CEMLINE® Unfired Steam Generators are designed to produce clean steam with steam or high temperature hot water as an energy source for use where there is a need to produce clean steam from boiler steam or high temperature hot water.

UNFIRED STEAM GENERATORS STANDARD EQUIPMENT

▼ ASME Code Constructed National Board Registered Vessel
CEMLINE Unfired Steam Generators are constructed and stamped in accordance with ASME code and bear the UB stamp as required by the ASME code. All vessels are registered with the National Board of Boiler and Pressure Vessel Inspectors and a compliance certificate is furnished. Unfired Steam Generators to generate steam 40 psig or greater will be 100% X-Rayed and heat treated in accordance the ASME code.

▼ Stainless Steel Construction
CEMLINE Unfired Steam Generators can be constructed of stainless steel when no condensate is returned and there is 100% make up, such as in steam humidification. A stainless steel USG would also be used to provide steam for sterilizers, food processing, pharmaceutical, and clean room applications where deionized or reverse osmosis water is used as feed water.

▼ Carbon Steel Construction
CEMLINE Unfired Steam Generators can be constructed with a carbon steel shell and steel components. These Unfired Steam Generators would typically be used when the condensate is returned to the boiler and there is little or no make up water. Carbon steel Unfired Steam Generators are typically used in building heating systems and in humidification where the feed water is not corrosive.

▼ Fiberglass insulation
CEMLINE Unfired Steam Generators are furnished with 3" thick fiberglass insulation. This high quality insulation is an extremely reliable means of minimizing heat loss.

▼ 20 gauge steel jacket with baked on enamel finish
CEMLINE Unfired Steam Generators are neatly and attractively covered with a 20 gauge steel jacket over the fiberglass insulation. The jacket protects the insulation and is professionally painted with superior quality enamel which provides an easy to maintain surface.

▼ Structural Support Skid Base
CEMLINE Unfired Steam Generators are mounted on a structural skid designed as a permanent base. This skid is pre-engineered to allow correct support for the Unfired Steam Generator.
ASME Pressure Relief Valve
CEMLINE Unfired Steam Generators are provided with one or more ASME Section I pressure relief valve(s) sized to relieve the total BTU input of the heating coil.

Boiler steam pressure gauge
CEMLINE Unfired Steam Generators are furnished with a large, easily readable pressure requirements.

U-Bend Coil
U-bend coils are constructed with copper, copper nickel, or stainless steel tubes. The selection of tubing material depends upon specific job requirements. The sizing section of this interactive catalogue will assist in selecting the correct tubing material.

Gauge Glass
CEMLINE Unfired Steam Generators are furnished with a gauge glass to allow monitoring of the water level in the vessel.

Steam Separator
A Steam Separator is factory supplied to dry the steam prior to being introduced into the clean steam line.

High pressure cutoff
CEMLINE Unfired Steam Generators are furnished with an adjustable high pressure cut off wired to close the control valve in the event of over pressure. The high pressure cut off also has an adjustable differential.

Level control/low water cutoff
CEMLINE Unfired Steam Generators are furnished with a combination feed water control/ low water cut off. This level control will allow the correct water level to be maintained in the vessel and will also shut the generator down in the event of low water.

Feed water solenoid with check valve
As the boiler makes steam, it is necessary to replenish the boiled off water. A solenoid valve, which opens and closes from the water level controller signal, is required. A solenoid feed system requires the feed water pressure must be at least 10 psi greater than the steam pressure in the Unfired Steam Generator. If there is less than 10 psi pressure differential, a feedwater pump must be used. A check valve is supplied between the solenoid valve and the unfired steam generator.

Solid State operating control
CEMLINE Model 2001 Solid State Steam Control Module incorporates operating and limit functions in one solid state controller. The controller features a LED display of the pressure and on board settings of high and low pressure safety cut off and alarms. The 2001 SSCM simplifies the control of the Unfired Steam Generator, enhances the look of the product, and follows industry trend to solid state controls.

Alarm Bell
An alarm bell is furnished to sound an alarm in the event of either low water or high pressure. An alarm silencing relay allows manual pressing of a button to silence the alarm bell, but red warning light remains on until the alarm condition is corrected.

Remote start/stop
This feature allows the Unfired Steam Generator to be started or stopped from a remote location. Typically this would be accomplished from the Building Automatic Control (BAC). Requires a dry contact suitable for 24 Vac and 1 amp.
SOLID STATE CONTROL MODULE SSCM 2001

▼ Built in On-Off switch
Allows for local on-off and is convenient for service in the unlikely event service is required.

▼ Built in Alarm Horn
The alarm horn will sound and fault LED will light on low water or high pressure. If either high water or low pressure options are selected the alarm horn will also sound in the event of high water or low pressure. The 2001 Solid State Control Module also features an alarm silence relay which will silence the alarm but not the fault light when the generator is being serviced. When the fault is cleared, both the alarm and fault light will automatically reset.

▼ Built in timer for timed blow down
If the timed blowdown option is selected, the interval and duration of blow down can easily be selected in the 2001 Solid State Control Module.

▼ Built in relay for water feed
The CEMLINE 2001 Solid State Control Module operates in conjunction with the level control to signal the feed water solenoid or feed water pump to maintain the correct water level in the unfired steam generator.

▼ Built in operating pressure readout
The 2001 Solid State Control Module features an easy to read LED digital readout of the operating pressure.

▼ Built in high pressure cut off and alarm
In the event of high pressure the 2001 Solid State Control Module will close the source steam or HTHW supply valve and sound an alarm.

▼ Built in low pressure alarm
If activated, the 2001 Solid State Control Module will sound an alarm if a low pressure condition occurs.

▼ Built in LED display of functions and alarms
The 2001 Solid State Control Module is designed for the user to tell at a glance how the system is operating. The built in LED displays make troubleshooting simple.

- Power ON
- Low Water
- High Water
- Water Feed
- High Pressure
- Low Pressure
- Blow down operating

▼ Built in contact to notify BAC (Building Automation Control) of functions and alarms
This control allows for simple and reliable interface with the BAC via dry contact closures so the BAC can monitor the unfired steam generator from a remote location. The BAC can also start and stop the unfired steam generator.

- Power ON
- Low Water
- High Water
- Water Feed
- High Pressure
- Low Pressure
- Blow down operating
- Operating Pressure
- Any Alarm
UNFIRED STEAM GENERATORS TECHNICAL INFORMATION

STEAM

STANDARD EQUIPMENT

STEAM CONTROL VALVE OPTIONS

▼Pilot Control Valve
A pilot operated valve can only be used with steam as the energy source. Pilot operated valves use steam pressure as the energy to modulate the control valve. Steam from upstream of the valve is directed into a pilot valve. This pilot valve has an adjustable set point and pressure sensor sensing generated steam pressure. The pilot valve compares the set point to the sensed pressure and regulates the amount of steam passing through the pilot to the diaphragm in the bottom of the control valve. The steam pressure on the diaphragm opens the valve. A pilot operated valve has a constant bleed line leading from the diaphragm to the downstream side of the valve. When the pilot valve senses that the desired pressure is reached it closes; this does not allow any more steam to pressurize the diaphragm in the bottom of the control valve. The bleed line allows any steam pressurizing the diaphragm to be relieved and the valve closes. In the event of high pressure or loss of building power the limit control closes the steam line from the pilot to the valve which closes the valve. With a supply pressure of up to 15 PSI, 3 PSI is the minimum pressure drop permitted across the valve. With a supply pressure from 16 to 31 PSI, 10 PSI is the minimum pressure drop permitted across the valve. With a supply pressure from 31 PSI and above, 20 PSI is the minimum pressure drop permitted across the valve.

▼Pneumatic (Air) Control Valve
Air operated valves are normally used in building when building control air is available. Air operated valves use building control air pressure to modulate the control valve. The air signal is brought to an adjustable set point pressure sensing controller sensing generated steam pressure. The pressure sensing controller compares the set point to the sensed pressure. The controller regulates the amount of air that passes to the pneumatic actuator of the valve to modulate the valve. This allows steam to pass into the unfired steam generator coil to maintain the set point of the controller. When the set point is achieved, no air is passed through the pressure sensing controller and the valve is closed. In the event of high pressure or loss of building power, the limit control will close the air line to the valve and vent any air to the actuator to atmosphere which closes the valve.

▼Electronic Control Valve
Electronically operated control valves use a solid state pressure sensor which is wired to an electronic control module. The electronic module has an adjustable set point. The control module compares the set point with the sensed pressure 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 steam through the valve to maintain the set point of the controller. When the set point is achieved, the controller sends a signal to the valve actuator and the valve closes. In the event of high pressure or loss of building power, the limit control closes the electric power to the controller which closes the valve.

▼Steam Traps
CEMLINE provides float and thermostatic traps for both the drip and main trap. Float and thermostatic traps are acknowledged as the correct traps to use with continuously modulating control valves. Float and thermostatic traps provide immediate drainage of condensate and include a built in thermostatic air vent for venting air. The drain orifice is designed to provide a water seal and eliminate the loss of any live steam under all load conditions. Float and thermostatic traps should not be used to lift condensate.

▼Inlet Stream Strainer
Strainers are "Y" type with blow down connection and easily removable stainless steel strainer screen.

▼Source Steam Pressure Gauge
Large, easily readable pressure gauges to read both the source and generated steam pressure.

▼Vacuum Breaker
A vacuum breaker will be mounted in the coil head and will break any vacuum which might occur when the source steam is condensed.

OPTIONAL EQUIPMENT
MAKE UP WATER FEEDING OPTIONS

Feedwater Pump/Condensate Receiver
As the boiler makes steam, it is necessary to replenish the boiled off water. This method feeds the water from a boiler feed pump unit with a condensate tank. The condensate tank is fed with make up water and condensate. It operates on a signal from the level controller on the Unfired Steam Generator which starts a pump that feeds the make up water into the Unfired Steam Generator. When the water level in the Unfired Steam Generator is satisfied, an electrical signal from the level controller signals the water feed pump to close. The feed water pump pressure must be 15 psi greater than the generated steam pressure. A solenoid valve and check valve is supplied between the pump and the unfired steam generator.

Feed Water Pump
As the boiler makes steam, it is necessary to replenish the boiled off water. This method uses a feed water pump which is connected to the make up water line and is started and stopped from a signal from the level controller. A solenoid valve and check valve is supplied between the pump and the unfired steam generator.

AUTOMATIC BLOW DOWN OPTIONS

Automated Blow Down - Timer Method
Unfired Steam Generators using city water will build up an accumulation of minerals in the boiler. These minerals must be disposed by a blowdown system. The blowdown system can simply be a manual blowdown where the maintenance person would manually blow off for a set period of time for a set frequency. It is advantageous to offer an automatic blowdown system. The simplest automatic blowdown system is one that operates from timers. The CEMLINE 2001 SSCM has a built in interval and duration timer wired to a blowdown solenoid valve. The owner/operator can set an interval between blowdowns in a range from 1 to 160 hours and a blowdown duration range of 1 to 250 seconds. The automatic blowdown is a fairly simple system. The automatic timer blowdown requires the owner/operator of the Unfired Steam Generator to do some analysis to determine what duration and interval he/she wishes to have his blowdown occur. *Note: Most municipalities do not allow high temperature discharge directly into the sewer system. CEMLINE offers a type "CBO" centrifugal blow-off/condensate cooler which will receive the blow down, flash the blow down to steam, and cool the condensate going to drain.

Automated Blow Down - Total Dissolved Solids Method
There is a more sophisticated system, which samples the boiler water and blows the boiler down when the dissolved solids exceed the set point. This is a time sample method which measures the total dissolved solids by opening the blowdown valve for an adjustable time period and measuring the blow off for dissolved solids. If the total dissolved solid exceeds the trip point, the motorized valve will remain open until the fresh water make up dilutes the boiler water to a safe level of total dissolved solids. *Note: Most municipalities do not allow high temperature discharge directly into the sewer system. CEMLINE offers a type "CBO" centrifugal blow-off/condensate cooler which will receive the blow down, flash the blow down to steam, and cool the condensate going to drain.

Automated Blow Down Location - Surface Blowdown
The unfired steam generator is a distiller creating pure water in the form of steam and leaving behind the minerals and dissolved solids in the water inside the steam generator. As more steam is produced the concentration of minerals and dissolved solids increase inside the steam generator. The concentration of dissolved solids will increase in the water until saturation point is reached. Then, the water can no longer hold all of the dissolved solids and some begin to drop out of the water in the form of suspended solids forming sludge or scale on the tube bundle and vessel. Scale formation on the tube bundle will reduce the capacity of the unfired steam generator.

Higher concentrations of dissolved solids may bring about carry over of make-up water in the form of wet steam. As the total dissolved solids increase so does the surface tension of the water causing the steam bubbles to adhere to themselves making it more difficult for the steam bubbles to burst as they rise to the surface of the boiling water. Therefore, the concentration of dissolved solids tends to be increased at or near top of water level in the steam generator. Reducing the concentration of dissolved solids and suspended solids in the steam generator will provide the desired capacity and dryness of steam.

A Surface Blowdown can be used to remove dissolved solids from the steam generator. Automatic blowdown controls such as a TDS control or timed blowdown can be mounted at the surface allowing the removal of dissolved solids from the water in the generator. Typically surface blowdowns are performed more frequently than bottom blowdowns.
Automated Blow Down Location - Bottom Blowdown

Higher levels of suspended solids may be found in harder make-up water conditions. Suspended Solids tend to collect in the lower part of the unfired steam generator and form scale on the tube bundle. Removal of these suspended solids can be accomplished by bottom blowdown.

Automatic Bottom blowdown controls can be mounted on the bottom blowdown.

Centrifugal Boiler Blow Off/Condensate Cooler

CEMLINE blow down/condensate coolers are designed to receive blow down from a steam boiler, flash the blow down to steam, and cool the condensate going to drain.

High Water Cut Off

In some unusual situations, it is possible for the feedwater to fail which could cause the Unfired Steam Generator to fill with water and flood the entire system. To prevent this from happening, CEMLINE CORPORATION® offers, as an option, a high water cut-off to close a feedwater ball valve if a high water condition occurs. This option consists of a level control connected to a high level switch. The high level switch will send a signal to either an air operated ball valve or an electrically operated ball valve mounted in the feedwater line. These valves are power to open, spring to close.

BOILER WATER

STANDARD EQUIPMENT

HTW CONTROL VALVE OPTIONS

Pneumatic (Air) Control Valve

Air operated valves are normally used in building when building control air is available. Air operated valves use building control air pressure to modulate the control valve. The air signal is brought to an adjustable set point pressure sensing controller sensing generated steam pressure. The pressure sensing controller compares the set point to the sensed pressure. The controller regulates the amount of air that passes to the pneumatic actuator of the valve to modulate the valve. This allows HTHW to pass into the unfired steam generator coil to maintain the set point of the controller. When the set point is achieved, no air is passed through the pressure sensing controller and the valve is closed. In the event of high pressure or loss of building power, the limit control will close the air line to the valve and vent any air to the actuator to atmosphere which closes the valve.

Electronic Control Valve

Electronically operated control valves use a solid state pressure sensor which is wired to an electronic control module. The electronic module has an adjustable set point. The control module compares the set point with the sensed pressure 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 HTHW through the valve to maintain the set point of the controller. When the set point is achieved, the controller sends a signal to the valve actuator and the valve closes. In the event of high pressure or loss of building power, the limit control closes the electric power to the controller which closes the valve.

Two Way Valve

A two way valve modulates from fully closed to fully open varying the amount of hot water circulated through the coil to maintain the desired output pressure. When closed the two way valve may cause a change in the heating water loop pressure.

Three Way Valve

A three way valve modulates from directing all heating water through the coil to directing no heating water through the coil, varying the amount of hot water circulated through the coil to maintain the desired output pressure. The pressure drop in the heating system will be relatively constant with a three way valve.

HTHW Thermometer

The dial type thermometer will monitor HTHW temperature.
MAKE UP WATER FEEDING OPTIONS

Feedwater Pump/Condensate Receiver
As the boiler makes steam, it is necessary to replenish the boiled off water. This method feeds the water from a boiler feed pump unit with a condensate tank. The condensate tank is fed with make up water and condensate. It operates on a signal from the level controller on the Unfired Steam Generator which starts a pump that feeds the make up water into the Unfired Steam Generator. When the water level in the Unfired Steam Generator is satisfied, an electrical signal from the level controller signals the water feed pump to close. The feed water pump pressure must be 15 psi greater than the generated steam pressure. A solenoid valve and check valve is supplied between the pump and the unfired steam generator.

Feed Water Pump
As the boiler makes steam, it is necessary to replenish the boiled off water. This method uses a feed water pump which is connected to the make up water line and is started and stopped from a signal from the level controller. A solenoid valve and check valve is supplied between the pump and the unfired steam generator.

AUTOMATIC BLOW DOWN OPTIONS

Automated Blow Down - Timer Method
Unfired Steam Generators using city water will build up an accumulation of minerals in the boiler. These minerals must be disposed by a blowdown system. The blowdown system can simply be a manual blowdown where the maintenance person would manually blow off for a set period of time for a set frequency. It is advantageous to offer an automatic blowdown system. The simplest automatic blowdown system is one that operates from timers. The CEMLINE 2001 SSCM has a built in interval and duration timer wired to a blowdown solenoid valve. The owner/operator can set an interval between blowdowns in a range from 1 to 160 hours and a blowdown duration range of 1 to 250 seconds. The automatic blowdown is a fairly simple system. The automatic timer blowdown requires the owner/operator of the Unfired Steam Generator to do some analysis to determine what duration and interval he/she wishes to have his blowdown occur. *Note: Most municipalities do not allow high temperature discharge directly into the sewer system. CEMLINE offers a type "CBO" centrifugal blow-off/condensate cooler which will receive the blow down, flash the blow down to steam, and cool the condensate going to drain.

Automated Blow Down - Total Dissolved Solids Method
There is a more sophisticated system, which samples the boiler water and blows the boiler down when the dissolved solids exceed the set point. This is a time sample method which measures the total dissolved solids by opening the blowdown valve for an adjustable time period and measuring the blow off for dissolved solids. If the total dissolved solid exceeds the trip point, the motorized valve will remain open until the fresh water make up dilutes the boiler water to a safe level of total dissolved solids. *Note: Most municipalities do not allow high temperature discharge directly into the sewer system. CEMLINE offers a type "CBO" centrifugal blow-off/condensate cooler which will receive the blow down, flash the blow down to steam, and cool the condensate going to drain.

Automated Blow Down Location - Surface Blowdown
The unfired steam generator is a distiller creating pure water in the form of steam and leaving behind the minerals and dissolved solids in the water inside the steam generator. As more steam is produced the concentration of minerals and dissolved solids increase inside the steam generator. The concentration of dissolved solids will increase in the water until saturation point is reached. Then, the water can no longer hold all of the dissolved solids and some begin to drop out of the water in the form of suspended solids forming sludge or scale on the tube bundle and vessel. Scale formation on the tube bundle will reduce the capacity of the unfired steam generator.

Higher concentrations of dissolved solids may bring about carry over of make-up water in the form of wet steam. As the total dissolved solids increase so does the surface tension of the water causing the steam bubbles to adhere to themselves making it more difficult for the steam bubbles to burst as they rise to the surface of the boiling water. Therefore, the concentration of dissolved solids tends to be increased at or near top of water level in the steam generator. Reducing the concentration of dissolved solids and suspended solids in the steam generator will provide the desired capacity and dryness of steam.

A Surface Blowdown can be used to remove dissolved solids from the steam generator. Automatic blowdown controls such as a TDS control or timed blowdown can be mounted at the surface allowing the removal of dissolved solids from the water in the generator. Typically surface blowdowns are performed more frequently than bottom blowdowns.
**Automated Blow Down Location - Bottom Blowdown**
Higher levels of suspended solids may be found in harder make-up water conditions. Suspended Solids tend to collect in the lower part of the unfired steam generator and form scale on the tube bundle. Removal of these suspended solids can be accomplished by bottom blowdown.

Automatic Bottom blowdown controls can be mounted on the bottom blowdown.

**Centrifugal Boiler Blow Off/Condensate Cooler**
CEMLINE blow down/condensate coolers are designed to receive blow down from a steam boiler, flash the blow down to steam, and cool the condensate going to drain.

**High Water Cut Off**
In some unusual situations, it is possible for the feedwater to fail which could cause the Unfired Steam Generator to fill with water and flood the entire system. To prevent this from happening, CEMLINE CORPORATION offers, as an option, a high water cut-off to close a feedwater ball valve if a high water condition occurs. This option consists of a level control connected to a high level switch. The high level switch will send a signal to either an air operated ball valve or an electrically operated ball valve mounted in the feedwater line. These valves are power to open, spring to close.
Cemline Unfired Steam Generators

Generate Clean Steam With Boiler Steam or High Temperature Hot Water as the Energy Source
Cemline Unfired Steam Generators are designed to produce clean steam with steam or high temperature hot water as an energy source for use where there is a need to produce clean steam.

Humidification:
Previously, Boiler House steam was used for humidification purposes. Boiler House steam contains chemicals and additives which are thought to be injurious to health and many jurisdictions now require a clean steam source for steam humidification.

Sterilization:
Medical Sterilization and laboratories require steam. A Cemline Unfired Steam Generator is the correct choice for providing clean steam for sterilization.

Pharmaceutical:
Many Pharmaceutical applications require clean steam. Cemline Unfired Steam Generators meet this need. Note: This steam is not pure steam for WFI.

Food Processing:
Cooking or blanching where steam comes in contact with food requires a source of clean steam. Cemline Unfired Steam Generators meet this need.

Basic Heating Requirements:
Complexes which use high temperature hot water as the basic energy source often require Steam Generators in individual buildings for steam heating and other use. Cemline Unfired Steam Generators convert high temperature hot water to steam.
Cemline USG (continued)

Cemline Corporation has an online website www.cemline.com containing informational sections and sizing programs. The Unfired Steam Generator (USG) sizing program allows the customer to size and select a USG. USG specifications and drawings can be downloaded to CAD and/or word processing files. This program is available upon request from Cemline or your Cemline Representative.

Cemline Unfired Steam Generators are available for operation with steam or high temperature hot water as the energy source.

Cemline Unfired Steam Generators are constructed and stamped in accordance with ASME Code and bear the UB stamp as required by the ASME Code. All tanks are registered with the National Board of Boiler and Pressure Vessel inspectors and an insurance compliance certificates furnished. Unfired Steam Generators to generate 40 psi or greater steam will be 100% x-rayed and heat treated in accordance with the ASME Code.

Cemline Unfired Steam Generators are carefully designed to provide the correct balance of steaming area, coil size and control components to meet the specified requirements.

Carbon Steel or Stainless Steel Construction:

**Carbon Steel**

Cemline Unfired Steam Generators can be constructed with a carbon steel shell and steel components. These Unfired Steam Generators would typically be used where the condensate is being returned to the boiler and little or no make-up is used. Carbon Steel Unfired Steam Generators are typically used in building heating systems.

**Stainless Steel**

Cemline Unfired Steam Generators can be constructed of stainless steel where there is no condensate returned and the unit is 100% make-up, such as in steam humidification. A stainless steel USG would also be used with the Unfired Steam Generators that are used for sterilization, food processing, pharmaceutical or deionized water applications. Type 316 stainless steel is typically used.
Cemline Unfired Steam Generators will shut down on loss of building power. The over pressure safety system is also supplied so that the source steam valve will close upon loss of power. Upon loss of building power, both the feedwater and source steam (or boiler water) will close and the unfired steam generator will shut off.

Basic USG Package Includes:

- ASME Code Constructed and National Board Registered Vessel
- 3” Fiberglass insulation
- 20 gauge steel jacket with hammertone enamel paint
- Structural I-Beam support skid base
- ASME pressure relief valve
- Clean steam pressure readout
- Blowdown valve
- Gauge glass
- Steam Separator
- High pressure & low water cut off
- Solid State Control Module - SSCM 2001 (see page 7)
- Feedwater solenoid and check valve

Standard Components With Steam As The Energy Source:

- Source steam pressure gauge
- Steam traps, main and auxiliary
- Steam strainer
- Modulating steam control valve
- Vacuum Breaker

Standard Components With High Temperature Hot Water As Energy Source:

- HTHW thermometer
- Modulating HTHW control valve
Cemline USG steam generators can be furnished with air operated, pilot operated, or electronically operated control valves. All valves are normally closed when no air or pilot pressure or electric signal is present. The valves will close on loss of building power.

**Pneumatically Operated Control Valve**

(Energy Source-HTHW or Steam): A pneumatically (air) operated steam control valve uses building air connected to a furnished transmitter which monitors the output steam pressure and sends a varying air signal to the source steam controller to modulate the flow of source steam to maintain a constant output steam pressure. Pneumatic set point is field adjustable.

**Pilot Operated Control Valve**

(Energy Source-Steam): A pilot operated steam control valve uses a steam pilot to monitor output steam pressure and automatically modulate the flow of source steam to maintain a constant output steam pressure. A pilot operated controller is field adjustable.

**Electronically Operated Control Valve**

(Energy Source-HTHW or Steam): An adjustable set point electronic control module is wired to the electronically operated control valve and the solid state pressure sensor. The control module compares the set point with the sensed pressure 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 steam through the valve to maintain the set point of the controller. When the set point is achieved, the controller sends a signal to the valve actuator and the valve closes.

**Traps**

Cemline provides float and thermostatic traps for both the drip trap and the main trap. Float and thermostatic traps are acknowledged as the correct traps to use with continuously modulating control valves. Float and thermostatic traps provide immediate drainage of condensate and include a built in thermostatic air vent for venting air. The drain orifice is designed to provide a water seal and eliminate the loss of any live steam under all load conditions. Float and thermostatic traps should not be used to lift condensate.
Cemline Unfired Steam Generators

Energy Source – Steam

Cemline Unfired Steam Generators are completely packaged and ready for use. All components are sized, mounted and piped prior to shipment. These boilers come complete and require only connections to services.

<table>
<thead>
<tr>
<th>Component</th>
<th>Carbon Steel</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>Cemline Unfired Steam Generators with a carbon steel shell are used where condensate is returned to the boiler and there is little or no make-up.</td>
<td>Cemline Unfired Steam Generators with a stainless steel shell are used in applications requiring stainless steel. Stainless steel grade furnished is typically 316-L. In a Stainless Steel Unfired Steam Generator, all components in contact with the clean steam can be constructed of the 316-L Stainless Steel.</td>
</tr>
<tr>
<td>Submerged Coils</td>
<td>Cemline Unfired Steam Generators are furnished with a copper U-Bend heating coil rolled into a steel tube sheet for up to 80 psi incoming steam. With source steam of above 80 psi, 90:10 Cupro-nickel tubes are used.</td>
<td>Cemline Unfired Steam Generators are furnished with a stainless steel U-Bend heating coil rolled into a stainless steel tube sheet.</td>
</tr>
<tr>
<td>Piping</td>
<td>Cemline Unfired Steam Generators are furnished with carbon steel piping.</td>
<td>Cemline Unfired Steam Generators are furnished with stainless steel piping on clean steam side.</td>
</tr>
<tr>
<td>High Pressure Cut Off</td>
<td>Cemline Unfired Steam Generators are furnished with a high pressure cut off of incoming energy source via solenoid on pilot or incoming air signal. This safety system is designed to prevent the unfired steam generator from generating steam above the desired set point. This solenoid is also wired to the level controller to close the control valve on the low water condition.</td>
<td>Cemline Unfired Steam Generators are furnished with a high pressure cut-off of incoming energy source via solenoid on pilot or incoming air signal. This safety system is designed to prevent the unfired steam generator from generating steam above the desired set point. This solenoid is also wired to the level controller to close the control valve on the low water condition.</td>
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</table>
Cemline Unfired Steam Generators
SSCM-2001

Cemline Model 2001 Solid State Steam Control Module incorporates operating and limit functions in one solid state controller. The controller features a LCD display of the pressure and on board setting of high and low pressure safety cut-off and alarms. The 2001 SSCM simplifies the control of the Unfired Steam Generator and incorporated contacts to interface with building automation systems.

Solid State Steam Control Module
Solid state operating controller

Features:
- Remote Start Stop
- On-Off Switch
- Alarm Horn w/Alarm Silence Relay
- Low Water Cut-Off
- Timer for Timed Blowdown
- Relay for Water Feed
- Operating Pressure Readout LCD Display
- High Pressure Cut-Out and Alarm
- Low Pressure Alarm
- LED Display of Functions and Alarms:
  - Power On
  - Low Water
  - High Water
  - Low Pressure
  - High Pressure
  - Blowdown Operating
  - Water Feed
- Contacts to notify BAC (Building Automation Control) of functions and alarms:
  - Power On
  - Low Water
  - High Water
  - Low Pressure
  - High Pressure
  - Blowdown Operating
  - Water Feed
  - Operating Pressure
  - Any Alarm
For Steam

To accurately size an Unfired Steam Generator, the following information is required:

1. Source Steam Pressure
2. Output Steam Pressure
3. Make-up Water Temperature
4. Pounds per hour of output steam required

(A safety factor between 1.25 to 1.5 times the total humidification load is recommended to account for start up loads, system heat losses, and to properly match humidifier valve(s) Cv).

Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit www.cemline.com to use the sizing program.
Cemline Unfired Steam Generators
Dimensional Data-Horizontal

Energy Source
High Temperature
Hot Water

Cemline Corporation has an online website www.cemline.com containing informational sections and sizing programs. The Unfired Steam Generator (USG) sizing program allows the customer to size and select a USG. USG specifications and drawings can be downloaded to CAD and/or word processing files. This program is available online at www.cemline.com or upon request from Cemline or your Representative.

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
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<th>W</th>
<th>H</th>
<th>O</th>
<th>S</th>
<th>E</th>
<th>M</th>
<th>J</th>
<th>P*</th>
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</table>

* This dimension is for the longest coil available, shorter coils with a corresponding shorter "P*" dimension are available. Consult factory or your Cemline representative.

** Dimension A and B are sized to suit generated steam capacity.

For Steam
To accurately size an Unfired Steam Generator, the following information is required:

1. Incoming Boiler Water Temperature
2. Output Steam Pressure
3. Make-up Water Temperature
4. Pounds per hour of output steam required

(A safety factor between 1.25 to 1.5 times the total humidification load is recommended to account for start up loads, system heat losses, and to properly match humidifier valve(s) Cv).

Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit www.cemline.com to use the sizing program.
Cemline Corporation has an online website www.cemline.com containing informational sections and sizing programs. The Unfired Steam Generator (USG) sizing program allows the customer to size and select a USG. USG specifications and drawings can be downloaded to CAD and/or word processing files. This program is available online at www.cemline.com or upon request from Cemline or your Representative.

Energy Source
Steam

Cemline Unfired Steam Generators
Dimensional Data-Vertical

For Steam
To accurately size an Unfired Steam Generator, the following information is required:

1. Source Steam Pressure
2. Output Steam Pressure
3. Make-up Water Temperature
4. Pounds per hour of output steam required

(A safety factor between 1.25 to 1.5 times the total humidification load is recommended to account for start up loads, system heat losses, and to properly match humidifier valve(s) Cv).

Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit www.cemline.com to use the sizing program.
Cemline Unfired Steam Generators
Dimensional Data-Vertical

**Energy Source**
- High Temperature
- Hot Water

Cemline Corporation has an online website www.cemline.com containing informational sections and sizing programs. The Unfired Steam Generator (USG) sizing program allows the customer to size and select a USG. USG specifications and drawings can be downloaded to CAD and/or word processing files. This program is available online at www.cemline.com or upon request from Cemline or your Representative.

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<tr>
<th>MODEL NUMBER</th>
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<th>H</th>
<th>O</th>
<th>S</th>
<th>M</th>
<th>J</th>
<th>P</th>
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<td>44&quot;</td>
<td>1 1/2&quot;</td>
<td>72&quot;</td>
</tr>
</tbody>
</table>

* This dimension is for the longest coil available, shorter coils with a corresponding shorter "P" dimension are available. Consult factory or your Cemline representative.

** Dimension A and B are sized to suit generated steam capacity.

For Steam
To accurately size an Unfired Steam Generator, the following information is required:

1. Incoming Boiler Water Temperature
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3. Make-up Water Temperature
4. Pounds per hour of output steam required
   (A safety factor between 1.25 to 1.5 times the total humidification load is recommended to account for start up loads, system heat losses, and to properly match humidifier valve(s) Cv).

Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit www.cemline.com to use the sizing program.
Cemline Unfired Steam Generators

www.cemline.com

Cemline’s website www.cemline.com features sizing programs that can provide Unfired Steam Generator selection data, specifications, and drawings for those sizing an Unfired Steam Generator.

Cemline Website Contains

- Easy to use sizing programs
- Print-outs with specifications and drawings
- Powerful specifying tool
- Download CAD drawings
- Download isometric piping diagrams
- Plant tour video
- Informational sections
- Installation operation and maintenance manual

USG Selection Data

AGENT:
Cemline Corporate Headquarters
P.O. Box 55
Chesterfield, Pennsylvania 15224
724/274-5430
724/274-5449
DATE/TIME: 9/20/02 2:19:52 PM

Steam

<table>
<thead>
<tr>
<th>Input Data</th>
<th>Value</th>
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<tbody>
<tr>
<td>Source Steam pressure</td>
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<tr>
<td>Source Steam pressure drop</td>
<td>10 psig</td>
</tr>
<tr>
<td>Flow rate of produced steam</td>
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</tr>
<tr>
<td>Pressure of produced steam</td>
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<tr>
<td>Makeup water temperature</td>
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<td>Fouling factor</td>
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<td>Unit configuration</td>
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<tr>
<td>Tube bundle pitch</td>
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</tr>
<tr>
<td>Tube diameter</td>
<td>18 gauge</td>
</tr>
<tr>
<td>Tube thickness</td>
<td>3/16 stainless steel</td>
</tr>
</tbody>
</table>

Output Data

<table>
<thead>
<tr>
<th>Output Data</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall heat transfer coefficient</td>
<td>407.9 Btu hr/ft² Deg F.</td>
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<tr>
<td>Tube/boiler transfer rate</td>
<td>1134557.1 Btu/hr</td>
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<tr>
<td>Surface area of tubing required</td>
<td>248.2 sq. ft</td>
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<tr>
<td>Source steam flow velocity</td>
<td>60.6 ft/s</td>
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<tr>
<td>Flow rate of source steam</td>
<td>12771.6 Btu/hr</td>
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<tr>
<td>Minimum Valve Cv Required</td>
<td>143.6</td>
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</table>

Cemline model configuration and dimensions

| Unit Configuration | Horizontal |
| Bundle diameter | 15 inches |
| Bundle length | 150 inches |
| Tube diameter | 1/4 inch |
| Tube thickness | 3/16 inch |
| Model number | HSTU/USG15/120 |

NOTE: The above design is based on the steam generator being supplied with source steam saturated at the pressure shown. If quality of the source steam is of suspect, designer must correct for it.

USG Selection Data Print Out

View of a portion of the USG screen on Cemline’s website
Cemline Unfired Steam Generators

Optional Extras

Cemline Unfired Steam Generators can be supplied with various options as listed below.

Options

Feedwater Preheater/Condensate Recovery Heat Exchanger

The energy from the source steam’s condensate can be recovered by running the make-up water through a preheater. The feedwater heat exchanger preheats the make-up water before it enters the steam generator. This will cool the condensate at the same time heating the make-up water. Either a shell and tube or plate and frame heat exchanger can be used. The heat exchanger materials can be copper, 90:10 copper nickel, and stainless steel.

High Water Cut-off—Option for Unfired Steam Generator

In some unusual situations, it is possible for the solenoid feedwater valve to stick in the open position that could cause the unfired steam generator to fill full with water and flood the entire system. To prevent this from happening, Cemline Corporation offers, as an option, a high water cut-off to close a feedwater ball valve if a high water condition occurs.

This option consists of an electronic probe mounted in the top of the vessel on a carbon steel USG or a stainless steel float on a stainless steel USG connected to a high level switch. The high level switch will send a signal to either an air operated ball valve or an electrically operated ball valve mounted in the feedwater line. Both of these valves are power to open, spring to close.

As the feedwater safety valves require power to open, spring to close, the feedwater valve will close upon loss of power.

Additional Make Up Water Feeding Options

All units are furnished with a feedwater solenoid and check valve. Additional make up water options can be added to the Unfired Steam Generator.

Feed Water Pump

Feed water pump which is connected into the city water or make up water line and is started and stopped from a signal from the level controller.

Feed Water Condensate Pump with Receiver:

Feed water from a boiler feed pump unit with condensate tank. The condensate tank is fed with make up water and condensate and on a signal from the level controller on the Unfired Steam Generator starts a pump which pumps the make up water into the Unfired Steam Generator. When the water level in the Unfired Steam Generator is satisfied, an electrical signal from the level controller signals the water feed pump to close.
Cemline Unfired Steam Generators

Blowdown Options

Cemline Unfired Steam Generators can be supplied with various options as listed below.

On Unfired Steam Generators using city water, there will be an accumulation of minerals built up in the boiler. These minerals must be disposed of by a blowdown system. The blowdown system can be as simple as a manual blowdown (standard with Cemline USG’s) where the maintenance person would blow the boiler off manually a set time for a set duration. It is advantageous to offer an automatic blowdown system to insure that blowdown is taking place. Cemline offers two automatic blowdown options.

**Automatic Blowdown – Timer Solenoid Valve**

The Cemline 2001 SSCM has a built in interval and duration timer wired to a blowdown solenoid valve. The owner/operator can set an interval between blowdowns in a range from 1 to 160 hours and a blowdown duration range of 1 to 250 seconds. The automatic blowdown is a fairly simple system. The automatic timer blowdown requires the owner/operator of the Unfired Steam Generator to do some analysis to determine what duration and interval he/she wishes to have his blowdown occur.

**Automatic Blowdown - TDS Sampling Method**

There is a more sophisticated system, which samples the boiler water and blows the boiler down when the dissolved solids exceed the set point. This is a time sample method which measures the total dissolved solids by opening the blowdown valve for an adjustable time period and measuring the blow off for dissolved solids. If the total dissolved solid exceeds the trip point, the motorized valve will remain open until the fresh water make up dilutes the boiler water to a safe level of total dissolved solids.

**Automated Blow Down Location – Surface Blowdown**

The unfired steam generator is a distiller creating pure water in the form of steam and leaving behind the minerals and dissolved solids in the water inside the steam generator. As more steam is produced the concentration of minerals and dissolved solids increase inside the steam generator. The concentration of dissolved solids will increase in the water until saturation point is reached. Then, the water can no longer hold all of the dissolved solids and some begin to drop out of the water in the form of suspended solids forming sludge or scale on the tube bundle and vessel. Scale formation on the tube bundle will reduce the capacity of the unfired steam generator.

Higher concentrations of dissolved solids may bring about carry over of make-up water in the form of wet steam. As the total dissolved solids increase so does the surface tension of the water causing the steam bubbles to adhere to themselves making it more difficult for the steam bubbles to burst as they rise to the surface of the boiling water. Therefore, the concentration of dissolved solids tends to be increased at or near top of water level in the steam generator. Reducing the concentration of dissolved solids and suspended solids in the steam generator will provide the desired capacity and dryness of steam.

A Surface Blowdown can be used to remove dissolved solids from the steam generator. Automatic blowdown controls such as a TDS control or timed blowdown can be mounted at the surface allowing the removal of dissolved solids from the water in the generator. Typically surface blowdowns are performed more frequently than bottom blowdowns.

**Automated Blow Down Location – Bottom Blowdown**

Higher levels of suspended solids may be found in harder make-up water conditions. Suspended Solids tend to collect in the lower part of the unfired steam generator and form scale on the tube bundle. Removal of these suspended solids can be accomplished by bottom blowdown.

Automatic Bottom blowdown controls can be mounted on the bottom blowdown.
Cemline blowdown/condensate coolers are designed to receive blowdown from a steam boiler, flash the blowdown to steam, and cool the condensate going to drain.

Cemline Unfired Steam Generators
Centrifugal Boiler Blow Off/Condensate Cooler

The blowdown enters the tangential inlet where it meets a 90 degree stainless steel wear plate. The wear plate will prevent erosion of the side wall of the vessel. The tangential blowdown entry causes the blowdown to swirl around the circumference of the vessel where part of the liquid will flash to steam and the balance will settle to the bottom of the vessel.

The internal flash will go through the vent to atmosphere and the hot condensate and sludge will fall to the bottom of the vessel where it will activate the thermal control valve which will feed cold water into the drain leg where the cold water and hot condensate will mix. This results in drained liquid temperature which is acceptable for municipal sewage.
Specifications—Steam as Energy Source

Use this specification for an Unfired Steam generator using steam as primary energy source.

- Unfired Steam Generator shall be as manufactured by Cemline Corporation, Cheswick, PA 15024.
- Unfired Steam Generator shall be furnished as a complete package ready for installation.
- Unfired Steam Generator shall be ASME Code constructed and stamped in accordance with Section VIII, Division I, for Unfired Steam Generators. Unfired Steam Generators shall be registered with the National Board of Boiler and Pressure Vessel Inspectors, and signed copy of shop inspection report shall be furnished. Unfired Steam Generator shall be built in accordance with Section VIII “Unfired Steam Generators” and shall bear the “UB” stamp.
- Unfired Steam Generator vessel shall be pressure vessel quality carbon steel (or 316 grade stainless steel).
- Unfired Steam Generator shall be insulated with not less than 3” of Fiberglass insulation, protected by not less than 20 ga. thick enameled steel jacket.
- Unfired Steam Generator shall be mounted on a suitable I-Beam support skid which shall be permanently welded to the shell.
- Unfired Steam Generator shall have submerged coil of 20 (or 18 or 16) gauge copper (or 316 grade stainless steel or 90:10 copper nickel) tubes expanded into a steel (or stainless steel) tube sheet with cast iron or fabricated steel coil head.
- Unfired Steam Generator shall be furnished with a pilot (or air or electric) operated control valve to modulate the in-coming steam to maintain the desired output of steam pressure +2 psi. Control valve shall be suitable for 150 psi. Control valve pilot shall monitor output steam pressure and modulate the steam to maintain constant output pressure.
- Unfired Steam Generator shall be factory supplied with dual float and thermostatic traps, one for the coil and one for the drip before the control valve. Unfired Steam Generator shall have an incoming strainer.
- Unfired Steam Generator shall be furnished with a brass/cast steel (or stainless steel wetted parts) ASME Code Section I pressure relief valve or valves with a capacity to relieve the total BTU of output of the generator.
- Unfired Steam Generator shall be furnished with a vessel steam gauge. Unfired Steam Generator shall be furnished with a cast iron float type (or stainless steel electronic) level controller. Water column shall also be furnished with gauge glass. Unfired Steam Generator shall be furnished with tandem blow off.
- All components for the Unfired Steam Generator shall be factory mounted, piped, and tested and the unit shall be shipped from the factory as a complete unit ready for installation. Unfired Steam Generator shall be furnished with a steam separator.
- Unfired steam generator shall be supplied with solid state control module with LED backlit LCD display and LED pilot lights to indicate on-off, high pressure, low pressure, low water, and water feed. Solid state control module shall allow the owner to set pressure limits on display screen. Solid state control module shall have flashing red alarm light and alarm horn with built in alarm silence relay. Solid state control module shall be supplied with dry contact closure outputs to indicate to building automation controls (BAC) the occurrence of power on, high pressure, low pressure, low water, and water feed. The control module shall allow the BAC to turn the unfired steam generator on or off through a remote relay suitable for 24 VAC, 1 amp. The control module shall allow the BAC to remotely monitor the operating pressure. Control module shall be supplied with an on-off switch and shall be mounted in a NEMA 4 panel. All solenoids and limits shall be 24 VAC.
Specifications—Steam (continued)

■ Furnish a factory installed brass (or stainless steel) feed water solenoid valve sized to feed the capacity of the boiler with a maximum pressure drop of 10 psi. Solenoid valve shall be factory wired to the level controller. Furnish a factory installed check valve between the solenoid valve and Unfired Steam Generator.

■ Unfired Steam Generator shall be Cemline Model ____________, designed with an output of _____ pounds per hour at _____ psi pressure and feed water of _____ °F, when supplied _______ lb/hr with _____ psi steam to the control valve, and a ______ psi source steam pressure drop.

Options

■ Vacuum Breaker
Package shall be supplied with vacuum breaker.

■ Centrifugal Boiler Blow Off Condensate Cooler
Package shall include a centrifugal boiler blow off condensate cooler.

■ High Water Cut-Off (Choose Between Air/Electric)
High water cut-off shall be factory furnished. High water cut-off shall include an electronic probe (or stainless steel float) mounted in the top of the unit connected to an (air) (electric) operated power to open spring to close ball valve. In the event of high water, ball valve will close.

■ Feedwater Preheater/Condensate Recovery Heat Exchanger
Package shall include a make-up water heat exchanger to preheat make-up water. Heat exchanger shall be constructed with copper (or copper nickel or stainless steel) tubes.

Additional Make Up Water Feeding Options (Choose one, if Required)

■ Feed Water Condensate Pump With Receiver:
Furnish a factory installed feed water condensate system consisting of a receiver, inlet strainer, pump, water make-up assembly, NEMA 1 panel with fused starter. Furnish factory installed check valve between the feed water condensate system and the unfired steam generator. Pump shall be factory wired to level controller.

■ Feed Water Pump:
Furnish and install a feed water pump with flexible connector, shut off valve, and check valve. Feed water pump shall be factory wired to level controller and furnished with fused starter in a NEMA 1 enclosure.

Automatic Blowdown (Choose One)

■ Automatic Blowdown Timer
Furnish a factory installed timed blowdown system consisting of a field programmable 1-160 hour interval and a 1 to 250 second duration timer and solenoid valve for blowing off the unfired steam generator.

■ Automatic Blowdown TDS Sampling Method
Time sample feed water system. Furnish a factory installed time sample feed water system consisting of a control which measures the total dissolved solids of the unfired steam generator on a timed basis. If the total dissolved solids exceed the set point shall blow the boiler off until fresh water brings the total dissolved solids level to the desired setting.
Use this specification for an Unfired Steam generator using high temperature hot water as primary energy source.

- Unfired Steam Generator shall be as manufactured by Cemline Corporation, Cheswick, PA 15024.
- Unfired Steam Generator shall be furnished as a complete package ready for installation.
- Unfired Steam Generator shall be ASME Code constructed and stamped in accordance with Section VIII, Division I, for Unfired Steam Generators. Unfired Steam Generators shall be registered with the National Board of Boiler and Pressure Vessel Inspectors, and signed copy of shop inspection report shall be furnished. Unfired Steam Generator shall be built in accordance with Section VIII "Unfired Steam Generators" and shall bear the “UB” stamp.
- Unfired Steam Generator vessel shall be pressure vessel quality carbon steel (or 316 grade stainless steel).
- Unfired Steam Generator shall be insulated with not less than 3” of Fiberglass insulation, protected by not less than 20 ga. thick enameled steel jacket.
- Unfired Steam Generator shall be mounted on a suitable I-Beam support skid which shall be permanently welded to the shell.
- Unfired Steam Generator shall have submerged coil of 18 (or 16) gauge BWG 90:10 copper nickel (or 316 stainless steel) tubes expanded into a steel (or stainless steel) tubesheet with a fabricated steel coil head.
- Unfired Steam Generator shall be furnished with an air operated 2 (or 3) way control valve to modulate the in-coming HTHW to maintain the desired output of steam pressure +2 psi. Control valve shall be suitable for 400 psi at 400°F. Control valve pilot shall monitor output steam pressure and modulate the HTHW to maintain constant output pressure.
- Unfired Steam Generator shall be furnished with a brass/cast steel (or stainless steel wetted parts) ASME Code Section I pressure relief valve or valves with a capacity to relieve the total BTU of output of the generator.
- Unfired Steam Generator shall be furnished with a vessel steam gauge, thermometer to monitor the incoming HTHW temperature. Unfired Steam Generator shall be furnished with a cast iron float type (or stainless steel electronic) level controller. Water column shall also be furnished with gauge glass. Unfired Steam Generator shall be furnished with tandem blow off valves.
- All components for the Unfired Steam Generator shall be factory mounted, piped, and tested and the unit shall be shipped from the factory as a complete unit ready for installation. Unfired Steam Generator shall be furnished with a steam separator.
- Unfired Steam Generator shall be supplied with solid state control module with LED backlit LCD display and LED pilot lights to indicate on-off, high pressure, low pressure, low water, and water feed. Solid state control module shall allow the owner to set pressure limits on display screen. Solid state control module shall have flashing red alarm light and alarm horn with built in alarm silence relay. Solid state control module shall be supplied with dry contact closure outputs to indicate to building automation controls (BAC) the occurrence of power on, high pressure, low pressure, low water, and water feed. The control module shall allow the BAC to turn the unfired steam generator on or off through a remote relay suitable for 24 VAC, 1 amp. The control module shall allow the BAC to remotely monitor the operating pressure. Control module shall be supplied with an on-off switch and shall be mounted in a NEMA 4 panel. All solenoids and limits shall be 24 VAC.
Specifications—High Temperature Hot Water (continued)

- Furnish a factory installed brass (or stainless steel) feed water solenoid valve sized to feed the capacity of the boiler with a maximum pressure drop of 10 psi. Solenoid valve shall be factory wired to the level controller. Furnish a factory installed check valve between the solenoid valve and Unfired Steam Generator.

- Unfired Steam Generator shall be Cemline Model ___________, designed with an output of _____ pounds per hour at _____ psi pressure and feed water of ______°F. when supplied with _______ GPM of _____ °F inlet - _____ °F outlet boiler water.

Options

- **Vacuum Breaker**
  Package shall be supplied with vacuum breaker.

- **Centrifugal Boiler Blow Off Condensate Cooler**
  Package shall include a centrifugal boiler blow off condensate cooler.

- **High Water Cut-Off (Choose Between Air/Electric)**
  High water cut-off shall be factory furnished. High water cut-off shall include an electronic probe mounted in the top of the unit connected to an (air) (electric) operated power to open spring to close ball valve. In the event of high water, ball valve will close.

- **Feedwater Preheater/Condensate Recovery Heat Exchanger**
  Package shall include a make-up water heat exchanger to preheat make-up water. Heat exchanger shall be constructed with copper (or copper nickel or stainless steel) tubes.

Additional Make Up Water Feeding Options (Choose One, if Required)

- **Feed Water Condensate Pump With Receiver:**
  Furnish a factory installed feed water condensate system consisting of a receiver, inlet strainer, pump, water make-up assembly, NEMA 1 panel with fused starter. Furnish factory installed check valve between the feed water condensate system and the unfired steam generator. Pump shall be factory wired to level controller.

- **Feed Water Pump:**
  Furnish and install a feed water pump with flexible connector, shut off valve, and check valve. Feed water pump shall be factory wired to level controller and furnished with fused starter in a NEMA 1 enclosure.

Automatic Blowdown (Choose One)

- **Automatic Blowdown Timer**
  Furnish a factory installed timed blowdown system consisting of a field programmable 1-160 hour interval and a 1 to 250 second duration timer and solenoid valve for blowing off the unfired steam generator.

- **Automatic Blowdown TDS Sampling Method**
  Time sample feed water system. Furnish a factory installed time sample feed water system consisting of a control which measures the total dissolved solids of the unfired steam generator on a timed basis. If the total dissolved solids exceed the set point shall blow the boiler off until fresh water brings the total dissolved solids level to the desired setting.
Catalog Brochures Available

- STONESTEEL Water Storage Tanks
- STONESTEEL Jacketed Storage Tanks
- Submerged Heating Coils
- Replacement Tube Bundles
- Steel Tanks
- Chilled Water Buffer Tanks
- System Efficiency Buffer Tanks
- STONESTEEL Commercial Electric Water Heaters
- Electric Boilers
- STONESTEEL Packaged Copper Coil Water Heaters
- Stainless Compact Packaged Copper Coil Water Heaters - Semi-instantaneous, Instantaneous
- Unfired Steam Generators
- Condensed Catalog

Cemline is represented in all major cities. Please contact your local representative or call Cemline Corporation.