

SPECIFICATIONS OF AUTOCLAVE:

SECTION 200 – AUTOCLAVE

MOSS EAGLEGUARD EG6018 RETORT VACUUM AUTOCLAVE SYSTEM

Moss cylindrical retort autoclaves are automatically controlled and operated. Waste is loaded from the front of the machine and uses saturated high pressure steam as the decontamination agent. The autoclave operates by vacuum assisted air displacement or by gravity, if desired. The Moss PLC control system offers several operator selectable cycle parameters depending on the type and packaging of the waste stream.

The capacity of the autoclave is determined by the amount of loose red bag waste that can fit within each stainless steel cart. The load capacity is also determined by the ramp angle into the autoclave or if loaded by a cart lift table or draw bridge assembly. This project requires that both autoclaves be installed in a pit so that loading and unloading can be accomplished quickly with minimum effort by the operator. The amount and type of waste in each load as well as type of cycle will determine cycle times as well as steam usage. The 5.0 ft. x 18.00 ft. autoclave will process three (3) carts per cycle.

1.0 CYCLES (The autoclave shall be capable of being programmed to run both of the following cycles as required).

1.1 Gravity Cycle: For sterilization of heat-and-moisture-stable goods at 122°C degrees to 160°C (254° to 320°F); decontamination of infectious waste prior to shredding and compacting prior to removal to sanitary landfill or other applications that use elevated temperature/pressure conditions with gravity air displacement.

1.2 Vacuum Cycle: For processing porous or convoluted waste material presenting a more challenging condition to air removal at 122 °C to 160 °C (254 °F to 320 °F), which require vacuum assisted air removal. Vacuum cycles provide very efficient steam penetration for fast processing of waste. Vacuum system is provided with four (4) different operating parameters.

2.0 VESSEL (Minimum requirements)

2.1 Pressure Vessel: The pressure vessel chamber is constructed with an interior of 60 inches diameter x 216 nominal inches (18.00 ft. overall length). The pressure vessel will be formed and welded to construct a cylindrical horizontal vessel. Unit including the door has a design pressure of 100 PSIG and will comply with ASME Section VIII Code regulations.

Pressure vessel is rigidly supported with a painted steel floor stand and will include longitudinal beams to facilitate installation. Also included is vessel lifting lugs for unloading and moving onto autoclave foundation.

The chamber interior is SA-36 0.375" carbon steel material and constructed of formed plate. The carbon-steel doorframe is fusion welded to the shell and end plate. A door gasket is supplied for sealing the surface of machined carbon steel. The chamber floor is equipped with removable stainless steel drain screen and loading cart channel tracks that accept the hook on ramp for loading and unloading.

2.1 Ports: Threaded coupling openings will be welded through the chamber wall with an adequate number of openings into the chamber shell to be provided for standard utility and instrumentation requirements three (3 – 2" tri-clamps).

2.3 Door: The autoclave is supplied with a single door design. The door is a dish design constructed of 0.375" thick cold-formed steel and is equipped with semi-automatic hydraulic door lock/unlock mechanism. Door is provided with a quick opening roto-wedge-lock side hinge that can be located on the right or left side of the vessel. Door is mounted on heavy duty thrust bearings. Safety interlock device prevents unlocking or opening of door while the chamber is under pressure. Hydraulic pump operates at less than 1000 PSIG.

2.4 Insulation: The exterior surface of the door is insulated and covered with aluminum. The main chamber will be insulated with fiberglass insulation with metal jacketing. The fiberglass insulation is four (4) inches thick and has a 25% compression rating R-7 or better.

2.5 Vessel Support: The vessel is mounted on I-beam floor supports welded to the jacket exterior.

2.6 Mounting: The vessel is designed for floor or pit mounting. Standard pit depth is seven (7) inches to ensure door to floor clearance. This project requires pit mounting since the carts are so large and heavy.

2.7 Ramp: The ramp will be constructed to lift off for storage after cart loading. Pit mounted units include a five (5) foot ramp. Ramp for floor installation includes a ten - (10) foot ramp. Recommended ramp loading angle for pit or floor installation is approximately 7.5 degrees.

3.0 CONTROLS:

3.1 Programmable Logic Controller (PLC) – Moss PLC control system monitors and controls system operations and functions. The PLC software provides the automatic progression of the cycle, while indicating all cycle parameters. Timers are setup within the PLC system that automatically resets at the end of each cycle or if temperature drops below the set point during exposure. A modem is provided with our standard PLC that is used for remote monitoring/troubleshooting and alarm notification via paging and text messaging (analog telephone line required to interface). As an option and if requested by the Purchaser, the PLC can be supplied with a network card for connection to the internet for same monitoring as supplied with the modem. Control panel that houses PLC is generally installed on the side opposite the door hinge away from heat, vapor and condensate if possible, otherwise, remote mounting may be a necessary option. The control panel has a NEMA rating for indoor installation.

3.1.1 Operator Interface: Control panel is provided with a 6" HMI touch screen display that is designed to allow operating personnel complete access to autoclave operating parameters. The display shows sterilizer status, time of day, cycle times, temperature, pressure and any warnings or alarms. System provides cycle and alarm history for last 20 cycle/alarm occurrences.

3.1.2 Service Access: The control panel provides access to all required relays, associated electronics and switches.

3.2 Programming:

3.2.1 Cycle Selection: The PLC software is provided with a numerical cycle selector on the touch screen to configure cycles and cycle parameters.

The operating system comes standard with five default cycle skeletons to be set on four (4) different setup parameters for vacuum or gravity. Each cycle setup screen is to have the following set of parameters designed into the software:

- *Sterilize time and temperatures
- *Dry time values
- *Phase alarms
- *Sterilize temperature overdrive
- *Overtemperature point
- *Undertemperature point
- *Chamber pressure points
- *Print interval
- *Vacuum measurement

3.3 Cycle Security: The software is provided with password protection capabilities to prevent changes by non-authorized personnel. Password code is to be accessed from the front panel screen or from computer at remote location.

3.4 Battery Backup: A battery backup is provided for cycle memory, which ensures the autoclave can complete the cycle properly and retain cycle memory in case of power failure. PLC is to hold the system in phase until power is restored. Once the power returns to the system, the PLC provides the system operator with a printed message on the screen and will resume or restart the cycle, depending on the cycle phase at the time of power interruption.

3.5 Printer:

3.5.1 Character: Control panel is provided with printer to give cycle print data sufficient to produce cycle plot, print beginning and end of each cycle and at all transition points and at selected print intervals.

3.5.2 Printout: Printout shall supply the following:

- Cycle start time and date
- Cycle count
- Set sterilize temperature
- Set control temperature
- Sterilize set time
- Key transition points in the cycle

Cycle summary including:

- Maximum and minimum temperature
- Condition time
- Sterilize time
- Exhaust time
- Total cycle time
- All alarms and status information

Also provides for operator entered data and duplicate print capability, if desired.

3.5.3 Units: Provides selection of printout units as follows:

- Time – standard AM/PM or Military
- Temperature – Degrees F or Degrees C
- Pressure/Vacuum – PSIG/in HG or Bars

3.6 Parameter control: System provides timing circuits for precision timing.

System is provided with a resistance thermal detector (RTD) to sense temperature and a pressure transducer to sense pressure/vacuum.

Process signals through an A/D converter providing accurate control inputs and readouts throughout the entire process cycle. Control provides for individual temperature and pressure calibration and temperature and pressure sensor failure alarms.

3.7 Cycle Safeguards:

3.7.1 Door/Cycle: The selected cycle will not begin unless the autoclave door is locked pressure tight.

3.7.2 Incorrect Entry: The controller will reject incorrect cycle parameters and will not allow the system to begin operation until corrections are made.

3.7.3 Floor Fail-safe: Controller provides floor fail-safe features to guard against failed steam supply systems.

4.0 PIPING

4.1 Effluent Disposal: Provides automatic condensing of chamber steam and disposal of condensate to drain. Operation provides manual regulation of condensing water flow to achieve minimal water usage consistent with the specific demands of each cycle and achieves water discharge temperatures at 140 °F. or lower.

4.2 Piping Steam Materials and Construction: Piping is threaded with standard National Pipe Thread (NPT) and sealed with pipe sealant prior to tightening. All inlet and outlet piping is brass or copper. Piping and valves are suspended onto the unit and properly secured. Piping, fittings and connections required that connect the sterilizer to building utilities and supply lines are by others.

4.3 Steam Supplies: Unit is supplied with electric steam control valves, trap and pressure regulator, if required, for operation of steam into sterilizer from boiler supply line. The steam supply pressure into the autoclave is to be 55-80 PSIG. Steam line components include strainer and hand-valve shutoff.

4.4 Water Supply: Autoclave unit requires a water supply of cooling water for effluent cooling and vacuum pump. A single connection shall be supplied that contains a water strainer and hand shut-off valve. The required water inlet pressure is to be supplied to the autoclave at 40 PSIG with a flow rate of 50 GPM.

4.5 Electrical: The unit will be wired for a dual input connection of 380 volt - 3 phase - 50 hertz with a 70 amp draw to be used directly for the vacuum pump and a secondary control voltage of 120 volt – 1 phase - 60 hertz with a 20 amp draw for controls and hydraulic pump motor. Electrical supply is to be provided to the appropriate electrical connection by others.

4.7 Vacuum System: PLC system is to control and monitor vacuum system consisting of a multi-stage high efficiency liquid ring vacuum pump that is powered by 7.5 HP 380 volt/3 phase/50 cycle TEFC motor.

Pre-vacuum: The pre-vacuum process will evacuate the autoclave at 22"-27" Hg. This process will achieve the removal of air from the autoclave to provide a quick and efficient penetration of steam throughout the medical waste load.

Post-vacuum: The post-vacuum process removes excess steam from the vessel and expedites the steam and moisture purging process. This process removes excess moisture from the waste load resulting in a drier treated waste product for disposal. Post vacuum cycles enhance moisture removal, which effectively controls nuisance odors.

4.8 Chamber Drain Shut-off Valve: A hand operated manual chamber drain ball valve will be provided for customer use to isolate the retort drain system from the building. This valve will be open for all sterilizer operations. An automatic valve is also included.

4.9 Chamber Drain: Purchaser to provide sanitary drain with an 80 GPM flow capacity.

5.0 QUALITY AND WARRANTY

5.1 Quality: Product submitted for approval must reflect construction quality commensurate in all respects with that of standard units manufactured by our ISO 9001 manufacturing facility.

5.2 Warranty: Moss warrants that each retort sterilizer is carefully tested, inspected, in proper working condition and free of all visible defects before it leaves the factory. Coverage includes one (1) year from startup, or 18 months after the date of shipment, whichever comes first on parts (except expendables) for defective warranted parts only.

NOTE: This system is designed for typical red bag waste exclusive of any waste deemed hazardous or is otherwise prohibited by any governmental or regulatory agency for processing in an autoclave system. It is strictly the purchaser's responsibility to insure such materials or liquids are not processed in the autoclave system and also that all other applicable local, state or government regulations are adhered to. All material to be autoclaved should be meltable or steam permeable.

Engineering Data: (Approximate and subject to change)

Vessel overall dimensions: 60" dia. X 216" (nominal)

Shipping Weight: 8,200 lbs.

Operating Weight: 9,000 lbs.

Flooded Weight: 28,800 lbs.

Water Rate: 40 GPM

Steam Usage: Approximately 600 - 800 lbs./hr. with a

total regulated peak flow rate of 1,100

lbs./hr. at an exposure temperature of 278

°F.

Electrical Requirements:

Control: 120/1/50 volts/20 amps

Hydraulic: 120/1/50 volts/20 amps

Vacuum pump: 380/3/50 volts/20 amps

Air (or electric valves): 75-125 PSIG, 2-3 CFM (Electric valves can be provided upon request).

Note: Steam consumption and cycle times will vary depending on type and quantity of waste per cycle along with other potential factors. For space requirements it is important to allow ten (10) foot (ramps) for floor mounted units and five (5) feet for pit mounted units beyond the total length of the vessel unless a cart lift table is provided in lieu of the ramps. In addition, the purchaser needs to allow additional space off the end of the ramps for the 59" carts to roll off of the ramps or cart lift table onto a floor area.

SECTION 300 – AUTOCLAVE CARTS

AUTOCLAVE CARTS

Autoclave offering includes six (6) aluminum autoclave carts for medical waste processing inside autoclave. Moss basket type aluminum high volume carts are partially perforated for steam circulation and condensate drainage. Carts are designed to fit the loading car channel tracks that are installed on the autoclave pressure vessel chamber floor. The under frame of the autoclave carts are equipped to allow for pickup by automatic tippers, dumpers or forklift. Each cart includes four (4) swivel 6" diameter casters. The autoclave is designed to process three (3) high volume carts per cycle. The capacity of each cart quoted herein is based upon 160 kg/m³ of waste weight but this can vary significantly based on waste volume along with other factors. This allows for four carts being processed inside the autoclave and four carts being loaded during the process cycle.

SECTION 400 - ELECTRIC BOILER

The electric boiler proposed in this section provides .782 metric tons/hr. (1,725 lbs./hr.) of steam when supplied with 212° F. feedwater.

1.0 SCOPE: Furnish one (1) electrically heated steam boiler complete with standard equipment and accessories as described herein. The steam boiler shall be of the package type, factory-assembled, wired and tested, and shall be UL listed and bear the Underwriter's Laboratories label and comply with the requirements of CSD-1.

1.1 BOILER RATING: Electric steam boiler shall be rated @ 105 kW at 380 volts, 3 phase, 50 cycle, 1,725 pounds steam/hour (when supplied with 212°F feedwater) or as required. Unit shall be suitable for operation at 60 PSIG nominal steam pressure.

1.2 VESSEL: Boiler vessel shall be horizontally constructed in accordance with ASME code - Section I and shall be National Board inspected and bear the "S" stamping for 100 PSIG. The pressure vessel steam outlet connection shall be as required.

One (1) safety valve is to be supplied to meet ASME requirements. Boiler is to be National Board rated and set for 6.89 Bar (100 PSIG). Pressure vessel shall be insulated with a double wrap of 5.08 cm (2-inch) fiber blanket insulation having 3.81 cm (1-1/2) PCF density.

1.3 HEATING ELEMENTS: Elements shall be 3-phase 4-bolt flange type rated @ 15 kW each / 380 volts, Incoloy sheathed, rod type, individually flange-mounted or equal so as to be easily field replaceable with standard tools. Heating element watt density shall not exceed 75 watts/square inch.

1.4 TRIM AND CONTROLS: Boiler shall be complete with the following standard trim and controls:

1. Modulating step control (boilers above 2 stages) to apply the load gradually in four (4) steps
2. Proportioning pressure control to balance power input to match system demand
3. Integral contactors rated for 500,000 cycles
4. Supplemental internal circuit protection fuses - current limiting rated for 200,000 amps interrupting capacity
5. Main lugs for supply circuits
6. Fused 120-volt control circuit transformer
7. High pressure limit automatic reset control
8. High pressure limit with manual reset low water cutoff
9. Float type combination low water cutoff / level control with blowdown valve
10. Probe-type manual reset low water cutoff
11. External interlock terminals
12. Pilot switch
13. Pilot lights to indicate control power "on", low water, and stage status (1 per stage)
14. Safety valve
15. Pressure gauge
16. Sight gauge
17. Feedwater stop and check valves
18. Blowdown valve

1.5 PRESSURE CONTROL SYSTEM:

A. The modulating step control shall be a solid-state step control featuring modulating control to provide an adjustable time delay between steps.

B. The modulating step control shall be a solid-state step progressive sequencing type and shall provide "first-off" control of the heating element circuits so as to equalize the number of operating cycles of all of the components controlled by the step control. At each increase in load, the heating elements which have been off the longest are the next to be energized; at each decrease in load the elements which have been on the longest are the next to be de-energized. The controls will include a recycle feature to cause the boiler to always start in the unloaded condition at startup or after a power outage of more than a few seconds.

ENCLOSURE: The steam boiler shall be mounted on a structural steel base full size for the enclosure. All sheet metal shall be 16 gauge steel minimum. The entire enclosure shall be finished in industrial gray enamel.

SECTION 500 – BOILER ACCESSORIES

One (1) Simplex boiler feed system to include:

1. One (1) 302.7 liters (80 gallon) receiver with support stand and thermometer.
2. One (1) Mechanical float make-up assembly.
3. One (1) Gauge glass assembly with shut off cocks and guard rods.

4. One (1) Centrifugal boiler feedwater pumps - 380/3/50 ODP (open drip proof) motors to include suction piping and pump pressure gauges. Pump capacity: 18.921 liters/minute (5 GPM) @ 5.5 Bar (80 PSIG) discharge pressure.
5. One (1) NEMA 12-control panel with motor starters and HOA switch and wired for 380/3/50 supply (120V coils).

Note: Selections based on an assumed boiler operating pressure of 4.13 bar (60 PSIG).

All components shall be prepiped and prewired.

One (1) Blowdown Separator constructed as per ASME Code. The internals of the separator is provided with a stainless steel striking plate. Each connection has threaded connections for blowdown inlet, vent and drain. This system is to be provided with a floor support stand, aftercooler and bi-metal thermometer.