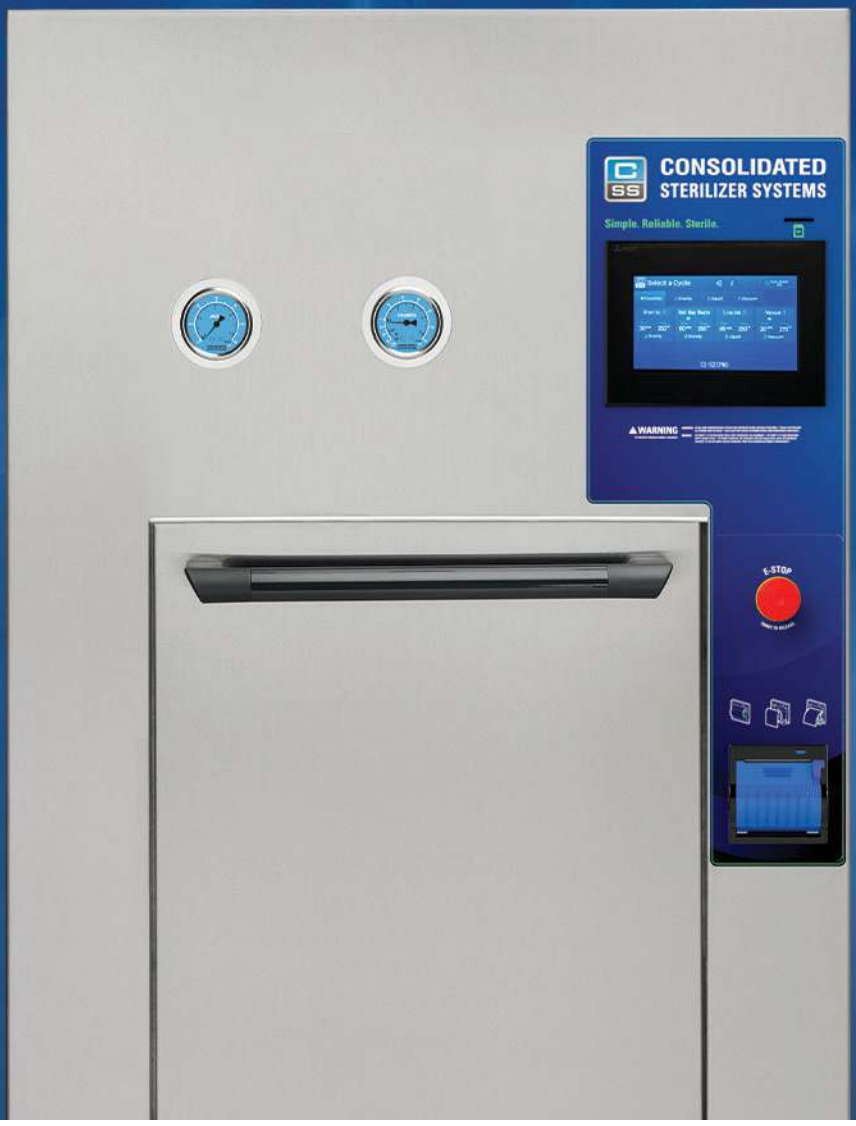
CONSOLIDATED
STERILIZER SYSTEMS

17 Questions to Ask

Before Buying a Medical Autoclave for Your Healthcare Facility



Introduction

When you're in the market for an autoclave for your hospital, surgical center, clinic or other medical facility, the purchasing process can sometimes feel overwhelming. With so many models, sizes, options and components to choose from, how can you ever really know exactly what you need to make the most out of your investment? If you aren't sure, don't worry — you aren't alone. We created this 17-question eBook as a framework to help you explore and discover the exact type of autoclave best suited for your particular healthcare application. These questions will help you to make informed decisions by outlining key considerations and explaining everything you need to know about owning a medical autoclave.

Let's Get Started!

1. What size autoclave do I need?

Determining the right size autoclave for your medical facility depends on two factors:

A. The size and volume of your load, and
B. The available space in your facility.

In other words, throughput capacity dictates the size autoclave you need, while floor space determines what can actually accommodate. Common sizes range from tabletop autoclaves to small, medium, and large (bulk) autoclaves.

Tabletop autoclaves are ideal for only small loads and basic equipment, such as dental practices, doctors' offices, outpatient clinics and nursing homes.

Small, medium, and large bulk autoclaves are more appropriate options for hospitals, ambulatory surgical centers and clinical and medical research applications. These autoclaves have an internal volume capacity ranging from 2 cubic feet to upwards of 200 cubic feet and boast a variety of configurations, from single door gravity units to vacuum walk-in autoclaves.

To determine the size of autoclave that best suits your needs:

1. Establish the volume and size of your average load and compare that to the published chamber dimensions and volume capacities of autoclave models.

2. Think about how the load will be configured and loaded into the autoclave. For instance, are you sterilizing medical waste or multiple trays of instruments or glassware? Will you place the load on a standard oven-style shelf in the autoclave or will you require a loading cart and transfer carriage for easier mobility? Analyze different material handling options to determine which one will be match your needs. Be aware of how a medical autoclave will accommodate such needs and leverage cubic space accordingly.

3. Measure available floor space and compare this to the footprint of the autoclave. Know that you will require additional space around each side of the unit for service clearance. If you have limited space, ask the manufacturer to customize your autoclave so that all of the plumbing is mounted on just one side of the unit.

2. What types of loads will I be running in my autoclave?

The autoclave you purchase should have cycles capable of sterilizing healthcare-specific loads.

Be sure to inquire about which cycles your autoclave is capable of running and ensure that your desired materials can be properly sterilized.

Consult the table below for common medical load types and their corresponding cycles:

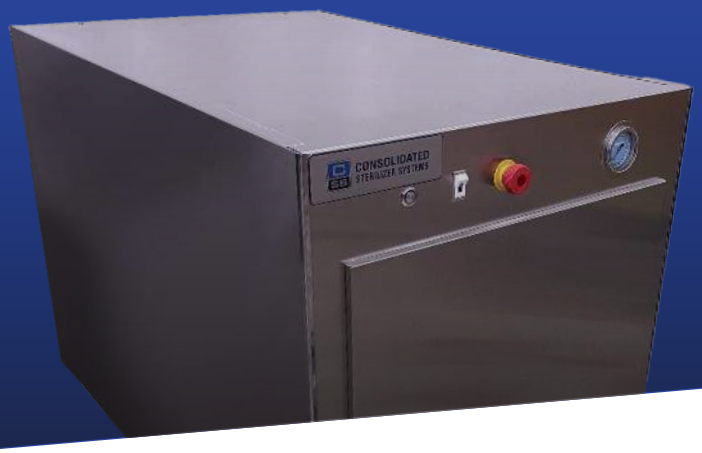
Table 1

Typical Application or Load Type	Basic Cycle Type
Fabric packs, unwrapped and wrapped instrument trays, glassware	Gravity
Double-wrapped instrument trays, fabric packs	Pre-Vacuum
Media, LB broth, water	Liquids
Unwrapped goods	Immediate Use Steam Sterilization (IUSS)*

All cycles should be validated by the manufacturer in compliance with AAMI-ST8 guidance.

**Should only be used for emergency situations and situations where patient care items cannot be packaged, sterilized and stored before use.*

3. What is my steam source for the autoclave?



Many medical facilities have “house steam” available to supply their autoclaves.

If house steam at 50 psi and 80-300 lbs./hr. is not available, you will require an electric steam generator (a.k.a. boiler) to create the steam necessary to sterilize your loads. Boilers can be purchased with your new autoclave or retrofitted to an existing medical autoclave. For new autoclaves, boilers can be mounted integral to the sterilizer (under the chamber), which reduces the footprint of your autoclave and saves space. Boilers are typically available in 208, 240, 380, and 480 voltages and in single or three-phase connections, with capacities ranging from 20kW to 120kW. “Automatic blow-down” is available for generators that will help extend the life of your heating elements by flushing away minerals left behind from the feed water source.

4. Do I have the right type of water available for the autoclave?

Water is the lifeblood of any autoclave.

Water quality can drastically impact the lifespan of the autoclave's components, steam generator and even the chamber. Poor water quality can also cause load staining. The quality of water is often defined by its levels of hardness, minerals, chlorides, and so forth. Common water sources include:

Tap Water

Many medical facilities use a domestic cold water supply to feed their autoclave, but this practice can lead to costly downtime and expensive repairs if the water quality is not adequate. Be aware: Tap water contains a variety of dissolved minerals and salts depending on your geographical location and water source (ground well, lake, river, etc.). The more minerals the water contains, the "harder" it is. Hard water can be problematic. When hard water is boiled into pressurized steam or used to cool autoclave waste, it leaves behind mineral deposits on the unit's generator, pipes, and valves. These deposits, like layers of paint, build up over time and decrease the efficiency and functionality of the unit. Water that is harder than 5 grains (85 mg/L) should be treated (reference table #2). Your local municipal water report will indicate the hardness of your tap water.

Treated Water

- Softened water removes most hardness from water;
- Reverse osmosis (RO) removes most solid contaminants, dissolved minerals and hardness
- Reverse osmosis/deionization (RO/DI) removes most solid contaminants, minerals and ions

Water Quality Specifics

Water between 0.1 MΩ/cm to 1.0 MΩ/cm (purity achieved with a Type III RO filter) is appropriate for the vast majority of medical sterilization loads, such as medical waste, glassware, medical, and surgical instruments.

Table 2

Water Feed Requirements, Carbon Steel Steam Generators		
	Recommended Conditions	Max Conditions
Temperature	As Supplied	140° F (60° C)
Total Hardness	0–17 mg/L	85 mg/L
Alkalinity	50-180 mg/L	350 mg/L
Total Dissolved Solids	0-150 mg/L	250 mg/L
pH	7.5–8.5	7.5–9.0
Total Silica	0.1-1.0 mg/L	2.5 mg/L
Resistivity	2,000-6,000 Ω/cm	26,000 Ω/cm

Keep in mind, when high purity water (> 1 MΩ/cm) is used as the source for steam generation, the autoclave must be constructed from stainless steel, specifically the chamber, jacket, steam generator and process piping. High purity water lacks ions or minerals and will try to leach impurities from everything it comes in contact with, including glass, steel and copper. This could cause continuous corrosion and premature failure of non-stainless steel components.

5. How much floor space will my unit take up?

Every autoclave requires dedicated floor space.

In order to maximize available floor space, it's important that you know how many autoclaves you'll need to house, each autoclave's physical footprint. Your autoclave footprint can also be impacted by the following:

- **Installation Type**

Will you be seeking a cabinet or recessed installation? If the unit is going to be placed into a wall or an existing opening, the opening may need to be increased in size to accept the autoclave. Just the same, trim panels may need to be fitted to fill any gaps in an opening that is too large. In either case, plan to have 12"–24" of additional space on the sides and back of the autoclave to allow for the dissipation of heat and room for servicing the unit.

- **Plumbing Configuration**

Where is the plumbing connected? Is it at the back of the unit or on the side? Plumbing connected through the back of the unit requires additional room in the back and can create more difficulty for maintenance, repairs or troubleshooting. Know where you can afford more space (in the back or the side of the autoclave). The right manufacturer will customize your autoclave specifications to meet your exact needs and save your sterile processing department space. For example, a manufacturer could configure your unit to have all of the plumbing on oneside so that the "non-plumbing" side could rest closely to a wall.

6. What Utilities are Required?

To prepare for installation, verify that you have the proper utility sources available within five feet of your unit:

Water:

A water source with a minimum of a ¾" water line capable of providing 45 PSI dynamic pressure with a flow of 12 gallons/minute is required for effluent cooling, steam generation (if applicable) and operating the vacuum system (if applicable.)

Steam:

To sterilize any equipment, you need to convert a water source into a steam source. This can be accomplished by 1) using house supplied steam with 50–80 PSI dynamic steam pressure with a ¾" NPT connection, or by 2) purchasing an electric steam generator add-on with your autoclave. Generators are typically available in 208, 240, 380 and 480 voltages and in single- or three-phase connections.

Electricity:

Whether you use a steam generator or have house-supplied steam, your autoclave needs electricity to operate. The basic requirements are: 110V, AC or 220V, AC, 1-phase, 15 amps — dedicated and isolated. There additional electricity requirements for integral steam generators that involve 3-phase circuits and higher amperage.

Drainage:

You must have an appropriate drainage source within 5 feet of your autoclave. A typical waste connection requires a 2.5" air gap over a 2.5" gravity floor drain.

7. Should I invest in water-and energy-saving technology?

Medical autoclaves can consume an enormous amount of water.

One small to medium autoclave can consume upwards of 1 million gallons of water per year. The water is used for three purposes:

Steam Generation

Effluent Cooling

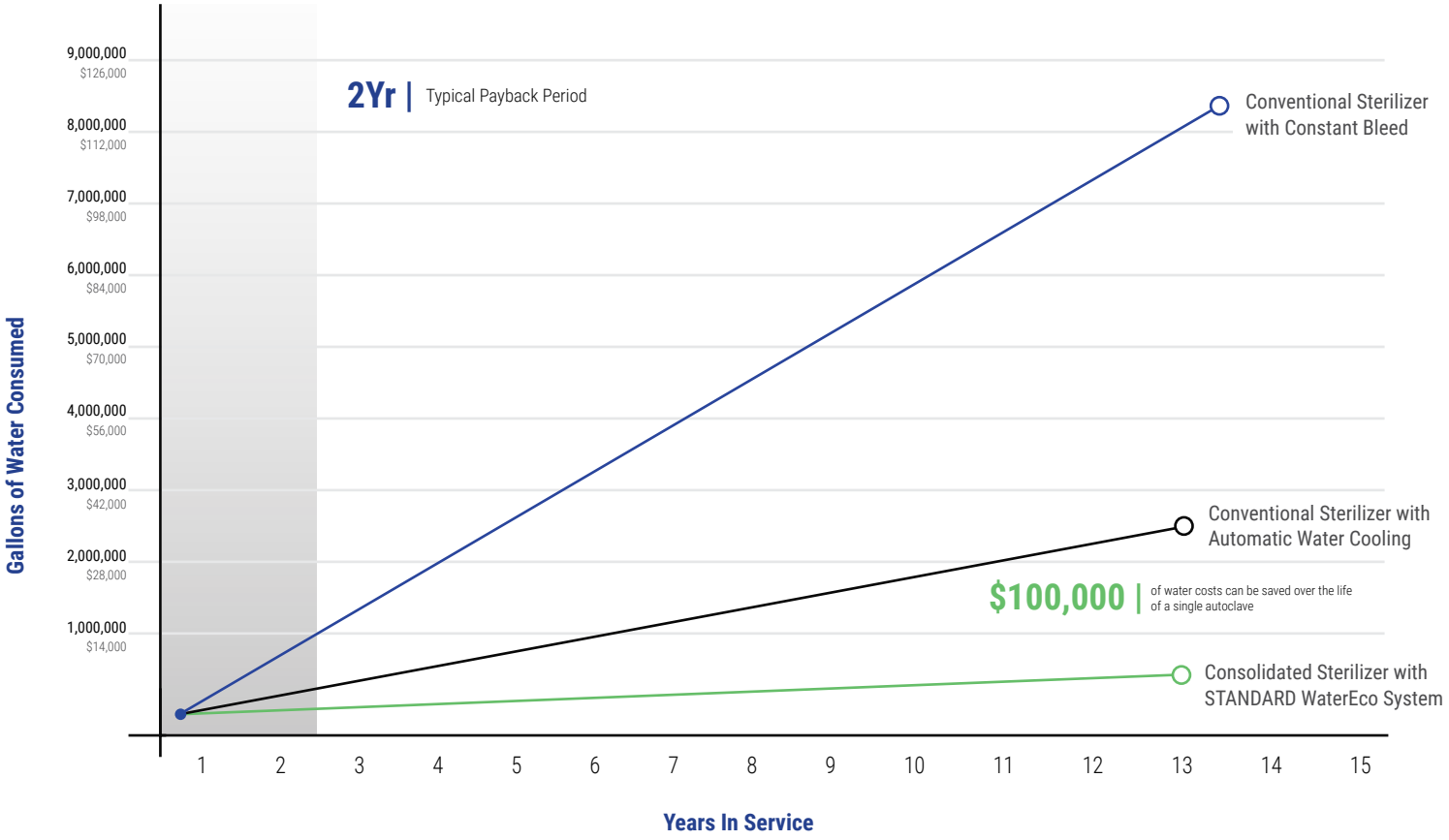
Vacuum Generation

In a standard medical autoclave, the steam generation process only requires 30–50 gallons/day, but the effluent cooling and vacuum generation can use between 10 to 50 times more water per day! A majority of the consumption is used for cooling hot effluent (to below 140° F) before it is drained, as required by most local building codes.

Autoclave manufacturers should now offer water-saving technologies standard on their equipment. (If they don't, request it.) These systems can reduce water usage by up to 99% and reduce the average water bill by more than $8,000 per year. These systems are great at minimizing water consumption from effluent cooling and vacuum generation inefficiencies, as well as supporting LEED certification and ASHRAE compliance.

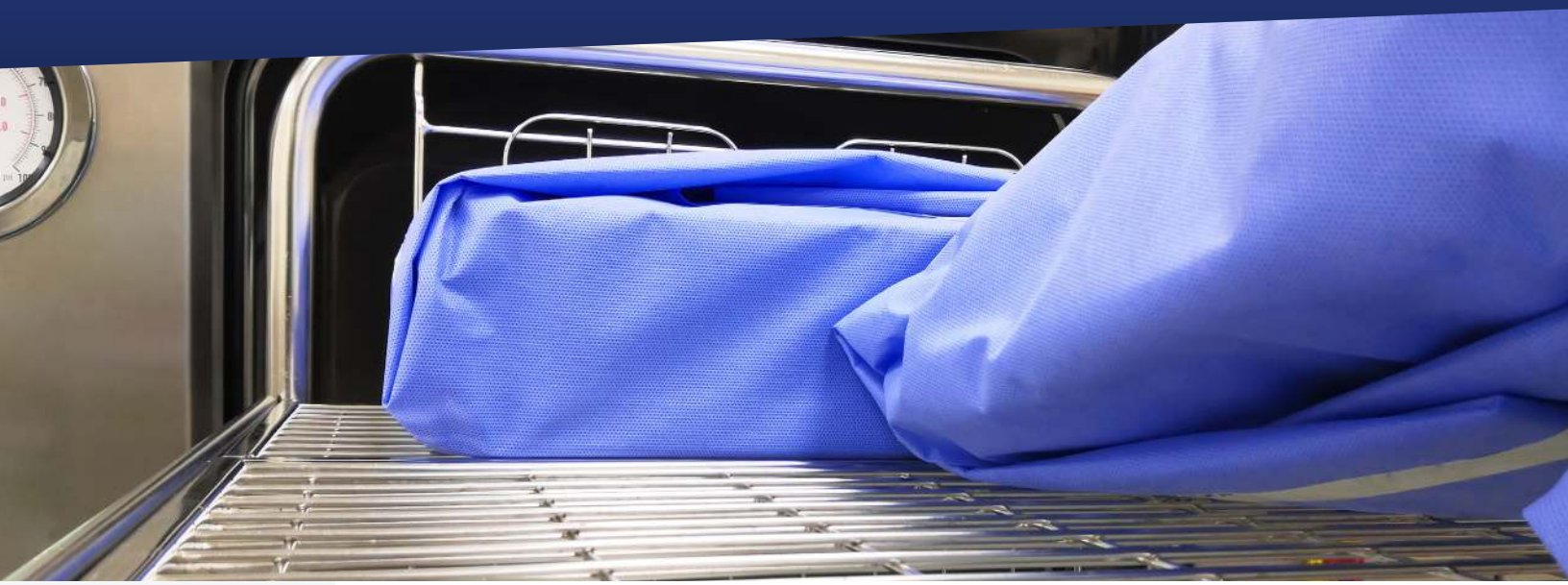
Water usage improvements are a direct result of efficiency technologies, such as:

- Effluent cooling management optimization
- Using facility-chilled water loops to cool the waste steam and condensate
- Employing recirculation systems which pump water back to the vacuum system



In addition to the above options, you can reduce energy and water consumption by simply turning your autoclave off. This is a zero-cost and minimal effort approach to noticeably reduce water consumption, eliminating the need for the system to continually work to maintain the right warm temperature needed for sterilization. Turning your autoclave off after the workday can save up to 70% of the effluent cooling water typically consumed. Some manufacturers offer an automatic shut-off feature that turns the autoclave off when not in use (otherwise known as “Auto-Idle Shut-Off”) or EcoCalendar.

8. How will I get the autoclave into my facility and its final resting location?

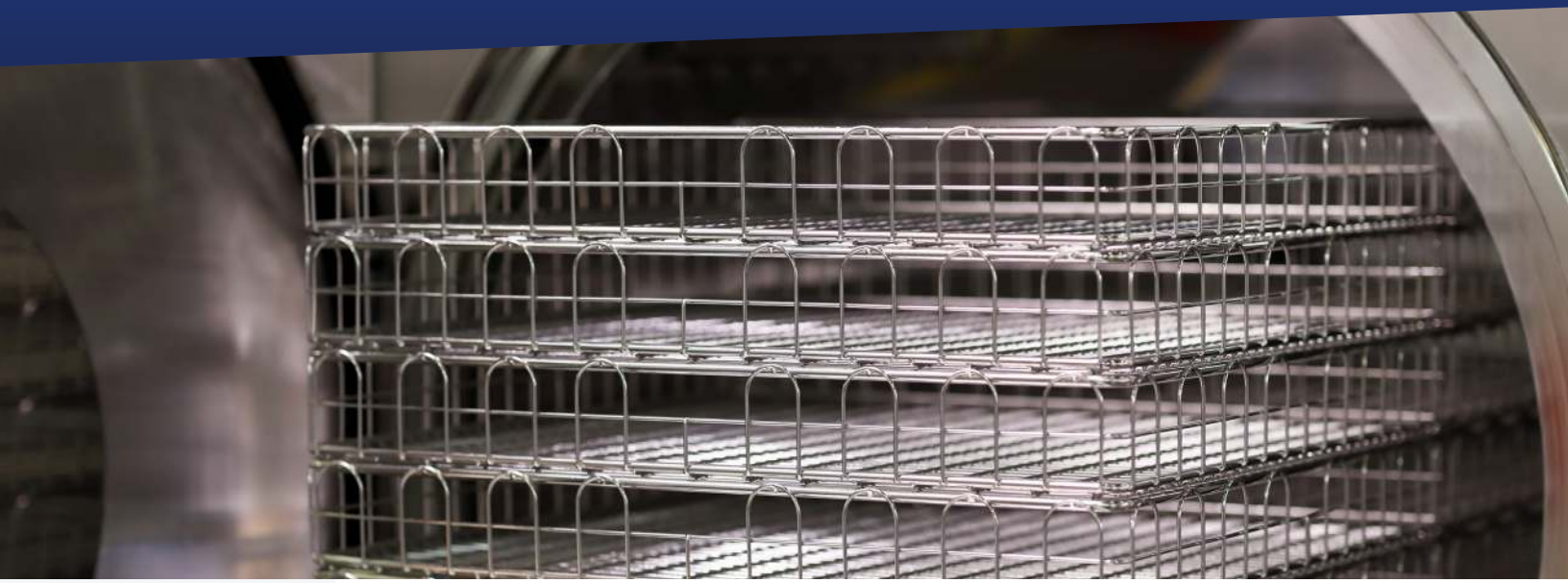


Remember — no matter how much or how little physical space you have — installing or removing autoclaves can be challenging.

Challenges can arise due to structural obstacles, odd loading dock dimensions, narrow hallways, stairs, doorways or floor-weight restrictions. Consider how you will receive your autoclave and move it into position. Proper planning and measurements can help avoid costly, disruptive rigging and renovations, such as knocking down existing walls or employing cranes to hoist equipment to high-level floors.

Request a site visit evaluation from a trained sales engineer to ensure your sterilizer can be properly transported to the final location.

9. Is Tech Support Available?

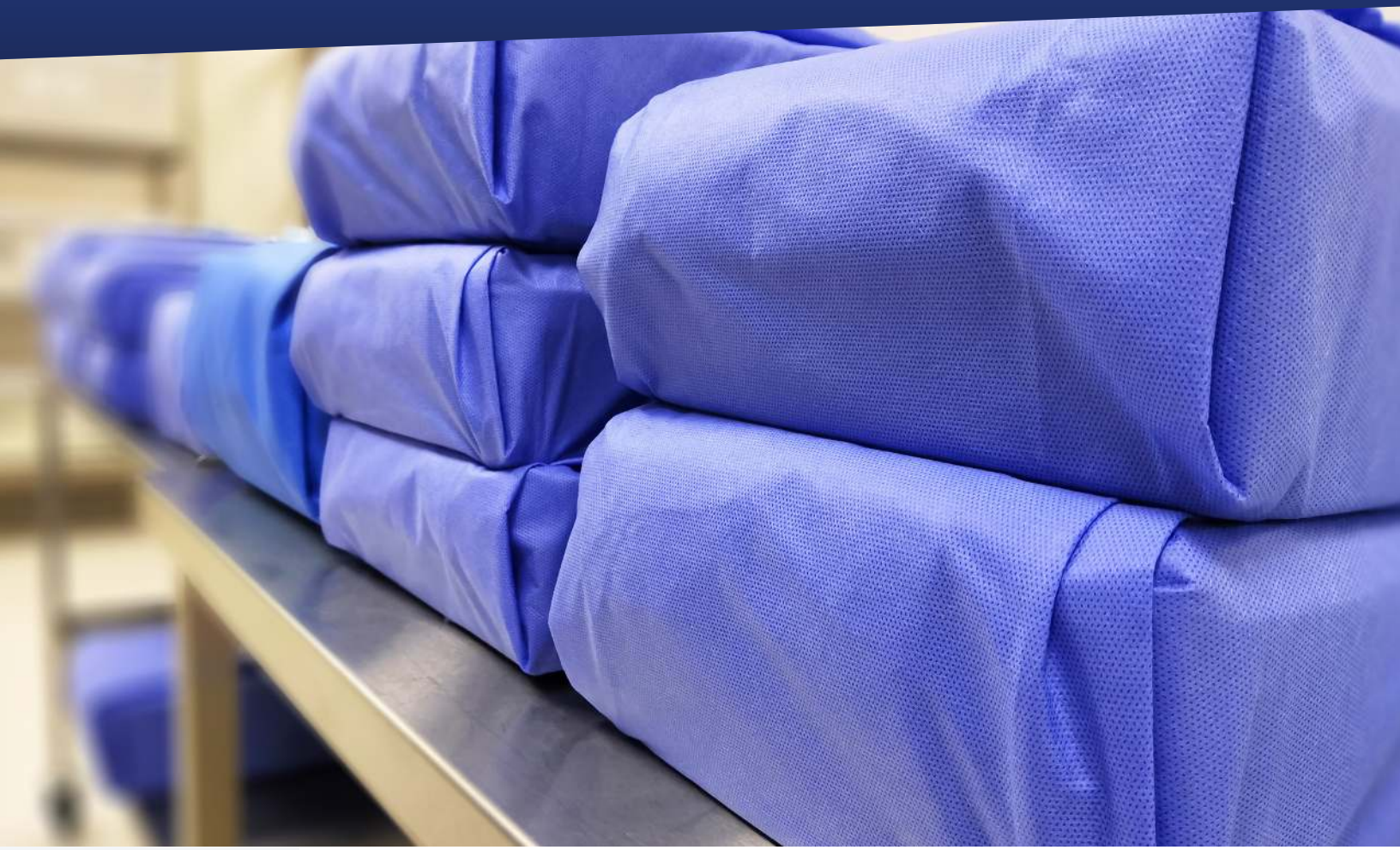


Given the essential nature of the work they do, hospitals, surgical centers and other medical facilities can't afford autoclave downtime.

That's why, when your autoclave isn't functioning properly, you want to be sure that competent tech support can be provided quickly. Ask your manufacturer about who provides technical support and when it is available. Do they outsource to a call center or provide competent in-house expertise? Also, is help available during your operating hours?

Evaluate who will service the autoclave should it need actual repairs and replacement parts and be sure that the service company is factory-trained and available for same-day calls. A reliable local service company should be stocked with commonly needed replacement parts.

10. What is the Warranty?



Manufacturers should provide a minimum warranty of one year on parts and labor and at least 15 years on the autoclave pressure vessel.

As stated above, evaluate who will service the autoclave should it need actual repairs and replacement parts.

11. Are replacement parts proprietary or commonly available?

Autoclaves typically last for over 20 years, so it's in your best interest that the autoclave purchased is manufactured with non-proprietary parts.

Using non-proprietary parts is truly the best way to protect your investment, as they ensure that parts procurement will be easy and inexpensive when future replacements are necessary. Should a manufacturer be out of stock, difficult to deal with or go out of business altogether, you want to know you can get what you need and not feel "stuck" with their equipment and no one to help.

12. What is the cost of your preventative maintenance plan?

The simplest way to prevent downtime is by having regularly scheduled preventative maintenance visits.

A manufacturer should help devise a cost-effective plan for service based on usage and throughput. Have your service provider present a service plan for one year and 3 years, with and without parts. It's important to know the total cost of ownership before selecting a sterilizer manufacturer.

13. Is training available?

Quality training and education is essential for establishing best practices among end users.

Beyond installation and start-up training, inquire if your manufacturer provides training for cycle set-ups, advanced cycles, troubleshooting tips and calibration techniques. Properly trained end users and facility technicians will help prevent downtime later on.

14. Where is the sterilizer manufactured?

In today's U.S. market, there are both domestic and foreign autoclave manufacturers.

Just like your car or food, it's important to know where your autoclave comes from. Where a unit is manufactured can impact the overall value. The question becomes: Do I buy a U.S. or foreign made autoclave? If you are a U.S.-based organization, autoclaves engineered and manufactured in the United States can provide more returns than their foreign counterparts. Here are several factors to consider:

• Quality & Craftsmanship

Plenty of foreign autoclave manufacturers are capable of manufacturing durable machines, but some outsource their operations to facilities less or completely unfamiliar with autoclave fabrication. This can lead to part failures and overall integrity compromises—meaning your investment is worth far less than the dollar price you pay for it. Be sure to inquire about the origin of manufacture for both the pressure vessel and final assembly, and be mindful that many autoclave manufacturers boast a "U.S.-based headquarters" (where they assemble products), but actual fabrication takes place elsewhere.

• Lead Time on New Orders & Replacement Parts

Ask about lead-time before making a purchase. Foreign autoclave manufacturers cannot deliver autoclaves as quickly as a U.S. manufacturer can, and likewise cannot fill future orders for parts as quickly. Consider the complications and increased lead-times associated with international shipping policies, rules, and regulations. Each of these challenges ultimately leads to more waiting and more downtime than your lab has time for.

• Service & Support

When you buy an autoclave, you are also buying the service and support that comes with your unit. With a foreign autoclave manufacturer, this experience can be more stressful to navigate. From initial inquiries to installation to training to scheduling maintenance or emergency repair visits, every service request can become overly complicated by an international relationship where hours, availability, and expectations of service and support may not align with your needs and expectations. This can increase downtime and leave you feeling isolated throughout the lifetime of ownership. Ask who will service and repair your equipment and if they are factory-trained.

• Support for the U.S. Economy

Manufacturing contributes nearly $2 trillion dollars to the U.S. economy annually. The U.S. manufacturing industry accounts for the world's 10th largest economy according to the National Association of Manufacturers. So, buying domestically manufactured autoclaves helps supply theses jobs and maintains America's prominence in the global economy. On the contrary, buying overseas does not support this goal, and similarly does not meet requirements of the American Recovery and Reinvestment Act of 2009 (ARRA) or the Buy-American Act, formally known as 41 U.S.C 10, designed to encourage U.S. manufacturing that uses materials produced substantially in the United States. This can be significant for accounts/facilities/labs that are funded by monies allocated to "buy American." Ask your purchasing department about these Acts.

15. Is the sterilizer compliant with industry standards?

Healthcare autoclaves need to comply with various standards, including ANSI/AAMI ST-8:2013 and AAMI-ST79:2010.

By purchasing an autoclave that complies with these and other relevant industry standards, you can ensure that your medical equipment will be properly sterilized and, more importantly, that your patients receive a standard of care.

For example, section 10.5.1 of AAMI ST79 states the following: "sterilizers that do not have recording devices should not be used." Make sure your the autoclave has a printer (physical or digital) that provides real-time measurements of time, temperature and pressure during sterilization.

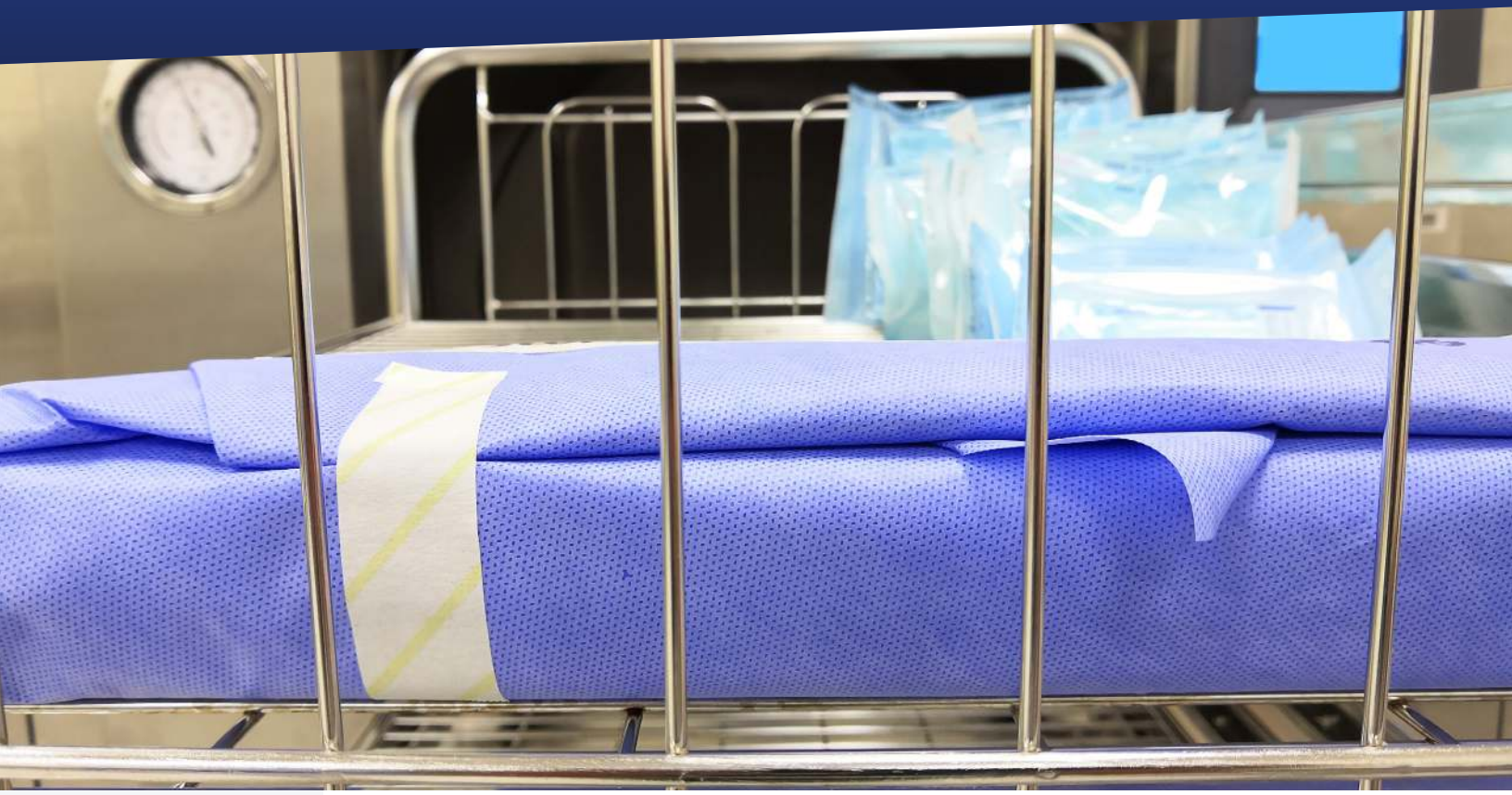
After each cycle, the operator should review the printout to verify that all cycle parameters were met.

16. How many years has the manufacturer been in business?

There is true value in working with an autoclave manufacturer that has withstood the test of time.

Seek out a manufacturer with many years of experience and a rich heritage of working with well-known and respected organizations within the healthcare industry. To truly gauge credibility, quality and reliability, ask for references and follow up with each. The more references you receive, the better.

17. Does the manufacturer have a single-product focus?



You want to work with a manufacturer with a single-product focus.

Single-product focus enables a manufacturer to build the most reliable, affordable and customizable autoclaves. Such strict focus also means engineering, production and customer service efficiencies are enhanced — and the customer reaps the immediate and long-term cost benefits of this manufacturing approach. While it is not uncommon for medical autoclave manufacturers to manufacture other equipment, it does mean their efforts can be divided by a fragmented manufacturing process and incentivized cross-selling.

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Please contact us to provide a complete total cost of ownership assessment.

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