

Autoclave Safety Checklist

Autoclaves (or sterilizers) rely on pressurized steam – 121°C at 15psig – to destroy microbiological contaminants on lab supply items (or wastes) treated in the chamber. These devices have hot surfaces that can easily burn skin when energized. The treatment process itself can expose operators to hot liquids, pressurized steam, and hazardous fumes (if incompatible materials are treated). Autoclaves can also be an explosion hazard. Users must recognize and never underestimate the hazards of this common lab device for everyone's safety.

Use this list of questions to ensure that you have checked all the safety boxes before attempting to operate an autoclave unsupervised.

- 1. Have you received the appropriate training to operate the unit?**
Every autoclave is different and cycle times vary. Previous experience running an autoclave is not a substitute for unit-specific training delivered by a senior lab member or shared resource manager.
- 2. Are you properly attired and using the appropriate personal protective equipment (PPE)?**
When operating an autoclave, you should limit the amount of exposed skin.
 - Long pants and footwear that completely covers your feet and ankles are needed in case scalding water or steam escapes the autoclave chamber.
 - A closed lab coat or solid-front smock and thermal autoclave gloves are needed for loading and unloading the chamber.
 - A full-face shield is strongly recommended for unloading the autoclave.

- 3. Are the items you intend to sterilize autoclave-safe?**
The following items are **not compatible** with autoclaves and can result in hazardous exposure and/or equipment damage.
 - Radioactive Materials
 - Pathological wastes – fixed or unfixed
 - Hazardous Chemicals
 - ❖ Flammables
 - ❖ Corrosives – including sodium hypochlorite (bleach)
 - ❖ Toxic substances
 - ❖ Reactive Substances

When in doubt, ask your lab supervisor or contact VU Biosafety for assistance.

- 4. If sterilizing plastic, have you verified that it is autoclave safe?**
Polypropylene (PP), polycarbonate (PC), and Nalgene labware is generally autoclave safe. Polyethylene and high-density polyethylene are not regarded as autoclave safe and will likely melt. If treating items in bags or sharps containers, verify that these are autoclave safe. This information is typically found in the item description provided in the product distributor's catalog.
- 5. If sterilizing glassware, have you verified there are no cracks or chips?**
Damaged glassware can rupture during the sterilization cycle which can result in glass debris in the chamber and spilled hot liquids if the vessel contains media. Only use glass devices in good condition to reduce exposure risks associated with spill cleanup.
- 6. If sterilizing liquids, have you loosened all container lids?**
Pressure build-up in individual containers will occur during the sterilization cycle if the lids are sealed. This can lead to container rupture. To prevent boil over after a cycle, always allow liquids to cool sufficiently before disturbing the vessels.
- 7. Have you placed your items in an autoclave safe secondary container?**
Whether your items are "dry" or contain liquids, these should be placed in a solid-bottomed tray with raised sides for the treatment cycle. The tray should be constructed of polypropylene or stainless steel.



8. **Are there any issues with the door gasket or chamber?**

You should visually inspect the gasket and chamber before loading the autoclave. The door gasket should be pliable, intact, and free of cracks. If it's damaged, or there is any issue with getting the door to close and seal properly, STOP. Do not proceed using the autoclave and place a service call.

Never ignore or bypass alarms! If debris is present in the chamber or in the strainer, it should be removed before initiating the cycle. Because the chamber will be hot, debris will need to be removed using tongs. Do not attempt to remove debris directly with your hands. Seek assistance from your lab supervisor or shared resource manager to remove debris safely.

9. **Is there sufficient space between the items loaded in the autoclave?**

To operate effectively, there must be sufficient space left around the load for the steam to circulate. Additionally, glass items in your tray should not be touching to prevent breakage during the cycle or during tray removal.

10. **Have you selected the correct cycle?**

Most lab autoclaves have preset cycles for dry goods (gravity; fast exhaust) and liquids (liquid; slow exhaust). If sterilizing liquids, it is imperative that the liquid cycle is selected to prevent boil over during the exhaust portion of the cycle. Again, liquids should be allowed to cool sufficiently before removal as disturbing the liquids can result in a boil over.

11. **Once the cycle has started, did you verify that the autoclave was functioning properly?**

After the first fifteen minutes of initiating the cycle, it's recommended that you verify that the autoclave has no alarms and no evidence of malfunction (such as leaking steam). If the autoclave is not functioning properly, terminate the cycle and notify the person responsible for the unit. **Don't attempt to bypass alarms or open the door without seeking guidance.**

12. **Before unloading the chamber, did you wait for the chamber conditions to return to normal?**

The autoclave door should not be opened until the pressure has returned to 0 psig. The door should be opened slowly in case hot water is present in the chamber. It is strongly recommended that items be left in the chamber for 10-20 minutes before you remove the tray.

13. **Do you have a cart ready for your tray of treated items?**

It is likely that your tray will contain hot liquid condensate in addition to the items that were sterilized. To minimize the possibility of a spill, it is recommended that you have a cart staged near the autoclave or easy transfer of tray to the cart.

Be aware: while autoclave gloves protect your hands from heat, they are not generally waterproof. DO NOT get these gloves wet during the handling process as this can result in a burn!

Vanderbilt Research Enterprise Autoclaves & Biowaste Treatment

Some elevated risk biological materials used in research may require sterilization at the lab level before these wastes are safe for others to handle for terminal waste treatment.

- The need to sterilize waste at the lab level will be determined by the biosafety risk assessment conducted for the research team's biomaterials use registration with the Institutional Biosafety Committee or federal permit requirements.
- VU research teams that need to perform biowaste sterilization at the lab level will do so in coordination with VU Biosafety. These teams will receive specific guidance on the necessary cycle parameters and performance verification procedures appropriate for their needs.



For further information on this topic, please contact VU Biosafety at VUBiosafety@vanderbilt.edu .