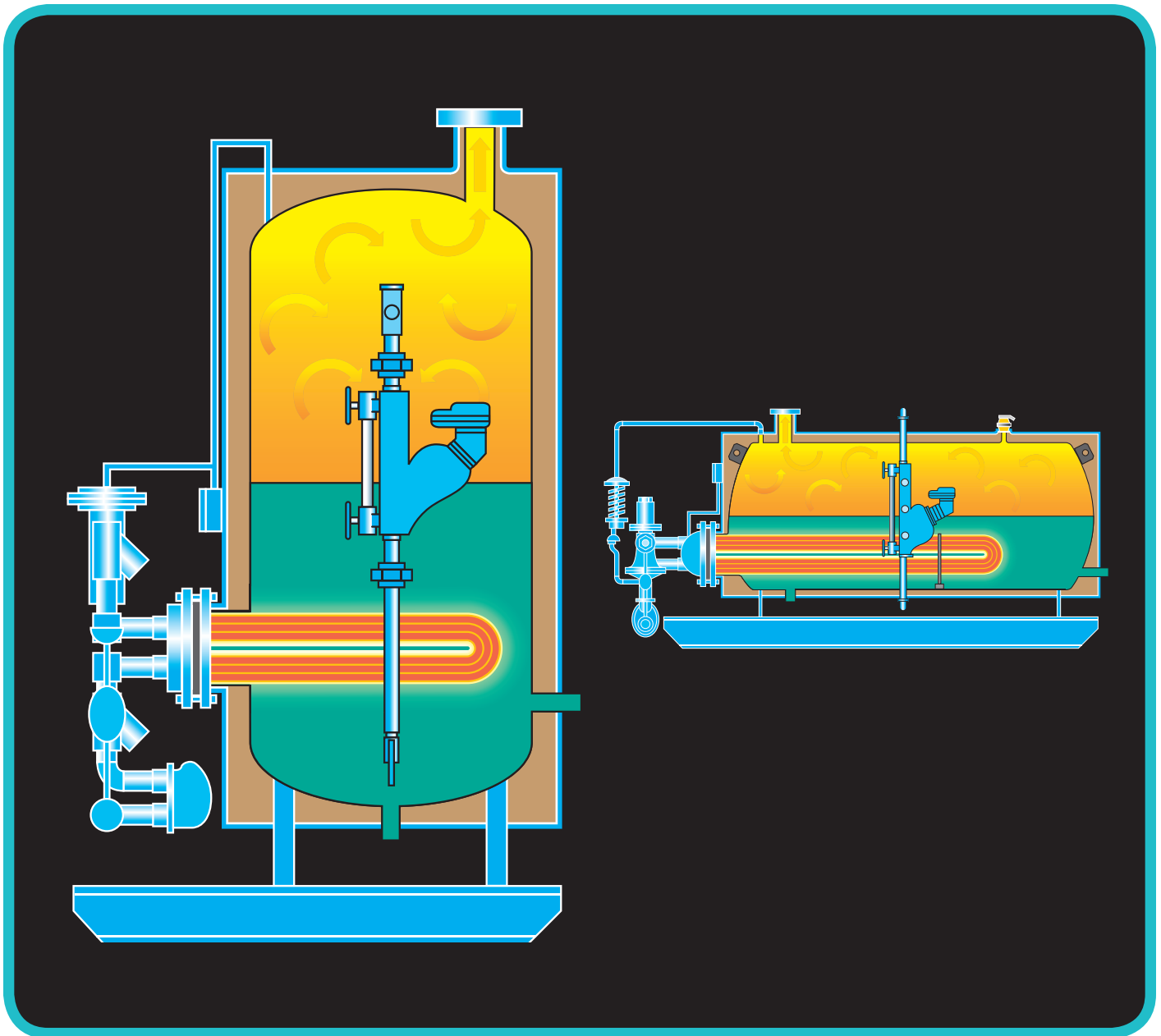


# USG Series



## Unfired Steam Generators

*Generate Clean Steam With Boiler Steam or High Temperature Hot Water as the Energy Source*



### CEMLINE CORPORATION

P.O. BOX 55 CHESWICK, PENNSYLVANIA 15024  
Phone: (724) 274-5430 FAX: (724) 274-5448

[www.cemline.com](http://www.cemline.com)

---

# Cemline® Unfired Steam Generators

---

*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](http://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 A.S.M.E. Code and bear the UB stamp as required by the A.S.M.E. 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 – Control System

## Energy Source – Steam/High Temperature Hot Water

*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:

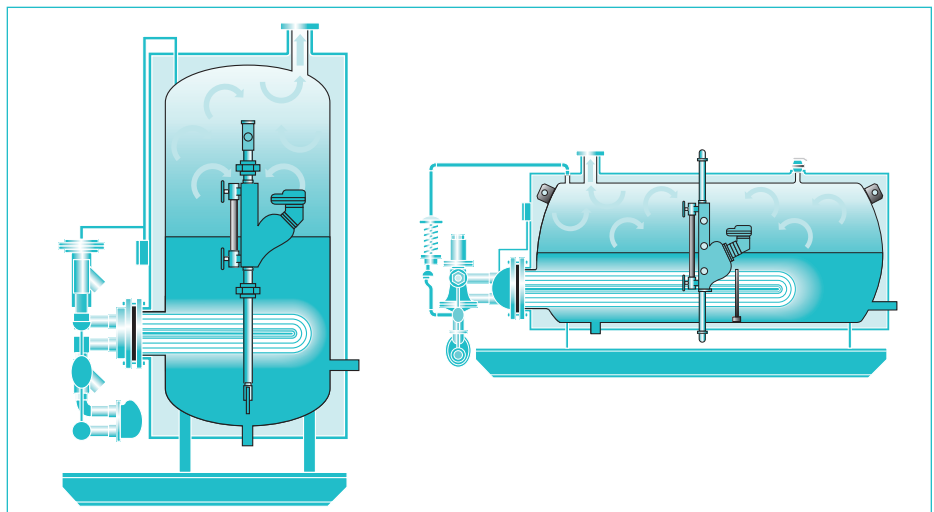
- A.S.M.E. Code Constructed and National Board Registered Vessel
- 3” Fiberglass insulation
- 20 gauge steel jacket with hammertone enamel paint
- Structural I-Beam support skid base
- ASME pressure relief valve
- Clean steam pressure readout
- Blowdown valve
- Gauge glass
- Steam Separator
- High pressure & low water cut off
- Solid State Control Module - Steam-trol® (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:

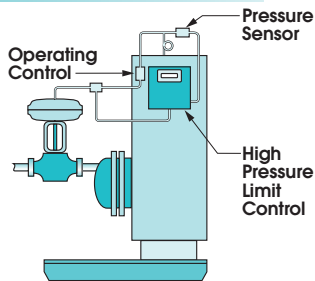
- HTHW thermometer
- Modulating HTHW control valve



# Control Valves/Traps

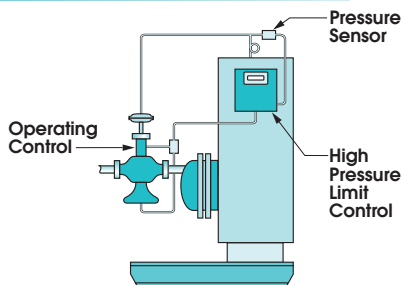
*Cemline USG steam generators can be furnished with air operated, pilot operated, or electronically operated control valves. All valves are normally closed when no air or pilot pressure or electric signal is present. The valves will close on loss of building power.*

## Pneumatically Operated Control Valve



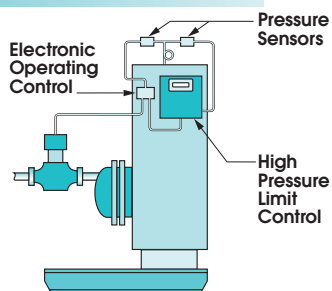
**(Energy Source-HTHW or Steam):** A pneumatically (air) operated steam control valve uses building air connected to a furnished transmitter which monitors the output steam pressure and sends a varying air signal to the source steam controller to modulate the flow of source steam to maintain a constant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

## Pilot Operated Control Valve



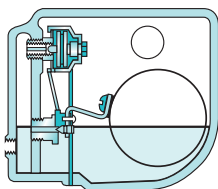
**(Energy Source-Steam):** A pilot operated steam control valve uses a steam pilot to monitor output steam pressure and automatically modulate the flow of source steam to maintain a constant output steam pressure. A pilot operated controller is field adjustable.

## 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/High Temperature Hot Water

*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.*

Shell	Carbon Steel	Stainless Steel
	<p>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.</p>	<p>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.</p>
Submerged Coils	Carbon Steel	Stainless Steel
	<p>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.</p>	<p>Cemline Unfired Steam Generators are furnished with a stainless steel U-Bend heating coil rolled into a stainless steel tube sheet.</p>
Piping	Carbon Steel	Stainless Steel
	<p>Cemline Unfired Steam Generators are furnished with carbon steel piping.</p>	<p>Cemline Unfired Steam Generators are furnished with stainless steel piping on clean steam side.</p>
High Pressure Cut Off	Carbon Steel	Stainless Steel
	<p>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.</p>	<p>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.</p>

# Cemline Unfired Steam Generators

## Steam-trol®

*Cemline Steam-trol® Control Module incorporates operating and limit functions in one solid state controller. This controller replaces the current controls used on Cemline Unfired Steam Generators. The controller features an LCD touch screen display of the pressure and on board operating PID pressure control along with settings of high and low pressure safety cut off and alarms. The Steam-trol® simplifies the control of the Unfired Steam Generator, enhances the look of the product, and follows industry trends to touch screen and solid state control.*



### Steam-trol® Control Module Solid state operating controller

#### Features:

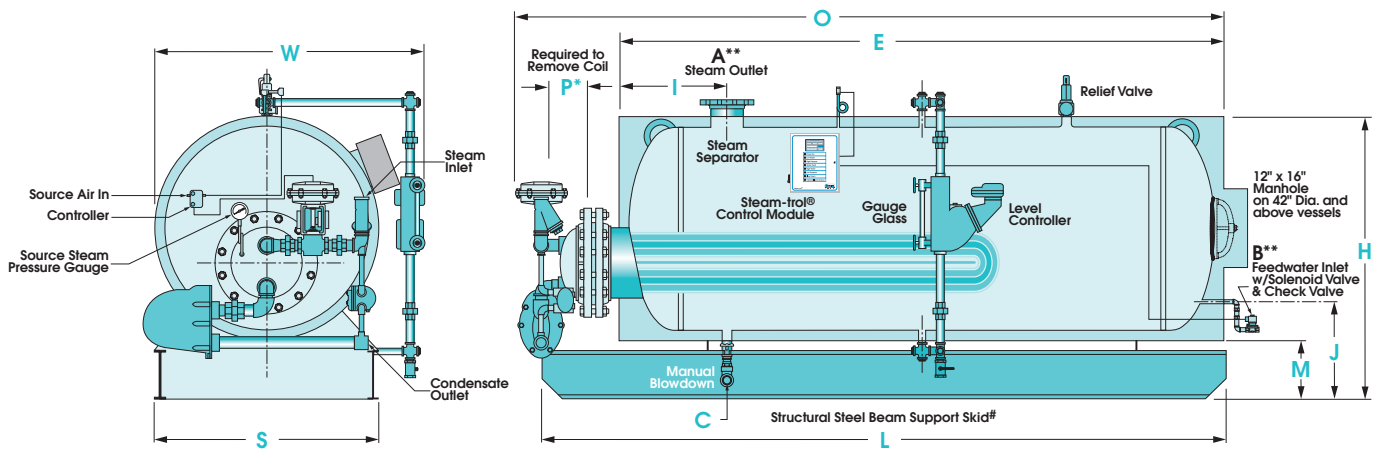
- PID Control Signal
- LCD Touch Screen Display
- Modulating Feed Water Control Option
- On-Off Switch
- Single Point Wiring
- Pressure Readout
- High Pressure Set Point
- Low Water Cut Off
- High Water Cut Off
- Blow Down Control
- Remote Pressure readout
- Remote Pressure setting
- Remote ON/OFF Control
- Modus Interface
- LCD Display of functions & Contacts to Notify BAS (Building Automation System) of Functions
  - Power On
  - Low Water
  - High Pressure
  - Water Feed
  - High Water
  - Low Pressure
  - Blow Down
  - Optional Input/Output

# Cemline Unfired Steam Generators

## Dimensional Data-Horizontal

Energy Source  
Steam

Cemline Corporation has an online website [www.cemline.com](http://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](http://www.cemline.com) or upon request from Cemline or your Representative.



MODEL NUMBER	Boiler Vessel Size	W	H	O	S	E	M	J	I	P*	L	C
H60USG	20" x 48"	34"	42"	70"	24"	52"	18"	24"	12"	48"	64"	1"
H120USG	24" x 63"	38"	46"	84"	28"	67"	18"	24"	15"	60"	79"	1"
H205USG	30" x 72"	44"	49"	95"	34"	76"	15"	21"	18"	72"	88"	1"
H395USG	36" x 96"	50"	52"	123"	40"	100"	12"	20"	20"	96"	112"	1 1/2"
H670USG	42" x 120"	56"	58"	151"	46"	124"	12"	20"	22"	120"	140"	1 1/2"
H860USG	48" x 120"	62"	64"	149"	52"	124"	12"	20"	24"	120"	140"	1 1/2"
H1085USG	54" x 120"	68"	70"	152"	58"	124"	12"	22"	28"	120"	140"	1 1/2"

\* 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. 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).

### #Structural Steel Beam Support Skid

- 8" x 6.5 lbs. per ft. for vessel diameters 36" or less.
- 10" x 12 lbs. per ft. vessel diameters 42" and above.

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](http://www.cemline.com) to use the sizing program.

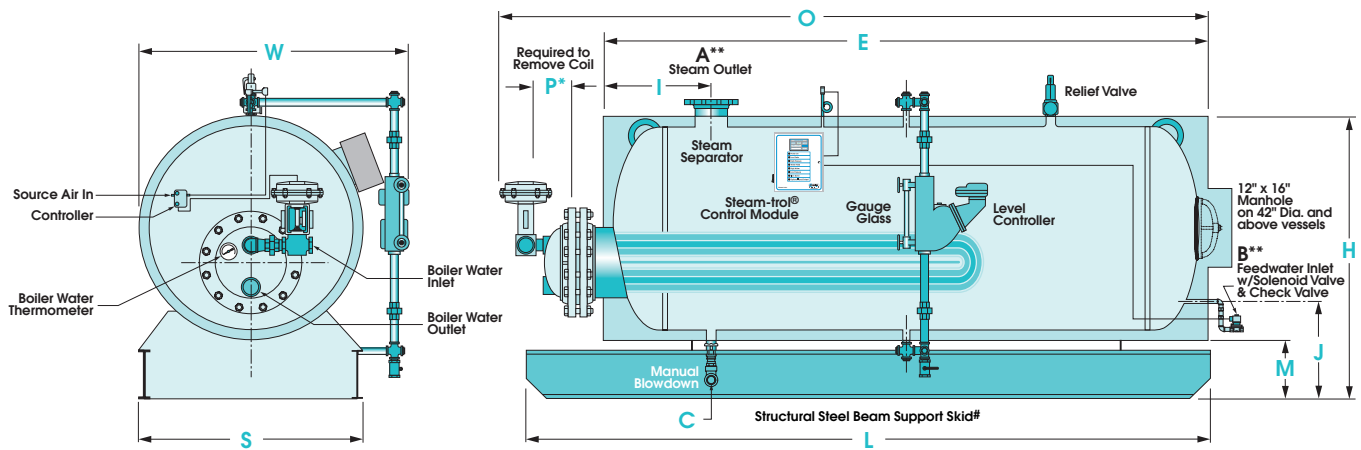


# Cemline Unfired Steam Generators

## Dimensional Data-Horizontal

Energy Source  
High Temperature  
Hot Water

Cemline Corporation has an online website [www.cemline.com](http://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](http://www.cemline.com) or upon request from Cemline or your Representative.



MODEL NUMBER	Boiler Vessel Size	W	H	O	S	E	M	J	I	P*	L	C
H60USG	20" x 48"	34"	42"	70"	24"	52"	18"	24"	12"	48"	64"	1"
H120USG	24" x 63"	38"	46"	84"	28"	67"	18"	24"	15"	60"	79"	1"
H205USG	30" x 72"	44"	49"	95"	34"	76"	15"	21"	18"	72"	88"	1"
H395USG	36" x 96"	50"	52"	123"	40"	100"	12"	20"	20"	96"	112"	1 1/2"
H670USG	42" x 120"	56"	58"	151"	46"	124"	12"	20"	22"	120"	140"	1 1/2"
H860USG	48" x 120"	62"	64"	149"	52"	124"	12"	20"	24"	120"	140"	1 1/2"
H1085USG	54" x 120"	68"	70"	152"	58"	124"	12"	22"	28"	120"	140"	1 1/2"

\* 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).

### #Structural Steel Beam Support Skid

- 8" x 6.5 lbs. per ft. for vessel diameters 36" or less.
- 10" x 12 lbs. per ft. vessel diameters 42" and above.

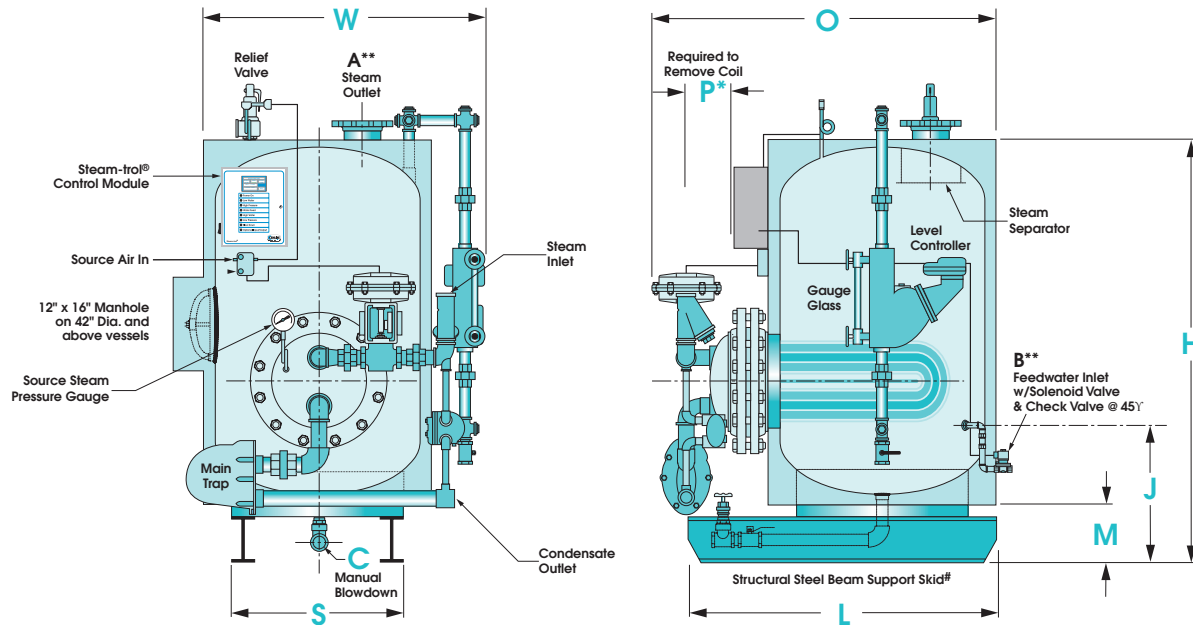
Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit [www.cemline.com](http://www.cemline.com) to use the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

# Cemline Unfired Steam Generators

## Dimensional Data-Vertical

### Energy Source Steam

Cemline Corporation has an online website [www.cemline.com](http://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](http://www.cemline.com) or upon request from Cemline or your Representative.



MODEL NUMBER	W	H	O	S	M	J	P	L	C
V45USG	34"	50"	36"	20"	10"	20"	10"	36"	1"
V90USG	38"	62"	42"	20"	10"	24"	14"	42"	1"
V160USG	44"	68"	48"	24"	10"	28"	20"	48"	1"
V240USG	50"	74"	54"	30"	10"	28"	26"	54"	1 1/2"
V320USG	56"	76"	60"	36"	12"	32"	30"	60"	1 1/2"
V410USG	62"	76"	66"	42"	12"	32"	38"	66"	1 1/2"
V510USG	68"	76"	72"	48"	12"	33"	44"	72"	1 1/2"

\* 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. 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).

### #Structural Steel Beam Support Skid

- 4" x 5.4 lbs. per ft. channel for V45USG & V90USG.
- 8" x 6.5 lbs. per ft. I-beam for V160USG & V240USG.
- 10" x 12 lbs. per ft. I-beam for V410USG & V510USG.

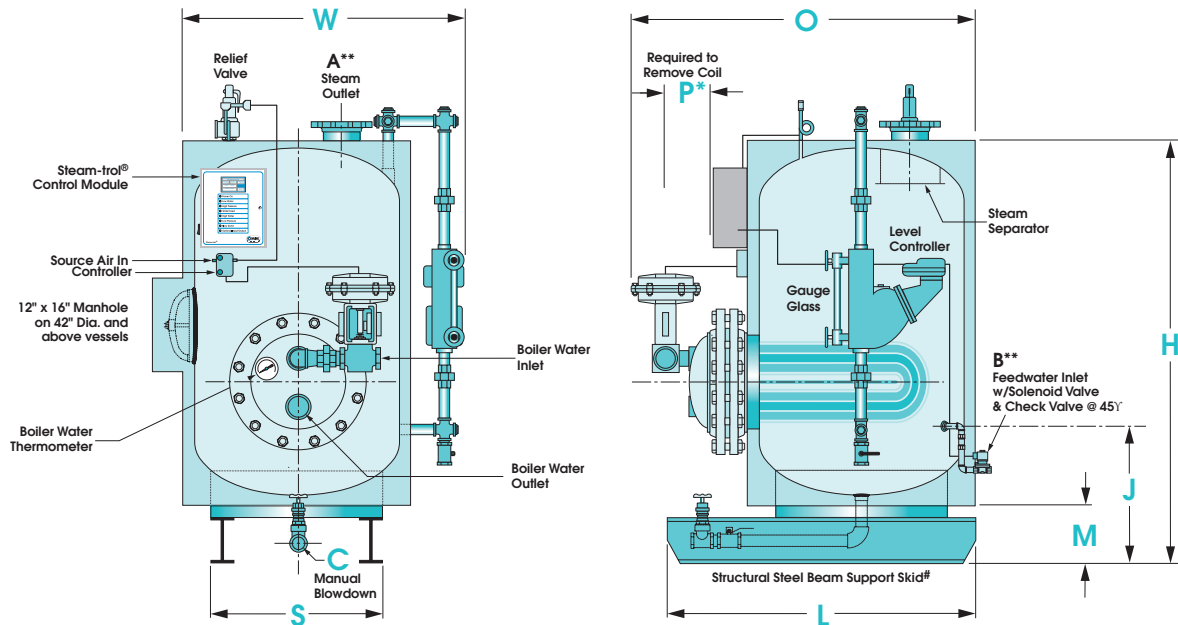
Given this information, Cemline Corporation or its authorized representative can size the Unfired Steam Generator from the Cemline computer program mentioned above. Please contact Cemline Corporation or your local representative for sizing, or visit [www.cemline.com](http://www.cemline.com) to use the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

# Cemline Unfired Steam Generators

## Dimensional Data-Vertical

Energy Source  
High Temperature  
Hot Water

Cemline Corporation has an online website [www.cemline.com](http://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](http://www.cemline.com) or upon request from Cemline or your Representative.



MODEL NUMBER	W	H	O	S	M	J	P	L	C
V45USG	34"	50"	36"	20"	10"	20"	10"	36"	1"
V90USG	38"	62"	42"	20"	10"	24"	14"	42"	1"
V160USG	44"	68"	48"	24"	10"	28"	20"	48"	1"
V240USG	50"	74"	54"	30"	10"	28"	26"	54"	1 1/2"
V320USG	56"	76"	60"	36"	12"	32"	30"	60"	1 1/2"
V410USG	62"	76"	66"	42"	12"	32"	38"	66"	1 1/2"
V510USG	68"	76"	72"	48"	12"	33"	44"	72"	1 1/2"

\* 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).

### #Structural Steel Beam Support Skid

- 4" x 5.4 lbs. per ft. channel for V45USG & V90USG.
- 8" x 6.5 lbs. per ft. I-beam for V160USG & V240USG.
- 10" x 12 lbs. per ft. I-beam for V410USG & V510USG.

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](http://www.cemline.com) to use the sizing program.

# Cemline Unfired Steam Generators

www.cemline.com

Cemline's website [www.cemline.com](http://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**

**CEMLINE CORPORATION**  
PO Box 11  
Cheswick, Pennsylvania 15013  
724-274-5430  
Fax: 724-274-3448

**AGENT:**  
Cemline Corporate Headquarters  
P.O. Box 55  
Cheswick, Pennsylvania 15024  
(724)274-5430  
(724)274-5448

**DATE / TIME:** 9/20/02 2:19:52 PM

**JOB NAME:** Unfired Steam Generator  
**CUSTOMER:** ABC Mechanical  
**ENGINEER:** XYZ Engineering  
**SELECTION NUMBER:** 1

**Steam**

**Input Data**

Source Steam pressure	80	psig
Source Steam pressure drop	10	psig
Flow rate of produced steam	10000	lb/hr
Pressure of produced steam	15	psig
Make-up water temperature	70	Deg F
Fouling factor	0.0005	Hr-F-sq ft/ BTU
Unit configuration	horizontal	
Tube bundle pitch	triangular	
Tube diameter	3/4	inch
Tube thickness	18	gauge
Tube material	316 stainless steel	

**Output Data**

Overall heat transfer coefficient	407.0	Btu/hr-sq ft-F
Total heat transfer rate	11343567.1	Btu/hr
Surface area of tubing required	349.2	sq ft
Source steam flow velocity	60.6	ft/sec
Flow rate of source steam	12771.8	lb/hr
Minimum Valve Cv Required	143.6	

**Cemline model configuration and dimensions**

Unit Configuration	horizontal	
Bundle diameter	16	inches
Bundle length	120	inches
Tube diameter	3/4	inch
Tubing area of this model	377	sq. ft
Cemline model number	H670USG16120	

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

**CEMLINE CORPORATION**

Products | Technical Resources | Brochures | IOM Manuals | Contact

## Unfired Steam Generators (USG)

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 need to produce clean steam from boiler water or high temperature hot water.

**STANDARD EQUIPMENT** COMMENTS: QUALITY CONTROL MODEL 1000 2001 CUT AWAY STEAM TUBE

ASME Code Connected National Board Registered Storage Tank

CEMLINE Unfired Steam Generators are constructed and stamped in accordance with ASME code and bear the UR 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 pressure above 60 psig or greater will be 100% X-Rayed and heat treated in accordance with the ASME code.

- Stainless Steel Construction
- Carbon Steel Construction
- Fiberglass Insulation
- 20 Degree Bevel Neck with Minimum Bevel Patch

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.

#### Modulating Feed Water Control

Along with the current feed water controls, the Steam-trol<sup>®</sup> has an option for modulating feed water control. The controller used in conjunction with a 4-20 mA level transmitter and a modulating feed water valve will provide modulating feed water to the Unfired Steam Generator. The benefit of supplying modulating feed water is to reduce suppression of steam production rate when water enters the Unfired Steam Generator.

### 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 Unfired Steam Generators

## Centrifugal Boiler Blow Off/Condensate Cooler

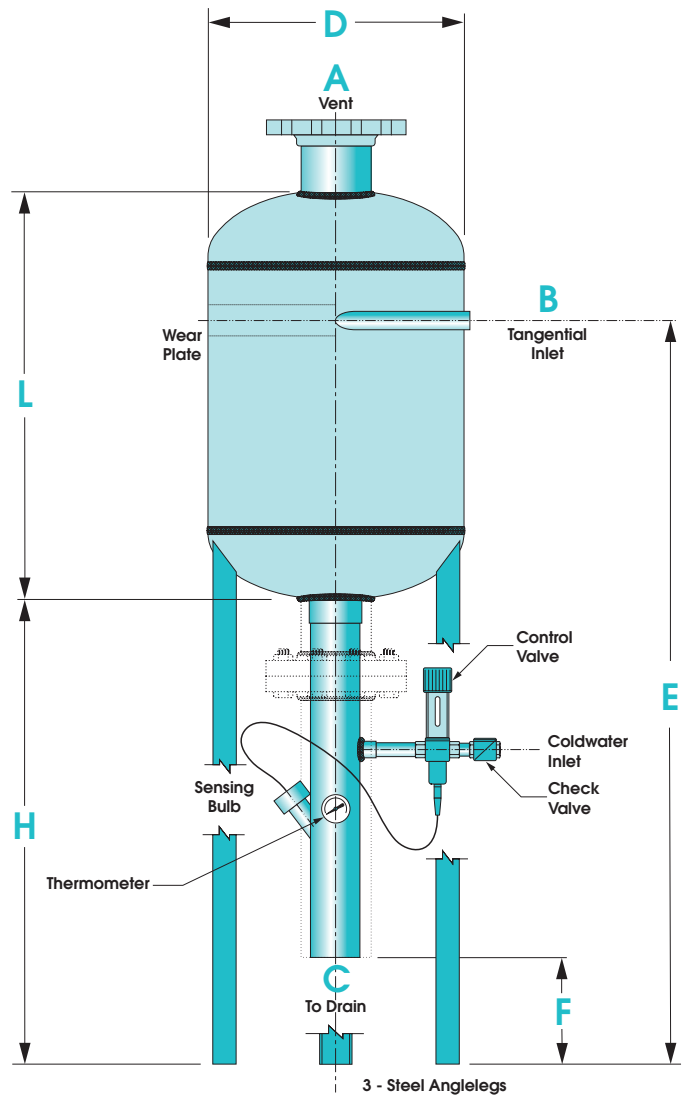
*Cemline blowdown/condensate coolers are designed to receive blowdown from a steam boiler, flash the blowdown to steam, and cool the condensate going to drain.*

### CBO Series

Cemline Blowdown/Condensate Coolers are A.S.M.E. code constructed and stamped for 150 PSI working pressure. Minimum steel thickness is 3/16". Where conditions require these vessels can be constructed with 1/4", 3/8", or 1/2" steel thickness.

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.



MODEL NUMBER	D	L	H	A VENT	B BLOWOFF	C DRAIN	D COLDWATER	E	F
CBO-5	16"	26"	26"	4"-150# FLANGE	1" M.N.P.T.	3" M.N.P.T.	1/2" N.P.T.	44"	8"
CBO-7	16"	26"	28"	6"-150# FLANGE	1 1/2" M.N.P.T.	4" M.N.P.T.	3/4" N.P.T.	46"	8"

---

# 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  $\pm 2$  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) A.S.M.E. 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 LCD touch screen 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 set point and 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.

■ **Modulating Feed Water Control**

Furnish a factory installed stainless steel modulating feed water valve sized to feed the capacity of the boiler with a maximum pressure drop of 10 PSI. Feed water valve shall be factory wired to the level controller. Furnish a factory installed check valve between the feed water valve and Unfired Steam Generator.

---

**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.

---

# Specifications-*High Temperature Hot Water as Energy Source*

*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  $\pm 2$  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 LCD touchscreen 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 set point and 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.

■ **Modulating Feed Water Control**

Furnish a factory installed stainless steel modulating feed water valve sized to feed the capacity of the boiler with a maximum pressure drop of 10 PSI. Feed water valve shall be factory wired to the level controller. Furnish a factory installed check valve between the feed water valve and Unfired Steam Generator.

---

**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)**

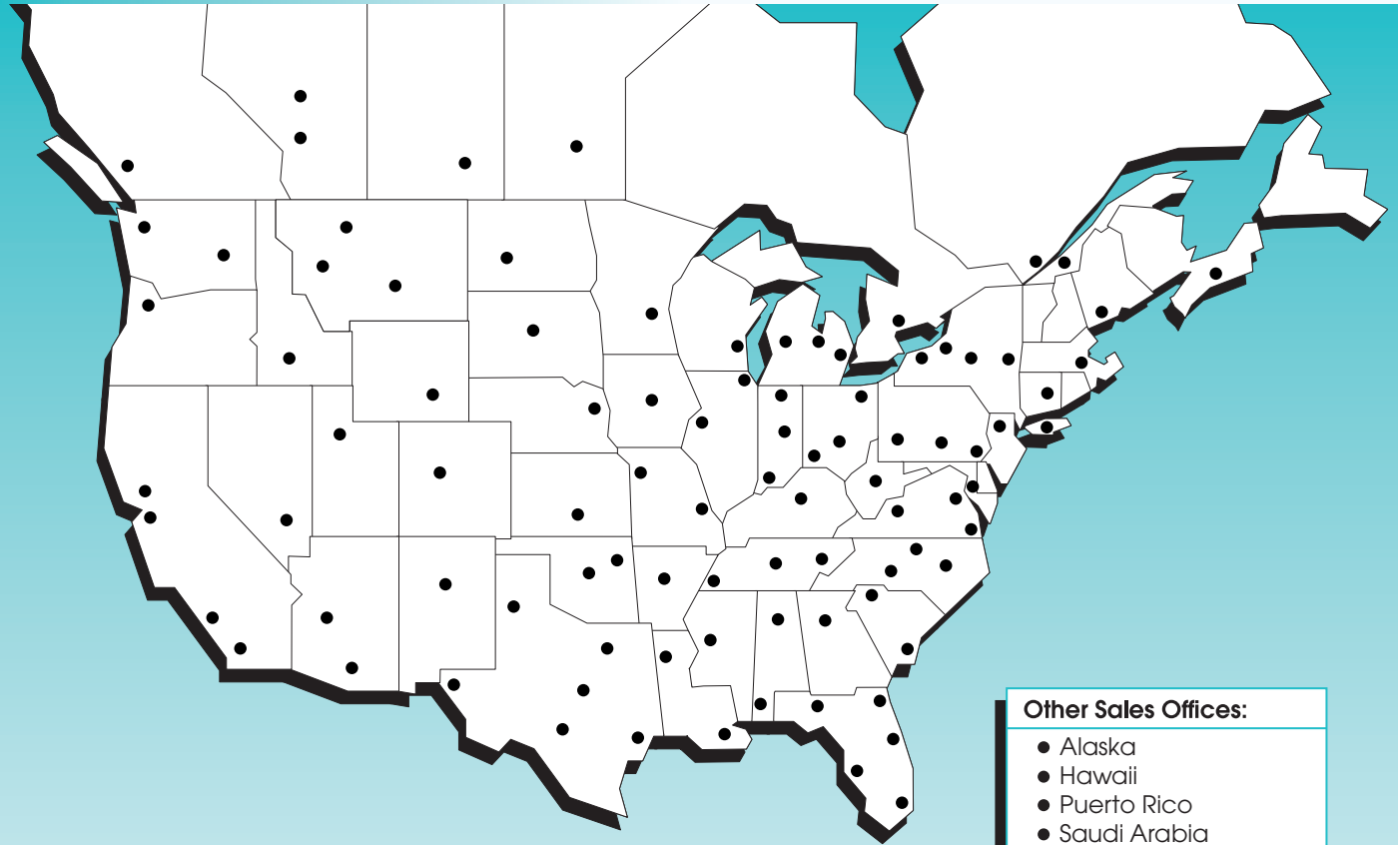
■ **Automatic Blowdown Timer**

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.

## Sales Offices



### Other Sales Offices:

- Alaska
- Hawaii
- Puerto Rico
- Saudi Arabia
- Taiwan
- U.A.E.

## Available Cemline Brochures



- [www.cemline.com](http://www.cemline.com)
- Product Sizing Programs
  - Brochures
  - I.O.M. Manuals
  - Drawings & Specifications
  - Agent Locator
  - Plant Tour

- STONESTEEL®
  - Water Storage Tanks
  - Jacketed Storage Tanks
  - Commercial Electric and Packaged Copper Coil Water Heaters
- Submerged Heating Coils
- Replacement Tube Bundles
- Steel Tanks
- Chilled Water Buffer Tanks
- System Efficiency Buffer Tanks
- Electric Boilers
- 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.*

