



# THERMINOL<sup>®</sup> 75

heat transfer fluid

Ultrahigh temperature  
at low pressure

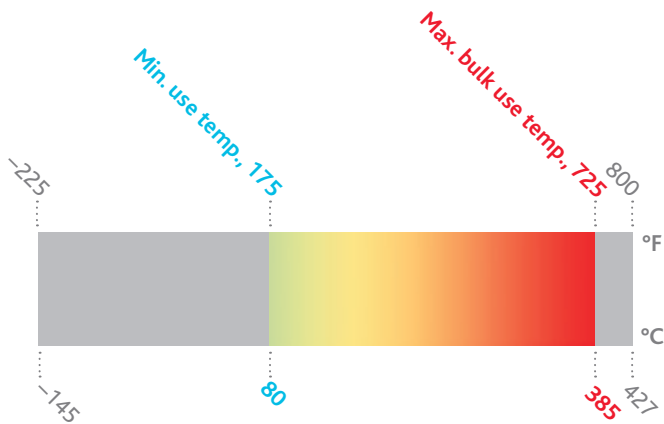
***80° to 385°C***  
***(175° to 725°F)***

**THERMINOL**

Heat Transfer Fluids by Eastman

# THERMINOL<sup>®</sup> 75

heat transfer fluid



Eastman Therminol<sup>®</sup> 75 heat transfer fluid offers excellent thermal stability. It was developed for use at temperatures up to 385°C (725°F) in typical liquid phase heat transfer systems which operate at low pressure. Static pressure of about 1½ atmospheres should maintain the liquid phase at high temperatures.

**Therminol 75 is available globally. Contact your local Eastman Therminol sales representative for more information.**

## Physical and chemical characteristics

Therminol 75 fluid has heat transfer coefficients that are equivalent to or higher than other natural or synthetic liquids in the same boiling range. Because of its high boiling point (343°C/649°F), Therminol 75 generates very little vapor pressure above ambient pressure at 385°C (725°F) and can be used in low-pressure systems. Under ambient conditions, Therminol 75 is a soft solid material with a slurry point of about 75°–80°C (165°–175°F). Therminol 75 has low odor and low mammalian toxicity.

The recommended maximum bulk and film temperatures for Therminol 75 are based on industry-standard thermal studies. Operation at or below these temperature maximums can provide long service life under most operating conditions.

Actual fluid life is dependent on the total system design and operation and can vary by heat transfer fluid chemistry. As fluid ages, the formation of low- and high-boiling compounds may result. Low-boiling compounds should be vented from the system as necessary to a safe location away from personnel and sources of ignition and in compliance with applicable regulations and laws. The high-boiling compounds can be very soluble in the fluid. Significant overheating or fluid contamination will accelerate decomposition and may result in increased high-boiler and solids concentrations. Excess solids can typically be filtered for removal.

Eastman recommends that systems utilizing Therminol 75 fluid should be blanketed with an atmosphere of inert gas to protect against the effects of fluid oxidation on its performance and life expectancy. Pressure relief device(s) should be installed where required.

Therminol 75 is noncorrosive to metals commonly used in the construction of heat transfer systems.


While Therminol 75 has a relatively high flash point, it is not classified as a fire-resistant heat transfer fluid. Consequently, the use of protective devices may be required to minimize fire risk and users of Therminol 75 should check with their safety and risk management experts for specific instructions.



## Typical properties<sup>a</sup>

|   |  |
|---|--|
| Appearance                                      | Soft solid melting to yellow liquid              |
| Composition                                     | Terphenyl/quaterphenyl                           |
| Maximum bulk temperature                        | 385°C (725°F)                                    |
| Maximum film temperature                        | 410°C (770°F)                                    |
| Normal boiling point                            | 343°C (649°F)                                    |
| Pumpability, at 300 mm <sup>2</sup> /s (cSt)    | 80°C (175°F)                                     |
| Pumpability, at 2000 mm <sup>2</sup> /s (cSt)   | 80°C (175°F)                                     |
| Slurry point                                    | 75°–80°C (165°–175°F)                            |
| Flash point, COC (ASTM D-92)                    | 185°C (365°F)                                    |
| Autoignition temperature (ASTM E-659)           | 567°C (1052°F)                                   |
| Coefficient of thermal expansion at 200°C       | 0.000803/°C (0.000446/°F)                        |
| Heat of vaporization at maximum use temperature | 236 kJ/kg (101 Btu/lb)                           |
| Total acidity (ASTM D-664)                      | <0.2 mg KOH/g                                    |
| Average molecular weight                        | 230  |
| Pseudocritical temperature                      | 579°C (1074°F)                                   |
| Pseudocritical pressure                         | 25.3 bar (367 psia)                              |
| Pseudocritical density                          | 323 kg/m <sup>3</sup> (20.2 lb/ft <sup>3</sup> ) |
| Moisture content, maximum (ASTM E-203)          | 200 ppm  |
| Dielectric constant @ 23°C (ASTM D-924)         | 2.32   |

<sup>a</sup>These data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications for Therminol 75 fluid. Does not constitute an express warranty. See disclaimer on the back page of this bulletin.



### To create your own customized table

with preferred properties, units of measure,  
and temperature intervals, visit  
[www.therminol.com/resources](http://www.therminol.com/resources)  
and download the Therminol heat transfer fluid calculator.

**For the technical service contact in your region,  
visit the CONTACT US page on our website, [www.therminol.com](http://www.therminol.com).**

## Liquid properties of Therminol® 75 heat transfer fluid by temperature<sup>a</sup> (SI units)

| Temperature |     | Liquid density    | Liquid heat capacity | Heat of vaporization | Liquid enthalpy <sup>b</sup> | Liquid thermal conductivity | Liquid viscosity <sup>c</sup> |                          | Vapor pressure <sup>d</sup> |
|-------------|-----|-------------------|----------------------|----------------------|------------------------------|-----------------------------|-------------------------------|--------------------------|-----------------------------|
| °C          | °F  | kg/m <sup>3</sup> | kJ/(kg·K)            | kJ/kg                | kJ/kg                        | W/(m·K)                     | cP (mPa·s)                    | cSt (mm <sup>2</sup> /s) | kPa                         |
| 71          | 160 | 1050              | 1.68                 | 393.9                | -14.3                        | 0.1314                      | 5.07                          | 4.84                     | 0.014                       |
| 80          | 176 | 1040              | 1.71                 | 388.9                | 0.9                          | 0.1307                      | 4.29                          | 4.12                     | 0.022                       |
| 90          | 194 | 1030              | 1.74                 | 383.3                | 18.2                         | 0.1300                      | 3.60                          | 3.48                     | 0.038                       |
| 100         | 212 | 1030              | 1.77                 | 377.8                | 35.8                         | 0.1292                      | 3.04                          | 2.96                     | 0.063                       |
| 110         | 230 | 1020              | 1.80                 | 372.3                | 53.6                         | 0.1285                      | 2.60                          | 2.55                     | 0.101                       |
| 120         | 248 | 1010              | 1.83                 | 366.9                | 71.8                         | 0.1277                      | 2.24                          | 2.21                     | 0.159                       |
| 130         | 266 | 1000              | 1.86                 | 361.5                | 90.2                         | 0.1269                      | 1.94                          | 1.93                     | 0.244                       |
| 140         | 284 | 998               | 1.89                 | 356.2                | 108.9                        | 0.1262                      | 1.69                          | 1.70                     | 0.369                       |
| 150         | 302 | 991               | 1.92                 | 350.9                | 128.0                        | 0.1254                      | 1.49                          | 1.50                     | 0.548                       |
| 160         | 320 | 983               | 1.94                 | 345.6                | 147.2                        | 0.1246                      | 1.32                          | 1.34                     | 0.800                       |
| 170         | 338 | 976               | 1.97                 | 340.4                | 166.8                        | 0.1238                      | 1.17                          | 1.20                     | 1.15                        |
| 180         | 356 | 968               | 2.00                 | 335.3                | 186.6                        | 0.1230                      | 1.05                          | 1.08                     | 1.62                        |
| 190         | 374 | 961               | 2.02                 | 330.2                | 206.7                        | 0.1221                      | 0.939                         | 0.977                    | 2.27                        |
| 200         | 392 | 953               | 2.05                 | 325.1                | 227.1                        | 0.1213                      | 0.847                         | 0.889                    | 3.12                        |
| 210         | 410 | 945               | 2.07                 | 320.1                | 247.7                        | 0.1204                      | 0.767                         | 0.812                    | 4.24                        |
| 220         | 428 | 938               | 2.10                 | 315.1                | 268.5                        | 0.1196                      | 0.698                         | 0.744                    | 5.69                        |
| 230         | 446 | 930               | 2.12                 | 310.1                | 289.6                        | 0.1187                      | 0.637                         | 0.685                    | 7.56                        |
| 240         | 464 | 922               | 2.15                 | 305.2                | 311.0                        | 0.1179                      | 0.584                         | 0.633                    | 9.94                        |
| 250         | 482 | 914               | 2.17                 | 300.3                | 332.5                        | 0.1170                      | 0.537                         | 0.587                    | 12.9                        |
| 260         | 500 | 906               | 2.19                 | 295.5                | 354.3                        | 0.1161                      | 0.495                         | 0.546                    | 16.7                        |
| 270         | 518 | 898               | 2.21                 | 290.7                | 376.4                        | 0.1151                      | 0.458                         | 0.510                    | 21.3                        |
| 280         | 536 | 889               | 2.24                 | 285.9                | 398.6                        | 0.1142                      | 0.425                         | 0.478                    | 27.0                        |
| 290         | 554 | 881               | 2.26                 | 281.1                | 421.1                        | 0.1133                      | 0.395                         | 0.448                    | 34.0                        |
| 300         | 572 | 872               | 2.28                 | 276.4                | 443.7                        | 0.1123                      | 0.368                         | 0.422                    | 42.4                        |
| 310         | 590 | 864               | 2.30                 | 271.6                | 466.6                        | 0.1113                      | 0.344                         | 0.398                    | 52.6                        |
| 320         | 608 | 855               | 2.32                 | 266.9                | 489.7                        | 0.1103                      | 0.322                         | 0.377                    | 64.7                        |
| 330         | 626 | 846               | 2.34                 | 262.1                | 513.0                        | 0.1093                      | 0.303                         | 0.358                    | 79.0                        |
| 340         | 644 | 837               | 2.36                 | 257.4                | 536.5                        | 0.1082                      | 0.285                         | 0.340                    | 96.0                        |
| 350         | 662 | 828               | 2.38                 | 252.6                | 560.2                        | 0.1072                      | 0.268                         | 0.324                    | 116                         |
| 360         | 680 | 818               | 2.40                 | 247.9                | 584.1                        | 0.1061                      | 0.254                         | 0.310                    | 139                         |
| 370         | 698 | 809               | 2.42                 | 243.0                | 608.1                        | 0.1049                      | 0.240                         | 0.297                    | 166                         |
| 380         | 716 | 799               | 2.43                 | 238.2                | 632.4                        | 0.1038                      | 0.227                         | 0.285                    | 197                         |
| 385         | 725 | 794               | 2.44                 | 235.8                | 644.6                        | 0.1032                      | 0.221                         | 0.279                    | 215                         |

<sup>a</sup>Maximum recommended bulk temperature 385°C (725°F). These data are based on samples tested in the laboratory and are not guaranteed for all samples. Contact us for complete sales specifications for Therminol 75 fluid. <sup>b</sup>Liquid enthalpy basis is 79.4°C (175°F). <sup>c</sup>1 cSt = 1 mm<sup>2</sup>/s and 1 mPa·s = 1 cP. <sup>d</sup>100 kPa = 1 bar

## Liquid properties of Therminol® 75 heat transfer fluid by temperature<sup>a</sup> (English units)

| Temperature |     | Liquid density |                    | Liquid heat capacity | Heat of vaporization | Liquid enthalpy <sup>b</sup> | Liquid thermal conductivity | Liquid viscosity <sup>c</sup> |                          | Vapor pressure <sup>d</sup> |
|-------------|-----|----------------|--------------------|----------------------|----------------------|------------------------------|-----------------------------|-------------------------------|--------------------------|-----------------------------|
| °F          | °C  | lb/gal         | lb/ft <sup>3</sup> | Btu/(lb·°F)          | Btu/lb               | Btu/lb                       | Btu/(ft·h·°F)               | lb/(ft·h)                     | cSt (mm <sup>2</sup> /s) | psia                        |
| 160         | 71  | 8.74           | 65.4               | 0.402                | 169.4                | -6.1                         | 0.0760                      | 12.2                          | 4.83                     | —                           |
| 180         | 82  | 8.68           | 64.9               | 0.410                | 166.8                | 2.0                          | 0.0755                      | 9.97                          | 3.96                     | —                           |
| 200         | 93  | 8.61           | 64.4               | 0.418                | 164.1                | 10.3                         | 0.0750                      | 8.22                          | 3.29                     | 0.007                       |
| 220         | 104 | 8.54           | 63.9               | 0.426                | 161.5                | 18.8                         | 0.0745                      | 6.86                          | 2.77                     | 0.011                       |
| 240         | 116 | 8.48           | 63.4               | 0.434                | 158.9                | 27.4                         | 0.0740                      | 5.78                          | 2.35                     | 0.019                       |
| 260         | 127 | 8.41           | 62.9               | 0.442                | 156.3                | 36.1                         | 0.0735                      | 4.92                          | 2.02                     | 0.031                       |
| 280         | 138 | 8.34           | 62.4               | 0.450                | 153.7                | 45.1                         | 0.0730                      | 4.22                          | 1.75                     | 0.049                       |
| 300         | 149 | 8.27           | 61.9               | 0.457                | 151.2                | 54.1                         | 0.0725                      | 3.65                          | 1.52                     | 0.076                       |
| 320         | 160 | 8.21           | 61.4               | 0.464                | 148.7                | 63.3                         | 0.0720                      | 3.18                          | 1.34                     | 0.116                       |
| 340         | 171 | 8.14           | 60.9               | 0.471                | 146.2                | 72.7                         | 0.0715                      | 2.80                          | 1.19                     | 0.173                       |
| 360         | 182 | 8.07           | 60.3               | 0.478                | 143.8                | 82.2                         | 0.0710                      | 2.47                          | 1.06                     | 0.254                       |
| 380         | 193 | 8.00           | 59.8               | 0.485                | 141.3                | 91.8                         | 0.0705                      | 2.19                          | 0.946                    | 0.366                       |
| 400         | 204 | 7.93           | 59.3               | 0.492                | 138.9                | 101.6                        | 0.0699                      | 1.96                          | 0.853                    | 0.519                       |
| 420         | 216 | 7.85           | 58.8               | 0.499                | 136.5                | 111.5                        | 0.0694                      | 1.76                          | 0.773                    | 0.725                       |
| 440         | 227 | 7.78           | 58.2               | 0.505                | 134.1                | 121.6                        | 0.0688                      | 1.59                          | 0.704                    | 0.999                       |
| 460         | 238 | 7.71           | 57.7               | 0.511                | 131.8                | 131.7                        | 0.0683                      | 1.44                          | 0.644                    | 1.36                        |
| 480         | 249 | 7.63           | 57.1               | 0.518                | 129.4                | 142.0                        | 0.0677                      | 1.31                          | 0.592                    | 1.82                        |
| 500         | 260 | 7.56           | 56.6               | 0.524                | 127.1                | 152.4                        | 0.0671                      | 1.20                          | 0.546                    | 2.42                        |
| 520         | 271 | 7.48           | 56.0               | 0.530                | 124.8                | 163.0                        | 0.0665                      | 1.10                          | 0.506                    | 3.18                        |
| 540         | 282 | 7.41           | 55.4               | 0.535                | 122.5                | 173.6                        | 0.0659                      | 1.01                          | 0.471                    | 4.13                        |
| 560         | 293 | 7.33           | 54.8               | 0.541                | 120.3                | 184.4                        | 0.0653                      | 0.933                         | 0.439                    | 5.31                        |
| 580         | 304 | 7.25           | 54.2               | 0.547                | 118.0                | 195.3                        | 0.0647                      | 0.864                         | 0.411                    | 6.77                        |
| 600         | 316 | 7.17           | 53.6               | 0.552                | 115.7                | 206.3                        | 0.0640                      | 0.803                         | 0.386                    | 8.56                        |
| 620         | 327 | 7.09           | 53.0               | 0.557                | 113.5                | 217.4                        | 0.0634                      | 0.748                         | 0.364                    | 10.7                        |
| 640         | 338 | 7.00           | 52.4               | 0.563                | 111.2                | 228.6                        | 0.0627                      | 0.698                         | 0.344                    | 13.3                        |
| 660         | 349 | 6.92           | 51.7               | 0.568                | 108.9                | 239.9                        | 0.0620                      | 0.654                         | 0.326                    | 16.5                        |
| 680         | 360 | 6.83           | 51.1               | 0.573                | 106.6                | 251.3                        | 0.0613                      | 0.613                         | 0.310                    | 20.2                        |
| 700         | 371 | 6.74           | 50.4               | 0.578                | 104.3                | 262.8                        | 0.0606                      | 0.577                         | 0.295                    | 24.6                        |
| 720         | 382 | 6.65           | 49.7               | 0.583                | 102.0                | 274.4                        | 0.0598                      | 0.543                         | 0.282                    | 29.7                        |
| 725         | 385 | 6.62           | 49.6               | 0.584                | 101.4                | 277.3                        | 0.0596                      | 0.536                         | 0.279                    | 31.1                        |

## Design recommendations

In addition to the design and operation guidance given in the *Liquid Phase Systems Design Guide* (publication TF-04), Therminol 75 heat transfer fluid, with its 75°–80°C (165°–175°F) slurry point, will require:

- Heat tracing of system components for thawing the heat transfer medium to the liquid state
- Continuous heat tracing of instrumentation and control lines, system vents, and other components which are cold during system operation and would not be operable with solid heat transfer media
- A heatable storage vessel that can accommodate the heat transfer system volume in case of emergency shutdown of utilities or drum storage which could be thawed out at a later time
- All system low spots to have drains to facilitate fluid discharge and system cleaning

## Operation procedures

### Start-up

In addition to suggested start-up procedures in the *Liquid Phase Systems Design Guide*, systems using Therminol 75 heat transfer fluid must be preheated along with the Therminol 75 to a temperature above the 80°C (175°F) slurry point and not be allowed to fall below this temperature. While Therminol 75 is reluctant to crystallize, the best operating practice is to have the system start-up temperature above 80°C (175°F). Two methods or combinations have been employed for preheating the system:

1. The first method is to have all components heat traced and the system preheated by the tracing.
2. The second method is to introduce low-pressure steam into the expansion tank and allow internal steam heating with condensate and steam exiting the system through the system drains and vents. This is especially useful where heat tracing of large heaters and user components is impractical.

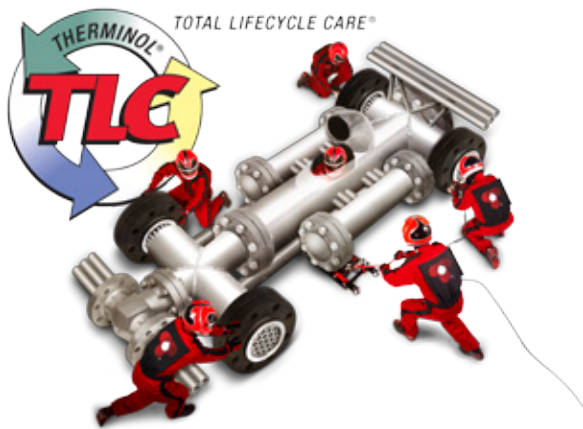
All system component temperatures should be monitored to ensure complete heating. Therminol 75 is charged at a temperature above 80°C (175°F) to the system from thermally heated bulk storage or heated drums. The continuous heat tracing of instrumentation lines, system vents, and pump shaft seals must be in operation before the system pumps and heaters are started. The expansion tank vents should be open to allow moisture to exit the system from the hot fluid moving through the expansion tank. After the free moisture has left the system, the expansion tank should be blanketed with inert gas and normal operation commenced.

### Shutdown

For shutdowns of systems which are not totally heat traced where the minimum system temperature is less than 80°C (175°F), Therminol 75 must be removed from the system and placed in a heatable storage vessel. All low-point drains must be opened to remove Therminol 75.

# TLC Total Lifecycle Care<sup>®</sup> program

Our TLC Total Lifecycle Care program is designed to support Therminol heat transfer fluid customers throughout their systems' lifecycle. This comprehensive program includes system design support, start-up assistance, training, sample analysis, flush and refill fluids, and more. In North America, call our hotline at 1-800-433-6997 or contact your local sales or technical representative found in the "Contact us" section of our website.



## In-service heat transfer fluid sample analysis

To help users get maximum fluid life, Eastman offers testing of in-service heat transfer fluids to detect contamination, moisture, thermal degradation, and other conditions that may impact system performance. Customers can access their specific test information via the myTherminol site portal. Sample analysis includes all-inclusive sample kits that are easy to use.

### myTHERMINOL

Results of the test are presented in a detailed report that provides suggestions for corrective action. Test results are stored in a database for future reference. Customers can access their specific test information via [my.therminol.com](http://my.therminol.com).

## Technical service hotline

Experienced technical service specialists can help answer your questions regarding heat transfer fluid selection, system start-ups, system design, and operational issues.

## System design support

Eastman regularly assists some of the world's largest engineering, chemical, and equipment manufacturing companies on the design and operation of heat transfer systems.

## Operational training

Eastman customers can take advantage of our heat transfer system operation and product training programs. These programs are customized to suit the varied needs of front-line technicians, operations supervisors, and maintenance technicians to design engineers.

## Safety awareness training

We provide our customers safety awareness training that focuses on the design, start-up, operation, and maintenance of heat transfer fluid systems.

## Start-up assistance

Start-up is often the most difficult part of operating a heat transfer fluid system. Eastman provides start-up assistance by reviewing procedures and making suggestions to reduce typical problems.

## Flush fluid and fluid refill

Liquid phase heat transfer systems can be cleaned with Therminol FF flush fluid. Therminol FF can be circulated at temperatures up to 177°C (350°F) and is compatible with mechanical system components and perfluoroelastomer O-rings found in heat transfer systems.

## Fluid trade-in program\*

As part of our commitment to sustainability and the environment, Eastman offers a trade-in program for used Therminol and competitive heat transfer fluids.



*\*Fluid trade-in program available in North America.*



For more information or to find the sales or technical contact nearest you, visit the "Contact us" page on our website:  
[www.therminol.com](http://www.therminol.com).

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