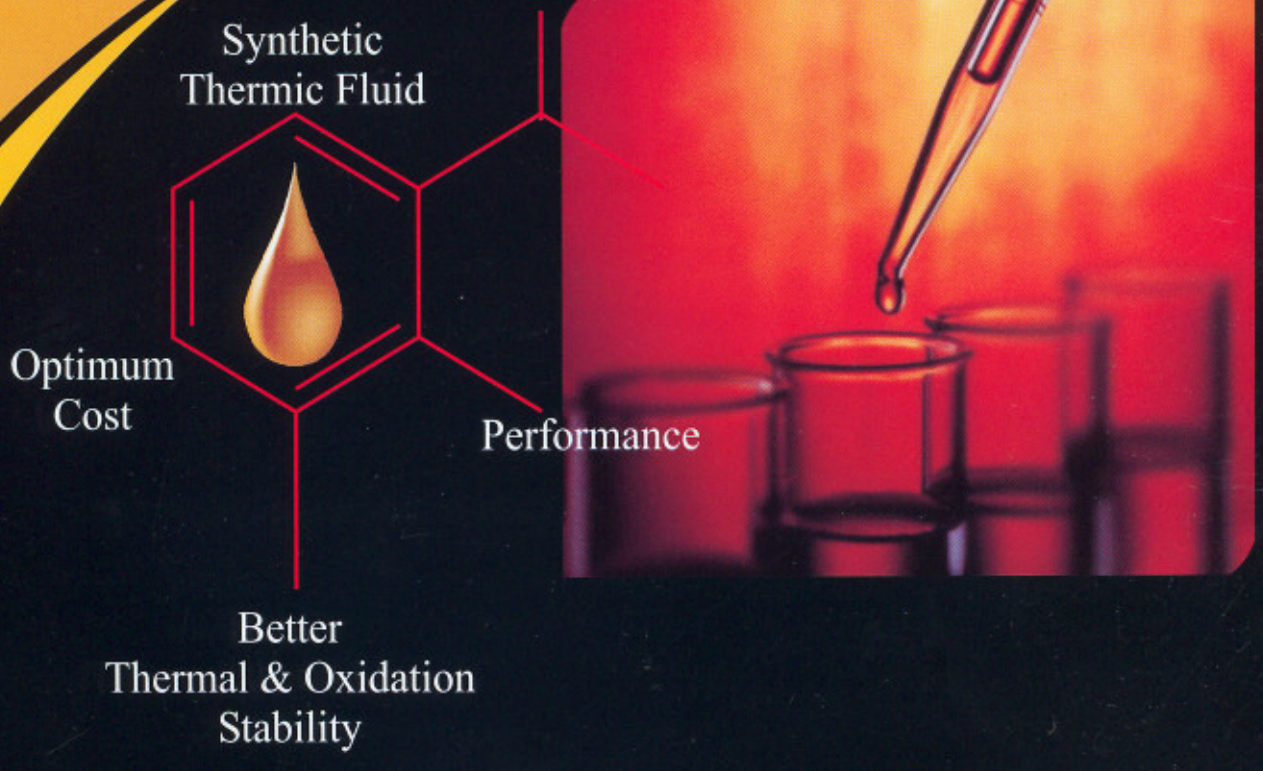
THERMINOL® 55

Heat Transfer Fluid by **Solutia**

Success Formula



THERMINOL®
Heat Transfer Fluids by **Solutia**

Solutia and its Therminol Range of Heat Transfer Fluids

A pioneer and leader in India in synthetic heat transfer fluids for over a decade now, the Therminol heat transfer fluid product range is produced by Solutia. Solutia is the world leader in high performance and synthetic heat transfer fluids. Solutia also leads in other areas; viz., performance films for laminated safety glass and after-market applications, ***Saflex***® and ***CP FILMS***® specialities such as aviation hydraulic fluid, ***Skydrol***® environmentally friendly cleaning solvents for aviation, ***SkyKleen***® and an integrated family of nylon products including high performance polymers and fibers, ***Vydyne***® and ***Ascend***®. Solutia uses world-class skills in applied chemistry to create solutions for customers, whose products are used by consumers every day.

Increased Thermal Stability for Continuous Performance

Therminol 55 is a synthetic heat transfer fluid intended for use in the liquid phase for indirect process heating. Therminol 55 offers increased thermal and oxidation stability that translates into more efficient heat transfer, longer fluid life, and optimum operating economies.

Wide Operating Range: -10°C to 305°C
Therminol 55 has an optimum economic bulk operating range of - 10°C to 305°C. It can be used to an extended bulk temperature of 315°C.
Therminol 55 exhibits thermal stability markedly superior to that of mineral oils used for the same purpose. Liquid phase systems using Therminol 55 find use in applications traditionally using steam as a heating medium resulting in capital, operation and maintenance cost-savings.

Therminol 55 Delivers Several Important Performance Benefits:

Long Life - Therminol 55 is a true 305°C fluid, delivering years of reliable, cost effective performance. The chemical composition of Therminol 55 has been carefully selected to minimize the formation of low boilers and eliminate the risk of insoluble high boiler formation and fouling, thus leading to long life.

Non-Fouling - The unique composition of Therminol 55 resists the effects of oxidation upto 10 times better than mineral oils. Less oxidation means less solids formation and much less fouling. For systems without nitrogen inerting, the performance advantages are significant.

Superb Low Temperature Pumpability - Therminol 55 is still pumpable at -15°F (-25°C), long after mineral oils have become jelly-like. In fact, some mineral oils will not pump at temperatures below 20°F (-7°C). Therminol 55 helps your heat transfer fluid system start-up quickly and easily.

Compatibility

Therminol 55 is compatible with many types of mineral oils. Please discuss adding / mixing of Therminol 55 with your current fluid with your Solutia fluid expert.

Application

Therminol 55 finds applications in process heating chambers in textiles, plywood, heating of calendar rolls, tracing of lines at storage terminals, process heating for chemical industry and waste heat recovery systems.

Typical Physical, Chemical and Thermal Properties of Therminol 55

Composition	Mixture of synthetic hydrocarbons
Appearance	Clear yellow liquid
Max. Bulk temperature	305°C (Extended use up to 315°C)
Max. film temperature	335°C
Kinematic viscosity @ 40°C	19 mm^2/s (cSt)
Density @ 25°C	868 kg/m^3
Flash point (ASTM D-92)	193°C
Fire point (ASTM D-92)	238°C
Auto ignition temperature (ASTM D-2155)	366°C
Pour point	-40°C
Boiling point @ 1013 mbar	351°C
Coefficient of thermal expansion	0.00096/°C
Moisture content	< 250 ppm

Note: Values quoted are typical values obtained in the laboratory from production samples. Other samples might exhibit slightly different data. Specifications are subject to change. Contact Solutia for current sales specifications.

Properties of Therminol® 55 vs Temperature

Temp	Liquid Density	Liquid Heat Capacity	Liquid Viscosity		Liquid Thermal Conductivity	Vapour Pressure
°C	kg/m³	kJ/(kg·K)	cP	cSt	W/(m·K)	mm Hg
-20	899	1.76	756	841	0.1330	
-10	892	1.80	309	346	0.1319	
0	885	1.83	143	162	0.1307	
10	878	1.87	73.8	84	0.1296	
20	872	1.91	41.6	47.7	0.1284	
30	865	1.94	25.2	29.2	0.1273	
40	858	1.98	16.3	19.0	0.1261	
50	852	2.01	11.1	13.1	0.1249	
60	845	2.05	7.93	9.39	0.1238	
70	838	2.08	5.89	7.02	0.1226	
80	831	2.12	4.52	5.43	0.1215	
90	825	2.16	3.56	4.32	0.1203	
100	818	2.19	2.88	3.52	0.1191	
110	811	2.23	2.38	2.93	0.1180	
120	804	2.26	2.00	2.49	0.1168	
130	797	2.30	1.71	2.14	0.1156	1.05
140	790	2.33	1.48	1.87	0.1145	1.64
150	784	2.37	1.29	1.65	0.1133	2.51
160	777	2.40	1.14	1.47	0.1121	3.76
170	770	2.44	1.02	1.32	0.1110	5.54
180	763	2.47	0.913	1.2	0.1098	8.02
190	755	2.51	0.825	1.09	0.1086	11.4
200	748	2.54	0.749	1.00	0.1074	16.1
210	741	2.58	0.683	0.921	0.1062	22.3
220	734	2.61	0.625	0.852	0.1051	30.6
230	726	2.65	0.574	0.790	0.1039	41.4
240	719	2.68	0.528	0.735	0.1027	55.3
250	711	2.72	0.488	0.686	0.1015	73.2
260	704	2.75	0.451	0.641	0.1003	95.9
270	696	2.79	0.418	0.600	0.0992	124
280	688	2.83	0.387	0.563	0.0980	160
290	680	2.86	0.360	0.529	0.0968	204
300	672	2.90	0.334	0.497	0.0956	258
310	663	2.93	0.311	0.468	0.0944	323
315	659	2.95	0.300	0.455	0.0938	361

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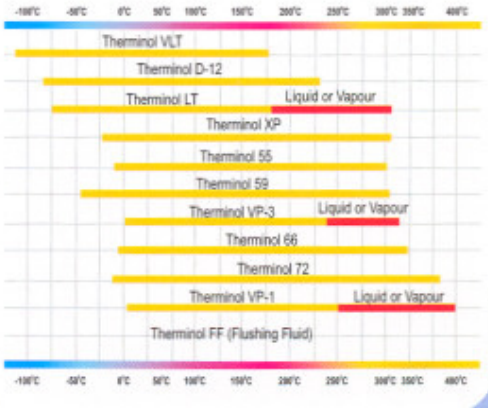
Therminol Range

Therminol offers the widest product range of synthetic heat transfer fluids for heating, cooling and heat recovery. The Therminol family of heat transfer fluids features products that can meet the operating needs of virtually any single or multiple heat-using systems. In properly designed systems, heat transfer fluids will perform within their respective temperature ranges for extended periods without breakdown or corrosion.

As a user's process temperature demands change there is always a Therminol fluid capable of meeting the new requirements. In addition Therminol fluids are often interchangeable allowing conversion by a simple top-up procedure where this is preferred.



TLC Total Lifecycle Care® Program

The TLC Program supports Therminol customers throughout their systems' life cycle. It is designed to help you get the most from your heat transfer fluid system. This comprehensive program includes system design guidance, start up assistance, training, sample analysis, flush and refill fluids.

TOTAL LIFECYCLE CARE

Quality Management

All our manufacturing units have obtained ISO 9001or ISO 9002 quality control certification. This registration means that plant procedures, quality control systems, material sampling, product storage, handling, packaging, shipping, record keeping and other company procedures are in the line with the quality requirements of the ISO 9001 or ISO 9002 standards and its other national equivalents.

FOR YOUR PEOPLE

- *Start-Up Assistance*
- *Operational Training*
- *Onsite Technical Service*

FOR YOUR FACILITY

- *System Design*
- *Quality Therminol Products*
- *Sample Analysis*
- *Flush Fluid & Refill*

Therminol® FF

Now, the new Therminol FF Cleaning System makes it quicker, cheaper and easier.

Therminol FF, the FIRST and BEST flushing fluid for liquid phase heat transfer systems.

- Sweeps away solids, sludge and other contaminants
- Flushes in ONE, FAST, EASY operation
- Eliminates the need for multiple washes
- Compatible with Therminol heat transfer fluids and other products
- System can be refilled IMMEDIATELY after flushing.
- Eliminates days of downtime.

Therminol Network

Therminol offers a worldwide network of technically qualified fluid specialists, along with manufacturing facilities across four continents. Therminol heat transfer fluids are backed by an India-wide network of sales and technical support services.

System Design and Maintenance

System design and operating conditions have a critical influence on fluid life. Correct fluid selection and proper maintenance maximizes fluid life and promotes safe operation.

Fluid Life

All Therminol fluids have published recommended maximum bulk and film temperatures. These maximum use temperatures are based on long-term study of thermal stability and should not be exceeded. Thermal degradation generally results in the formation of volatile products referred to as low boilers. The low boiling products should periodically be removed from the system by venting via the expansion tank. Low boilers can be combustible therefore relief valves and vents should be positioned at a safe distance from ignition sources and personnel. We recommend safe collection and disposal of low boilers.

Fluid Analysis

Regular monitoring of fluid characteristics in the system enables detection of deviations and correction. Solutia provides analysis of fluid samples for its customers. The analysis reports indicate when corrective action is considered necessary.

Please contact us for this sampling unit.

Construction Material

Metals and alloys normally suitable in high temperature systems can be used. However, the use of copper, aluminum and bronze should be kept to a minimum because of their reduced tensile strength at higher temperatures.

Pipework and Flanges

The piping for Therminol systems should be sized to provide the required flow rate at an economical pressure drop. Drain valves should be provided at low points to facilitate cleaning and vent valve connection sited at all high points.

Stresses arising from expansion during temperature changes can be avoided by use of loops and bellows. The tendency to leak through joints and fittings is a characteristic of heat transfer fluids unless these fittings are extremely tight. Monitoring of piping leaks is essential, since fluid saturated insulation may create a fire hazard. On new systems, it is strongly recommended that a maximum number of joint be welded.

Expansion Tank

After the heater, the expansion tank is the most critical element of a heat transfer fluid system and its design is directly connected with the design of the entire system. It is recommended that a qualified engineering company or heater manufacturer be consulted.

The expansion tank performs the following functions:

1 Maintains a static pump suction head.
2 Compensates for temperature related volume and pressure changes.
3 Provides a means of online venting of moisture and low boilers.
4 Prevents fluid oxidation.

The expansion tank should be positioned at the highest point of the system and connected to the inlet side of the pump. It may also be connected to the main circulating loop at the lowest pressure point.

For heating circuits, the expansion tank should be sized so that it is 1/4 full at ambient temperature and 3/4 full when the system is at operating temperature; Vice versa for cooling.

Fluid expansion can be 25% or more depending on the fluid choice and the operating temperature range. Protection of heat transfer fluid against oxidation is essential. Contact with oxygen is detrimental, and can occur in both the expansion tank and in the collection tank, if the temperature in the vessel is above 60-80°C. Oxidation can be minimized by blanketing with an inert gas or by use of a cold seal trap.

Startup, Venting and Normal Operation of the System

The thermic fluid system should be pneumatically tested to suitable pressure. The pressure should be held for 1-2 hours. This will minimize the possibility of system leakage.

Before the first charge with heat transfer fluid there will usually be some moisture in the system (for example due to condensation in pipes and on the vessel walls). During charging, the fluid mixes with this water which must then be vented via the expansion tank during heat up. If not properly vented, pump cavitation and/or other moisture related problems may occur.

Health, Safety and Environmental Information

Please contact the Solutia India offices for the Material Safety Data Sheet, or if other information concerning health, safety and environmental issues is required during filling or operation of your heat transfer system with this product.

In case you require detailed information on the above mentioned subjects, please feel free to contact us. We will send you literature containing helpful information on products and services along with an array of design guides and technical aids that will make your job a lot easier. And if it cannot answer your questions or solve your problem, it will connect you to the people who can. This revolutionary new resource is what you would expect from an industry leader like Solutia.