

SAFE and EFFECTIVE USE of the STEAM AUTOCLAVE

A steam autoclave may be used to sterilize media, glassware, waste, instruments, etc. To accomplish the desired end goal and to protect the user and the environment from hazardous materials, the autoclave must be used correctly. Additionally, wastes must be managed in compliance with state and local regulations.

For the autoclave process to be effective in achieving sterilization, sufficient temperature, time and direct steam contact are essential. Air must be completely removed from the sterilizer chamber and from the materials to allow steam penetration so that the material being autoclaved will be at treatment temperature for sufficient time to achieve kill. Factors that affect air removal include type and quantity of material to be autoclaved, packaging, load density and configuration, and container type, size, and shape.

GENERAL PROCEDURES

1. All potentially infectious materials must be autoclaved before being washed and stored or disposed.
2. Personnel who use an autoclave must be trained to understand proper packaging, loading, labeling, and operation procedures.
3. Biohazardous materials must be labeled as such and must be sterilized by the end of each work day, or must be secured appropriately. Do not leave biohazardous materials in an autoclave overnight in anticipation of autoclaving the next day.
4. Do not autoclave materials that also contain toxic or volatile chemical or radiological agents.

PACKAGING

1. Use bags or other containers labeled “Biohazard” for items that contain or may be contaminated with potentially infectious agents.
2. Use plain, unmarked containers for items that are not hazardous.
3. Do not double bag waste or tightly seal containers as this will impede steam penetration.
4. Do not put sharp objects such as broken glassware into an autoclave bag.
5. Open, shallow metal pans are more effective in conducting heat and allowing air removal than tall, plastic tubs.
6. Vessels with liquid should not be plugged or tightly capped.
7. It is advisable to add some water to bags of solid wastes (the water will vaporize into steam that will drive out residual air once sterilization temperature has been reached inside the bag).
8. When using an autoclave bag with a ‘Biohazard’ symbol on it, place a strip of tape that produces the word “autoclaved” across the symbol. This must be done for any autoclave bag that has a Biohazard symbol.

LOADING

1. Place containers of liquid, bags of agar plates, or other items that may boil over or leak inside a secondary pan in the autoclave.
2. Never place autoclave bags or glassware in direct contact with the bottom of the autoclave.
3. Do not overload the autoclave; leave sufficient room for thorough steam circulation.
4. Make sure the plug screen in the bottom of the autoclave is clean.
5. Do not mix loads of liquids with solids.

OPERATING PARAMETERS

1. The parameters for the sterilization cycle will depend upon the amount and type of material. Usually 121 C° at 15 psi for a minimum of 30 minutes is recommended. However, the temperature and cycle time should be determined using a worst case load and using a biological indicator as verification that sterilization was achieved (e.g., ampoule of *B. stearothermophilus* spores placed in the middle of the full load). A biological indicator should be used frequently enough (e.g., once per month) to ensure that the sterilization parameters are effective in treating biohazardous waste.
2. Make sure chart paper or printer paper is in place to document the cycle parameters for the load. If a recording system is not available, it is critical to verify that sterilization parameters were achieved by another means such as spore strips, an autoclave thermometer, etc.
3. The exact operating procedure for each model of autoclave will differ. The user should develop an SOP to describe proper steps to operate the autoclave.

REMOVING STERILIZED ITEMS

1. Open the sterilizer door no more than 0.5 inch; wait 10 minutes before unloading items.
2. Wear heat resistant gloves to unload items.
3. Be very careful of liquids, molten agar, etc. to avoid getting splashed with scalding liquid. Do not agitate containers of super-heated liquid or remove caps before unloading.
4. Unload hot items onto a cart for transport.
5. Take bags of autoclaved disposable waste to the dumpster.
6. NOTE: If a faulty condition exists (e.g., sterilizer did not finish the cycle, or water leaks out when the door is unlocked), contact a service technician.

RECORDKEEPING

1. Document the treatment of each load of biohazardous waste in a log which lists: the date of treatment; the amount of waste treated; the method/conditions of treatment; and the printed name and initials of the person performing the treatment. Keep charts or printout strips with the logbook as documentation of the autoclave operation.
2. Document the date and results of each verification test using biological indicators.

NON-STERILIZATION PROCEDURES

For procedures where an autoclave treatment is used for purposes other than acquiring sterilization, the time and temperature parameters will vary as needed to accomplish the intended goal of the user.

REPAIRS / MAINTENANCE

When maintenance work or repairs are needed, the user must provide a safe work environment for the service technician. Remove all items from the sterilizer chamber, clean any spills or leaks inside the chamber, remove untreated biohazardous materials from the vicinity, etc.

REFERENCES:

Title 25, Texas Administrative Code, Chapter 1, Sections 131-137

Title 30, Texas Administrative Code, Chapter 330, Sections 1001-1010

Management of Medical Waste, City of College Station – Sanitation Department

Management and Disposal of Biological Waste at Texas A&M University

Infectious and Medical Waste Management, Peter Reinhardt and Judith Gordon

The Foundations of Laboratory Safety, Stephen R. Rayburn

Laboratory Safety Principles and Practices, Diane Fleming, John Richardson, Jerry Tulis, and Donald Vesley, editors

Biohazards Management Handbook, Daniel Liberman and Judith Gordon, editors

Stanford University Biosafety Manual

Massachusetts Institute of Technology Biosafety Manual