



### Personal Protective Equipment

When loading, operating, or unloading an autoclave, laboratory personnel must wear the following:

- Close-toed shoes
- Safety glasses
- Heat-resistant gloves that completely cover the hand and forearm
- Lab coat

### Standard Autoclave Safety Procedure

A few safety protocols to keep in mind:

- Always wear the protective gear listed in the previous section to prevent scalds, burns and other injuries caused by residual steam, hot fluids from boiling liquids and spillage. Additionally, laboratory autoclaves use a jacketed construction, which means that metal surfaces are hot even when the autoclave is not actively in use.
- Be mindful of your hands and arms when closing the autoclave door to prevent injury.
- Check all items prior to sterilization to ensure that they are autoclave-safe and check any glassware for cracks.
- Never place sealed containers in the autoclave, as the pressure within the container could cause glassware to crack or explode.
- Never put items that contain solvents into an autoclave, as these can emit toxic fumes when heated.

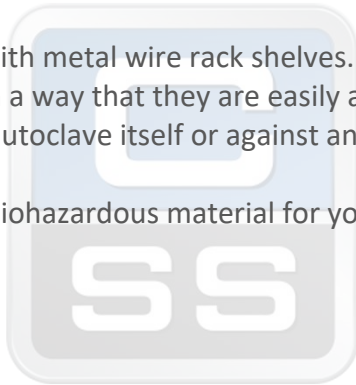
**Do not autoclave bleach or use any cleaner containing bleach on the autoclave because chlorides within the bleach will damage the unit.**

## Tips for Loading an Autoclave

Laboratory personnel should observe the following autoclave procedure when loading the unit:

- Loosen the lids on any containers being loaded into the autoclave and ensure that any bags are not tied shut or otherwise sealed. Steam-penetrable bungs may be used.
- Empty glassware or other containers that do not need to be sealed should be placed on the side or upside-down to prevent air pockets from forming.
- Any goods containing liquid should be placed in a secondary containment pan made of an autoclave-safe material. The pan should be large enough to contain a total spill of all the liquid contents.
- Load all goods in such a way that there is as much space between each item as possible. Make sure that nothing is touching the side wall or bottom floor of the autoclave, and that the drain at the bottom is free from blockage.
- Ensure that there is a metal strainer present in the drain of the autoclave, and that that strainer is free and clear of debris. If it is clogged, the strainer should be removed, cleaned, and put back in place before running the autoclave cycle.
- Do not overload the autoclave; it's important that there be sufficient room for steam to circulate through the entire chamber.
- Most autoclaves are equipped with metal wire rack shelves. When loading goods into this type of autoclave, place all items in such a way that they are easily accessible from the autoclave door, without having to lean into the autoclave itself or against any piece of metal on the side.

Carefully observe protocol for sharp or biohazardous material for your laboratory when loading the autoclave.



## Tips for Unloading an Autoclave

Once the cycle is complete, unload the unit according to the following autoclave procedure:

- When the cycle is complete and the pressure within the autoclave has dropped to a safe range, ensure that no one is standing near the unit and open the door one inch. This enables the autoclave to vent and goods to cool.
- If there is a fume hood above the autoclave, make sure it is turned on while the door is open and the steam inside the chamber vents out.
- Allow steam to vent and goods to cool for approximately 10 minutes.
- Liquids can become super-heated by autoclave cycles due to high pressure raising the boiling point. To reduce the risk of scalds or burns, do not agitate any liquid containers or remove caps while unloading.
- Place all goods in an area that clearly designates that the items are hot and allow them to cool to room temperature. Shut the autoclave door and engage the locking pins.
- Once the autoclave is unloaded, leave the jacket on and engaged in case other laboratory personnel need to use it. If it is the end of the day, shut down the jacket by turning the appropriate switch.

## How to Safely Operate the Autoclave

Once the unit is loaded, be sure to observe the following autoclave working procedure:

- If you are using a hinged-door autoclave, close the door fully, engaging the locking pins and turning the locking mechanism until it stops moving. Be mindful not to use extreme force on the locking mechanism, as this can damage the gasket or internal mechanism of the door lock. Simply tighten the locking mechanism until it cannot be tightened any further.
- Choose the appropriate cycle for the goods inside the chamber (e.g. Gravity, Liquid or Vacuum). When choosing a cycle, keep in mind that Gravity and Vacuum cycles can cause liquid goods to boil over inside the chamber. Vacuum cycles may be insufficient at sterilizing porous or bagged goods. Liquid cycles take longer, but will not damage goods suited for Gravity cycles, such as glassware or metal instrumentation.
- Do not attempt to open the autoclave door once the cycle has started. As mentioned above, autoclave doors feature a mechanical locking mechanism that can be damaged by extreme force. This mechanism will not disengage until the pressure within the chamber has dissipated. Even a few pounds per square inch of pressure on the autoclave can present an extreme safety hazard to the user and, with enough force, the safety lock can be broken.
- Should you suspect any issues with the autoclave, abort the cycle using the controller or emergency stop button (which is a standard feature in all Consolidated sterilizers). Wait for both the temperature and pressure to return to a safe range before attempting to open the door lock.
- If your facility maintains an autoclave use log, be sure to add your name and the time of use to the log.

Consult the autoclave manual for assistance in choosing the correct cycle parameters. Autoclave manuals should be stored near the autoclave.

**NOTE: Larger laboratory autoclaves are equipped with heated jackets. It's important that the unit be allowed sufficient time to reach temperature before you run a cycle (this could take up to an hour, depending on autoclave size).**

**Consolidated Sterilizer System's autoclaves include an automatic on/off timer, called EcoCalendar™, which enables you to set the unit to turn on or off at specific times of the day – for example, the unit could be set to reach temperature at the same time the first user enters the building for the day.**

## Contingency Plans

Although it's important that laboratory personnel take every precaution to eliminate safety risks, incidents can and do occur. To prevent unnecessary damage or injury, follow the safety protocols listed below.

### How to Proceed in the Event of an Equipment Malfunction

- If the autoclave does not operate as expected, record the issue in the autoclave log book. Do *not* attempt to diagnose or fix the issue. Instead, notify the laboratory manager and mark the autoclave as out of order with a sign or a sticker.
- Remember that goods should only be removed from the autoclave once it has completely cooled, even if the cycle is aborted. Never attempt to force the safety lock mechanism open in order to retrieve goods from an autoclave that has aborted a cycle.
- If the autoclave vents steam into the room, liquid pools underneath the autoclave, or the autoclave emits smoke and sets off the fire alarm, use the three-phase power disconnect to turn off power to the generator.

### How to Proceed in the Event of a Spill

- Spills can occur when the liquid within a container boils over or when a container breaks. Should a spill occur, do not operate the autoclave until it is cleaned up.
- Wait until the autoclave's heat jacket has cooled to room temperature before attempting to clean up a spill. Once the autoclave has cooled, contain the spill using paper towels or your laboratory's spill kit.
- Dispose of waste, including any potential cracked glassware, according to your laboratory's protocol for sharps and biohazardous material.

Once the spill has been contained and cleaned, document the incident and clean-up procedure in the autoclave log book.



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