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# HOW TO PROPERLY MAINTAIN YOUR AUTOCLAVE

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**A Guide to Short Term & Long Term Steam Sterilizer Maintenance**





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# The Importance of Maintaining Your Autoclave

## Improve Uptime, Protect Your Investment

Just like a car, your autoclave should receive routine maintenance to make certain it works properly today, tomorrow, and for years to come. Keeping your steam autoclave in proper working order improves productivity, reduces downtime, extends the life of your autoclave, and helps to ensure overall safety in the workplace.

When you are ready to run a load in your autoclave, you expect it to work and work right. Routine preventative maintenance will help catch any potential issues before they occur. Sometimes this is referred to as “proactive” maintenance (see Cloud section to learn more), but maintenance is more than just routinely checking your autoclave to confirm it’s running correctly. In order to properly care for your autoclave, you must develop both a short term and long term plan, one that involves both in-house maintenance from the users and from trusted service providers.

Most of the issues that occur with an autoclave are a result of lack of maintenance. These are some of the problems that could arise from an unmaintained autoclave:

- Wet packs
- Staining
- Incomplete sterilization (biological indicator failure)
- Cycles abort prematurely
- Premature component failure
- Chamber corrosion

To help you maintain your autoclave, we’ve put together this comprehensive guide complete with a component-by-component maintenance breakdown, as well as other valuable insight from our team of engineers and sterilization experts.

# How Often Should You Inspect Your Autoclave?

## Time-based or Usage-based?

Planned maintenance inspections that are part of a preventative maintenance (PM) plan typically occur based on elapsed time (i.e., quarterly, annually, etc.).

Although this is generally seen as Good Service Practice (GSP), it may also be worth initiating service inspections based on actual usage (i.e. number of cycles versus time alone).

For example, you may have an autoclave that runs only once per week and is turned off in between runs. In this case, the unit only sees approximately 50 cycles in one year and may not require a quarterly inspection. In cases like this, an annual safety inspection may be all that is required. By contrast, if you have a unit that runs 6 cycles/day 5 days/week, then a quarterly inspection is probably best.



# What Contributes the Most to Steam Autoclave Damage?

Aside from usage, environmental factors can significantly impact equipment longevity and frequency by which inspections should occur, including:

## Steam Quality

Ensuring that the equipment is fed saturated steam with acceptable dryness and particulate levels is vital. Particulates can damage valves and cause steam traps to fail prematurely. A simple steam filter could resolve this issue. In addition, be aware that some chemicals commonly found in house steam boilers, can wreak havoc on plumbing lines and the sterilizer chamber.

## Water Quality

Water quality is also critical. Hard water in the form of calcium carbonate can cause scaling of heating elements, plumbing components, and sterilizer surfaces. Scale buildup will significantly decrease the efficiency of the heating elements and cause components to work harder and reduce their life expectancy. Chlorides in the water source can be particularly damaging even to high quality stainless steel and can lead to corrosion, pitting, and other damage of the metal.

# Routine Maintenance by Component

The following steam autoclave components should be carefully monitored:

## Chamber



The chamber is the primary component of a steam autoclave, consisting of an inner chamber and outer jacket. Chambers can be subject to corrosion if not cleaned frequently and properly. Wiping down the chamber after each run (with a mild solution like [C3 Chamber Cleaner](#)) can go a long way in keeping your chamber in good shape. Be sure to wipe up spills right after they happen and use non-chlorinated water when rinsing the inside of the chamber.

## Valves



There are two primary types of automatic valves used: [valves for steam](#) and valves for other applications like [air, water and exhaust](#). Typically, the steam valves will wear (i.e. leak) more quickly than other valves. Steam to jacket valves see the greatest use as most jackets remain at temperature while awaiting the next sterilization load. Thus, these valves should be checked on a quarterly basis (or every 300 cycles). Manual valves like ball valves and needle valves could last the life of the steam autoclave.

## Heating Coils



The life of an autoclave steam generator is highly dependent on incoming water quality and maintenance — particularly water hardness, frequency of blow-downs (draining the generator of water and flushing out deposits), and any descaling procedures performed. With proper boiler maintenance and attention to water quality, heating coils could last five to ten years on average, although decreasing efficiency and performance may be experienced. Depending on water quality, and the number of cycles run, it is recommended to blowdown the generator daily or weekly.

## Contactors



[Contactors](#) are basically high amperage electrical relays and are used on sterilizers equipped with electric steam generators and liquid ring pumps. Switching a high voltage connection on and off is a very demanding function and causes significant wear on the contactors. It is vital that all high voltage wires are periodically tightened as thermal cycling can cause them to loosen over time. Contactors should be regularly inspected and replaced when there are signs of pitting, heat damage, or excessive arcing on the points. The life of the contactors will depend greatly on the amount of use the sterilizer sees.

## Steam Traps



[Steam traps](#), also referred to as thermostatic traps, are heavily dependent on the quality of the steam delivery system and absence of debris. For facility-supplied steam, a steam trap inspection program should extend beyond the sterilizer to include all the traps back to the boiler. Although various types of traps can be used in a steam delivery system/steam autoclave, they all perform the same function—removing condensate while allowing the passage of dry steam.

## Safety Valves



Per the ASME (American Society of Mechanical Engineering) pressure vessel standards, [safety valves](#) are calibrated and set to be equal to or less than the maximum allowable working pressure (MAWP) of the chamber and/or jacket and generator, depending on sterilizer manufacturer. The MAWP will be shown on the stamped vessel plate visibly located on the vessel exterior. This is the final fail-safe device for the pressure vessel should all electronic and mechanical controls fail. Therefore, it is imperative that all safety valves on the autoclave and generator be inspected, tested and verified to be in proper working condition based on the recommendation of the sterilizer and/or valve manufacturer, as well as local inspection and insurance agencies. It is common practice to inspect and test safety valves on a regular basis.



## Controls



The controls should last the lifetime of the device assuming they are protected from excessive heat, moisture, humidity, and electrical noise/surges/spikes. In particular, PLC controls have proven to be extremely reliable across industries and in various environments. Although devices vary, in most cases the backup battery should be replaced every 3-5 years to avoid loss of memory or programs. The electrical connections should be covered or within an enclosure to avoid direct contact with water, steam (when the door is opened, for instance), or vapor from the drain or other devices in the same area. Items like control screens may be located above the chamber door provided they are adequately protected from heat and excessive moisture. In rare cases where software updates are required, modern controls can typically be updated via laptop software, USB port, or remotely via an internet/Ethernet connection.

## Vacuum Pump (Pre-Vacuum Units only)



Vacuum pumps should last the lifetime of the steam autoclave, however, hard water can cause a buildup to occur within the pump decreasing efficiency and placing greater strain on the motor and impeller. It is possible for the impeller to become nicked by debris that passes through the strainer, and become imbalanced. Monitor any solid goods, such as animal bedding, that can be drawn through the drain by ensuring that the chamber drain strainer is clean and in good condition. Occasionally, pump bearings will wear depending on usage. If pump maintenance is needed, trained service technicians can often easily clean the pump head and replace worn components.

To help you and your facility easily remember which common autoclave components to inspect during preventative maintenance, use the table below as your guide:

Component	Comments
Valves (Steam)	Steam causes valves to require maintenance more often than air, water or exhaust. Should be inspected and replaced as needed.
Valves (Air + Water)	Should be inspected and replaced as needed.
Heating Coils	Water quality and ongoing maintenance, including blow-down, can affect longevity.
Steam Traps	May not require replacement but should be inspected and cleaned as needed.
Contactors	Replacement will depend greatly on usage.
Safety Valves	Replace as recommended by local regulatory authorities; may only require testing or inspection.
Controls	When protected from excessive heat and moisture, should last the life of the unit.
Vacuum Pump	Under normal circumstances and loads should last the life of the unit.
Door Lock Assembly	On hinged door autoclaves, check the door locking mechanism. May not require replacement but should be inspected.
Steam Generator	Inspect coils, low water cut off, site glass, and probes. Clean out and remove debris from inside of boiler. Tighten heater and contactor lugs.

# How to Maintain Your Autoclave: Self Service

Proper maintenance of your autoclave is dependent on the balanced approach of self-service, professional service, and good water quality. If you are maintaining your unit in house, here are a few steps you can take to ensure your autoclave is operating smoothly:

## Daily

- 1** Make sure the chamber drain strainer (located in the front drain hole of the sterilizer) is totally free of debris. A clogged chamber drain strainer will prevent the sterilizer from sensing temperature. [Here's a useful video on how to clean the drain strainer.](#)
- 2** Be sure to immediately wipe up any spills in the autoclave chamber with chamber cleaning solution (like C3 Chamber Cleaner) and accompanying cleaning pads. Do not use bleach-containing hypochlorites, corrosive chemicals, acids or seawater inside the stainless chambers.
- 3** If your autoclave is equipped with a steam generator, it may have an automatic generator blow down valve on it. If the generator exhausts the steam each day when you turn it off, then it has an automatic blow down. If it does not, you should manually drain the generator at the end of each day (depending on water quality). This will aid in drawing off the sediments and impurities in the water and keep the generator clean.

## Weekly

- 1** Flush the chamber with clean, non-chlorinated water or chamber cleaning solution. This is particularly necessary if saline solutions are being sterilized. Depending on the type of goods being sterilized, the chamber may also require scrub cleaning (or other type) on a regular basis.
- 2** Inspect the door gasket for tearing, pitting or warping. If you see any of these, it may be time to replace it.
- 3** Visually check for water and/or steam leaks. If you see a leak, find the root cause and repair it as soon as possible.

# How to Maintain Your Autoclave: Professional Service

Your autoclave should also undergo more thorough inspections and cleanings by a trained service provider.

The frequency for this service will vary depending on your daily autoclave usage and water quality, but can range anywhere from once to more than four times yearly. This service may include lubrication of door parts, calibration of temperature and pressure sensors, time and temperature verification, cleaning of traps, inspection of the generator internals, contactor(s), heating elements, removal and cleaning of generator water probes or low water cut off device, and, where needed, replacement of worn parts (e.g. solenoid valves, gaskets, safety valves, etc.).

It is recommended that you keep records of all services in accordance with your local, state and/or federal requirements. This record keeping includes service dates, autoclave model and serial numbers, service descriptions, who serviced the autoclave, and a signature from whoever approves the service(s).





# How Cloud Connectivity is Changing Autoclave Maintenance

The advent of cloud technology and the Internet of Things is transforming the way we think about maintenance for capital equipment items like autoclaves.

A cloud-connected autoclave has the ability to track the number of autoclave cycles and can send alerts (reminders) via text or email at certain intervals. For example, an alert could be sent to the lab manager and the service technician after every, say, 300 cycles to gently remind them to initiate a preventative maintenance call. This is the epitome of “proactive” maintenance and staying ahead of problems that may arise. This is a great way to minimize downtime.





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