NOBODY UNDERSTANDS HEAT TRANSFER FLUID SYSTEMS LIKE MULTITHERM...

TROUBLE SHOOTING GUIDE

This Trouble Shooting Guide will not solve every problem. It will however, help identify some of the more frequent problems we have encountered in our years of working with hot fluid systems. These are general guide lines that just may save you much time, money and aggravation.

Your questions, problem solving experiences and input to this guide will certainly be appreciated.

Call us at 800-225-7440 with your comments.

MULTITHERM HEAT TRANSFER FLUIDS APPLICATION CHART

RECOMMENDED FOR TEMPERATURE CONTROL OF:

- MultiTherm PG-1
  - Dies
  - Extruder barrel zones
  - Extruder screws
  - Ovens

- MultiTherm 502
  - Batch reactors
  - Hot/Cold mold cycling
  - Pilot plants
  - Dies
  - Mold

- MultiTherm 10-4
  - Dryers
  - Laminating rolls
  - Open baths (at 350°F)

- MultiTherm 16-1
  - Tank heating
  - Dryers
  - Asphalt Plants
  - Particleboard Plant

- MultiTherm OG-1
  - Lathes
  - Molds
  - Tank heating

- MultiTherm FF-1
  - Flushing/cleaning new systems or for general maintenance

- MultiTherm FSC PLUS
  - Designed to breakdown sludge and stay in suspension for easy removal or filtration in large systems.

Please visit our website:
www.multitherm.com

TRANSPORTING MULTITHERM HEAT TRANSFER FLUIDS

- STOCK - 5 Gallon Pails
  Usually used in smaller systems where a 55 gallon drum is too large or too much fluid.

- STOCK - 55 Gallon Drums
  Easily the most common method when ordering heat transfer fluids. Easy to ship and store after shipment.

- 2/5 Gallon Totes
  Available by request only. Usually required by customers who do not wish to dispose of drums thru a "drum recycler." MultiTherm sometimes has trees in stock and other times requires a special order. If we need to special order, it can add 2-3 weeks to the shipping time.

- Bulk - 1,000 Gallons & Up
  Tractor trucks can economically transport 1,000 to 5,000 gallons per load. Some larger systems will require multiple tanks. Please let us know your fluid requirements and we will determine the best mode of transportation to get the fluid to you to meet your deadlines. Bulk shipment lead times are 2-3 weeks, but can be expedited to around a week depending on fluid availability.

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Or everything you’ve always wanted to know but didn’t know who to ask!
### PROBLEMS

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<th>Problem</th>
<th>Refer to Causes</th>
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<tr>
<td>Carbon build up on heater rods</td>
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<tr>
<td>Pump seals require frequent replacement</td>
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<tr>
<td>Fluid turns dark and thick</td>
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<tr>
<td>System temperature control is uneven</td>
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<tr>
<td>Frequent Y strainer pluggage</td>
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<tr>
<td>Pump cavitation</td>
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<td>Smoking</td>
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### CAUSES

<table>
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<th>Cause</th>
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<td>Contamination</td>
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| Contamination is identified as anything in a heat transfer fluid system that isn’t associated with the fluid. It’s generally more noticeable during initial start-up or after a system has been shut down for maintenance. Contaminants can be:  
  - Low boilers such as water or solvents from clean out.  
  - Particles such as metal filings or scale.  
  - Thermally unstable oils or chemicals added during an emergency. |
| Mismatched Heaters and Heat Users   |                    |
| Continuous high pump discharge pressure can result from connecting a high flow capacity heater to a low flow capacity heat user. Under these conditions, a positive displacement pump will lift the relief valve and a centrifugal pump will deliver a lower flow rate through the heating chamber. In either case, the response time of the temperature control system will be altered and could make temperature control of the heat user erratic. |
| Oxidation                           |                    |
| Heat transfer fluid should never be exposed to air in reservoirs or expansion tanks above 120°F/50°C. Even though there may be no active air flow into the vapor space, oxygen will diffuse through any openings and react with the fluid. This oxidation results in the formation of organic acids which can increase the rate of thermal cracking.  
  Openings that are sources of air often have “smoke” coming out of them. The smoke is produced when low boiling components boil off from the fluid which increases the concentration of “high boiling components” and increases fluid viscosity. |
| Thermal Cracking                    |                    |
| High fluid velocity is important in electric immersion heaters for two reasons:  
  1. It provides enough fluid to remove the heat generated by the elements.  
  2. It creates turbulence in the fluid which minimizes the differential between the element surface film temperature and the average fluid temperature.  
  Any reduction in flow rate will result in an increase in the average fluid temperature since less fluid is available to remove the heat generated.  
  In many cases of extremely low flow, the fluid near the surface essentially insulates the elements, and allows the surface film temperature to increase excessively. Overheating can occur even though the temperature set point is well below the maximum film temperature of the fluid. The resulting high temperature can cause thermal cracking of the fluids which produces carbon “coke”, and light ends which boil at low temperatures.  
  Viscosity can also affect the amount of turbulence present in the heating chamber. High viscosity, such as when the fluid is cold, and/or severely degraded, can effectively insulate the heating surface and increase the rate of thermal cracking. |

### SOLUTIONS

<table>
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<th>Solution</th>
<th>Refer to Details</th>
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<tr>
<td>Filtration</td>
<td>Use a parallel flow cartridge filter with a 10 micron filter media to remove particles from the heat transfer fluid.</td>
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<tr>
<td>Strainer</td>
<td>Install a 100 mesh basket strainer on the pump suction line for start-up period. May be used for normal operation, also.</td>
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<tr>
<td>Heat Transfer Fluid</td>
<td>Drain, clean and refill.</td>
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</table>
| Heat Users                         | Make sure hoses are correct size and have no kinks.  
  Add multiple inlet and discharge ports to increase fluid flow through heat user.  
  Add manual bypass valve as close as possible to the heat user. |
| Procedures                         | For start-up, allow fluid to circulate cold before turning on heaters and/or short cycle around the heater until reasonable flow rate is obtained. Then gradually open valves to include the rest of the system.  
  For shut down, turn off heater and allow temperature to drop to 250°F before shutting off pump.  
  Avoid hot shut down which can overheat the fluid.  
  Set flow controls so that a full design flow is maintained through the heater at all times. |
| Expansion Tank                     | Seal off expansion or reservoir tank with a liquid seal or vacuum/pressure relief valve.  
  Provide nitrogen blanket on vapor space. Relocate tank far enough from active loop so that it remains "cold" during operations. |