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TOWOLDMON0039301
WATER_PCB-00023770

THERMINOL 77 HIGH-TEMPERATURE HEAT TRANSFER FLUID

Therminol 77 is a new liquid-phase heat transfer fluid particularly suitable for continuous use over a bulk-temperature range of 600°F to 700°F. It has been used for about two years in commercial and pilot plant systems in a diversity of applications; e.g., paint and resin manufacture, high-temperature plastic extrusion, lamination of plastics, chemical processing, laboratory baths, and thermostatic devices.

Unlike Monsanto's Therminol FR line of fire-resistant heat transfer fluids (chlorinated hydrocarbons), Therminol 77 does not contain halogen and is not fire resistant. The recommended design considerations described in the Therminol FR Engineering Manual, such as flow rate, ΔT, heat-flux density, etc., are also applicable to Therminol 77.

Although Therminol 77 does thermally degrade at temperatures above 700°F, it has been used in commercial heat transfer systems up to its atmospheric boiling point of 830°F. Degradation rate is very low at 700°F and increases progressively at increasing temperatures. Therminol 77 degradation products are predominantly polymers which are completely soluble in the bulk fluid and, therefore, do not form insulating deposits in the system. Degraded fluid is, however, more viscous than fresh fluid but can be reclaimed economically to essentially new-fluid condition.

Complete properties of Therminol 77 are presented in the following pages. The fluid is readily available in 5-gallon and 55-gallon containers.

Further assistance in the application of Therminol 77 can be obtained by contacting

Monsanto Company
Organic Division
Development Department
St. Louis, Missouri

Monsanto

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Therminol 77
Fluid Properties

Temp °F	Vapor Pressure (mm Hg)	Viscosity (cs)	Viscosity (Lbs/Ft-Hr)	Density (GMS/cc)	Density (Lbs/Gal)
100	-	181	505	1.152	9.60
210	-	7.78	20.8	1.106	9.26
300	0.27	2.65	-	1.070	8.94
400	1.03	1.50	3.74	1.029	8.58
500	9.2	0.96	2.28	0.981	8.16
600	44	0.66	1.49	0.931	7.76
700	168	0.46*	0.99	0.885	7.38
800	530	-	-	-	-

*Extrapolation

Temp °F	Specific Heat (BTU/lb °F)	Thermal Conductivity (Cal/cm, °C, sec)	Thermal Conductivity (BTU/°F, Ft-Hr)	Thermal Expansion, (cc/°F)
100	0.350	32.25×10^{-5}	0.0781	0.00034
200	0.385	31.40×10^{-5}	0.0760	-
300	0.420	30.50×10^{-5}	0.0739	0.00037
400	0.455	29.65×10^{-5}	0.0719	-
500	0.495	28.80×10^{-5}	0.0698	0.00049
600	0.530	-	-	-
700	0.565	-	-	0.00062
800	0.600	-	-	-

Refractive Index	1.6413	Fire Point	540°F
Pour Point	+ 45°F	A. I. T.	1115°F
Flash Point	460°F	Thermal Decomposition**	800°F

**Thermal decomposition was determined by the isoteniscope method as described in the "Journal of Chemical and Engineering Data," January 1961, Vol. 6, No. 1. It is defined as the temperature at which dp/dt = 0.014 mm Hg per second, or 500 mm Hg per 10 hours.

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Electrical Properties

	60 Cycle	1000 Cycle
Dielectric Constant, 100°C	3.77	3.54
Power Factor @ 100°C, %	19.3	1.21
Resistivity, ohm-cm	at 100°C 29×10^9	

Oxidation-Corrosion Test
(48 hrs, 450°F, Air, MIL-L-9236A Method)

% Viscosity Increase	at 100°F	37
	at 210°F	13
Metal Weight Loss, mg/cm^2:	Cu	-1.56
	Fe	+0.01
	Mg	+0.02
	Ag	-0.99
	Ti	0.0
	Al	0.0

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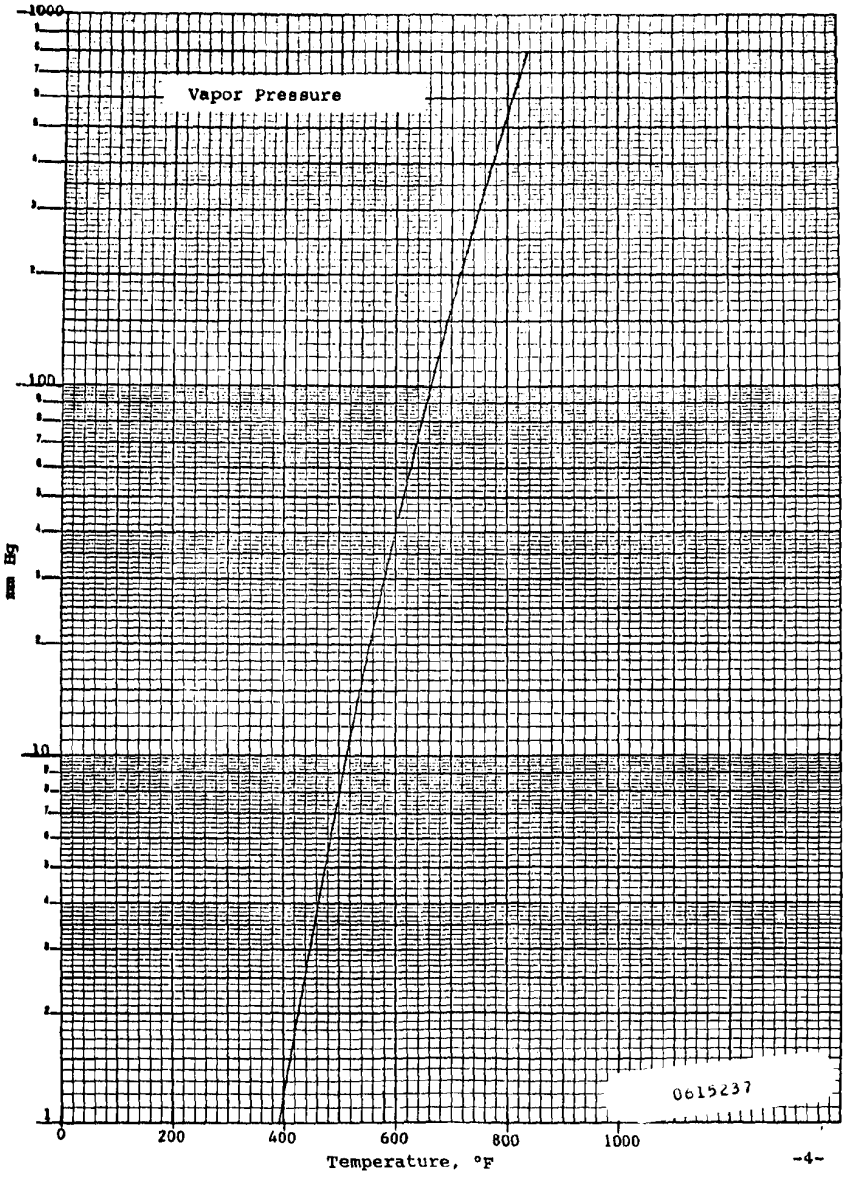

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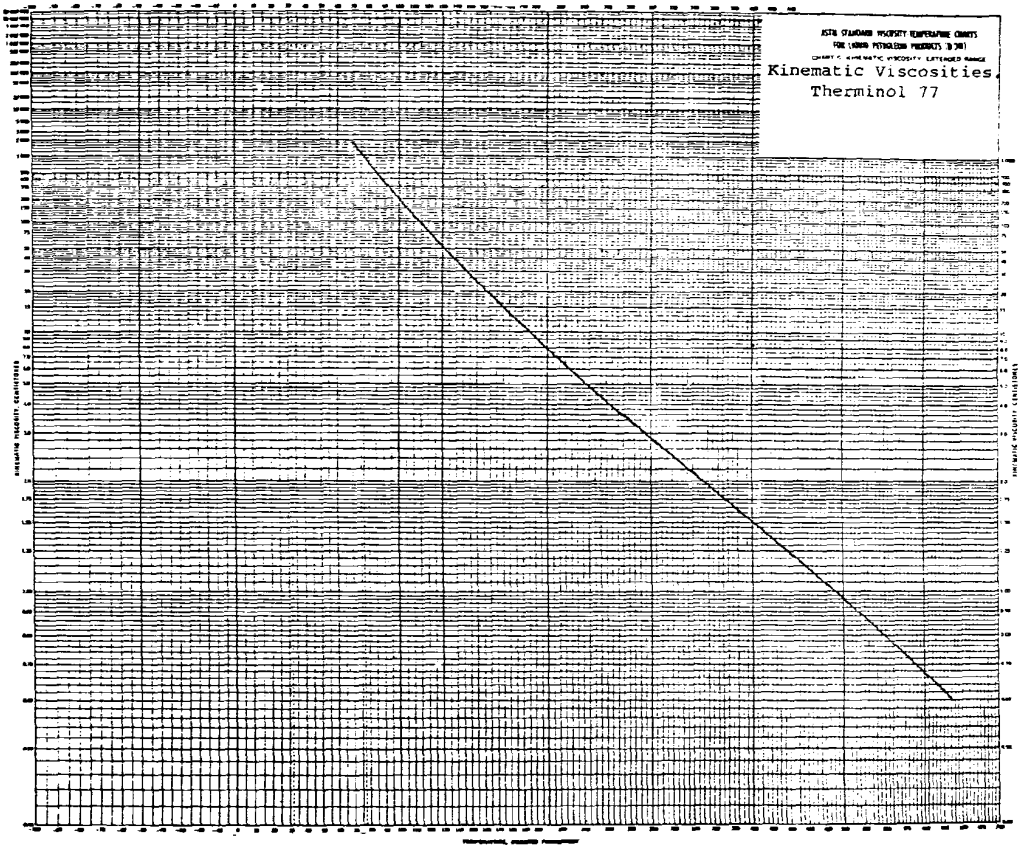

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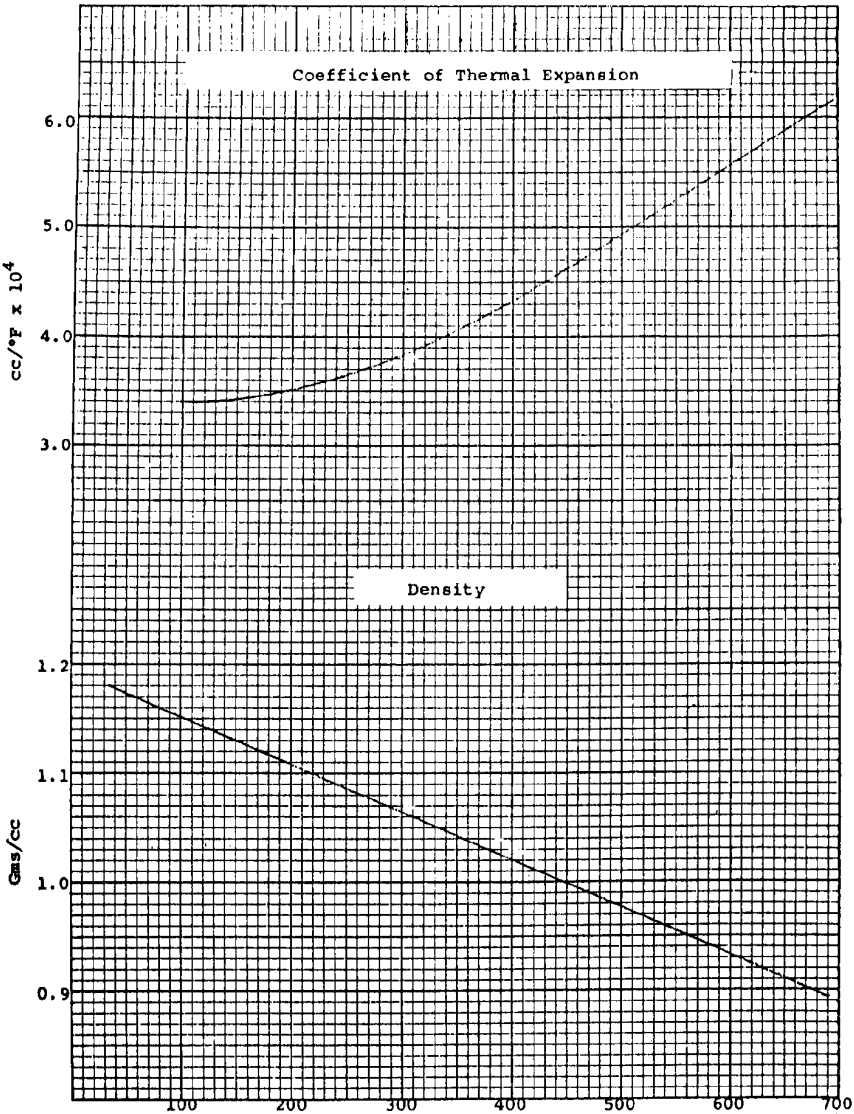

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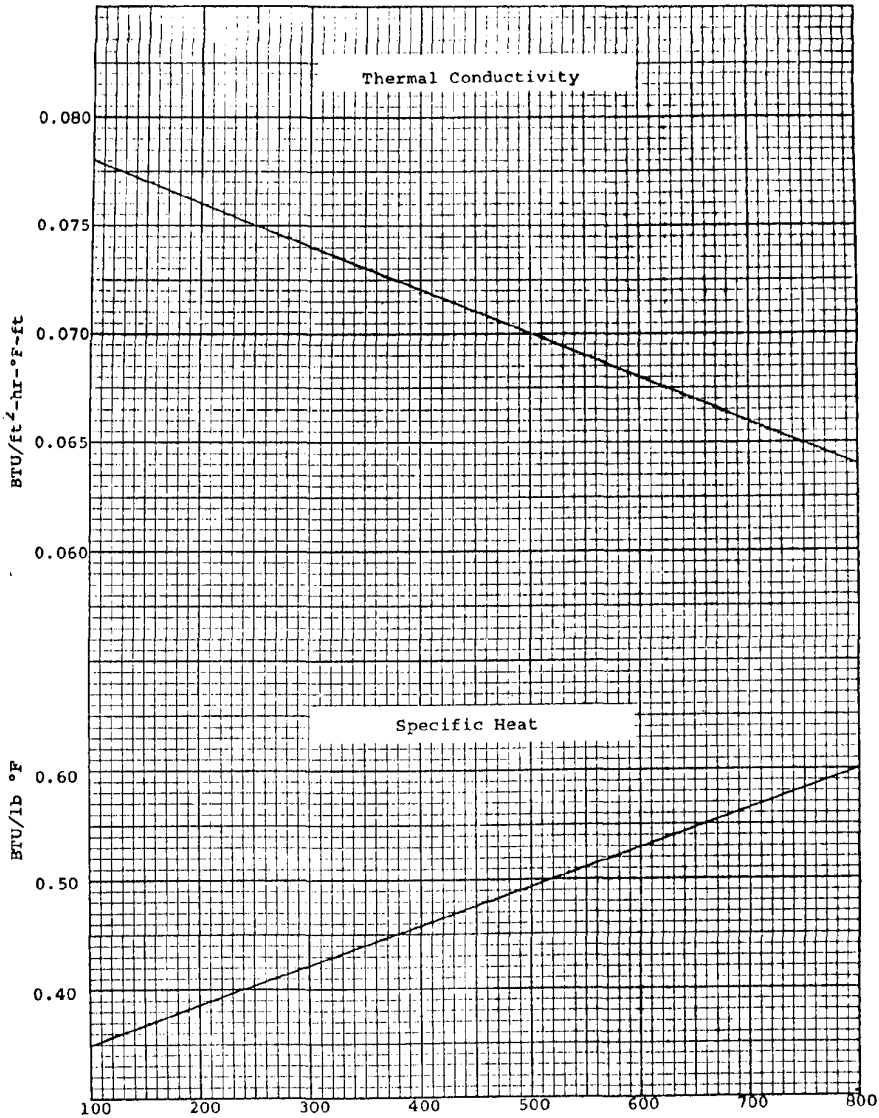

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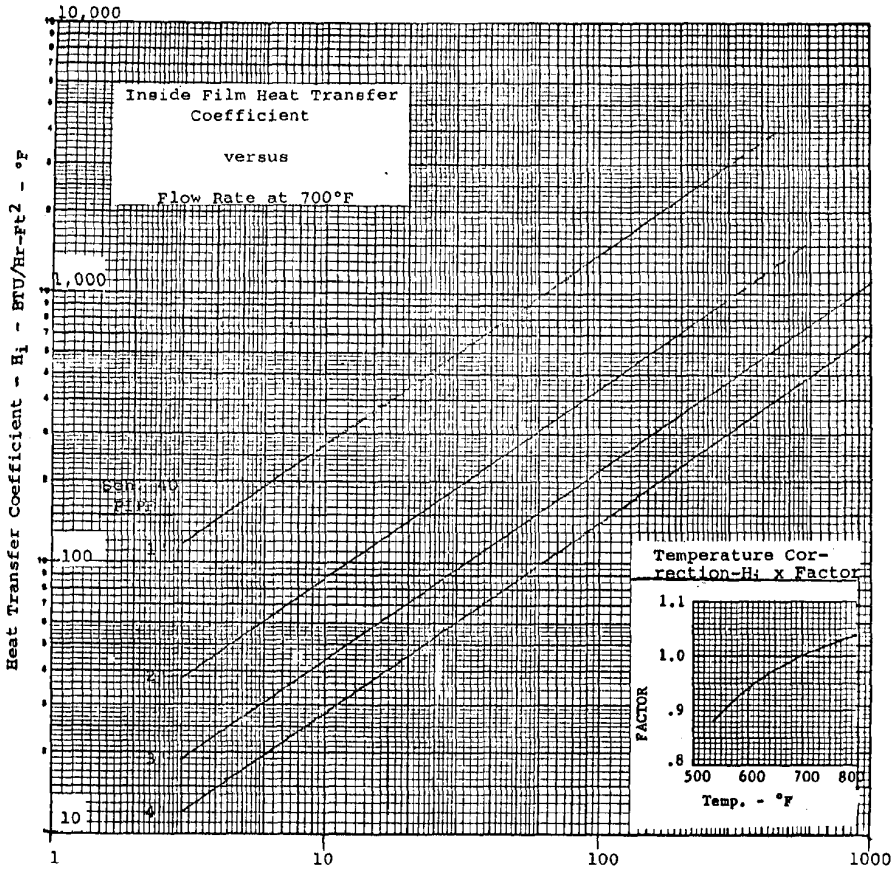

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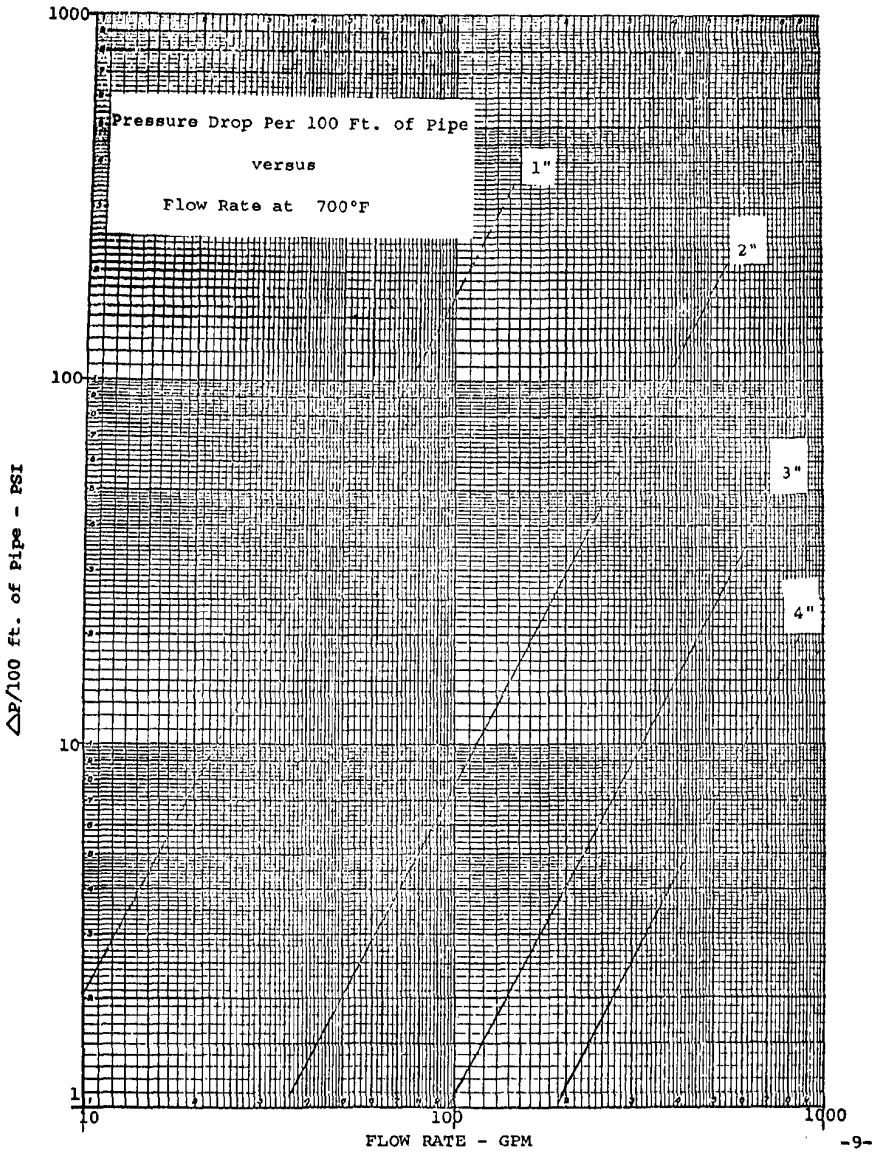

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Toxicity and Safe Handling

Appropriate animal toxicity studies indicate that Therminol 77 is "practically non-toxic" from the standpoint of accidental swallowing or single massive skin exposures. Irritation potential studies indicate that it should not be irritating to the skin and only slightly irritating to the eyes if there is accidental contact. Animals survived a single four-hour exposure to an atmosphere saturated with vapors at room temperature. It appears that no particular safety precautions are necessary during the handling of this fluid at room temperature.

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