

# Thermal Oils

*The need for increased productivity drives industry forward and so processes operate more quickly and efficiently. In real terms this means process operating temperatures need to be achieved quickly, absolute operating temperatures are increasingly higher and the requirement to cool systems rapidly are part of the challenges for production managers.*

*To meet these process demands the use of thermal oils can be found in many industries servicing both heating and cooling requirements.*



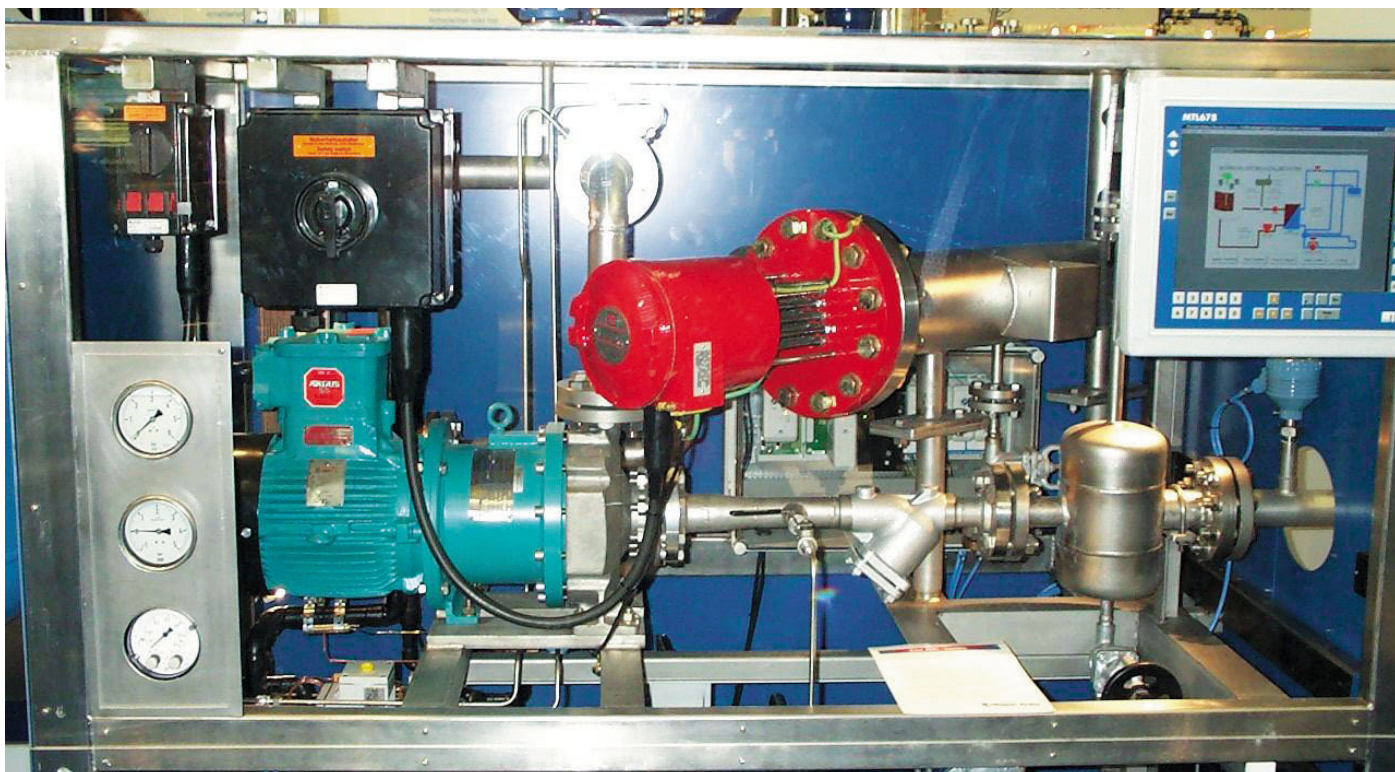
*Thermal oil circulation plays a crucial role in pharmaceutical production*

## Industries

- Pharmaceuticals
- Food
- Construction and Bitumen
- Process
- Electronics manufacture
- Oil and gas

## Example Fluids

- Dowtherm™
- Syltherm™
- Mobiltherm™
- Therminol™



*A Global Mark II pump on display in a thermal oil circulation control system*

### **Process points**

### **Perishable life**

Thermal oils are low-viscosity fluids that are gradually heated or cooled and circulated around a system to regulate process temperatures.

Thermal oils are subject to degradation when operating at higher temperatures. Known as 'thermal cracking' the thermal oil can prematurely fail due to the thermal oil developing new compounds and becoming more volatile, such as the flash point of the fluid being lowered. Some thermal oil types may also ignite when exposed to the air.

At lower viscosity the fluid becomes more 'searching' in nature, which can affect shaft seal pumps with leakage or any pump using mechanical seals.

Thermal oils can be subject to significant oxidation should the fluid come into contact with air, particular when at a raised temperature. The oxidized fluid can become corrosive and cause damage to the circulation system.

Contamination can also quickly degrade thermal oil. This is most often caused in new systems from debris or protective coatings or by moisture left in the system after flushing.

### **Extreme temperatures**

As the fluid is being brought to process temperature from ambient to either extreme cold or heat, the risk to employees, the working environment and the process equipment is raised. The effect of sudden shutdowns on the fluid and the system can be catastrophic, especially when thermal cracking

has occurred. In this potentially volatile state the fluid must be kept contained.

### **Flow rate**

The flow rate depends on the size of the system. Larger systems can require extensive capacities at over 100m<sup>3</sup> p/hr, however most commercial manufacturing premises may require much lower duties than this.

### **Operating costs**

The circulation of thermal oils may be exceptionally costly due to the heating energy needed for fluids and the circulation around the lengths of pipe work.

Downtime through system breakdown can incur substantial costs as can the replacement of prematurely degraded thermal oil.



## Pharmaceutical industry

A major user of seal-less pumps for thermal oil applications can be found in the pharmaceutical industry as the production of pharmaceutical products requires consistent and accurate temperatures in order to produce the high quality, high value substances.

The high value and delicate nature of pharmaceutical ingredients requires a consistent and uninterrupted process. 'Fail-safe' reliability is essential to guarantee the final product's quality.



*Verdermag Global pumps installed at a pharmaceutical production facility*

## Construction and building materials

Thermal oil systems are used with bitumen derived products such as coatings for building materials/ coatings and in road construction for maintaining the flowable state of the hot road mixture. The temperature for this application is typically between 170 and 200°C. As the systems, including pumps, are used in multiple locations including in close contact with the general public and workforce there is a prerequisite for a non-leaking, close-coupled design.

Seal-less pump technology reduces the risk of leakage and injury from high temperature oils, avoiding a potentially hazardous situation. Pumps with mechanical seals are still frequently seen, but due to the inherent failures of sealed pump units these are being phased out by many organisations.



## OEM and Turnkey Systems

Hot oil systems are specific and made by specialist companies, who will combine their knowledge and expertise in equipment like reactor vessels, heaters, control valves and pumps. This industry is mainly concerned with quality products against optimum initial cost.

Modularity and interchangeability will be predominant with higher population of systems on one site. The contractor may require a pump range that allows for bespoke requirements on behalf of customers such as specific materials, documentation and test data.



*Verdermag Global pumps installed in cooling systems*

At the heart of any thermal oil circulation system is a pump. The Verdermag Global Mark II range has performed exceptionally well in many thermal oil applications.

### **Containment**

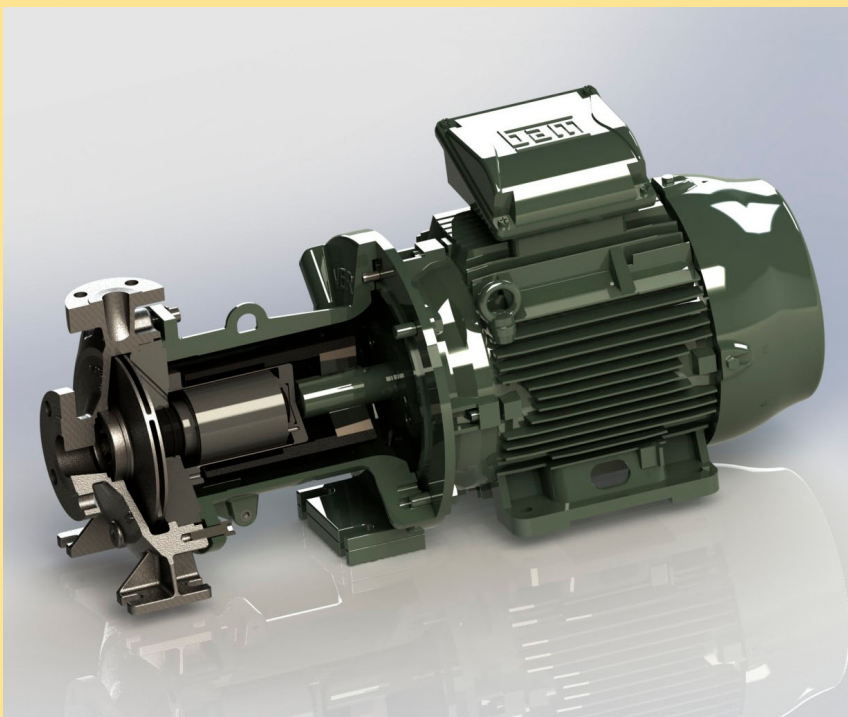
All Verdermag Global pumps are 100% leak-free as they are hermetically sealed with no mechanical sealing. The fluid

is kept totally contained within the pump and is air-tight to the environment preventing oxidation of the fluid and potentially dangerous leaks. The Mark II range uses ISO 2858 flange fittings.

### **Temperature tolerance**

Global pumps are able to convey all types of thermal oil at

temperatures ranging from -100 to 250°C. This allows the same pump to circulate one fluid at both extremes of temperature, ideal for when just one fluid is wanting to be used in a single flush cycle. The Global pump range incorporates a unique floating bearing design enabling the pump to cope with thermal shocks encountered during rapid changes in operating temperature. The high-grade, silica free silicon carbide bearing components are mounted on O-ring elastomers. This permits thermal expansion and distortion without causing damage. The elastomer material is selected to accommodate the fluid temperature range and to give the best compatibility with the transferred liquid. The Mark II range also has a standard connection feed for sensor probes.



*The Verdermag Mark II range is a pump designed to excel in extreme temperature applications. It uses a simple, modular design to give the pump long life, a small footprint and easy to specify for any thermal oil application.*



## Fluid duties

Mark II pumps can produce flows of 5 - 200m<sup>3</sup>/hr and tolerate temperatures between -100°C and +205°C. System pressures of up to 19 bar.

## Ultra-robust and reliable

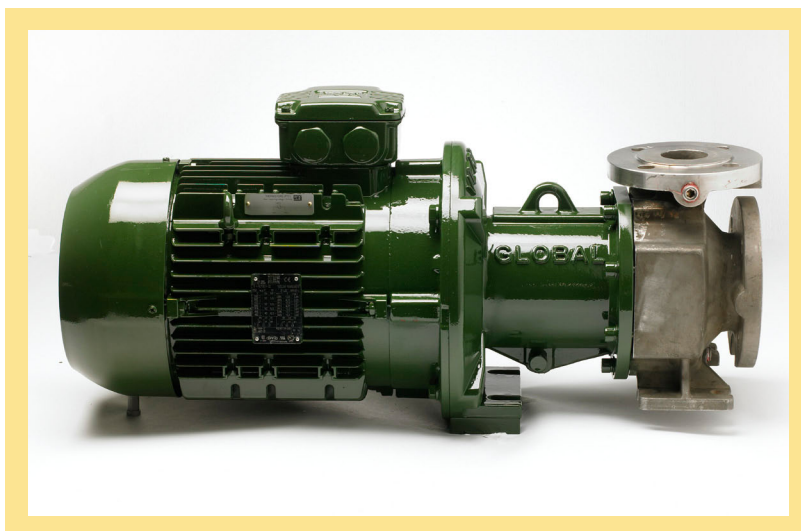
Many of our pumps run for years between services. Although we advise inspection periodically, a Verdermag pump can be installed in a 'fit and forget' application.

There are no special tooling requirements for maintenance, commissioning, inspection or complete reassembly of the pump unit.

## Contact Global

Contact our sales engineers who will be able to assist you with specifying a Global pump for your fluid handling requirements.

The Verder Group has been at the forefront of pumps and pumping systems for over 50 years with continued investment in quality systems, design and personnel training.



## Bespoke design and options

Verdermag Global operate an 'open door' approach to your requirements. For specialist applications, materials, fittings or fabrication our engineering team has gone the extra mile for contractors and end users alike. For customers with OEM requirements we can produce pumps to industry or company specifications.



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passion for pumps