-hr	lb/ft³	lb/gal	g/cc			psia	mm hg
0	-18	546	540	1307	62	8.3	0.99	0.068	0.44		
25	-4	133	130	315	61	8.2	0.98	0.068	0.45		
50	10	52	50	121	60	8.1	0.97	0.068	0.46		
75	24	22	22	52	60	8.0	0.96	0.068	0.46		
100	38	12	11	28	59	7.9	0.95	0.068	0.47		
125	52	7.9	7.4	18	58	7.8	0.94	0.068	0.48		
150	66	5.1	4.7	11	58	7.7	0.92	0.067	0.49		
175	79	3.8	3.5	8.5	57	7.6	0.91	0.067	0.49		
200	93	2.6	2.4	5.7	56	7.5	0.90	0.066	0.50		
225	107	2.1	1.9	4.6	56	7.5	0.89	0.066	0.51		
250	121	1.8	1.5	3.7	55	7.4	0.88	0.065	0.52		
275	135	1.5	1.3	3.1	54	7.3	0.87	0.065	0.52		1.6
300	149	1.3	1.1	2.7	54	7.2	0.86	0.064	0.53	3.1	3.1
325	163	1.1	0.95	2.3	53	7.1	0.85	0.064	0.54	0.11	5.5
350	177	0.98	0.82	2.0	52	7.0	0.84	0.063	0.55	0.18	9.5
375	191	0.87	0.72	1.8	52	6.9	0.83	0.062	0.55	0.30	16
400	204	0.78	0.64	1.6	51	6.8	0.82	0.061	0.56	0.49	25
425	218	0.71	0.57	1.4	50	6.7	0.81	0.060	0.57	0.76	39
450	232	0.64	0.51	1.2	50	6.7	0.80	0.059	0.58	1.1	59
475	246	0.59	0.46	1.1	49	6.6	0.79	0.059	0.58	1.7	88
500	260	0.54	0.42	1.0	48	6.5	0.78	0.057	0.59	2.5	128
525	274	0.50	0.38	0.93	48	6.4	0.76	0.056	0.60	3.5	183
550	288	0.47	0.35	0.85	47	6.3	0.75	0.055	0.61	5.0	257
575	302	0.44	0.32	0.78	46	6.2	0.74	0.054	0.61	6.9	355
600	316	0.41	0.30	0.72	46	6.1	0.73	0.053	0.62	9.4	484
625	329	0.38	0.28	0.67	45	6.0	0.72	0.052	0.63	13	652
650	343	0.36	0.26	0.62	44	5.9	0.71	0.050	0.64	17	869
675	357	0.34	0.24	0.58	44	5.8	0.70	0.049	0.64	22	1144
700	371	0.32	0.22	0.54	43	5.8	0.69	0.047	0.65	29	1492

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.