STANDARD OPERATING PROCEDURE

Autoclave Operation SOP

Document no.	SOP-LAB-012
Revision	1.0
Owner	Laboratory Supervisor
Effective date	September 15, 2026
Review cycle	Every 12 months

1. Purpose

To sterilize laboratory materials and waste reliably using the autoclave, while protecting operators from steam and pressure hazards and confirming each cycle achieves sterilization.

2. Scope

Applies to steam autoclaves used to sterilize glassware, media, instruments and biohazard waste. Chemical disinfection of surfaces is covered by the lab cleaning SOP.

Definitions

Gravity cycle	A standard sterilization cycle relying on gravity displacement of air by steam, used for most solid goods.
Liquid cycle	A slower-exhaust cycle used for liquids to prevent boil-over from rapid pressure release.
Biological indicator	A test vial containing heat-resistant spores used to confirm a cycle actually achieved sterilization.

3. Responsibilities

Lab Technician	Loads, runs and unloads the autoclave, and records cycle parameters and indicator results.
Laboratory Manager	Reviews weekly biological indicator results and approves the autoclave's return to service after a failure.
Maintenance Technician	Services the autoclave, checks water levels and gaskets, and repairs faults.

RACI matrix

Activity	Lab Technician	Laboratory Manager	Maintenance Technician
Check water level and door seal	R/A	-	C
Select cycle and load items	R/A	-	-
Run weekly biological indicator test	R	A	-
Approve return to service after a failed load	I	A	R

R = Responsible, A = Accountable, C = Consulted, I = Informed

4. Materials and PPE

Materials, tools and systems

- Autoclave-safe bags and containers
- Chemical indicator tape or strips
- Biological indicator vials and incubator
- Autoclave cycle log
- Heat-resistant gloves and tray for unloading

Personal protective equipment

- Heat-resistant gloves
- Face shield or safety glasses
- Closed-toe shoes

5. Procedure

Step	Task	Owner	Done
5.1	**Check the water reservoir** Check the autoclave's water reservoir level and top it up with the manufacturer-specified water type before starting a cycle.	Lab Technician	☐
5.2	**Inspect the door seal** Inspect the door gasket for cracks, debris or misalignment, since a damaged seal will prevent the chamber from reaching pressure.	Lab Technician	☐
5.3	**Load items correctly** Place items in autoclave-safe containers or bags, venting biohazard bags loosely and avoiding overpacking so steam can circulate around every item. **Warning:** Never seal a biohazard bag tightly closed; steam must be able to penetrate the load.	Lab Technician	☐
5.4	**Apply a chemical indicator** Place a chemical indicator strip or tape on or inside each load so a color change confirms exposure to autoclave conditions.	Lab Technician	☐
5.5	**Select the correct cycle** Choose the gravity, liquid or waste cycle matching the load type, since liquids and waste need slower exhaust to avoid boil-over.	Lab Technician	☐
5.6	**Close and lock the door** Close the chamber door and confirm it is fully locked before starting the cycle, following the unit's specific locking procedure.	Lab Technician	☐
5.7	**Start the cycle and record parameters** Start the selected cycle and record the temperature, pressure, run time and operator on the autoclave cycle log.	Lab Technician	☐
5.8	**Monitor for completion** Check the display or printout at the end of the cycle to confirm the sterilization phase reached and held the required temperature and time. **Checkpoint:** The cycle printout or display confirms the sterilization set point was reached and held for the full cycle time.	Lab Technician	☐

Step	Task	Owner	Done
5.9	**Allow pressure to release before opening** Wait until the chamber pressure gauge reads zero and any manufacturer-specified cooling time has passed before unlocking the door. **Warning:** Never force open the door while the chamber shows any residual pressure.	Lab Technician	☐
5.10	**Unload with heat-resistant gloves** Open the door slowly to let residual steam escape away from your face, then remove items using heat-resistant gloves and a tray.	Lab Technician	☐
5.11	**Verify sterilization results** Check the chemical indicator color change on each item, and run and read a weekly biological indicator test against a positive control. **Checkpoint:** The weekly biological indicator shows no growth compared with the positive control before the autoclave continues routine use.	Lab Technician	☐
5.12	**Log the cycle and report failures** Complete the cycle log entry with indicator results, and report a failed cycle or failed biological indicator to the laboratory manager immediately, holding the load as non-sterile.	Lab Technician	☐

6. Quality checks

- Every load carries a chemical indicator that shows the expected color change.
- Cycle logs show the sterilization temperature and time were reached and held.
- A biological indicator test is run and read at least weekly.
- Failed loads are held as non-sterile and reprocessed, not released.

7. Records

- Autoclave cycle log
- Biological indicator test results
- Chemical indicator records
- Maintenance and repair history

8. KPIs

- Percentage of cycles passing biological indicator verification
- Number of failed or aborted cycles per month
- Average autoclave downtime for repair
- Percentage of weekly biological indicator tests completed on schedule

9. Common mistakes

- Sealing a biohazard bag tightly so steam cannot reach the contents.
- Opening the door before the pressure gauge reads zero.
- Overpacking the chamber so steam cannot circulate around every item.
- Skipping the weekly biological indicator test when the schedule is busy.

10. Revision history

Revision	Date	Description	Reviewed by
1.0	September 15, 2026	Initial release	Ilia Pirozhenko

Approval

Prepared by	Approved by	Date

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