Autoclave Use Procedures

Autoclaves operate by applying pressurized steam to destroy microorganisms and sterilize items.

Any individual that operates the autoclaves must have successfully completed a training session on safe operating procedures as part of the required laboratory-specific hands on training discussed in the TWU Chemical Hygiene Plan.

General Procedure

1) **Prohibited Materials**
   a. Ensure that the material is suitable for the autoclave. **DO NOT** put items such as sharps, anatomical pathological waste or animal carcasses/parts.
   b. Materials containing solvents or substances that may emit toxic/noxious fumes should **NOT** be autoclaved.
   c. **DO NOT** autoclave any radioactive material.
2) **Material Preparation**
   a. If microbiological/biomedical waste is to be treated prior to disposal as general refuse, the load **must be weighed and recorded on the Autoclave Use/Waste Treatment Log prior to autoclaving** (see below). Weight can be obtained using household-type scales.
   b. Loads must not exceed the effective capacity of the autoclave chamber. Leave space between items/bags to allow steam circulation.
   c. Do not wrap packages/waste too tightly as doing so will impede steam penetration, potentially preventing full sterilization. Ensure adequate steam penetration by creating an opening of at least one inch in the bag's closed top. An exception to this would be the use of specialized sterilizable autoclave bags or pouches that allow steam through even when sealed. For example, when sterilizing dental hygiene equipment.
   d. Because liquids tend to boil during the autoclaving cycle, avoid the risk of burns by not overfilling containers; use containers that allow your solution to double in volume.
   e. **DO NOT** put sealed containers in the autoclave: NOTE: A large long-necked bottle

which has been over-filled with liquid may behave like a sealed container.

f. On autoclaves which have no pre-vacuum cycle, water can be carefully added to bags of waste, and a solids/gravity cycle can be run. Alternatively, water can also be added to autoclavable pans at a depth of 2.5 cm.

g. All items or containers must be tagged with autoclave tape to verify 121°C was achieved.

3) Required Settings

a. Temperature: Minimum of 121°C

b. Pressure: Minimum of 15 psi. Make sure steam supply to autoclave is adequate and that there are no air pockets present in steam line (jacket pressure should be at least 15 psi prior to starting a load).

c. Time: **A minimum of 30 minutes is required when treating waste**, and is recommended for sterilization of equipment. However, based on performance testing results, **longer times may be required**. If so, signs will be placed on the autoclave indicating the minimum time, which should be followed.

d. Waste: The minimum time for waste treatment is 30 minutes (or longer for specific autoclaves as noted above), more time may be needed to ensure decontamination for specific loads. Studies have demonstrated that complete decontamination of waste loads is dependent on load size, type of container, moisture content of load, and media (liquid vs. solid). Therefore, for large loads, tightly packed loads, or particularly dry loads, the length of time may need to be increased to allow steam to penetrate to the middle of the load. Contact Risk Management for assistance with determining necessary treatment time.

4) Cycle Selection

a. Make sure that autoclave door is properly closed/latched/sealed.

b. Use **slow exhaust** when autoclaving liquids, to prevent contents from boiling over.

c. Select **fast exhaust and dry cycle** for non-liquids and glassware.

d. Use **fast exhaust cycle** for wrapped items.

e. WHEN IN DOUBT always use **slow exhaust.**

f. Defer to the manufacturer's instructions if they conflict with the above recommendations.

5) **Removing the Load**
    a. Use proper protective equipment (wear lab coat, eye protection, insulated gloves, and closed-toe shoes) to prevent burns.
    b. Check that the chamber pressure is zero. **DO NOT** open door while the chamber is still pressurized.
    c. Allow autoclave to cool down before opening door (some, but not all, autoclaves have a safety interlock that prevents opening the door too soon).
    d. **DO NOT stand in front of door when opening it.** Stand to the side and slowly open door only a crack, beware of rush of steam.
    e. Allow autoclaved items to sufficiently cool before handling/removing them to prevent burns.

6) **Waste Disposal**
    a. If the autoclave load ran **successfully** (no malfunctions, minimum 121°C, 15 psi, and minimum of 30 minutes, or longer if required), allow the biohazard bag to cool before proceeding. If the run was **unsuccessful** (minimum parameters not met), the waste must be treated again to ensure proper sterilization/treatment.
    b. Place an adhesive label over at least one of the biohazard symbols on the biohazard bag that states: "The contents of this container have been treated in accordance with the provisions of 25 TAC §1.136." Labels can be obtained from Risk Management.
    c. The biohazard bag with the affixed label may be placed into a large black trash bag and tied closed. Do not overfill the outer trash bags. This will indicate to the custodial staff that the waste has been treated, and may now be disposed of in the normal trash.

7) **Autoclave Log for Waste Treatment**
    a. Every time an autoclave is used for **waste treatment**, the load must be recorded in the "Autoclave Use/Waste Treatment Log," which can be obtained from Risk Management.
    b. Required information includes the date, the lab/investigator the operator works for, the weight of the waste load, the operating parameters (pressure, temperature, time),

and the name and initials of the operator.

c. These records are required by the Texas Commission on Environmental Quality (TCEQ) for waste treatment, and are useful for reporting of incidents, accidents and/or faults.
d. The log book must be kept adjacent to the autoclave.
e. The logs must be maintained for a minimum of three years.

Autoclave Maintenance/Repairs

a. It is highly recommended that all autoclaves be maintained regularly by an outside maintenance contractor.
b. If the autoclave does not operate properly, a notice should be placed on the unit indicating it should not be used until fixed.
c. The problem should be recorded in the log and Risk Management notified.
d. Repairs shall be made by qualified persons.

Autoclave Performance Testing

Autoclave tape will indicate if the autoclave achieved a temperature of 121°C during the cycle, but alone is not an adequate method to determine if the autoclave is functioning properly and destroying all microorganisms. Therefore, Risk Management performs additional tests using biological indicators to monitor the performance of autoclaves used for waste treatment. See the Autoclave Performance Testing Procedures document for further information.

AUTOCLAVE USE / WASTE TREATMENT LOG

Autoclave ID: _____ Building: _____ Room No: _____

- **Minimum Parameters for Waste: 1. Pressure: PSI ≥ 15 psig 2. Temperature: ≥ 121°C 3. Time: ≥ 30 minutes**
- **Waste Labeling:** Ensure a treated medical waste label (obtained from Risk Management) is affixed to all loads of treated waste prior to placement in an outer black trash bag and subsequent disposal in the trash.
- **Recordkeeping:** Record waste treatment and performance testing only on this log. Autoclave logs and other associated records (service, testing etc.) must be maintained a minimum of three years.

Date	Lab/Investigator	Weight (lbs) of Load Containing Waste	Pressure (psig)	Temperature (Celsius)	Minutes of Autoclaving	Printed Name of Person Operating Autoclave	Comments	Initials of Operator