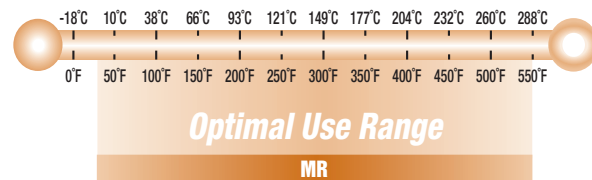


# Paratherm<sup>TM</sup> MR

## Heat Transfer Fluid



### Low-Temperature Start-Up • Heat/Cool

ENGINEERING BULLETIN MR 412

Paratherm MR® heat transfer fluid is a food grade, aliphatic-hydrocarbon based heat transfer fluid formulated for use in closed-loop liquid-phase heat transfer systems to 550°F in fired heaters, and to 580°F in full-convection heaters and electric immersion units.

Applications include:

- Chemical batch reactors
- Food processing
- Multiple-loop continuous chemical processing
- Plastic processing

### Lower viscosity offers true cooling versus mineral oils

Even the lowest viscosity mineral oils can't efficiently cool equipment or product down to ambient temperature because the viscosity is too high. Low viscosity Paratherm MR can achieve 45°F when cooled with chilled water or can achieve an 8°F temperature differential with tower water.

### 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.

### 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.

### Typical Properties\*

Chemical Name	Linear Alkene
Appearance	Water White Liquid
Odor	Slight Odor
Maximum Recommended Film Temperature	600°F/316°C
Maximum Recommended Operating Temperature - Fired Heaters	550°F/288°C
Maximum Recommended Operating Temperature - All Others	580°F/304°C
Minimum Operating Temperature 20 cPs (20 mPa-s)	38°F/3°C
Minimum Start-up Temperature 300 cPs (300 mPa-s)	-37°F/-38°C
Viscosity cSt:	
40°C (104°F)	6.5
100°C (212°F)	2.1
288°C (550°F)	0.48
Density at 60°F/15.5°C lb/gal (kg/m³)	6.7 (804)
Flash Point Pensky-Martens Closed Cup (D93)	>300°F/149°C
Boiling Point (14.7 psia/101 kPa)	>650°F/343°C
Vapor Pressure @ maximum operating temperature psia (kPa)	8.4 (61)
% Volume expansion over recommended operating temperature per 100 °F (°C)	4.4 (7.9)
Average Molecular Weight	300
Heat of Combustion (approximate) BTU/lb (kJ/kg)	20,000 (46,300)
Heat of Vaporization (approximate) BTU/lb (kJ/kg)	115 (266)

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

### 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 MR® Heat Transfer Fluid

## Physical Properties

°F	°C	Viscosity		Density			Thermal Conductivity BTU/hr-ft-°F	Specific Heat BTU/lb-°F	Vapor Pressure	
		cPs	cSt	g/cc	lb/gal	lb/ft³			mm HG	psia
-40	-40	376	443	0.85	7.1	53.1	0.077	0.54		
-25	-32	150	177	0.85	7.1	53.1	0.077	0.54		
0	-18	60	72	0.83	6.9	51.8	0.077	0.55		
25	-4	28	34	0.82	6.8	51.2	0.077	0.56		
50	10	14	17	0.81	6.8	50.6	0.077	0.56		
75	24	8	10	0.80	6.7	50.0	0.077	0.57		
100	38	5.3	6.8	0.79	6.6	49.3	0.077	0.58		
125	52	3.9	5.1	0.77	6.4	48.1	0.077	0.58		
150	66	2.8	3.7	0.76	6.3	47.5	0.076	0.59		
175	79	2.1	2.8	0.75	6.3	46.8	0.076	0.60		
200	93	1.7	2.3	0.74	6.2	46.2	0.076	0.60		
225	107	1.4	1.8	0.73	6.1	45.6	0.075	0.61		
250	121	1.1	1.5	0.72	6.0	45.0	0.075	0.62		
275	135	0.93	1.3	0.71	5.9	44.3	0.074	0.62		
300	149	0.79	1.1	0.70	5.8	43.7	0.073	0.63		
325	163	0.68	0.97	0.70	5.8	43.7	0.073	0.64		
350	177	0.60	0.87	0.69	5.8	43.1	0.072	0.64		
375	191	0.52	0.75	0.69	5.8	43.1	0.071	0.65		
400	204	0.46	0.68	0.68	5.7	42.5	0.070	0.65	28	0.5
425	218	0.41	0.60	0.68	5.7	42.5	0.069	0.66	44	0.9
450	232	0.39	0.58	0.67	5.6	41.8	0.068	0.67	67	1.3
475	246	0.37	0.55	0.67	5.6	41.8	0.067	0.67	100	1.9
500	260	0.35	0.52	0.67	5.6	41.8	0.066	0.68	146	2.8
525	274	0.33	0.50	0.66	5.5	41.2	0.064	0.69	210	4.1
550	288	0.32	0.47	0.66	5.5	41.2	0.063	0.69	295	5.7
575	302	0.30	0.45	0.66	5.5	41.2	0.062	0.70	409	7.9
600	316	0.29	0.45	0.65	5.4	40.6	0.060	0.71	560	10.8

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 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.