Packaged Marine Design Thermal Fluid (Hot Oil) Heaters

For Heating Asphalt Barges, Tankers, And Any Other Application Requiring Dependable Heating

13 Models Starting At 500,000 BTU/HR Topping Out At 20,000,000 BTU/HR

Volcanic Heaters are available with single or double wound helical coils pending requirements

Volcanic Heater, Inc.
Volcanic marine type thermal fluid heaters operate within a closed loop

The end mounted burner fires down the inside of the helical coil unit, heating the thermal fluid, which is pumped through the coils and travels throughout the system back to the expansion tank. These 2 pass gas flow systems operate with precise temperature control, and can reach temperatures up to 399°F with class II barge piping or higher with class I barge piping while operating at minimal low pressure.

Heat transfer takes place by convection and radiation on the inside of the coil surface -- convection on the outside.

The Volcanic heater, using its original Hopkins design is a long proven rugged work horse suited for on-deck usage.

Volcanic marine heaters are complete packaged heaters with these great features

- Low maintenance.
- Unattended operation.
- Automatic running and safety controls.
- No rust, no corrosion, no freezing with hot oil systems.
- Built to customer specs. Control panel and expansion tank can be mounted in "right hand or left hand" position.
- No pressures associated with a thermal fluid closed loop system.
- Volcanic heaters come with a one year warranty.

Several Volcanic Heaters can be seen "on-deck", heating asphalt cargo on this inland waterways barge.

The burner and control panel are protected by a waterproof housing. Control panel and expansion tank can mount left or right.
Volcanic - a sound name in Marine Heaters riding the waterways for years

A Volcanic marine heater is no ordinary thermal fluid heater. It’s a durable long lasting work horse unlike most “land based” designed heaters. And, Volcanic still uses the original Hopkins design helical coil concept.

Volcanic heaters have been working the Canadian and American waterways from coast to coast for years.

These hot oil helical coil design heaters are designed and built, in fact, overbuilt, for years of hard work on asphalt barges, tank farms, anywhere heat is needed to deliver the goods.

Volcanic heaters are used with unattended operation.
1 The burner and electrical control panel are protected by a waterproof housing for on deck usage. Control panel meets NEC and UL Codes.

2 High combustion efficiency is obtained by pressure atomization of fuel oil and high pressure air. An electric pre-heater heats the residual fuel oils for proper atomization.

3 Electrical panel meets all required codes and can be mounted on either side of the heater package.

4 Optional controls provide full modulation with low fire start and up to 6:1 turndown ratio. Burners meet USCG requirements and ABS on request.

5 Extra heavy steel cylindrical shell surrounds the helical single or double wound coil made from Schedule 40/80 seamless pipe. Spacers separate the coil and shell.

6 The shell is covered with layers of ceramic fiber blanket insulation. A rigidizer is sprayed on the surface to protect against velocity of exiting gases.

7 Helical Coil - single or double wound designed by Volcanic.

8 Access door allows for inspection and maintenance tasks.

9 Observation port allows for checking flame pattern and flue combustion conditions.

10 Separation/surge tank velocity of thermal fluid returning from the system is decreased to allow any steam or air in the system to escape into the expansion tank.

11 Expansion Tank - as the system is brought up to operating temperature, heated thermal liquid expands into the expansion tank from the separation tank. Thermal liquids expand approximately 4% by volume for each 100°F temperature increase. When the system is shut down and the liquid cools, liquid is withdrawn from the expansion tank to maintain a filled circulating loop.

12 Cold Seal Tank - The thermal liquid system is vented to the atmosphere through this tank to expel air and any steam during system start up.

13 Circulating Pump - A centrifugal pump is used to supply thermal liquid for the entire system. Pumps are selected to meet flow and pressure drop requirements of the system. Pumps are jacketed for water cooling when thermal liquid in the pump is above 350°F when required.

Miles of barge heating piping carries hot oil to users with minimal to no pressure

With steam* at 338°F (170°C), a pressure of 100 PSIG (7 bars) is required and at 572°F (300°C) the pressure rises to nearly 1500 PSIG (105 bars). With thermal fluids, these temperatures are achieved at low pressures and system pressure drop for pump circulation of the fluid is the only governing factor.

*Saturated steam or pressurized water

Operating components of the Volcanic marine heater

- 1 The burner and electrical control panel
- 2 High combustion efficiency
- 3 Electrical panel
- 4 Optional controls
- 5 Extra heavy steel cylindrical shell
- 6 The shell is covered
- 7 Helical Coil
- 8 Access door
- 9 Observation port
- 10 Separation/surge tank
- 11 Expansion Tank
- 12 Cold Seal Tank
- 13 Circulating Pump

System Pressure (PSI) vs. Temperature

- Saturated Steam/Water
- Thermal Fluid

- Pressure transition from 100 PSIG (7 bars) at 338°F (170°C) to nearly 1500 PSIG (105 bars) at 572°F (300°C)

- Thermal fluids allow for high pressures and low temperature operation

- System pressure drop for pump circulation of the fluid is the only governing factor.
**Features of the standard safety and limit controls**

**Flame Program & Safety Control** - The flame program control provides for ignition and flame failure protection for automatically ignited burners. With limit, operating controls and interlocking devices, the control automatically programs the operation of burner, blower motor, ignition, fuel valves and modulator.

**Low Flow Cut Out** - Protects the heater and the fluid. This differential pressure switch measures pressure drop through the heater coil, indicating flow. Low flow will shut down the burner. (Manual reset).

**Low Level Control** - This float cage type switch is usually attached to the expansion/surge tank. It will shut the burner down on low liquid level and turn off the red limit light, and will restart the burner when the proper level has been returned and reset.

**High Temperature Cut Out** - The sensing element is located in the heater fluid line. The set point which is set by factory technician to customer and USCG specifications, should never be above the maximum temperature permissible for the fluid used in the system. In case the set point is reached, the instrument will shut the burner down.

**Low Fuel Oil Pressure Cut Out** - Control shuts off the burner if the pressure in the fuel oil supply line drops below the minimum required for proper atomization.

**Alarm circuit and Signal Light** - The burner wiring is arranged in such a manner as to ring an alarm in case of flame failure. Manual resetting is required. In case of “flame failure” the button on the flame program control must be pushed. All other limit safety switches will only energize the red limit light if closed. Once the cause of stoppage is eliminated, the burner will restart after resetting.

**Low Fire Interlock Switch** - This switch is part of the modulator motor, and serves as a safety interlock which will prevent the burner from starting unless its components are set to provide “low fire” only. This provides for safe ignition.

Volcanic personnel work with the customer, creating layout, piping, and heat requirements to produce a totally efficient system.

When a shipyard sets out to build a vessel, a barge, Volcanic engineering and system designers will work with the customer to get the job done.

Sizing of the heater, the helical coil, the pumping, the piping package, taking into consideration the vessel’s holding size - everything is calculated. And when it’s all sized right and up and running, we at Volcanic know it’s a precise and highly efficient system that will perform without flaws for many years to come.

Volcanic’s Packaged System

Skid mounted heaters are complete units containing all operating controls and instruments. Installation time is minimized due to quick connections for power leads, fuel lines, stack, and thermal fluid piping lines. Volcanic service engineers complete on site start up and go through maintenance procedures with the customer.
### Specifications - Volcanic Thermal Fluid Heater

<table>
<thead>
<tr>
<th>Model</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>400</th>
<th>600</th>
<th>800</th>
<th>1000</th>
<th>1200</th>
<th>1500</th>
<th>1800</th>
<th>2000</th>
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<tbody>
<tr>
<td>Output Cap. Million BTU/HR.</td>
<td>0.50</td>
<td>0.75</td>
<td>1.0</td>
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<td>3.0</td>
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<td>75</td>
<td>150</td>
<td>225</td>
<td>300</td>
<td>425</td>
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<td>725</td>
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<td>Coil Pressure Drop, PSI</td>
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<td>40.0</td>
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</table>

*1 Provides a heat flux of 9,000 BTU/Hr. sq. ft.
*2 Based on an oil temperature increase of approximately 55°F through the heater.
*3 Based on centrifugal pump @ 150 ft. TDH.
*4 For fuel consumption rate, consult factory.

### Dimensions - Volcanic Thermal Fluid Heater

<table>
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<tr>
<th>Model</th>
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<tr>
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<td>53</td>
<td>53</td>
<td>64</td>
<td>72</td>
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Volcanic Marine Design Heaters are built to ASME Code, Section I