Shell Thermia Oil E

Closed heat-transfer system oil

Shell Thermia Oil E is a blend of premium quality, highly refined, medium viscosity index, naphthenic mineral oils ideally suited for use as a heat transfer fluid in indirect closed heat transfer systems.

Applications

- Indirect, closed, heat transfer systems operating at bulk oil temperatures up to 320°C

Performance Features

- *High thermal and oxidation stability*
- *Good heat transfer properties*
- *Low vapour pressure*
- *Non corrosive*
- *Non-toxic*
- *Low cost*

Resistance to Cracking & Oxidation

Mineral oils are subject to two forms of degradation during use.

Cracking, or the breaking down of hydrocarbon molecules by heat. As the oil temperature rises, so the molecules rupture to form volatile gases or non-soluble deposits. The rate of cracking is insignificant until the temperatures of around 320°C are reached

Oxidation, or the reaction of hydrocarbon oil with atmospheric oxygen. At room temperature this reaction occurs very slowly, but it accelerates rapidly with increasing temperature. Oxidation produces acid in the oil and, at a later stage, sludge.

Service Life

The life of Shell Thermia Oil E depends on the design and usage of the heat transfer system. In well-designed systems, the life of the oil may be for many years. It is important to monitor oil condition regularly and note any change in viscosity, flash point and Insolubles.

It is recommended that a sample should be taken from a newly filled system for use as a reference oil.

Design & Operating Notes

A potential source of damage to a heat transfer oil is the heater. To avoid trouble, the circulation pump should be capable of producing fully turbulent oil flow through the heater with surface speeds between 2 and 3 metres per second according to surface geometry. The heat flux should be kept to a minimum to reduce film temperature. The maximum film temperature for Shell Thermia Oil E is 340°C.

The heater should contain a minimum of refractory in its construction so that heat soak-back into the oil is reduced should the circulation pump fail. Thermal response is also improved. Direct flame impingement onto the oil tubes should be avoided so as to prevent local overheating and excessive film temperatures.

An expansion tank is necessary to allow for the change in fluid volume upon heating or cooling. The volume of mineral oil at 340°C is about 20% greater than at room temperature. The tank should be large enough to accept the total heat expansion within its own dimensions. It should be the highest point in the oil circuit and be connected to the system on the pump section side to provide and adequate static heat. Circulation through the expansion tank can be prevented by some means such as a U-bend below the point where it joins the main circuit.

The pipe connecting the expansion tank to the system should be small bore and unlagged so that the oil in the tank exposed to the air is cool. If hot oil is allowed to come into contact with the atmosphere it is likely to oxidise in a comparatively short time. In a well designed and properly operated system, oxidation of the oil is negligible.

The whole system should be instrumented to monitor oil temperature and flow at critical points, i.e. either side of the heater. It should also have fail-safe devices so that pump failure, or excessive temperature, trip the heater. Constant flow through the heater should be maintained regardless of conditions at the process vessel and this can be achieved by a by-pass line across the process vessel containing a constant pressure valve capable of taking full oil flow.

Pre-Commissioning

Before the heat transfer system is commissioned for use, the system should be pressure-tested for leaks and then thoroughly

flushed with Shell Thermia Oil E. Air is preferred for pressure testing the system. Water should never be used for flushing. After the system is flushed and drained, it should be filled with fresh Shell Thermia Oil E. The system should be filled until the expansion tank is a quarter full when the oil is cold. The tank should have a capacity equal to 50% of the oil volume in the remainder of the system if the operating temperature is above 300°C, but a small capacity will suffice if the temperature is lower. During initial operation, the temperature should be increased gradually and steam and air carefully vented from the lines. The heater should be operated continuously until all air and steam have been expelled from the system before full temperature is imposed. During this initial period, all strainers should be checked and cleaned frequently.

Health & Safety

Shell Thermia Oil E is unlikely to present any significant health or safety hazard when properly used in the recommended application, and good standards of industrial and personal hygiene are maintained.

Avoid contact with skin. Use impervious gloves with used oil. After skin contact, wash immediately with soap and water.

For further guidance on Product Health & Safety refer to the appropriate Shell Product Safety Data Sheet.

Protect the environment
Take used oil to an authorised collection point. Do not discharge into drains, soil or water.

Advice

Advice on applications not covered in this leaflet may be obtained from your Shell Representative

Typical Physical Characteristics

Shell Thermia Oil E	
Kinematic Viscosity @ 20°C cSt 40°C cSt 100°C cSt 200°C cSt 300°C cSt (IP 71)	 460 138 11 1.9 0.9
Viscosity Index (IP 226)	37
Density @ 15°C kg/l (IP 365)	0.906
Flash Point °C (Pensky-Martens Closed Cup) (IP 34)	221
Flash Point °C (Cleveland Open Cup) (IP 36)	229
Fire Point °C (ISO 2592)	252
Pour Point °C (IP 15)	-33
Initial Boiling Point °C	Above 360
Coefficient of Thermal Expansion per °C	0.00063
Neutralisation Number (IP 139)	0.05

These characteristics are typical of current production. Whilst future production will conform to Shell's specification, variations in these characteristics may occur.

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