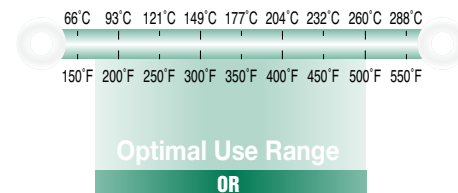


Paratherm™ OR

Heat Transfer Fluid



Sludge Resistant, Non-Fouling, Non-Toxic

ENGINEERING BULLETIN OR 716

The Paratherm™ OR heat transfer fluid is formulated to provide extended protection against sludging in portable electric heaters up to 500°F/260°C.

Applications include:

- Plastics Injection Molding and Profile Extrusion
- Die Casting Die Temperature Control
- Solvent Recovery

Extend Time Between Fluid Replacement

When hot heat transfer fluids are exposed to air in a reservoir, the molecules form acids. These acids then react to form sludge that can plug lines and coat reservoirs. Paratherm OR contains an additive package that prevents these acids from becoming carbon so the fluid stays solids-free longer. This significantly extends the interval between fluid replacements improving productivity and reducing waste.

Cost Effective

Like automobile oil changes, carbon/sludge formation in electric units can be controlled by periodic replacement of the heat transfer fluid. However, there is a cost for purchasing fluid and for disposal as well as for equipment down time. And if a machine has to run beyond its scheduled changeout date, it could require significant maintenance. So using a cheap fluid may not always be the most cost effective.

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

Typical Properties*

Chemical Name	Hydrotreated White Mineral Oil
Appearance	Water White Liquid
Odor	Odorless
Maximum Recommended Film Temperature	550°F/288°C
Maximum Recommended Operating Temperature-Fired Heaters	Not Recommended
Maximum Recommended Operating Temperature-All Others	500°F/260°C
Minimum Operating Temperature 20 cPs (20 mPa-s)	128°F/53°C
Minimum Start-up Temperature 300 cPs (300 mPa-s)	40°F/4°C
Viscosity cSt:	
40°C (104°F)	40.2
100°C (212°F)	6.09
260°C (500°F)	0.88
Density at 60°F/15.5°C lb/gal (kg/m ³)	7.5 (881)
Flash Point Pensky-Martens Closed Cup (D93)	330°F/166°C
Vapor Pressure @ maximum operating temperature psia (kPa)	2 (14)
Average Volume Expansion, %/100°F (100°C)	4.8 (8.6)
Average Molecular Weight	360
Heat of Combustion (approximate) BTU/lb (kJ/kg)	20,000 (46,300)
Heat of Vaporization (approximate) BTU/lb (kJ/kg)	93 (215)
Pour Point D97 °F(°C)	<-25°F/-32°C

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

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.

Replacing Existing Fluid

In many cases, changing fluid involves a straight- forward 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://thermalprops.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.

Paratherm OR® Heat Transfer Fluid

Physical Properties

Temp. °F	Temp. °C	Density		Viscosity			Thermal Conductivity BTU/(hr-ft ² -°F/ft)	Specific Heat BTU/(lb-°F)	Vapor Pressure		
		g/cc	lb/gal	lb/ft ³	cP	cSt			lb/(ft-hr)	mm Hg	psia
0	-18	0.9052	7.56	56.57	2631	2908	6366	0.0770	0.4256		
10	-12	0.9018	7.53	56.35	1409	1563	3409	0.0768	0.4309		
20	-7	0.8983	7.50	56.14	801	892	1938	0.0765	0.4362		
30	-1	0.8949	7.48	55.92	480	537	1161	0.0763	0.4415		
40	4	0.8914	7.45	55.70	301	339	729	0.0761	0.4468		
50	10	0.8880	7.42	55.49	197	222	477	0.0758	0.4522		
60	16	0.8845	7.39	55.27	134	152	324	0.0756	0.4575		
70	21	0.8811	7.36	55.06	94	107	228	0.0754	0.4628		
80	27	0.8776	7.33	54.84	68	78	165	0.0752	0.4681		
90	32	0.8742	7.30	54.63	50	58	122	0.0749	0.4734		
100	38	0.8707	7.27	54.41	38.3	44.1	92.8	0.0747	0.4787		
110	43	0.8673	7.24	54.20	29.8	34.4	72.0	0.0745	0.4840		
120	49	0.8638	7.22	53.98	23.6	27.3	57.0	0.0742	0.4893		
130	54	0.8604	7.19	53.76	19.0	22.1	45.9	0.0740	0.4947		
140	60	0.8569	7.16	53.55	15.5	18.1	37.5	0.0738	0.5000		
150	66	0.8535	7.13	53.33	12.8	15.0	31.1	0.0736	0.5053		
160	71	0.8500	7.10	53.12	10.8	12.7	26.1	0.0733	0.5106		
170	77	0.8466	7.07	52.90	9.14	10.8	22.1	0.0731	0.5159	0.04	
180	82	0.8431	7.04	52.69	7.84	9.28	19.0	0.0729	0.5212	0.05	
190	88	0.8397	7.01	52.47	6.78	8.06	16.4	0.0726	0.5265	0.06	
200	93	0.8362	6.99	52.26	5.92	7.06	14.3	0.0724	0.5318	0.07	
210	99	0.8328	6.96	52.04	5.21	6.23	12.6	0.0722	0.5371	0.12	
220	104	0.8293	6.93	51.83	4.61	5.54	11.2	0.0720	0.5425	0.16	
230	110	0.8259	6.90	51.61	4.11	4.96	9.94	0.0717	0.5478	0.21	
240	116	0.8224	6.87	51.39	3.68	4.46	8.91	0.0715	0.5531	0.25	
250	121	0.8190	6.84	51.18	3.32	4.04	8.03	0.0713	0.5584	0.30	
260	127	0.8155	6.81	50.96	3.01	3.68	7.27	0.0710	0.5637	0.46	
270	132	0.8120	6.78	50.75	2.74	3.36	6.62	0.0708	0.5690	0.62	
280	138	0.8086	6.76	50.53	2.50	3.09	6.05	0.0706	0.5743	0.78	
290	143	0.8051	6.73	50.32	2.30	2.85	5.56	0.0704	0.5796	0.94	
300	149	0.8017	6.70	50.10	1.97	2.45	4.76	0.0701	0.5850	1.10	
310	154	0.7982	6.67	49.89	1.87	2.34	4.52	0.0699	0.5903	1.60	0.03
320	160	0.7948	6.64	49.67	1.77	2.22	4.27	0.0697	0.5956	2.10	0.04
330	166	0.7913	6.61	49.45	1.67	2.11	4.03	0.0694	0.6009	2.60	0.05
340	171	0.7879	6.58	49.24	1.57	1.99	3.80	0.0692	0.6062	3.10	0.06
350	177	0.7844	6.55	49.02	1.47	1.88	3.56	0.0690	0.6115	3.60	0.07
360	182	0.7810	6.52	48.81	1.38	1.76	3.33	0.0688	0.6168	4.80	0.09
370	188	0.7775	6.50	48.59	1.28	1.65	3.10	0.0685	0.6221	6.00	0.12
380	193	0.7741	6.47	48.38	1.18	1.53	2.87	0.0683	0.6275	7.20	0.14
390	199	0.7706	6.44	48.16	1.09	1.42	2.64	0.0681	0.6328	8.40	0.16
400	204	0.7672	6.41	47.95	0.99	1.30	2.41	0.0678	0.6381	9.60	0.19
410	210	0.7637	6.38	47.73	0.96	1.26	2.32	0.0676	0.6434	12.3	0.24
420	216	0.7603	6.35	47.51	0.92	1.22	2.24	0.0674	0.6487	15.0	0.29
430	221	0.7568	6.32	47.30	0.88	1.17	2.15	0.0672	0.6540	17.6	0.34
440	227	0.7534	6.29	47.08	0.85	1.13	2.06	0.0669	0.6593	20.3	0.39
450	232	0.7499	6.27	46.87	0.81	1.09	1.98	0.0667	0.6646	23.0	0.44
460	238	0.7465	6.24	46.65	0.78	1.05	1.89	0.0669	0.6665	28.2	0.55
470	243	0.7430	6.21	46.44	0.74	1.01	1.81	0.0662	0.6753	33.4	0.65
480	249	0.7396	6.18	46.22	0.71	0.96	1.72	0.0660	0.6806	38.6	0.75
490	254	0.7361	6.15	46.01	0.67	0.92	1.64	0.0658	0.6859	43.8	0.85
500	260	0.7327	6.12	45.79	0.64	0.88	1.56	0.0656	0.6912	49.0	0.95
510	265	0.7292	6.09	45.57	0.62	0.85	1.51	0.0653	0.6965	60.0	1.16
520	271	0.7258	6.06	45.36	0.60	0.83	1.47	0.0651	0.7018	71.0	1.37
530	277	0.7223	6.03	45.14	0.58	0.81	1.42	0.0649	0.7071	81.9	1.58
540	282	0.7189	6.01	44.93	0.57	0.79	1.38	0.0646	0.7124	92.9	1.80
550	288	0.7151	5.97	44.69	0.55	0.77	1.33	0.0644	0.7183	105	2.03
560	293	0.7117	5.94	44.43	0.54	0.75	1.31	0.0639	0.7236	136	2.63
570	299	0.7083	5.91	44.21	0.53	0.74	1.28	0.0634	0.7289	167	3.22
580	304	0.7048	5.88	44.00	0.52	0.73	1.25	0.0628	0.7343	198	3.82
590	310	0.7014	5.85	43.79	0.51	0.72	1.23	0.0623	0.7396	228	4.42
600	316	0.6980	5.83	43.57	0.50	0.712	1.20	0.0618	0.7449	259	5.01