

# SUSTAINABILITY INITIATIVES BY STUDENT ORGANIZATIONS FUNDING PROPOSAL

## Part I - General Information

**Name of Student Organization:** Biochemistry Graduate Student Association

**Contact/Responsible Person:** Elisa Gagliano

**Contact Office Held/Title:** Student Member

**Contact Email Address:** elisag1@vt.edu

**Contact Telephone Number:** (505) 363-6310

## Part II - Project Cost Information

Estimate Cost of this Proposal  See Part III.C

Estimated Savings –  See Part III.D

**Net Cost of this Proposal**

## Part III - Supporting Information

A. Please describe your sustainability initiative and attach supporting documentation.

The purpose of this Green RFP is to propose to replace one of the autoclaves that is installed in Engel Hall, with a more environmentally-friendly model. Engel Hall currently has two autoclaves, which are pressure chambers used to perform sterilization by subjecting contents to hot steam. This equipment is essential for completing sterile experiments, as well as decontaminating hazardous biowaste before disposal. Typical loads include lab items such as glassware, experimental reagents, and equipment, as well as Biohazardous waste (Biological Safety Levels 1 and 2).

Traditional autoclaves, such as our STERIS AMSCO 2021 sterilizer that was originally manufactured in 1979, consume massive amounts of water and energy (see Part III D). The unit we propose to replace our old autoclave with, a **STERIS AMSCO 250LS autoclave with a Green Gravity Water Saver system**, would conserve an estimated 150,000 gallons of water per year, and 12,500 kWh of energy per year. (See Part III D for calculations.)

We researched autoclaves from different manufacturers, and chose a STERIS unit of equivalent size to our old one. We have chosen this manufacturer because of our successful track record with them. The AMSCO 250LS model would use less water and energy because it can automatically shut down utilities when it is not in use (pg. 12), and because it is designed to use less water per cycle than our old unit (pg. 7).

The optional Green Gravity Water Saver system saves additional rinse water by allowing steam to cool partially on its own in a cooling tank (pg. 12). Our cost estimate for the unit we are requesting is based on two quotes obtained from STERIS (pg. 8-11). (We had also researched the optional STERI GREEN system and the vacuum pump it would require, but it would be too difficult to incorporate into our facility because it would require the room to be remodeled to provide 3-phase electrical power, and would require more space, maintenance, and heat load than we are prepared to deal with.) The related quotes and supporting materials are attached (pg. 5-17).



*An autoclave originally built in 1979 is currently installed in Engel Hall.*

B. How does this initiative help to achieve the goals of the Virginia Tech Climate Action Committee Resolution (CACR) and Sustainability Plan?

Replacing Engel Hall's old autoclave with the model in this proposal will conserve. . .

- 150,000 gallons of water per year (see Part III D) -- enough water to take 4,200 baths with.
- 12,500 kWh of energy per year (see Part III D) – as much power as one or two -80°C freezers use in a year.

**Conserving Water** (150,000 gallons per year):

The autoclaves in Engel Hall consume water in two forms: steam from the campus Central Steam Plant<sup>1</sup>, and the domestic water supply. The steam decontaminates the contents loaded into the autoclave, and at the end of the cycle, domestic water is flushed through the jacket to cool the contents. Our old autoclave continues circulating steam and water when it is not in use. Water conservation features on modern autoclaves are a laboratory improvement with significant and measured efficiency and cost benefits. The autoclave we propose to replace our old one with would conserve water and steam by establishing some control over the "idle" water and steam usage, and it is designed to use less water per cycle. Including the "Green Gravity Water Saving" option, a holding tank that allows steam to cool partially on its own, would conserve an additional ~4000 gallons of water a year (See Part III D for calculations.) (CACR Points #1, #4, #10)<sup>2,3</sup>.

By conserving water, this initiative supports VT Policy 5505: Campus Energy, Water and Waste Reduction; and VT Unique GOS 7.3 to "Improve water-use efficiency of new and existing buildings." It can also bring Engel Hall closer to LEED certification.<sup>5</sup> (CACR Point #1 and #6)<sup>2,3</sup> This purchase can help Virginia Tech maintain its STARS Gold Rating (through OP-22: Water Consumption and OP-3: Building and Operations and Maintenance)<sup>4</sup>, and excel in other conservation metrics.

**Conserving Energy** (12,500 kWh per year):

A new autoclave would provide more control over the steam consumed when the autoclave is not in use. The autoclaves in Engel Hall consume steam produced by the VT Central Steam Plant. Currently, two of the plant's five boilers are powered by coal,<sup>1</sup> which emits high amounts of CO<sub>2</sub>. If 2/5 of the energy saved by installing a new autoclave can be attributed to a reduction in burned coal, and 3/5 to natural gas, then **3700 pounds of coal** and **5.3 tons of greenhouse gas** will be conserved every year<sup>6</sup> until the coal boilers are phased out. (See Part III D for steam and energy estimates.) (CACR Points #1, #3, #4, #7, #10)<sup>2,3</sup>

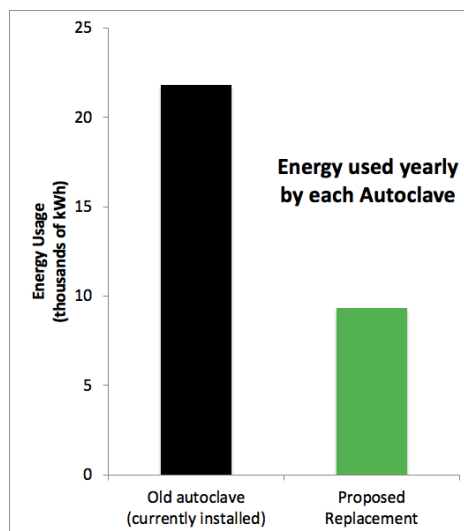
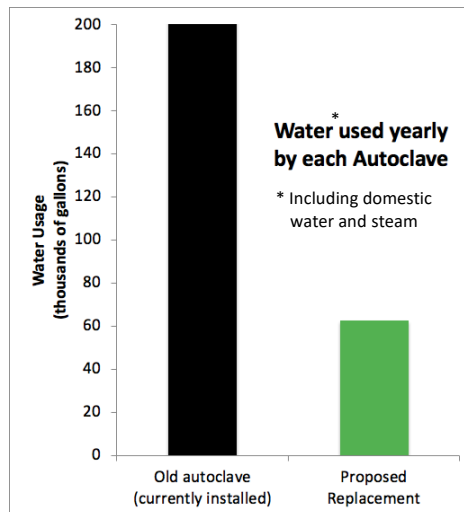
This improvement can contribute to a STARS Gold rating through the OP-1: Greenhouse Gas Emissions, OP-3: Building and Operations and Maintenance, and OP-5: Building Energy Consumption portions of Virginia Tech's STARS report.<sup>4</sup>

**General:**

Adopting the use of water- and energy-efficient autoclaves for biological research will solidify Virginia Tech's reputation as a campus dedicated to sustainable technology and infrastructure (CACR Point #1). This project would also promote the idea of sustainable laboratory infrastructure and practices more generally, and serve as a positive example of collaboration between Virginia Tech students, faculty, and staff on projects that promote sustainability. This project can bolster the presence of the campus Green Lab initiative, and can be advertised to a wider audience through social media, our organization's and the Biochemistry department's websites, and the department's newsletter (CACR Points #1, 10).

**Sources:**

- 1) <https://www.facilities.vt.edu/energy-utilities/central-steam-plant.html>
- 2) [https://www.facilities.vt.edu/content/dam/facilities\\_vt\\_edu/sustainability/climate-action-commitment.pdf](https://www.facilities.vt.edu/content/dam/facilities_vt_edu/sustainability/climate-action-commitment.pdf)
- 3) [https://www.facilities.vt.edu/content/dam/facilities\\_vt\\_edu/sustainability/Sustainability-Plan.pdf](https://www.facilities.vt.edu/content/dam/facilities_vt_edu/sustainability/Sustainability-Plan.pdf)
- 4) <https://reports.aashe.org/institutions/virginia-tech-va/report/2017-12-19/>
- 5) <https://www.steris.com/about/hse/stewardship>
- 6) <https://duluthmn.gov/energy/greenhouse-gas-calculator/>



C. What is the cost of your proposal? Please describe in adequate detail the basis for your cost estimate.

**Budget Cost: \$42,723**

We have obtained quotes for different autoclaves, and have chosen the STERIS 250LS model with basic features (\$32,297.88) plus the Green Gravity Water Saving option (\$1,050). Our total budget cost estimate includes installation, maintenance coverage for the first and second year after purchase, and removing the old autoclave. (See pg. 8-11 for STERIS quotes).

With the Biochemistry department's contribution of \$6,000, the proposal's cost to the Green RFP program would total **\$36,723**.

D. Will your proposal produce cost savings for the University? If so, how much? Please describe in adequate detail the basis for your savings estimate.

Anticipated payback for the new autoclave is 15.8 years, well within the lifetime of the equipment. (See pg. 5-17 for data used in the following calculations.)

### Rates

water cost/gallon	Sewer cost/gallon	Total cost Water /gallon	Steam cost/MBtu	Cycles Autoclave used/Year
\$0.0037 <sup>1</sup>	\$0.00851 <sup>2</sup>	\$0.01221	\$8.50 <sup>3</sup>	730 <sup>4</sup>

### Steam & Energy Usage

Autoclaves	Pounds/cycle	Idle pounds/hour	Idle hours/year	Steam pounds/Year	kWh/Year
Old autoclave (currently installed) <sup>5</sup>	21	7	8,036	71,579	21,831
Proposed Replacement <sup>6</sup>	21	7	2,192	30,671	9,355

Steam pounds per year = [(Cycles per year) x (Pounds/cycle)] + [(Idle hours/year) x (Idle pounds/hour)]

kWh/year = 0.305<sup>9</sup> x Steam pounds per year

### Domestic Water Usage

Autoclaves	Gallons/cycle	Idle gallons/hour	Idle hours/year	Gallons domestic water/Year
Old autoclave (currently installed) <sup>5</sup>	164	10	8,036	200,075
Proposed Replacement <sup>6</sup>	64.5	1	8,036	55,121

Gallons domestic water / Year = [(Cycles per year) x (Gallons/cycle)] + [(Idle gallons/hour) x (Idle hours/year)]

### Maintenance Cost

6,517.13<sup>8</sup> ÷ 4 past years ÷ 2 autoclaves = \$815 per year

### Savings Totals

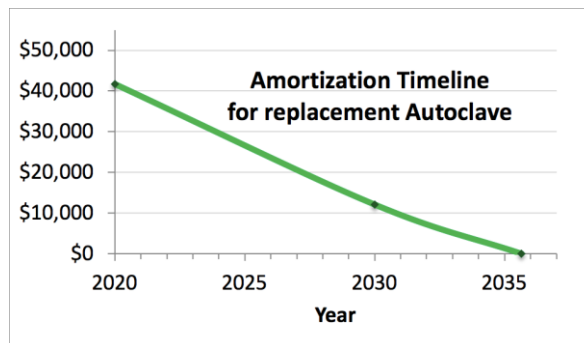
Autoclave	kWh saved Yearly	Gallons <sup>9</sup> of steam water saved Yearly	Domestic water saved Yearly (gallons)	Utility \$ saved Yearly	Maintenance savings (10 years)	Cost	Payback (Years)
Proposed Replacement	12,477	4,901	144,955	\$2,191	\$8,146	\$42,723	15.8

Utility \$ saved Yearly = [(Steam MBtu save<sup>7</sup>) x (Steam cost<sup>3</sup>)] + [(Total Water saved) x (water and sewer rate)]

Payback Years = [(Quoted cost) - (10 years future maintenance)] / (Utility \$ saved Yearly)

### Sources:

- 1) New River Valley Regional Water Authority: (540) 639-2575
- 2) Public Service Authority: (540) 382-6930
- 3) Lowell Jessee, PE, CEM, LEED-AP Energy Engineer (ljessee@vt.edu)
- 4) Autoclave log (pg. 6)
- 5) See pg. 7, 12
- 6) See pg. 12
- 7) <https://www.abraxasenergy.com/energy-resources/toolbox/conversion-calculators/energy/>
- 8) Maintenance costs on pg. 6
- 9) <https://metric-calculator.com/convert-gal-to-lb.htm>



E. Is this funding request an Ongoing or One-Time change (please check one)?

One-time       Ongoing

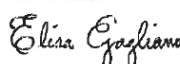
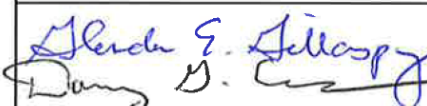

F. Is funding available for this request from another source? If yes, describe the funding (source, amount, etc.)

The Virginia Tech Biochemistry department has committed to contribute \$6,000 towards the purchase of a new, sustainable autoclave. For questions regarding this contribution please contact Glenda Gillaspay Virginia Tech Biochemistry Department Head, gillaspay@vt.edu. This proposal was initiated and designed by students under the advisement of faculty and staff on campus and would complement the other efforts individuals and laboratories in the Biochemistry department have made to decrease waste and increase sustainability.

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### SUSTAINABILITY INITIATIVES BY STUDENT ORGANIZATIONS FUNDING PROPOSAL

Part IV- Requestors/Reviewers		
 Elisa Gagliano		11-7-19
Prepared By (Name of Contact for Student Organization)		Date
	Glenda Gillaspay - Biochemistry Department Head	11-7-19
	Denny Eanes - Electronic Technician - Biochemistry	11-7-19
Reviewed By (Name of Appropriate University Official)		Date
Denny Cochrane		2/17/20
Reviewed By (Name of Office of Sustainability Representative)		Date



**3000 CONVERSION KITS  
POST-CONVERSION  
CHECK-OUT AND TEST**

Unit WAS Built in 1979

Service Technician: TIM WEBSTER Clock # 43154 Reg. Office: 41903 Date: 5-13-03  
 Account Name: VA. TECH  
 A/R Number: 24802 City: BLACKSBURG State: VA.  
 Serial Number: 0129279-102 Est. Conversion Date: 5-13-03

Please Print Legibly

(Refer to Test Section at the end of the Conversion Instructions)

SECT #	TESTS	PASS	FAIL
5	Loss Of Power Test	✓	
6	Water Switch Test	NA	
7	Solenoid Valves Test	✓	
8	Safety Valve Test (if replaced)	NA	
10	Leak Test Cycle (vac only)	NA	
12	Manual Operation	NA	

SECT #	ADJUSTMENTS	COMPLETE
6	Door Switch Adjustment	✓
8	Hi-Lo Valve Setting Low ≈ 20 psig High ≈ 33/34 psig	✓
		✓
9	Sensor Calibration Pressure Temperature	✓
		✓
11	Chart Cycle High Temperature Low Temperature	NA
		NA
		NA

REMARKS: \_\_\_\_\_

THIS DOES NOT INCLUDE APPLICABLE TAXES.		TOTAL AMT: <u>11,458.55</u>
STERIS TECHNICIAN/DATE <u>TIM WEBSTER</u>		
THIS IS NOT AN INVOICE. AUTHORIZING SIGNATURE INDICATES THE SERVICES LISTED ABOVE WERE PERFORMED.		

Attach copies of tapes with Low and High Temperature Chart Cycles to this form before returning.

Signature: \_\_\_\_\_

Date: 5-13-03

# AUTOCLAVE USE LOG

Please Sign In For All Loads

Autoclave Location \_\_\_\_\_  
 Autoclave Model \_\_\_\_\_ 2021 \_\_\_\_\_  
 Verify Sterility Before Discarding Waste

Date	User	Room#	Time		Cycle				Load Sterility Verified By C.I.?	
			IN	OUT	#1 Liquid 20 min.	#2 Liquid 30 min.	#3 Gravity 15 min.	#4 Liquid 60 min.		Biohazardous Waste? X For Yes
8/16/19	Uska	123	11:33							
8/16/19	Uska	119	3:59							
8/18/19	Bela	123		6:05						
8/19/19	Robert Jankovics	202/204	10:10							
8/19/19	Bela Jankovics	202/204	10:40							
8/21/19	Emang	109	15:15							
8/21/19	Bela	123	8:30							
8/22/19	Kevin	202	9:30							
8/22/19	Mari	205	10:45							
8/22/19	Bela	123	5:00							
8/23/19	Monica Vojtkova	301	15:32							
8/23/19	Uska	307	1:40							
8/25/19	Uska	307	10:30							
8/26/19	Kevin	202	9:50							

Date	Cost \$	Parts
20151019	236.9	Two valve repair kits
20161011	62.15	Touch switch panel Eagle 3000
20161011	962.23	Power supply assy
20170224	707.49	Pressure transducer
20171219	1801.75	Printer assy. see opt. 744
20190812	1948.77	Printer assy. see opt. 744
20190912	641.24	Two sol vlv: 3/8 in. npt
20191010	147.16	Two touch switch pnl-EAGL3000
TOTAL	6507.69	
	1626.9225	Average per year
	813.46125	Average per year for single autoclave

Maintenance records available upon request.

## **Eanes, Danny**

---

**From:** Asplund, Leena <Leena\_Asplund@steris.com>  
**Sent:** Tuesday, October 29, 2019 8:28 PM  
**To:** Eanes, Danny  
**Cc:** Barton, Jr., Jim  
**Subject:** RE: STERIS Autoclaves 16" and 20"

Danny,

Per our discussion earlier this week – this is what I received from engineering:

**Water consumption:**

Eagle 3000 20" x 20" x 38" 15 gpm peak and 164 gal per cycle

Amisco 250LS 20" x 20" x 38" 6 gpm and 55 gal per cycle (45 min total cycle time)

Why the new units use less water is because of different design being used, drain water cooling controlled by temperature probe, CVs of valves are different.

Generally I would also say that insulation in new autoclaves is better and more durable.

I hope this information is for some help in justification process.

Best,

Leena

**Leena T Asplund**

Account Manager - Capital Equipment Solutions (NC, SC, VA, WV, KY, TN)

STERIS Corporation | Life Sciences

440-354-2600 | 800-444-9009


Direct: 800-989-7575 ext.20843

Mobile: 603-365-1409

Fax: 440-350-7077


E-Mail: [Leena\\_Asplund@steris.com](mailto:Leena_Asplund@steris.com)

Web: [www.sterislifesciences.com](http://www.sterislifesciences.com)

Item	Equipment #	Description	Quantity	Extended Discount Price
1.0000	SF5213011110000000	 <p><b>AMSCO® 250L S Small Steam Sterilizer, 20" x 20" x 38" (508 x 508 x 965 mm)</b> STERIS Amasco 250L S Small Scientific Laboratory Steam Sterilizer is STERIS Corporation's most advanced line of steam-jacketed small sterilizers with a chamber size of 20 x 20 x 38" (508 x 508 x 965 mm). The manual operated vertical sliding door Amasco 250L S sterilizer is equipped with the latest features in both state-of-the-art technology and ease of use including an Allen-Bradley Micrologix (TM) control system with enhanced functionality and A-B PanelView Plus (TM) 600 interface screen and modularized vessel and piping for increased dependability and reduced servicing time. Door seal is steam-activated, requires no lubrication and warranted for 2 years. Pressure vessel is warranted for 15 years.</p> <ul style="list-style-type: none"> <li>• AMSCO 250L S Scientific Laboratory Steam Sterilizer</li> <li>• Prevacuum</li> <li>• Manual Vertical Sliding Door(s)</li> <li>• Single Door</li> <li>• Single Door Cabinet</li> <li>• Standard Piping: Brass and Copper Threaded</li> <li>• Plant Steam</li> <li>• 120V, 1 Ph (for line steam only)</li> <li>• English Language</li> </ul>	1	30,028.70
2.0000	FV021005 GTN: 00724995150495	<p><b>Loading Rack &amp; Two Shelves-20X20X38" Sterilizer For Single Door Unit Only</b></p>	1	1,344.85
3.0000	SE011242	<p><b>Installation - 20 Inch Lab 250(LS) Steam Sterilizer</b> STERIS Installation Service Package includes all necessary labor (non-union) and materials required to do the following:</p> <ul style="list-style-type: none"> <li>• Uncrate the equipment at the site and inspect for shipping damage</li> <li>• Assemble or re-erect the equipment</li> <li>• Assemble equipment piping packages and accessories where provided</li> <li>• Install standard final panels where provided</li> <li>• Move the equipment to specified facility location. Customer to provide clear, unimpeded ingress to installation site. No special rigging or rigging equipment is included in this scope unless previously addressed and priced</li> <li>• Put the equipment into its place and level it (see Seismic restrictions)</li> <li>• Make all air, steam, water &amp; drain utility connections from building termination to the equipment (maximum of 6ft/1.8m) using flexible or hard-piping* according to local regulations. Proper disconnects, isolation valves, wall or ceiling penetrations to be provided by others. *Flexible or hard-piping must be specified in advance through contact with the STERIS District Service Manager.</li> <li>• Make electrical connections to the equipment, a service which includes one of the following which must also be specified in advance through contact with the STERIS District Service Manager: Either: supply and fit electrical cable from the junction box within 6ft/1.8m of unit to the STERIS equipment electrical connection point according to local regulations. Wall or ceiling penetrations and Junction / Isolation / disconnect box to be supplied by others. Or: The final termination / connection of the cable (supplied by others) to the STERIS equipment electrical connection point according to local regulations.</li> </ul> <p>Customer is responsible for receiving the equipment and disposing of packing materials. Once the equipment has been received, please contact STERIS to schedule installation.</p> <p>Price is for normal working hours. Monday – Friday 8 am -5 pm unless otherwise noted. Please refer to the STERIS terms and conditions of installation found later in this quotation for a more detailed description of the scope of work.</p>	1	2,725.00



Item	Equipment #	Description	Quantity	Extended Discount Price
4.0000	<b>SHIPPING &amp; HANDLING CHARGES</b>	STERIS's designated carriers are extensively trained to best handle our complex equipment needs and ensure safe and timely delivery of all products. Our carrier representatives work to ensure accurate deliveries specific to your timeline as well as problem resolution should there be any delays, damages or redelivery required.	1	1,199.23
<b>Quote Total Excluding Taxes</b>				<b>35,297.78</b>
<b>Currency:</b>				
<b>USD</b>				

Item	Equipment #	Description	Quantity	Extended Discount Price
1.0000	SF5213011110000000	 <p><b>AMSCO® 250LS Small Steam Sterilizer, 20" x 20" x 38" (508 x 508 x 965 mm)</b>                      STERIS AmSCO 250LS Small Scientific Laboratory Steam Sterilizer is STERIS Corporation's most advanced line of steam-jacketed small sterilizers with a chamber size of 20 x 20 x 38" (508 x 508 x 965 mm). The manual operated vertical sliding door AmSCO 250LS sterilizer is equipped with the latest features in both state-of-the-art technology and ease of use including an Allen-Bradley MicroLogix (TM) control system with enhanced functionality and A-B PanelView Plus (TM) 600 interface screen and modularized vessel and piping for increased dependability and reduced servicing time. Door seals is steam-activated, requires no lubrication and warranted for 2 years. Pressure vessel is warranted for 15 years.</p> <ul style="list-style-type: none"> <li>• AMSCO 250LS Scientific Laboratory Steam Sterilizer</li> <li>• Prevacuum</li> <li>• Manual Vertical Sliding Door(s)</li> <li>• Single Door</li> <li>• Single Door Cabinet</li> <li>• Standard Piping: Brass and Copper T threaded</li> <li>• Plant Steam</li> <li>• 120V, 1 Ph (for line steam only)</li> <li>• English Language</li> </ul>	1	30,028.70
2.0000	VP01	Vacuum pump in place of venturi	1	3,141.45
3.0000	GGWSS	Green Gravity Water saving option	1	1,050.00
4.0000	STERIGREEN	STERI GREEN Water Saver (without access to chilled water)	1	7,050.00
5.0000	FV021005 GTIN: 00724995150495	Loading Rack & Two Shelves-20X20X38" Sterilizer For Single Door Unit Only	1	1,344.85

Item	Equipment #	Description	Quantity	Extended Discount Price
6.0000	SE011242	<p><b>Installation - 20 Inch Lab 250(LS) Steam Sterilizer</b></p> <p>STERIS Installation Service Package includes all necessary labor (non-union) and materials required to do the following:</p> <ul style="list-style-type: none"> <li>• Uncrate the equipment at the site and inspect for shipping damage</li> <li>• Assemble or re-erect the equipment</li> <li>• Assemble equipment piping packages and accessories where provided</li> <li>• Install standard final panels where provided</li> <li>• Move the equipment to specified facility location. Customer to provide clear, unimpeded ingress to installation site. No special rigging or rigging equipment is included in this scope unless previously addressed and priced</li> <li>• Put the equipment into its place and level it (see Seismic restrictions)</li> <li>• Make all air, steam, water &amp; drain utility connections from building termination to the equipment (maximum of 6ft/1.8m) using flexible or hard-piping according to local regulations. Proper disconnects, isolation valves, wall or ceiling penetrations to be provided by others. *Flexible or hard-piping must be specified in advance through contact with the STERIS District Service Manager.</li> <li>• Make electrical connections to the equipment, a service which includes one of the following which must also be specified in advance through contact with the STERIS District Service Manager: Either: supply and fit electrical cable from the junction box within 6ft/1.8m of unit to the STERIS equipment electrical connection point according to local regulations. Wall or ceiling penetrations and Junction / isolation / disconnect box to be supplied by others. Or: The final termination / connection of the cable (supplied by others) to the STERIS equipment electrical connection point according to local regulations.</li> </ul> <p>Customer is responsible for receiving the equipment and disposing of packing materials. Once the equipment has been received, please contact STERIS to schedule installation.</p> <p>Price is for normal working hours, Monday – Friday 8 am -5 pm unless otherwise noted. Please refer to the STERIS terms and conditions of installation found later in this quotation for a more detailed description of the scope of work.</p>	1	2,725.00
7.0000	SE0112410045	<p><b>1st Year Preventive Maintenance - Lab 250(LS) Steam Sterilizer</b></p> <p>The STERIS 1st Year Premier Plus service agreement is a preventative maintenance program designed to keep new STERIS equipment operating according to manufacturer's requirements throughout the warranty period. Inspection(s) are conducted using the appropriate STERIS Preventive Maintenance Checklist and any necessary PM parts, lubricants, testing and adjustments are included. Expendable and consumable parts are not covered in this program. Please note that this service is complementary to but independent of the STERIS warranty program.</p>	1	2,250.00
8.0000	SE0112452	<p><b>2nd Year Comprehensive - Lab 250(LS) Steam Sterilizer</b></p> <p>Comprehensive is all-inclusive service coverage: parts, labor and travel for all scheduled Preventive Maintenance inspections and unlimited repairs are included. Excluded from coverage are accessories and consumable/expendable items.</p>	1	4,125.00
9.0000	SHIPPING & HANDLING	<p><b>CHARGES</b></p> <p>STERIS's designated carriers are extensively trained to best handle our complex equipment needs and ensure safe and timely delivery of all products. Our carrier representatives work to ensure accurate deliveries specific to your timeline as well as problem resolution should there be any delays, damages or redelivery required.</p>	1	1,199.23
Currency: USD		<b>Quote Total Excluding Taxes</b>		<b>52,914.23</b>

# STERIS Amsco 250LS autoclaves

## Technical data

<https://www.sterislifesciences.com/products/steam-sterilizers/steam-sterilizers/small-steam-sterilizers>  
> Technical data > pg. 3, 11

11/6/19 email from Leena Asplund  
(Leena\_Asplund@steris.com)

## ENVIRONMENTAL SUSTAINABILITY

### Automatic Utilities Startup/Shutdown

This feature permits slow cooling of the entire vessel and load. Shutdown may be programmed to activate at the end of any designated cycle or time of day. When activated, control system automatically shuts off all utility valves, conserving steam and water usage. Sterilizer utilities can be restarted either by programmed time or manual operation. A different shutdown and restart time can be programmed for each day.

### Green Mode

The Green Mode is a standard feature on the control that will shut off the steam to the jacket after the unit has sat idle for a specified period of time. The specific time frame is determined by the user and entered into the control during set up; it can be changed at any time.

### Green Gravity Water Saver System

The Green Gravity Water Saver System provides additional water savings by collecting steam effluent and holding it in a cooling tank, reducing the amount of water required to cool the effluent.

### STERI-GREEN® Water Conservation System

This system significantly reduces the consumption of potable water. The STERI-GREEN system utilizes a mixing tank and an air-cooled heat exchanger to cool and recycle vacuum pump water and steam effluent. Water temperature is constantly monitored to minimize the need to add fresh cool water to the mixing tank. The end result is water savings in the range of 45 to 55% per sterilization cycle over the vacuum pump alone, or 70-80% over a water ejector. When ordered, system includes a vacuum pump (3-phase power required).

Cost of cold water \$/Liter:	0.0013
Cycles per day:	5
Days/Year	260

	Ejector	Vacuum Pump	Steri-Green	Steri-Green Plus	Green Gravity System with Vac pump	WE & closed Loop Chilled water system (drain only)
Water Usage/Cycle (L)	208	125	26	0.4	104	170
Cost/Cycle	0.28 \$	0.17 \$	0.04 \$	0.00 \$	0.14 \$	0.23 \$
Water Usage/Day (L)	1041	625	132	2	520	852
Cost/Day	1.38 \$	0.83 \$	0.18 \$	0.00 \$	0.69 \$	1.13 \$
Water Usage/Year (L)	270657	162394	34447	492	135328	221446
Cost/Year	358 \$	215 \$	46 \$	0.65 \$	178.75 \$	292.50 \$
% of Savings		40%	87%	99.8%	50.0%	18.2%
Saving/Year (L)		108263	236210	270165	135328	49210
Saving/Year (\$)		143 \$	312 \$	357 \$	179 \$	65 \$

Model & Chamber Size in (mm)	Heating	UTILITIES CONSUMPTION								
		Water <sup>c</sup>						Steam		
		Cold			Hot <sup>d</sup>			Peak <sup>f</sup> lb/hr (kg/hr)	Per Cycle <sup>e</sup> lb/cycle (kg/cycle)	Idle lb/hr (kg/h)
		Peak gpm (lpm)	Per Cycle <sup>e</sup> gal/cycle (l/cycle)	Idle gph (lph)	Peak gpm (lpm)	Per Cycle <sup>e</sup> gal/cycle (l/cycle)	Idle gph (lph)			
AMSCO 110LS 16 x 16 x 26 (406 x 406 x 660)	Steam	6 (23)	68 (257)	7 (27)	N/A	N/A	N/A	180 (81)	18 (8)	7 (3)
	Electric	6 (23)	68 (257)	7 (27)	1 (4)	3 (11)	1 (4)	N/A	N/A	N/A
AMSCO 250LS 20 x 20 x 38 (508 x 508 x 965)	Steam	6 (23)	70 (265)	10 (38)	N/A	N/A	N/A	180 (81)	21 (10)	7 (3)
	Electric	6 (23)	70 (265)	10 (38)	1 (4)	4 (15)	1 (4)	N/A	N/A	N/A

Sales Rep	Pete Conley	Quote #	12627-1
Sales Rep Phone #	(804) 869-5949	Quote Date	November 4, 2019
Sales Rep Email	compassresourcesllc@gmail.com	Expiration Date	December 4, 2019

**Quote To:**  
 Virginia Tech  
 Elisa Gagliano  
  
 Blacksburg, VA 24061  
 (505) 363-6310  
 elisag1@vt.edu

**Ship To:**  
 Virginia Tech  
 Elisa Gagliano  
 Blacksburg, VA 24061  
 (505) 363-6310  
 elisag1@vt.edu

We are pleased to submit the following quotation for your consideration:

Line	Description	Qty.	Extended Price
1.0	<b>Model 3AV: 20" x 20" x 38" chamber single door sterilizer with the following features:</b>	1	\$32,580.00
	<b>Selected Options</b>		
	X1 Controls: 7" Color Touchscreen, 2 programmable cycles (gravity & liquid only) Impact Printer Controls: 110 Volts, 60 Hz (Standard) Controls Mounted on Right Side 316L Stainless Steel Chamber with Carbon Steel Jacket Standard Finish (Passivated Chamber) House Steam Gravity Air Removal with Economy Post-Vacuum Drying System Brass, Bronze, and Copper Piping EZ-Glide Vertical Sliding Door with Non-Stick Gasket Cabinet Mounting with Stainless Steel Front and Side Panels (Standard) WaterEco® Basic with Automatic Wastewater Cooling Emergency Stop Button Whisper-Quiet On-Board Air Compressor (Supplied if house air is not available) 2 Shelves - 1 Stationary Bottom Shelf & 1 Stationary Upper Shelf (Standard) Custom Hardware Configuration - Final drain connection 1 inch female thread, 1 connection point for incoming water connections, 1/2 inch cross fitting in chamber drain for external temp probe for service, 1/2 inch WWC valve for WaterEco. Steam line drip leg and trap installed.		
	<b>Standard Features</b>		
	EcoCalendar & Auto Idle Shut-Off capability for energy efficient control of steam ASME (American Society of Mechanical Engineers) U-1 Code Stamping 1/2" Thermocouple Port UL, cUL Listed End-of-Cycle Vacuum Drying Fully Opening Front Service Panel CSS Starter Kit including C3 cleaner and scrubbing pads, a pair of autoclave gloves, printer paper and printer ribbon (if applicable), and electronic manuals		





<b>Installation for Line 1</b> Installation Level 4 (Turnkey): Includes receiving sterilizer, uncrating, setting into place, leveling, final assembly, final utility connections, start-up, and user training. Does not include permitting or inspections. De-installation and removal of existing sterilizer including de-installation, disconnection of all existing utilities, and removal of sterilizer from customer site. Does not include replacement of any site-required equipment.	<b>\$7,750.00</b>
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Pricing Summary	
<b>Total Base Configuration Price</b>	<b>\$32,580.00</b>
<b>Additional Options Total</b>	<b>\$0.00</b>
<b>Installation Total</b>	<b>\$7,750.00</b>
<b>Shipping &amp; Handling: FOB Destination</b>	<b>\$942.00</b>
Additional services such as liftgate, inside delivery, or guaranteed shipments not included unless otherwise specified. Please contact Consolidated if additional services are required.	
<b>Grand Total: \$41,272.00</b>	

Thank you for your interest in Consolidated Sterilizer Systems!

Terms and Conditions:

\*Domestic Quote Terms/Warranty: <https://www.consteril.com/domestic-quote-terms-and-conditions/>

\*International Quote Terms/Warranty: <https://www.consteril.com/international-quote-terms-and-conditions/>

For questions about your quotation, please contact your sales representative, Pete Conley, at (804) 869-5949.

Please email all purchase orders to [sales@consteril.com](mailto:sales@consteril.com)

**Please Remit to: 3 Enterprise Road, Suite C, Billerica, MA 01821**

**Purchase orders must reflect this address to be accepted.**



# Consolidated Sterilizer Systems 3AV

## Technical data

<https://consteril.com/wp-content/uploads/2018/08/CSS-Small-EZ-Glide-Lab-Series-Spec-Sheet-high-res.pdf>  
> pg. 3, 8, 13

### EcoCalendar™

The X1 controls are equipped with a calendar-based automatic start-up and shut-down feature known as EcoCalendar. This feature helps minimize utility consumption and HVAC load through a software controlled, automatic steam shut-off program. Utilities can be programmed for automatic start-up and shut-down based on time of day and day of the week.

### Auto Idle Shut-Off

Like the EcoCalendar, this feature helps save energy by shutting the autoclave off when not in use. It functions similarly to a "sleep-mode" for your home computer. Simply set the desired idle time and the autoclave will enter Sleep Mode after the set idle time has elapsed.

### WaterEco® Water Saving Systems

The Consolidated WaterEco® Water Saving Systems reduce water consumption to the autoclave by up to 99%. Factory or field installed. Available on gravity and pre-vacuum units in the following configurations:

- **WaterEco® Basic:** Reduces cooling water by up to 90% without the use of electricity. This system functions by collecting autoclave drainage into a cooling reservoir. This effluent is cooled using a combination of air, previously cooled effluent and a minimal amount of cold water.
- **WaterEco® Plus:** Reduces cooling water consumption by up to 99% through a stainless steel heat exchanger that utilizes a facility chilled water supply. This system virtually eliminates once-through cooling water.
- **WaterEco® Vac Plus:** This full recovery system reduces water consumption by the vacuum and cooling systems by up to 99%. Designed to integrate with pre-vacuum autoclaves when facility chilled water is readily available. This system is the best solution to minimize water consumption.

Table 7: Power and Steam Usage<sup>15</sup>

Power and Steam Usage			Electrically Heated				Steam Heated			
Model	Chamber Dimensions (w x h x f-b)	Air Removal Method	Generator Size (KW)	Generator Current (amps) <sup>16</sup>				Steam Consumption		
				208V	240V	380V	480V	Peak (lb/hr)	Per Cycle (lb/cycle)	Idle (lb/hr)
3AV	20" X 20" X 38" 50.8 X 50.8 X 96.5 cm	Gravity	25	69	60	37	30	180	20	7
		Vacuum	25	69	60	37	30	180	35	7
26AV	26" x 26" x 39" 66 x 66 x 99 cm	Gravity	25	69	60	37	30	180	35	9
		Vacuum	30	83	108	46	36	180	55	9
26BV	26" x 26" x 49" 66 x 66 x 124.5 cm	Gravity	30	83	108	46	36	180	40	9
		Vacuum	45	125	108	68	54	180	70	9
26CV	26" x 26" x 67" 66 x 66 x 170.2 cm	Gravity	30	83	108	46	36	180	45	10
		Vacuum	45	125	108	68	54	180	75	10

15) Assuming 30 Minute sterilizing time at 250°F (121°C) and 5 minute drying time.

16) Nominal current drawn by a 3-phase generator. Local codes and regulations may affect breaker size. Single phase available if required.

Table 8: Water Consumption (Per Chamber)<sup>17</sup>

Model	Chamber Dimensions (w x h x f-b)	Air Removal Method	Water Consumption							
			Cold Water				Hot/Treated Water			
			Peak (gpm)	Per Cycle (gal/cycle)	Per Cycle With WaterEco™ Basic (gal/cycle)	Idle (gph)	Idle With WaterEco™ Basic (gph)	Peak (gpm)	Per Cycle (gal/cycle)	Idle (gph)
3AV	20" X 20" X 38" 50.8 X 50.8 X 96.5 cm	Gravity	6	58	46	9	1	1	3	1
		Ejector	6	93	87	9	1	1	4	1
		Vac Pump	6	34	27	9	1	1	4	1
26AV	26" x 26" x 39" 66 x 66 x 99 cm	Gravity	6	69	48	10	1	1	4	1
		Ejector	6	116	104	10	1	1	7	1
		Vac Pump	6	50	38	10	1	1	7	1
26BV	26" x 26" x 49" 66 x 66 x 124.5 cm	Gravity	6	75	49	10	1	1	5	1
		Ejector	6	130	115	10	1	1	9	1
		Vac Pump	6	60	45	10	1	1	9	1
26CV	26" x 26" x 67" 66 x 66 x 170.2 cm	Gravity	6	87	50	11	1	1	6	1
		Ejector	6	154	134	11	1	1	9	1
		Vac Pump	6	77	57	11	1	1	9	1

17) Assuming 30 minute sterilizing time at 250°F (121°C) and 5 minute drying time.

# QUOTATION



Quote Number: 003919  
Date: 11/04/2019

Virginia Tech  
595 Laurel Grove Road  
Winchester, VA 22602

Elisa Gagliano  
(505) 363-6310  
elisag1@vt.edu

Priorclave North America Inc  
47526 Clipper St., #701142  
Plymouth, Michigan 48170

Barbra Wells  
800-748-1459  
barbra@priorclavena.com



## Product Pricing and Features

QTY	Product Code	Product	Description	List Price	DISC	Total Price
1.0	PNA/QVA/EH320M	Front Loading 320L Vacuum Drying Priorclave	ASME & ETL Compliant. Combined Pre-Cycle Vacuum, Vacuum Cooling and Vacuum Drying - Liquid Ring Vacuum Pump. Includes Pre-Cycle Vacuum, Vacuum Cooling and Vacuum Drying with 5 program memory.	42,210.00	20.0%	33,768.00
1.0	PNC/COM/USB	External USB Port	Records temperature, pressure, time, and cycle data for export, and for remote diagnostic purposes.	0.00	0.0%	0.00
1.0	PNC/DRC/020	Drain Condenser	Cools effluent prior to release.	1,495.00	20.0%	1,196.00
1.0	PNC/SPK/V6HE	Vac Q63 Front Loader Spares Kit	Includes spare parts for Service and Preventative Maintenance on Vacuum Front Loading 320L & 400L units, including valves, gaskets, and probes.	4,425.00	15.0%	3,761.25
1.0	PNC/AEC/020	Export Case (ISPM15)	Suitable for export freight - with Tilt indicators	1,010.00	20.0%	808.00
1.0	PNC/000/02	Sea Freight	Includes delivery to the ground floor premises near the door, dock, or delivery entrance.	2,500.00	0.0%	2,500.00

**Total Base Price 42,033.25**

## Optional Items

QTY	Product Code	Product	Description	List Price	DISC	Total Price
1.0	PNC/PRN/000	Tactrol® Printer	Provides a built-in printed log of cycle data.	1,305.00	15.0%	1,109.25
1.0	PNC/TKI	Installation & Training	Authorized Service Agent to install & commission unit(s) and train selected users. Customer to supply and fit electrical connections and provide drain or floor sink as needed. Validates the warranty.	3,500.00	0.0%	3,500.00

**Subtotal of Optional Items: 4,609.25**

**Total with All Options USD 46,642.50**



# Priorclave (320L)

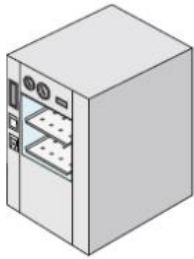
Additional information

<https://chesc.org/wp-content/uploads/UCR-Autoclave-study-2016-PROCUREMENT-DF.pdf>  
> slide 9

<http://priorclavena.wpengine.com/wp-content/uploads/2016/03/Is-Your-Autoclave-Bleeding-You-Dry.pdf>  
> pg. 1

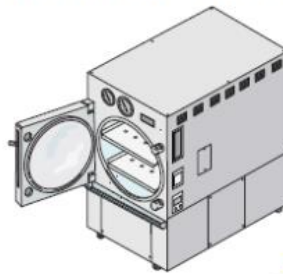
## What are the other options on the market ?

### Medical Grade



High-throughput  
24 x 7 Operation  
Square Chambers

### Research Grade

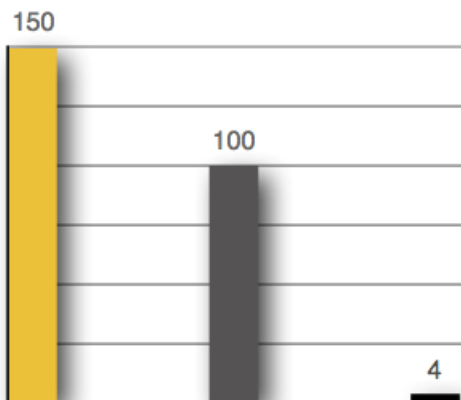


Capacity up to: 500 Liters

Need warm up  
time  
Cycles are longer

< 5 cycles/day  
Lowest Cost  
Round Chambers

Use only 45 gal/cycle 18kW on-demand steam  
No single pass cooling water 16,000 kWh/year for 5 cycle/day



### COMPARABLE PER-CYCLE STEAM STERILIZER WATER CONSUMPTION (IN GALLONS)

- Standard Medical-Grade Autoclave
- "Water Conserving" Medical-Grade Autoclave
- Research-Grade Autoclave