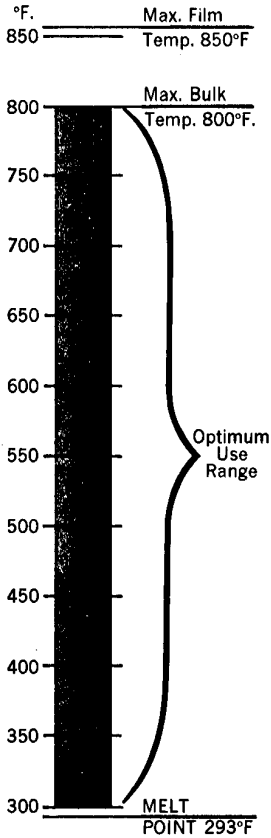
Therminol® 88* IC/FF-43



high-temperature liquid phase heat transfer fluid for indirect heating and cooling from 300°F to 800°F. Especially suited to high-temperature applications.

Heat transfer fluids are intended only for *indirect* heating purposes. Under no circumstances should this product contact or in any way contaminate food, animal feed, food products, food packaging materials, pharmaceuticals or *any items which may directly or indirectly be ultimately ingested by humans.* Any contact may contaminate these items to the extent that their destruction may be required. Precautions against ignitions and fires should be taken with this product.

Monsanto

NOTICE: "Nothing contained herein is to be construed as a recommendation to use any product in conflict with any patent. MONSANTO MAKES NO WARRANTIES AS TO THE FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY OF ANY PRODUCT REFERRED TO, no guarantee of satisfactory results from reliance upon contained information or recommendations, and disclaims all liability for any resulting loss or damage."

FUNCTIONAL PRODUCTS / Monsanto Industrial Chemical Co.
800 North Lindbergh Blvd., St. Louis, Missouri 63166

0616013

® Registered Trademark of Monsanto Company.
*In certain countries of Western Europe and the Far East, Monsanto sells Therminol Heat Transfer Fluids under the brand name Santotherm Heat Transfer Fluids". Corresponding Therminol and Santotherm fluids are identical in composition.

TOWOLDMON0039402

Therminol 88 . . .

is a specially formulated synthetic heat transfer fluid offering outstanding high-temperature heat transfer properties along with high-temperature pumpability — up to 800°F Therminol 88 is ideally suited to replace hard-to-handle inorganic salts.

This fluid is designed for use in indirect heating systems.

Therminol 88 is not classified as a fire-resistant heat transfer fluid. The use of protection devices may be required to minimize fire risk.

Therminol 88 is compatible with metals normally used in high-temperature heat transfer systems.

Typical Properties*

Composition	Mixed Terphenyls
Appearance	Crumbly wax-like flakes at room temperature. Light amber liquid above Melt Point.
Odor	Faint, pleasant
Melt Point begins to soften completely liquid	 140°F (60°C) 293°F (145°C)
Flash Point	375°F (191°C)
Flame Point	460°F (238°C)
Autoignition Temperature	>1000°F
Coefficient of Expansion	0.00047 cc/cc/°F
Latent Heat of Fusion	5.0-5.1 Kcal/mole
Molecular Weight	230
Boiling Range	687°-784°F (364°-418°C)

*This data is based upon samples tested in the laboratory and is not guaranteed for all samples. Write us for complete sales specifications for Therminol 88.

Variations of Properties With Temperature

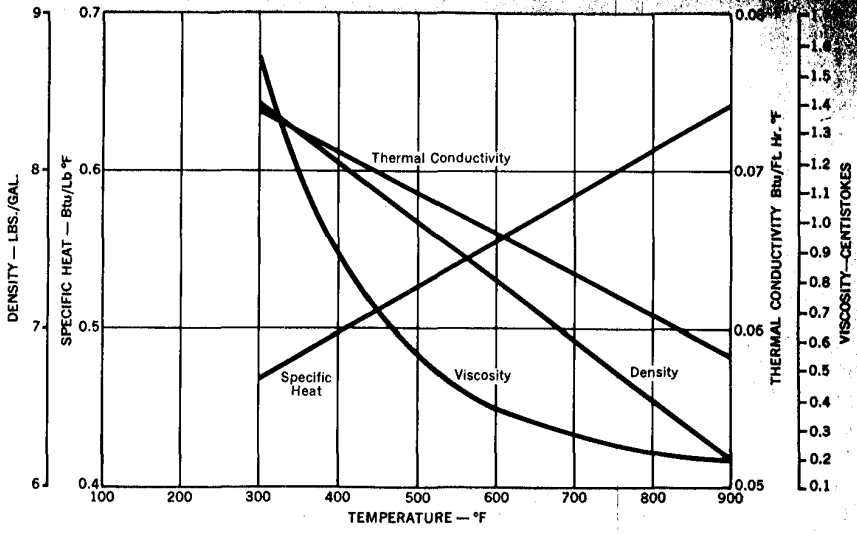
Temperature		Density			Specific Heat		Thermal Conductivity		Viscosity		Vapor Pressure	
°F	°C	lbs./gal.	lb./ft.³	gm/cc	BTU/lb. °F	Kcal./Kg. °C	BTU/ft. hr. °F	Kcal./m. hr. °C	lb./hr. ft.	cs	mmHg. absolute	Kg./cm.²
77	25	9.43	70.55	1.133	—	—	—	—	—	—	—	—
200	93	—	—	—	—	—	—	—	—	—	—	—
250	121	—	—	—	—	—	—	—	—	—	—	—
300	149	8.42	63.05	1.01	0.467	0.467	0.0738	.1099	0.38	1.57	1.2	.002
350	177	8.25	61.80	0.99	0.482	0.482	0.0725	.1079	0.28	1.16	4.5	.006
400	204	8.01	59.93	0.96	0.497	0.497	0.0712	.1060	0.20	0.87	11	.015
450	232	7.84	58.68	0.94	0.511	0.511	0.0699	.1041	0.16	0.70	28	.038
500	260	7.67	57.44	0.92	0.525	0.525	0.0686	.1021	0.12	0.55	65	.088
550	288	7.50	56.18	0.90	0.540	0.540	0.0673	.1002	0.10	0.46	175	0.238
600	316	7.34	54.94	0.88	0.554	0.554	0.0660	.0983	0.08	0.38	260	0.354
650	343	7.09	53.06	0.85	0.569	0.569	0.0647	.0963	0.07	0.33	450	0.612
700	371	6.92	51.82	0.83	0.584	0.584	0.0634	.0944	0.06	0.29	800	1.088
750	399	6.75	50.57	0.81	0.599	0.599	0.0621	.0925	0.05	0.25	1100	1.496
800*	427	6.59	49.32	0.79	0.613	0.613	0.0608	.0905	0.04	0.23	1500	2.040
850	454	6.25	46.82	0.75	0.628	0.628	0.0595	.0886	0.04	.020	2250	3.060
900	482	6.17	46.20	0.74	0.642	0.642	0.0581	.0865	0.04	0.19	3000	4.080

*Maximum Recommended Bulk Temperature

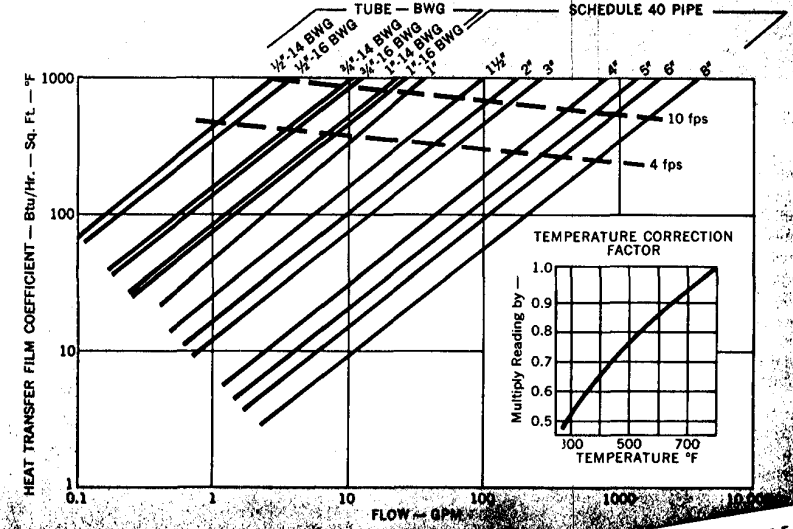
0616014

TOWOLDMON0039403

Therminol® 88 — Physical Properties



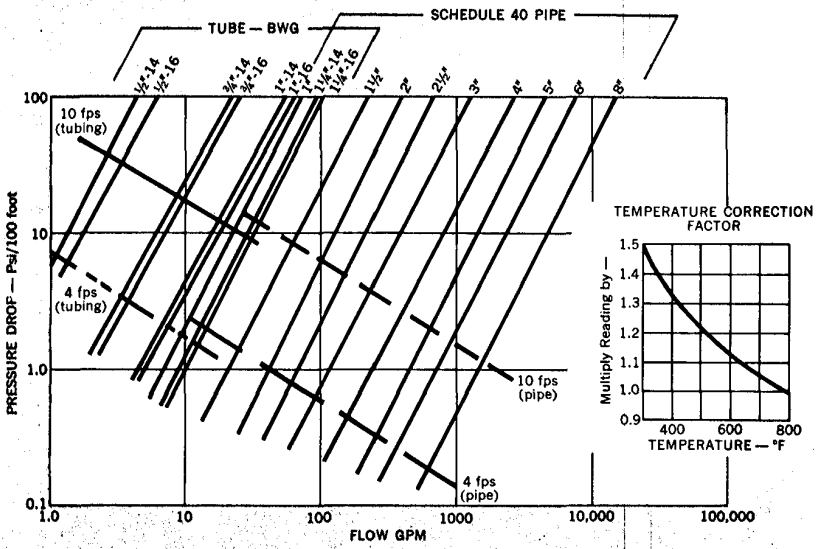
Therminol® 88 — Heat Transfer Coefficients



0616015

TOWOLDMON0039404

Therminol® 88 — Pressure Drop



Therminol 88 — Safety of Handling

Therminol 88 is virtually non-toxic and non-irritating, posing no special handling problems. It is not absorbed through the unbroken skin in significant quantities, is non-irritating to the skin and only mildly irritating if eye contact occurs. Immediate flushing of the eye with copious amounts of water will avoid irritation or aftereffects. It is suggested that Therminol 88 be washed off the skin with soap and water as soon as possible after contact, but no serious irritation should be observed. Handled like any other industrial chemical, Therminol 88 is quite safe to store and use.

There is no vapor exposure problem when transferring Therminol 88 fluid from its shipping container to the heat transfer system. On the other hand, vapors emitted by Therminol 88 heated to elevated temperatures may be mildly irritating upon prolonged exposure. In heat transfer installations, the fluid is used in a closed, non-pressurized system free from leaks and with the expansion tank vent trapped so as to condense any vapors. Consequently, there should be little or no opportunity for workers to come in contact with vapors.

While Therminol 88 poses no serious problems with respect to the environment, as a concerned supplier to industry, Monsanto urges the user to maintain a tight system, to correct leakage promptly, and to exercise care in the handling and disposal of this and all other such products. A tight maintenance program not only protects the environment, but keeps employes comfortable, the working area clean, and the system running smoothly.

TOWOLDMON0039405