SPH Series

Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters

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Advantages of Cemline® Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters

Cemline® Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heater (SPH) is a perfect solution for domestic water heating systems using hydronic boilers including cast iron, copper tube, water tube, or specialty high efficiency condensing boilers. The SPH heat exchanger allows high efficiency condensing boilers to operate more efficiently since the SPH heat exchanger can return the boiler water to the hydronic boiler at lower temperatures than the traditional u-bend heat exchanger. The boiler water can be returned to the boiler as low as 90°F from the SPH water heater.

The SPH heat exchanger has a high heat transfer rate allowing for maximum heat transfer between the boiler water and the domestic water. As the heat is transferred from the boiler water to the domestic water, the boiler water can experience large temperature drops through the heat exchanger using less boiler water without experiencing laminar flow on the boiler water side of the heat exchanger. The heat exchanger can even allow for temperature crosses between the boiler water outlet and the domestic water outlet temperature, meaning the domestic water outlet temperature can be greater than the returned boiler water temperature.

This heater can be used in many hydronic heating style applications including those systems using low temperature boiler water. The SPH heater can also be used in condensate systems by recovering heat from the condensate to produce hot water.

Cemline Vertical Packaged Storage Boiler Water Fired Plate Heat Exchanger Water Heaters (SPH) are completely packaged and ready for use. The tank allows for storage of hot water and all components are sized, mounted and piped prior to shipment. The heaters come complete and require only connection to services. Cemline Corporation SPH Series Water Heaters are available with Cement Lined STONESTEEL® or 316-L stainless steel vessel in sizes 60, 120, 200, 300, 500, and 680 gallon capacity. The time tested STONESTEEL® lining is a unique formulation of hydraulic cement that is durable, reliable, trouble-free lining know for hot water storage. Optionally, the 316-L stainless steel is corrosion resistant and with solid 316-L stainless steel vessel no lining is required.

The Cemline SPH comes factory standard with a 3-way electronically operated boiler water control valve. The 3-way electronically operated control valve allows for close temperature control of the water heater by modulating flow of the boiler water through the heat exchanger. The 1000:1 turn down ratio of the control valve allows for accurate control of these water heaters.

### Standard SPH Package

- **A.S.M.E. CODE constructed National Board Registered Storage tank (125 PSIG WP)** — ASME Code stamping and registration offers the assurance of quality controlled construction.
- **STONESTEEL® lining** — STONESTEEL® prevents rust or and corrosion.
- **316-L Stainless Steel Vessel** — Type 316-L Stainless is virtually rustproof.
- **Brazed Plate or Plate & Frame Heat Exchanger** — Extremely efficient. Allows close temperature approaches.
- **3" Fiberglass insulation** — Prevents heat loss to cut operation costs. Meets latest ASHRAE standards.
- **20 gauge steel jacket with hammertone enamel paint** — Protects insulation & provides neat finished appearance with hammertone enamel painted exterior.

### Features

- **Standard operating controls** — All components necessary for safe-complete-operation. All gauges, relief valves, controls, and piping factory piped and mounted. Over-temperature safety system which will close the main control valve upon an over-temperature condition. This system utilizes an adjustable electric thermostat which monitors the temperature of the water and if over-temperature condition is detected, sends an electric signal to the valve, thereby closing the valve. This system requires a 120 volt 5 amp circuit.

### Optional Safety System

- **Double safety system** — This is an optional overtemperature safety system which will deactivate the main control valve, as described above and also open a solenoid valve at the top of the vessel to drain. This system requires a 120 volt 5 amp circuit.
Standard Equipment
Cemline Storage Plate Heat Exchanger Water Heaters

Cemline Storage Plate Heaters are completely packaged and ready to use. All components are sized, mounted and piped prior to shipment. These heaters come complete and require only connection to services.

**Basic SPH Package Includes:**
- A.S.M.E. CODE Constructed National Board Registered storage tank
- STONESTEEL® lining
- 316-L Stainless Steel threaded connections
- 3” Fiberglass insulation
- 20 gauge steel jacket with hammertone enamel paint
- Structural steel base
- A.S.M.E. relief valve-pressure and temperature
- Electronic temperature gauge
- Water pressure gauge
- Drain valve
- Brazed Plate Heat Exchanger
- Integral bronze circulator
- Single safety system with electronic limit control
- 2 or 3-Way Electronic Boiler Water Control Valve
- Boiler water temperature gauge
- CEM-TROL® control module

**Optional:**
- 316-L Stainless Steel Vessel* (Note: 60 gallon only available in 316-L stainless steel)
- Double Walled Plate and Frame Heat Exchanger
- Boiler water pump
- Aquastat for boiler water pump
Digital Electronic Temperature Control
Cemline Storage Plate Heat Exchanger Water Heaters

SPH water heaters have a CEM-TROL® electronic control and limit with LCD readout.

Electronically Operated Control Valves
Electronically operated control valve used for boiler water applications. Electronically operated control valves use a solid state temperature sensor which is wired to the CEM-TROL® electronic control module. The control module has an adjustable set point. The CEM-TROL® compares the set point with the sensed temperature and sends an electric signal to a magnetic linear actuator on the control valve. The magnetic linear actuator modulates the control valve and regulates the amount of boiler water through the valve to maintain the set point of the controller. As the set point is approached the controller sends a signal to the valve actuator and modulates the valve to a closed position. In the event of high temperature or loss of building power the limit control interrupts the power to the controller which closes the valve.

Digital Electronic Temperature Limit Control
SPH Water Heaters have a CEM-TROL® Digital Electronic Limit Control with LCD readout. The ASME code requires that water heaters utilizing boiler water as energy source have a high limit temperature control. Our limit controller is a solid state device with LCD readout of temperature, set point and differential and easily field-programmable.

Standard:
Single Safety System:
This temperature controller is a single set point limit control will act directly to close an electronic control valve on over temperature.

Optional:
Double Safety System:
This temperature controller is a dual set point limit control. The first set point output will act directly to close an electronic control valve on over temperature.

The second adjustable set point output will open a water solenoid to drain excessively heated water from the water heater. Since there are two set points and two outputs, the water drain solenoid set point can be set at a slightly higher temperature than the valve close-off temperature.

Advantages over electro-mechanical device:
Solid state device/no mechanical parts to wear out.
Digital readout on large LCD screen.
Easily adjustable set point and differential.
Dual set points for double safety system.
Accuracy within +1°F.

As a safety measure, all heaters are designed to shut off on loss of primary power.

Specifications:
Set point adjustment range: 50-180°F
Input: 115v AC
Temperature Sensor: 1000 ohm
Operating Ambient: 32° to 140°F

Operating Humidity:
5% to 95% RH (Noncondensing)
Recovery Capacities - Single or Double Wall Brazed Plate Heater and Double Wall Plate & Frame Heater

The listing below is for the boiler water temperatures and temperature rises which are most widely used. Heat exchangers are available for other boiler water temperatures and different temperature rises. Consult factory for further information.

<table>
<thead>
<tr>
<th>Hex Model #</th>
<th>Flow Rate (gph)</th>
<th>Inlet Temp. (°F)</th>
<th>Outlet Temp. (°F)</th>
<th>Inlet Temp. (°F)</th>
<th>Outlet Temp. (°F)</th>
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<tbody>
<tr>
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<td>300</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>13</td>
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<td>600</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>26</td>
</tr>
<tr>
<td>750</td>
<td>900</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>39</td>
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<td>1000*</td>
<td>1200</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>52</td>
</tr>
<tr>
<td>1250*</td>
<td>1500</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>65</td>
</tr>
<tr>
<td>1300*</td>
<td>1800</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>78</td>
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<tr>
<td>1750*</td>
<td>2100</td>
<td>40</td>
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<td>200</td>
<td>160</td>
<td>91</td>
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<tr>
<td>2000*</td>
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<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>104</td>
</tr>
<tr>
<td>2250*</td>
<td>2700</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
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<td>3000</td>
<td>40</td>
<td>140</td>
<td>200</td>
<td>160</td>
<td>130</td>
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SPH water heaters are not recommended for water with hardness over 140 parts per million. If water hardness exceeds 140 ppm either put a water softener in the system or use Cemline SWH series water heaters.
SPH Water Heaters - Dimensional Data

Cemline SPH Series (single wall or double wall brazed plate) vertical Packaged Heaters are normally piped as shown below. Also available with 2-way control valve.

Brazed Plate Unit

<table>
<thead>
<tr>
<th>Gallon Capacity</th>
<th>Model Number</th>
<th>Tank Size D x L</th>
<th>W</th>
<th>H</th>
<th>O</th>
<th>J</th>
<th>M</th>
<th>S</th>
<th>A &amp; B*</th>
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<tbody>
<tr>
<td>60</td>
<td>V60SPH</td>
<td>24” x 36”</td>
<td>28”</td>
<td>49”</td>
<td>40”</td>
<td>20”</td>
<td>9”</td>
<td>18”</td>
<td>1 1/2”</td>
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<tr>
<td>120</td>
<td>V120SPH</td>
<td>24” x 63”</td>
<td>28”</td>
<td>77”</td>
<td>48”</td>
<td>24”</td>
<td>10”</td>
<td>20”</td>
<td>1 1/2”</td>
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<tr>
<td>200</td>
<td>V200SPH</td>
<td>30” x 76”</td>
<td>34”</td>
<td>90”</td>
<td>54”</td>
<td>28”</td>
<td>10”</td>
<td>24”</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>300</td>
<td>V300SPH</td>
<td>36” x 90”</td>
<td>40”</td>
<td>90”</td>
<td>60”</td>
<td>28”</td>
<td>10”</td>
<td>25”</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>500</td>
<td>V500SPH</td>
<td>42” x 90”</td>
<td>46”</td>
<td>104”</td>
<td>66”</td>
<td>30”</td>
<td>10”</td>
<td>32”</td>
<td>1 1/2”</td>
</tr>
<tr>
<td>680</td>
<td>V680SPH</td>
<td>48” x 96”</td>
<td>52”</td>
<td>110”</td>
<td>72”</td>
<td>30”</td>
<td>12”</td>
<td>42”</td>
<td>2”</td>
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*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.
SPH Water Heaters - Dimensional Data

Cemline SPH Series (single or double wall plate and frame) vertical Packaged Heaters are normally piped as shown below. Also available with 2-way control valve.

Plate and Frame Unit

<table>
<thead>
<tr>
<th>GALLON CAPACITY</th>
<th>MODEL NUMBER</th>
<th>TANK SIZE D x L</th>
<th>W</th>
<th>H</th>
<th>O</th>
<th>J</th>
<th>M</th>
<th>S</th>
<th>A &amp; B*</th>
<th>X</th>
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<tbody>
<tr>
<td>60</td>
<td>V60SPH</td>
<td>24” x 36”</td>
<td>28”</td>
<td>49”</td>
<td>40”</td>
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<td>9”</td>
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<tr>
<td>120</td>
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<td>24” x 63”</td>
<td>28”</td>
<td>77”</td>
<td>48”</td>
<td>24”</td>
<td>10”</td>
<td>20”</td>
<td>1 1/2”</td>
<td>82”</td>
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<tr>
<td>200</td>
<td>V200SPH</td>
<td>30” x 76”</td>
<td>34”</td>
<td>90”</td>
<td>54”</td>
<td>28”</td>
<td>10”</td>
<td>24”</td>
<td>1 1/2”</td>
<td>88”</td>
</tr>
<tr>
<td>300</td>
<td>V300SPH</td>
<td>36” x 90”</td>
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<td>94”</td>
<td>60”</td>
<td>28”</td>
<td>10”</td>
<td>25”</td>
<td>1 1/2”</td>
<td>94”</td>
</tr>
<tr>
<td>500</td>
<td>V500SPH</td>
<td>42” x 96”</td>
<td>46”</td>
<td>104”</td>
<td>66”</td>
<td>30”</td>
<td>10”</td>
<td>32”</td>
<td>1 1/2”</td>
<td>100”</td>
</tr>
<tr>
<td>680</td>
<td>V680SPH</td>
<td>48” x 96”</td>
<td>52”</td>
<td>110”</td>
<td>72”</td>
<td>30”</td>
<td>12”</td>
<td>42”</td>
<td>2”</td>
<td>106”</td>
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</table>

*Inlet and outlet dimensions listed are standard size. Please verify maximum flow rate.
Heat exchanger sizing for SPH can be obtained by using Cemline Corporation’s automatic sizing program on the Cemline CD Rom or from the internet at www.cemline.com. Please contact Cemline or your local representative for sizing or for a copy of the sizing program.

Storage heater shall be Cemline Series SPH; factory assembled and packaged. Water heater shall be constructed in accordance with ASME Code for a working pressure of 125 psig. The packaged water heater shall be constructed with a vertical steel tank, cement lined (or 316-L stainless steel) with 316-L stainless threaded openings.

Heater shall be mounted on a steel support skid and shall have concealed lifting lugs. Heater shall be insulated with 3" Fiberglass protected by an enameled metal jacket, 20 gauge minimum thickness. Heater shall be factory assembled and piped including electronic operated 2 or 3-way temperature regulating valve. Heat exchanger shall be single wall copper brazed 316L Stainless Steel Plate Type (or double wall brazed or double wall plate and frame heat exchanger) an integrated cover and shall have an integral valved circulator to circulate domestic water through the heat exchanger into the bottom of the tank.

Heater shall be provided with a field programmable digital electronic limit control with LCD readout and digital thermometer.

Heater shall be furnished with a water pressure gauge and an A.S.M.E. pressure-temperature relief valve of sufficient size to relieve total BTU input of the coil.

Manufacturer shall assume responsibility for correct sizing of components to assure performance designated in design criteria.

Heater shall be CEMLINE Corporation Model V___SPH___.
Tank dimensions ___“ diameter x ___” long.
Storage gallon capacity ___.
Plate exchanger to heat ___ GPH from ___ °F to ___ °F with _____ GPM of ___ °F inlet - ___ °F outlet Hot Water.