



Paratherm MG™ HEAT TRANSFER FLUID

Single-Fluid Heating/Cooling • Non-Toxic

ENGINEERING BULLETIN MG 704

The Paratherm MG™ mid-range heat transfer fluid is rated for service from 30°F to 550°F. It is efficient across the temperature range, thermally stable and cost-effective. Non-aromatic and non-toxic, the fluid is safe to use and is easy to dispose. Used or contaminated fluid can be safely combined with spent lubricating oils and recycled locally. Designed for a broad variety of applications such as batch reactors, laminating lines and plastics mold temperature control, the Paratherm MG is tough and durable. Engineered to provide outstanding performance under demanding conditions, it is easy and safe to handle — a pleasant alternative to synthetic aromatic fluids.

Environmental Safety

The MG fluid is plant friendly and safe to use. In the event of a release, the same simple clean-up procedures used for spills of light lubricating oils can be employed. Once gathered, it can be combined with spent lube oils and sent to the local oil recycler. The crystal-clear Paratherm MG fluid contains no SARA-reportable substances such as chlorinated hydrocarbons, aromatics, heavy metals, or sulfur or nitrogen compounds.

Fluid Toxicity

The Paratherm MG fluid is non-toxic. It carries the NSF's HT1 (USDA H-1) incidental food contact rating. Where conventional fluids can produce dermatitis, the fluid is not expected to cause skin irritation on contact. And unlike other heat/cool liquids, the MG fluid emits no pungent or noxious odors. See the Material Safety Data Sheet (MSDS) before using this product.

Vapor Pressure

The MG fluid has an extraordinarily low vapor pressure — a fraction of an atmosphere at its maximum operating temperature of 550°F. This permits the designer considerable latitude in the choice of lower-cost equipment that does not need to be pressurized to prevent fluid boiling and pump cavitation.

Efficiency

The lower a heat transfer fluid's viscosity, the less energy will be required to pump it through the system. Paratherm MG fluid's viscosity is among the lowest of available heat/cool fluids. This, and the fluid's exceptionally low pressure drop means that less horsepower is needed for a given duty, and that a smaller pump and motor can be specified. And, lower power consumption continues to produce savings year after year.

Typical Properties

Physical Properties

Base	Hydrocarbon
Appearance	Transparent, Bright Water White
Taste & Odor	Slight Odor
Optimum Use Range	32°F to 550°F (0°C to 260°C)
Maximum Recommended	
Film Temperature	600°F (316°C)
Flash Point (TAG cc) ASTM D-56	>300°F (>149°C)
Autoignition Temperature (AIT) ASTM E659-78	>600°F (>316°C)
Atmospheric Boiling Point	
10% Fraction, ASTM D-1160	>550°F (>260°C)
90% Fraction, ASTM D-1160	>600°F (>316°C)
Vapor Pressure, psia @ 400°F (204°C)	<1
Coefficient of Thermal Expansion	0.0005/°F 0.0009/°C
Average Molecular Weight	220
Density, lb/gal @ 75°F (24°C)	6.65
Pour Point ASTM D-97	<-76°F (<-60°C)
Heat of Vaporization (approximated), BTU/lb	115
Total Acid Number (TAN) ASTM D-664	0.01

Water in the System

Because the Paratherm MG is immiscible with water and is also slightly less dense, any water can be easily drained from the system's low point drain valves. Crack each 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. Chemically inert, the fluid will not attack seals and gasketing.

Storing Your Fluid

Containers of heat transfer fluid should be kept in non-hazardous dry areas only. 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 steel drums. In the afternoon and evening when temperatures decrease, 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*.

Pre-Cleaning the System

For optimal performance of your 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. Lodging in restrictions, these contaminants can easily create low flow conditions that cause premature failure of systems and fluid.

Inerting the System

Once installation and cleaning are complete, consider purging with inert gas. Such purging can reduce or eliminate air and water vapor, substantially reducing the chance of corrosion. And once purged, the system can be leak-tested by pressurizing the inert gas and using the simple soap-bubble detection method. And when the system is charged and started up, fluid oxidation will be minimal.

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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

Used or contaminated Paratherm fluids can be safely combined with spent lubricating oils and recycled locally (EPA, citation 57FR21524). We strongly encourage the recycling of used heat



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

Paratherm MG™ Heat Transfer Fluid

Physical Properties

Temperature		Specific Gravity	Density		Viscosity			Specific Heat BTU/lb-°F	Thermal Conductivity BTU/hr-ft-°F	Vapor Pressure	
°F	°C		lb/gal	lb/ft3	cSt	cP	lb/ft-hr			mm Hg	psia
0	-18	0.8281	6.90	51.6	30.5	25.3	61.2	0.5148	0.0830		
10	-12	0.8231	6.86	51.3	23.4	19.3	46.7	0.5178	0.0828		
20	-7	0.8182	6.81	51.0	18.4	15.1	36.5	0.5208	0.0826		
30	-1	0.8133	6.77	50.7	14.8	12.0	29.1	0.5238	0.0824		
40	4	0.8083	6.73	50.4	12.0	9.74	23.6	0.5268	0.0822		
50	10	0.8034	6.69	50.1	9.99	8.03	19.4	0.5298	0.0820		
60	16	0.7985	6.65	49.7	8.41	6.71	16.2	0.5328	0.0818		
70	21	0.7935	6.61	49.4	7.16	5.68	13.8	0.5358	0.0816		
80	27	0.7886	6.57	49.1	6.17	4.87	11.8	0.5388	0.0814		
90	32	0.7836	6.53	48.8	5.37	4.21	10.2	0.5418	0.0812		
100	38	0.7787	6.49	48.5	4.72	3.67	8.89	0.5448	0.0810		
110	43	0.7738	6.44	48.2	4.18	3.23	7.83	0.5478	0.0808		
120	49	0.7688	6.40	47.9	3.73	2.87	6.94	0.5508	0.0806		
130	54	0.7639	6.36	47.6	3.35	2.56	6.20	0.5538	0.0804		
140	60	0.7589	6.32	47.3	3.03	2.30	5.57	0.5568	0.0802		
150	66	0.7540	6.28	47.0	2.76	2.08	5.03	0.5598	0.0800	0.01	-
160	71	0.7491	6.24	46.7	2.52	1.89	4.57	0.5628	0.0798		
170	77	0.7441	6.20	46.4	2.32	1.72	4.17	0.5658	0.0796		
180	82	0.7392	6.16	46.1	2.14	1.58	3.82	0.5688	0.0794		
190	88	0.7343	6.12	45.7	1.98	1.45	3.52	0.5718	0.0792		
200	93	0.7293	6.07	45.4	1.84	1.34	3.25	0.5748	0.0790	0.05	-
210	99	0.7244	6.03	45.1	1.72	1.25	3.02	0.5778	0.0788		
220	104	0.7194	5.99	44.8	1.61	1.16	2.80	0.5808	0.0786		
230	110	0.7145	5.95	44.5	1.51	1.08	2.62	0.5838	0.0784		
240	116	0.7096	5.91	44.2	1.43	1.01	2.45	0.5868	0.0782		
250	121	0.7046	5.87	43.9	1.35	0.95	2.30	0.5898	0.0780	0.30	0.01
260	127	0.6997	5.83	43.6	1.28	0.89	2.16	0.5928	0.0778		
270	132	0.6947	5.79	43.3	1.21	0.84	2.04	0.5958	0.0776		
280	138	0.6898	5.74	43.0	1.15	0.80	1.93	0.5988	0.0774		
290	143	0.6849	5.70	42.7	1.10	0.75	1.82	0.6018	0.0772		
300	149	0.6799	5.66	42.4	1.05	0.71	1.73	0.6048	0.0770	1.50	0.03
310	154	0.6750	5.62	42.1	1.01	0.68	1.64	0.6078	0.0768		
320	160	0.6701	5.58	41.7	0.97	0.65	1.57	0.6108	0.0766		
330	166	0.6651	5.54	41.4	0.93	0.62	1.49	0.6138	0.0764		
340	171	0.6602	5.50	41.1	0.89	0.59	1.43	0.6168	0.0762		
350	177	0.6552	5.46	40.8	0.86	0.56	1.36	0.6198	0.0760	5.70	0.11
360	182	0.6503	5.42	40.5	0.83	0.54	1.31	0.6228	0.0758		
370	188	0.6454	5.37	40.2	0.80	0.52	1.25	0.6258	0.0756		
380	193	0.6404	5.33	39.9	0.78	0.50	1.20	0.6288	0.0754		
390	199	0.6355	5.29	39.6	0.75	0.48	1.16	0.6318	0.0752		
400	204	0.6306	5.25	39.3	0.73	0.46	1.12	0.6348	0.0750	19.0	0.37
410	210	0.6256	5.21	39.0	0.71	0.44	1.08	0.6378	0.0748		
420	216	0.6207	5.17	38.7	0.69	0.43	1.04	0.6408	0.0746		
430	221	0.6157	5.13	38.4	0.67	0.41	1.00	0.6438	0.0744		
440	227	0.6108	5.09	38.1	0.66	0.40	0.97	0.6468	0.0742		
450	232	0.6059	5.05	37.7	0.64	0.39	0.94	0.6498	0.0740	51.7	1.00
460	238	0.6009	5.00	37.4	0.62	0.38	0.91	0.6528	0.0738		
470	243	0.5960	4.96	37.1	0.61	0.36	0.88	0.6558	0.0736		
480	249	0.5910	4.92	36.8	0.60	0.35	0.85	0.6588	0.0734		
490	254	0.5861	4.88	36.5	0.58	0.34	0.83	0.6618	0.0732		
500	260	0.5812	4.84	36.2	0.57	0.33	0.81	0.6648	0.0730	130	2.51