HEATEC TEC-NOTE

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CHOOSING HEAT TRANSFER FLUIDS
for Heatec thermal fluid heaters

Choosing a suitable thermal fluid for Heatec thermal fluid heaters is *extremely* important. Most of the major oil companies offer suitable products known as *heat transfer oil*. Always choose a heat transfer oil designed specifically for use in thermal fluid heating systems.

Do not use lubricating oils, turbine oils, diesel fuels and hydraulic fluids. They are not suitable for use in Heatec heaters! Unsuitable fluids can lead to the following problems:

- Carbon deposits in the heating coils and oil failure
- Greatly increased risk of fire
- Accumulation of sludge in the expansion tank
- Clogging of jumpers in hot oil jackets of asphalt lines
- Failure of pumps

Fluid products designed specifically for heat transfer have special properties. They include additives that help maximize heat transfer and minimize oxidation. Oxidation is a common problem with fluids heated over 300 degrees F unless they are designed for those temperatures. Oxidation significantly degrades the thermal fluid and contributes to the problems listed above.

The heat transfer oil that you use in your Heatec heater should meet the following requirements:

Test Parameter	Value	Test Method Standard
Viscosity @ 100° F	Less than 10 cP	ASTM D445
Viscosity @ 210° F	Greater than 2 cP	ASTM D445
Flash point	Greater than 350°F	ASTM D92
Pour point	Less than 5°F	ASTM D97
Carbon Residue	Less than 0.10% Conradson	ASTM D189
Neutralization No.	Less than 0.07	ASTM D947
Sulfur Content	Less than 0.05%	
Max. film temperature	600 °F*	
*NOTE: Film temperature is a very important factor in the life of a heat transfer oil. The film temperature specified here applies to heaters used at asphalt plants and may not be adequate for heaters at industrial plants.		

Heatec heaters at asphalt plants do not produce film temperatures above 507°F when burning No. 2 fuel oil. Temperatures are even less when burning gas. However, an abnormal operating condition can produce much higher film temperatures. Thus, our recommendation makes allowance for the possibility of higher than normal film temperatures.

The operating temperatures of Heatec thermal fluid heaters used at industrial plants vary according to the application. Many operate at temperatures higher than 600°F. Thus, heat transfer oils with a film temperatures somewhat higher than their actual operating temperature should be used. If you do not know the operating temperature of your heater, please contact the engineering department of Heatec.

Paraffinic and mineral oils are an economical choice for systems operating in the 300°F to 600°F temperature range. They offer very good themal stability and acceptable physical properties. At 500°F, a hot oil will last for 10–15 years. However, they cannot be pumped at low temperatures. Therefore, they require use of heat tracing.

At lower usage temperatures (below about 550°F), the lower cost of the hot oils makes them economical. They are about $4/gal to $8/gal, whereas synthetic organics and silicones are about $7/gal to $40/gal. But premium priced fluids become good, economical choices when temperatures exceed about 550–600°F, or when other properties such as good low-temperature heat transfer are desired.

Contact your local suppliers of heat transfer oils and get their recommendations based on the requirements shown in the table. When selecting a supplier you will also want to consider the following factors:

Does supplier have technical support capabilities?
Does supplier offer a testing/support service?
Is supplier knowledgeable about your application?
Does supplier's product line allow choices?
Do you already use the supplier for other products?
Does supplier have a return/credit program?
Does supplier have a disposal program?
Does supplier offer a delivery service?
What is the regulatory status of the oil they recommend?
Do you need for the oil to have NSF HT1 registration?
Does the oil they offer have thermal stability?
Does the oil they offer produce obnoxious odors?
How much is the initial cost of the oil alone?
What is the overall cost over the life of the oil?

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