Carnegie Mellon University Environmental Health & Safety FIRE | LAB | WORK	**Environmental Health and Safety** **Autoclave Safety - Guideline**
Date of Issuance: January 2020	**Revision Date:** 10/23/2023
Revision Number: 5	**Prepared by:** EHS

1. Purpose

Carnegie Mellon University has developed this guideline to cover general procedures for the safe use and operation of autoclaves.

2. Scope

This guideline applies to all Carnegie Mellon faculty, staff and students that use autoclaves.

3. Introduction

Autoclaves are commonly used in laboratories to sterilize glassware and instruments, media and solutions. However, routine use of this equipment is not without hazard.

4. Roles and Responsibilities

a. Carnegie Mellon University Environmental Health and Safety (EHS) is responsible for:
   i. Developing the written Autoclave Safety Guideline and revising as necessary;
   ii. Developing a training program on the safe use and operation of autoclaves;
   iii. Conducting routine inspections to ensure the safe use and operation of autoclaves; and
   iv. Investigating incidents related to autoclaves.

b. Departments will be responsible for:
   i. Understanding and complying with the requirements of this Guideline;
   ii. Ensuring the safe use and operation of autoclaves according to this Guideline;
   iii. Designating a responsible person/supervisor/facility manager for autoclave use, operation and maintenance;
   iv. Ensuring all required training has been completed and is up-to-date; and
   v. Contacting EHS if assistance is needed.

c. Autoclave users will be responsible for:
   i. Complying with the procedures outlined in this Guideline;
   ii. Completing Fire Extinguisher Training online,
   iii. Receiving training by their department's responsible person on use and operation of the each autoclave to be used;

iv. Ensuring autoclaves are inspected annually by qualified service personnel; and
v. Informing their department's responsible person/supervisor/facility manager of any problems, defective equipment or any other issues relating to autoclaves and associated equipment.

5. Risks

Potential risks of using an autoclave are heat and steam burns, hot fluid scalds, injuries to hands and arms from the door and bodily injury in the event of an explosion.

6. Guidelines

a. Wear the following Personal Protective Equipment (PPE):
   i. Laboratory coat;
   ii. Long heat-resistant gloves; and
   iii. Face shield.
b. Inspect Autoclave
   i. Inspect the door gasket (seal) for any cracks or bulges;
   ii. Check the drain screen to make sure it is not clogged or obstructed and clean if necessary; and
   iii. If any problems are found, immediately notify the responsible person and ensure the autoclave is placed out of service until issues can be rectified. Out of service autoclaves must be posted with appropriate signage indicating that the autoclave is not to be used until further notice and applicable sections must be followed in the Hazardous Energy Control Procedures.
c. Prepare Items
   i. The following items are forbidden from autoclaving:
      1. Sharps
      2. Flammable, toxic, corrosive and reactive chemicals (for more information, consult with the Safety Data Sheet (SDS) for more information)
      3. Radioactive materials
      4. Infectious and pathological waste
   ii. Check to make sure the item to be autoclaved or the vessel in which items will be autoclaved is compatible and can withstand the temperatures and pressures.
   iii. Place containers of liquid (e.g., bottles, beakers, flasks) topped with a cotton plug or steam-penetrable bung in a large, leak-proof, shallow pan.
      1. If glassware is used, inspect for cracks and other defects before use.
      2. Do not overfill bottles.
   iv. Place autoclave bags in a large, leak-proof, shallow plastic or stainless steel pan to contain spills.
      1. Open bags to allow steam penetration and place a small amount of water inside the bag to allow heat proper heat transfer.

d. Operate Autoclave
    i. Read and understand the manufacturer's operating manual and follow the operating instructions.
    ii. Ensure the area around and above autoclave is clear and remove any combustible items immediately around or on top of unit.
    iii. Carefully load the autoclave allowing sufficient space between items.
    iv. Close and lock autoclave door, double-checking to ensure door is locked.
    v. Select the appropriate load type, cycle time and temperature.
    vi. Run the autoclave and log use.
    vii. Ensure any existing local exhaust ventilation is functioning properly.
    viii. Allow the run cycle to complete before opening autoclave door.
    ix. Notify responsible person if cycle fails or if materials are not properly decontaminated.

f. Unload Autoclave
    i. Don appropriate PPE.
    ii. Verify that the chamber temperature has dropped and pressure is zero.
    iii. Open the autoclave door slowly to allow steam to escape gradually.
    iv. Allow items to cool in the autoclave for at least 10 minutes before removing.
    v. Remove items slowly, being careful not to agitate containers.

7. Emergency Procedures

a. Emergency Phone Numbers
    i. EHS: (412) 268-8182
    ii. University Police: (412) 268-2323

b. Personnel Contamination
    i. For eye contamination, flush with an eyewash for 15 minutes. Contact EHS and University Police.
    ii. For localized skin contamination or first degree skin burns, wash the impacted area with soap and water and apply burn cream as needed. Contact EHS and University Police.
    iii. For widespread contamination, remove contaminated clothing and shoes and flush body for as long as needed to remove contamination with an emergency safety shower. Contact EHS and University Police.
    iv. For steam burns that are second or third degree in nature, personnel should seek emergency medical attention by contacting EHS and University Police.

c. Small Fires (a fire the size of a typical household wastebasket)
    i. Contact EHS and University Police.
    ii. Keep the exit at your back.
    iii. Use the nearest fire extinguisher:

1. Pull the pin to break the seal.
2. Aim at the base of the fire.
3. Squeeze handle grips or trigger.
4. Sweep the fire, spraying side-to-side at the base of the flames.

iv. Ventilate the area after the fire is completely extinguished.

d. Large Fires (a fire larger than the size of a typical household wastebasket)
   i. Activate the nearest fire alarm pull station and alert others.
   ii. If safe to do so, assist others who may be in danger. However, do not put yourself at risk.
   iii. Evacuate the area, use stairs and close doors behind you.
   iv. Contact EHS and University Police, report location, injuries and other hazards.
   v. Move away from the building exterior and assemble with floor marshal.
   vi. Inform emergency responders of any hazards, injuries or locations of persons remaining inside.
   vii. Remain outside the building until cleared for re-entry.

8. Revisions

Date	Documented Changes	Initials
1/2020		
10/2020	Updated Format	AJL
10/27/2020	Updated Format and Accessibility Update	MAS
8/5/2021	Added 4. c. iv	AJL
10/23/2023	Reviewed – no revisions needed	AJL

For additional questions or concerns please contact EHS: safety@andrew.cmu.edu