

Standard operating procedures for Biological Safety Cabinets

The purpose of this guideline is to detail the safe operation of biological safety cabinets, or BSC, in ASU laboratories and to ensure adequate containment of biological materials. The most common type of BSC at ASU is a Class II. Class II BSCs provide the microbe-free work environment necessary for cell culture propagation and handling of infectious organisms.

Biological Safety Cabinet make or model: _____

Person responsible and phone number: _____

Location in building and room: _____

Definitions

Biological Safety Cabinet: A piece of equipment designed to protect the operator, the laboratory environment and work materials from exposure to infectious aerosols and splashes that may be generated when manipulating substances containing infectious agents, such as viruses, bacteria and primary tissue cultures.

High Efficiency Particulate Air or HEPA Filter: Filter that traps 99.9 percent of particles of 0.3 μm in diameter and 99.9 percent of particles of greater or smaller size, thus capturing all infectious agents and ensuring only microbe-free air is exhausted from the cabinet or directed to the work surface.

Responsibilities

Principal Investigator

The Principal Investigator, or PI, is responsible for ensuring personnel under their supervision are trained on the safe and proper use of the BSC and that correct procedures are followed.

Designated person

The PI may designate a member of the lab to oversee the correct operation and maintenance of the BSC. This person shall:

- Coordinate yearly BSC certification by the certified vendor. The dates of the most recent certification must be posted on the front of the BSC.
- Label the BSC when it is not operating correctly.
- Make any necessary arrangements for repairs and annual certification of the BSC.
- Periodically inspect the BSC to ensure its operational performance.
- Report to PI unsafe practices by BSC users.

BSC users

- BSC users must receive proper training from their PI on the safe and proper use of the BSC prior to use.
- BSC users must follow correct procedures.
- BSC users shall report any injuries, accidents or spills to their PI.
- BSCs users shall report any defects or malfunctions of the BSC to their PI or the designated person.

Procedures

Prior to operation

1. Read the Safety Data Sheets, or SDS, for materials being used in a BSC. Note any precautions regarding the use of the chemical or microorganisms in the BSC.
2. Lift the sash to the recommended height.
3. Turn on the BSC fan 10 minutes before beginning work to allow adequate air filtration.
4. Check the air intake and exhaust grilles for obstructions, and check the pressure gauge reading indicating HEPA filter load. If you do not know the acceptable reading for the cabinet, ask the certifier or consult your manufacturer's manual.
5. If the cabinet is equipped with an alarm, test the alarm and switch it to the ON position.
6. Confirm inward airflow by holding a piece of tissue at the middle of the edge of the viewing panel and ensuring it is drawn in.
7. Decontaminate the cabinet surface and surface-decontaminate all materials to be placed inside the BSC — refer to the Cleaning and Disinfection section.
8. Bulky items, such as waste containers and suction collection flasks, should be placed to one side of the interior of the cabinet.
9. Keep the work area of the BSC free of unnecessary equipment or supplies. Clutter inside the BSC may impede proper airflow and the level of protection provided. Consider using wire racks or shelving to increase airflow around front and rear grills.
10. Wear eye protection, a lab coat, closed-toe shoes and disposable gloves to protect yourself as well as your samples from contamination.
11. Respirators may be required for some procedures. The nature of the Personal Protective Equipment, or PPE, worn may vary according to the findings obtained from the biological risk assessment.

Operation

- Active work should flow from clean to contaminated areas across the work surface.
- Always use mechanical pipetting aids. Mouth pipetting is not allowed.
- Arms should be moved in and out slowly, perpendicular to the front opening to minimize disruption of the air curtain and laminar flow.
- Do not work in a BSC while a warning light or alarm is signaling.
- Heat sources such as Bunsen burners are strictly prohibited inside the BSCs as they significantly disrupt the laminar flow of air.
- Locate liquid waste traps inside cabinet and use an in-line HEPA filter to protect the vacuum line. If traps must be located on the floor, place them in a secondary container such as a durable plastic tray or box to prevent breakage.
- To sterilize bacteriological loops, micro-burners or electric furnaces may be used.
- Work as far to the back as possible, but within comfortable reach.

Cleaning and disinfection

1. When work is completed, all equipment and supplies from the BSC should be decontaminated and removed from the cabinet.
2. The interior surfaces should also be wiped with an appropriate disinfectant that would kill any microorganisms that could be found in the cabinet. Corrosive chemicals such as bleach should be avoided, but if used, should be followed with a wipe down of sterile water or 70 percent ethanol.
3. Allow the cabinet to run for 10 minutes.

Ultraviolet (UV) lights

- If installed, UV lamps must be cleaned weekly to remove any dust and dirt that may block the germicidal effectiveness of the ultraviolet light.
- If the cabinet has a sliding sash, close the sash when operating the UV lamp.
- The lamps should be checked weekly with a UV meter to ensure that the appropriate intensity of UV light is being emitted.
- Ultraviolet or UV lamps are not recommended in BSCs nor are they necessary.
- UV lamps must be turned off when the room is occupied to protect eyes and skin from UV exposure, which can burn the cornea and cause skin cancer.

Spills

In the event of a spill within a BSC, follow these steps:

1. Alert the other laboratory employees.
2. Leave the cabinet turned on.
3. While wearing gloves, spray or wipe cabinet walls, work surfaces and equipment with disinfectant equivalent to 1:10 bleach solution. If necessary, flood the work surface, as well as drain-pans and catch basins below the work surface, with disinfectant for a contact time of at least 20 minutes.
4. Report the spill to the laboratory's PI, who will report the spill to the Responsible Official if a select agent or toxin is involved.
5. Soak up disinfectant and spill with paper towels. Drain catch basin into a container. Lift front exhaust grill and tray and wipe all surfaces. Ensure that no paper towels or solid debris are blown into the area beneath the grill.
6. Autoclave all clean-up materials before disposal in the biohazard waste container.
7. Wash hands and any exposed surfaces thoroughly after the clean-up procedure.

Other considerations

- All repairs to the BSC must be performed by a qualified technician. Any malfunction of the BSC must be reported and repaired before the BSC is used again.
- The BSC must be decontaminated before filter changes and before being moved. The most common decontamination method is by fumigation with formaldehyde gas. BSC decontamination may only be performed by a certified contractor.
- The BSC should be positioned in an isolated corner to minimize disruption of the air intake arising from traffic around the biosafety cabinet or drafts from doors, windows and air conditioning.

Contact ASU Biosafety and Biosecurity at 480-965-1823 if you have any questions.