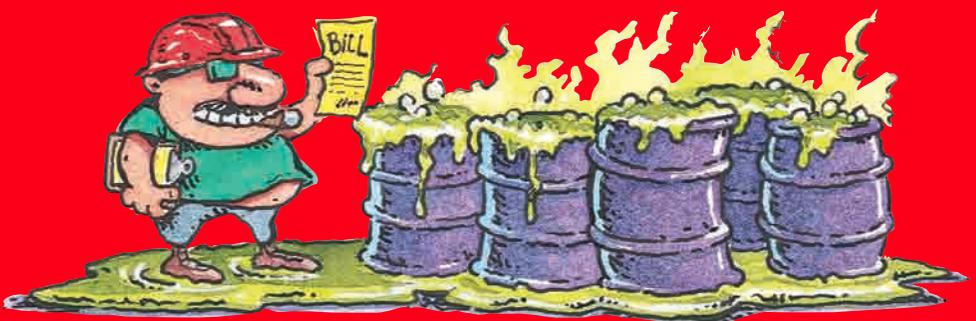


**Flushing out  
your heat  
transfer system  
was a dirty job,  
a big expense,  
and a serious  
bummer.**



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



**NOW**, it's as easy to clean the gunk out of your heat transfer system as it is to flush your car's radiator.

Introducing Therminol®FF, the **FIRST** and **ONLY** 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!
- We handle disposal and recycling for you!

# Therminol<sup>®</sup> FF

## Heat Transfer System Flushing Fluid by Solutia

Therminol FF is a key component of a low cost alternative to chemically cleaning a heat transfer system containing severely degraded or contaminated organic heat transfer fluid.

Deposits from oxidized, thermally degraded or contaminated fluid can foul interior surfaces, making it necessary to clean the system prior to charging with new fluid.

In the past, cleaning procedures used solvents with low flash points and high volatility, which necessitated the use of stringent safety precautions during the clean-out procedure. Alternatively, water-based acidic or caustic solutions could only be used at relatively low temperatures due to the high pressure generated at elevated temperatures.

Therminol FF is a synthetic hydrocarbon with a high flash point and initial boiling point, making it much safer to use. Due to its high boiling point, Therminol FF can be safely heated while circulating in the system to increase its strong solvent action and overall effectiveness as a cleaning fluid.

Small amounts of Therminol FF left in the system will be miscible and compatible with most organic heat transfer fluids. This compatibility factor means less downtime. Water-based cleaning solutions add costly drying time to a clean-out procedure, creating additional chance for contamination. Therminol FF eliminates drying, thus significantly reducing the length of the procedure.

# Therminol FF Return Program

Solutia can supply Therminol FF and then take it back after it is used at no additional cost. This cost-effective solution could be the most important factor in choosing Therminol FF as a flush fluid. Our cradle-to-grave approach eliminates expensive disposal costs which are necessary when solvents or other cleaning fluids are used. Therminol FF is not regulated under DOT and, when mixed with spent heat transfer fluid, meets the criteria for a synthetic used oil under the U.S. EPA Standards for Management of Used Oil (40 CFR 279), which govern recycling and disposal of used oil.



## Heat Transfer System Cleaning With Therminol FF

When performance of a heat transfer system decreases due to fouling, or when solids level in the fluid is too high for effective filtration, a clean-out may be necessary to restore the system to peak operating performance. Sludge and solids are often the result of process contamination or decomposition of the heat transfer fluid through oxidation or overheating.

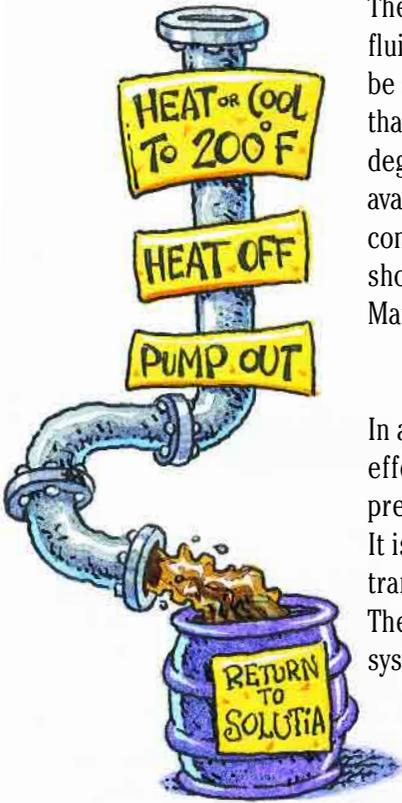
To help you decide on the correct clean-out procedure, Solutia can provide a no-charge fluid analysis to determine the extent of degradation or contamination. These test results can then be used in developing the parameters required to maximize the effectiveness of Therminol FF as a flush fluid in your system.



To request a fluid analysis, please call 800-433-6997 to receive a free Therminol Fluid Sample Collection Kit.

A general system cleaning procedure follows but each system and situation is different so consultation with your Therminol specialist is recommended prior to starting the clean-out procedure.

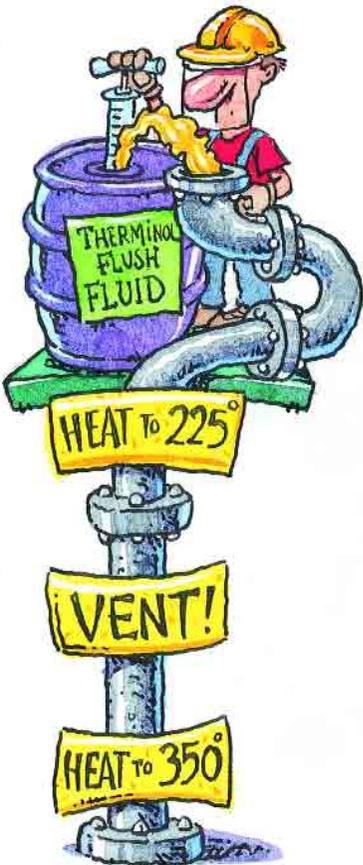
## Draining the System



The system should be circulating, and the temperature of the fluid heated or cooled to about 200°F. The heater should then be shut down and the main circulating pump allowed to run so that loose solids and sludge will be fully suspended in the degraded heat transfer fluid. Drain the fluid through all available low point drains. Caution should be taken to avoid contact with the hot fluid. All fluid removed from the system should be handled in accordance with measures listed in the Material Safety Data Sheet for that fluid.

In areas of the system where gravity draining the fluid is not effective, such as heater coils or horizontal users, blowing or pressurizing the piping with nitrogen can remove excess fluid. It is important to remove as much of the degraded heat transfer fluid as possible to maximize the effectiveness of the Therminol FF flush fluid in cleaning interior surfaces of the system.

## Flushing the System



Introduce the Therminol FF into low points in the system. The system should be filled completely, including the expansion tank where solids tend to deposit. Next, circulate the entire system at ambient conditions to thoroughly mix the Therminol FF with any residual fluid left in the system. Any moisture which may have entered the empty system will also be removed in the charge of Therminol FF fluid. Check the return line strainer periodically for plugging from solids which may have been dispersed from the fouled heat transfer surfaces. For larger systems capable of isolating sections, less Therminol FF can be used by closing one section at a time.

Gradually heat the circulating fluid to about 225°F and vent any moisture that may have entered the system through the vapor space of the expansion tank. When all the moisture has been vented, continue heating the circulating fluid to about 350°F to maximize the solvent characteristics of the Therminol FF. Allow for thermal expansion of the Therminol FF when heating. Typical volume expansion from ambient to 350°F could be about 10-12%.



Full circulation of the entire system should be maintained at 350°F for 16-24 hours before cooling the fluid to 200°F. Then repeat the above draining procedure.

## Heat Transfer System Startup After Cleaning

Once the system has been completely drained of as much Therminol FF as possible, visually inspect the system in areas of low fluid velocity to check for solids which may have fallen out of suspension. Any solids found should be removed. If the system does not have a side stream filter to continuously remove solids during normal operation, the installation of one should be considered prior to charging the new heat transfer fluid.

The refill and startup of the system with new heat transfer fluid should follow the same procedures used in previous startups. Care should be taken to vent any moisture which may have entered the system during flushing, draining or re-filling of the system. Small amounts of Therminol FF remaining in the system will not have an adverse effect on the operation or service life of the new fluid.



## System Components Compatibility with Therminol FF

Mechanical components used in most high temperature heating systems which use organic heat transfer fluids are generally compatible with Therminol FF. This includes piping, flanges, gaskets, pumps, valves and valve packing, filters and insulation. Using Therminol FF as a cleaning fluid will not compromise performance or cause harm to the integrity of these system components.

## Safety and Handling

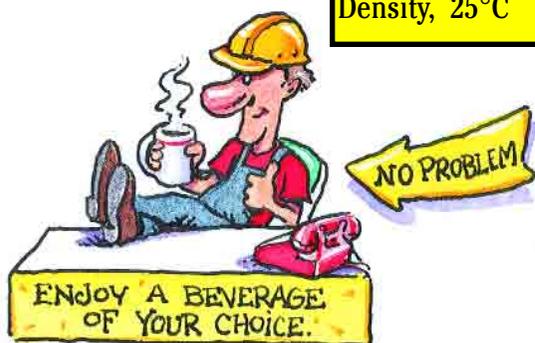
Toxicity studies and manufacturing experience indicate that no special precautions are required in the use or handling of Therminol FF. Data from laboratory studies conducted by Solutia classify Therminol FF as practically nontoxic by ingestion.

As with with most hydrocarbon-based materials, Therminol FF can be irritating to the skin from repeated and prolonged exposure. Therefore the use of skin protection-- gloves, face shield, and apron-- should be worn when splashing is likely to occur. Avoid breathing vapor or mists. Use NIOSH/MSHA approved respiratory protection equipment when airborne exposure is excessive.

More data are available for Therminol FF in the Material Safety Data Sheet, which is available upon request.

## Typical Properties

Appearance	Dark amber liquid
Composition	Synthetic hydrocarbon
Moisture Content	200ppm
Flash Point (ASTM D92)	>250°F
Fire Point (ASTM D92)	>270°F
Boiling Range(ASTM D20)	420°F - 550°F
Viscosity, 25°C	2-5 cSt
Density, 25°C	0.96-0.98 g/cm 3



**THERMINOL**<sup>®</sup>

Flushing Fluids by **Solutia**

Customer Service: 800-426-2463 to order.

Technical Service: 800-433-6997 to request a sample kit or more information.

Web Site: [www.therminol.com](http://www.therminol.com)

P.O.Box 66760

St.Louis, Missouri 63166-6760



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