

	<b>Effective Use of Autoclaves</b>	Effective	March 24, 2006
		Originator	AnnaMaria Miller
		Last Updated	October 13, 2006
		Updated By	Keith Lander

## 1. Purpose:

1.1 The purpose of this Policy is to ensure that steam sterilization of materials is conducted in a dependable procedure for the destruction of microbial life. Steam sterilizers (autoclaves) are common laboratory tools that must be properly used to be effective. This establishes guidelines for their effective use for (a) the decontamination of cultures and other potentially biohazardous materials and (b) the sterilization of surgical and laboratory equipment. Hereafter the use of autoclaves for (a) above will be called “decontamination” and that for (b) will be called “sterilization”.

## 2. Scope:

2.1 This procedure applies to all technicians and laboratory personnel who are employed by the Ross University School of Veterinary Medicine.

## 3. Procedure:

### 3.1 Successful Components of autoclaving

These should include validation of effectiveness by monitoring temperature, pressure and cycle duration time for each cycle and providing periodic decontamination challenges (quality assurance), i.e. use of biological indicators. A logbook should be maintained to record autoclave use and should be available for inspection.

- **Temperature:** The autoclave should be set to employ saturated steam at a pressure of approximately 15 psi to achieve a chamber temperature of a least 121°C (250°F) for a minimum of 30 minutes, or at 27psi to achieve a temperature of at least 132°C (270°F) for a minimum of 4 minutes.
- **Time:** The time is measured after the temperature of the material being sterilized reaches the required temperature.
- **Contact:** Steam must contact all areas of the load. Air pockets or inadequate steam supply will cause sterilization failure. Materials and objects that are required to remain sterile after autoclaving (eg, surgical instruments, laboratory glassware, etc) should be place in containers that allow steam penetration during autoclaving but do not allow free access of air when the objects have been cooled to room temperature for storage.

**Containers:** Materials that are to be decontaminated should be carried to the autoclave in leak proof containers. Containers used to hold material while being autoclaved are described below.

- Primary Containers – Clear autoclave bags come in a wide variety of sizes. They are usually placed in a secondary container during decontamination cycles to catch liquids that may drain out of the bag.
- Secondary Containers – Plastic or stainless steel containers are commonly used to contain material during autoclaving. Polypropylene plastic pans with 6-12 inch sides are favored over polyethylene and polystyrene because they can withstand autoclaving without melting. Stainless steel containers are durable and a good conductor of heat.

For sterilization of surgical equipment the container should be sealed and tagged to prevent unintentional opening. A broken tag indicates an opened container. The tag shows the sterilization cycle number (Batch-Number.), the sterilization date, expiration date, and the responsible person who packed and sterilized the pack.

**Indicators:** These are tools used to validate the decontamination process.

- Chemical indicators (paper slip or tape) change color after being exposed to 121°C (250°F). They indicate only that the sterilized goods were heated but do not indicate that exposure time or temperature was sufficient to sterilize. This indicator type is called a “through-put” indicator. They serve as a quick reference during loading to differentiate between processed and unprocessed items.
- Biological indicators (BI) are designed to demonstrate that an autoclave is capable of killing microorganisms. They most commonly use spores of a very heat-resistant bacterium, *Bacillus stearothermophilus*. Such tests (BI) should be performed after every 10 cycles of the autoclave.

**Recordkeeping:** The sterilizing process must be documented by personnel performing the process. It is recommended that the autoclave be tested daily before use by a method such as the Bowie-Dick test.

- Records of cycles, maintenance, logs, chart recorders, calibration results and BI tests should be kept for a minimum of three years.

### 3.2 Training in Autoclave Operation

Principal investigators or supervisors must train and qualify their staff for operation of steam autoclaves for decontamination of materials. Qualified autoclave users should understand the time, temperature, pressure relationships required for proper materials decontamination or sterilization. Additional training on handling materials to be autoclaved should also be provided. Supervisors should maintain a permanent record of training provided to their staff.

- Personnel should wear proper personal protective equipment, i.e. heat resistant gloves, eye protection and a lab coat, particularly when unloading the autoclave. Regularly inspect your autoclave components for proper operation. Follow the autoclave manufacturer's recommendations for inspections and service. Autoclaves should be inspected on a regular basis and temperature gauges should be calibrated at least annually. If a problem is found, promptly notify your area supervisor who will call for maintenance. **Do not operate an autoclave until it has been properly repaired.**
- **Never place sealed containers in an autoclave.** Large bottles with narrow necks can simulate sealed containers if filled with too much liquid.
- **Do not** autoclave items containing solvents, volatile or corrosive chemicals (phenol, trichloroacetic acid, ether, chloroform, etc.) or any radioactive materials.
- After loading and starting the autoclave, processing time starts after the autoclave reaches the required temperature and pressure.
- Decontamination conditions vary with type of load therefore processing times will vary according to the conditions. A minimum of 30 minutes at a temperature of 121<sup>o</sup>C is needed to decontaminate biological waste.
- At the end of a decontamination cycle make sure that the pressure in the autoclave chamber is near zero before opening the door. Slowly open the autoclave door and allow the steam to gradually escape from within the autoclave.
- Take care when opening autoclave doors. Opening the autoclave door too quickly may result in glassware breakage and/or steam burns on the operator.
- Allow materials inside the autoclave to cool for 10 minutes before removing them from the autoclave.
- After autoclaving, waste can be disposed of as solid waste.

If you have questions regarding waste disposal call the Director of Security (Ext 191)