



Biosafety Cabinet Procedures

EHS-BIOSAFETY-SOP.02 Revision 0

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1.0 Purpose and Applicability

1.1 The following document describes the proper procedures for working in a biosafety cabinet as well as the annual certification requirements.

1.2 These procedures must be followed properly by all who own and work in a biosafety cabinet.

2.0 Definitions

2.1 A biosafety cabinet (BSC) is the primary barrier protection for individuals working with biohazardous materials. Laboratory procedures that could create airborne biohazards should always be performed in a BSC as it protects laboratory workers and the environment from aerosols or droplets that could spread biohazardous material.

2.2 Laminar flow/clean benches are devices that look similar to a biosafety cabinet, but only protect the product from contamination. These devices direct air towards the operator and should never be used for handling infectious, toxic or sensitizing materials.

2.3. Fume hoods are designed for working with chemicals.

2.4 A biosafety cabinet certification involves performance and safety tests that are conducted annually by an outside contractor to ensure that the cabinet is working according to the NSF-49 Safety Standard.

3.0 Roles and Responsibilities

3.1 **Principal Investigator** – Individual responsible for ensuring that biosafety cabinets are certified annually and that all researchers working in the laboratories are informed on biosafety cabinet use procedures.

3.2 **Biosafety Officer at EH&S** – Staff member responsible for advising researchers on biosafety cabinet purchasing, certifications, locations, and procedures for use.

4.0 Procedures for Use

4.1 Biosafety Cabinet Operational Procedures:

- Ready the work area. Operate cabinet blowers for five minutes before beginning work to allow the cabinet to purge or remove particulates from the cabinet.
- Disinfect the work area. Wipe the work surface, interior walls and surface of the window with a suitable disinfectant such as 70% ethanol, 10% bleach solution, an iodophor, or quaternary ammonium compound.
- Assemble material. Introduce only those items that are required to perform the procedures and arrange in a logical order. Each item should be wiped with a

disinfectant prior to placing it into the cabinet in order to reduce the introduction of contaminants. The flow of work should proceed across the work surface from clean to contaminated areas. Similarly, pipette tip discard trays containing disinfectant, biohazard bags, sharps containers, etc., should be placed to one side inside the BSC.

- Wear protective clothing. Laboratory coats or solid front gowns should be worn over street clothing and long-cuffed latex or other appropriate gloves (e.g., nitrile, vinyl) should be worn for hand protection. The cuffs of the gloves should be pulled up and over the cuffs of the coat sleeves.
- Perform procedures slowly by moving items in and out of the cabinet using a straight in and out motion and avoiding side to side motions. Avoid rapid movements. After placing arms/hands inside the BSC, manipulations should be delayed to permit the cabinet to stabilize and allow the flow of air to remove surface contaminants from your arms/hands.
- Do not block the front grille with papers, equipment, etc., as this may cause air to enter the work space area instead of being drawn through the front grille and into the HEPA filter. Arms should be raised slightly and operations should be performed on the work surface at least four inches from the front grille. The middle third area is ideal. Likewise, no operations or equipment should block the rear exhaust grille. Any equipment generating aerosols such as a microcentrifuge, vortex or blender should be placed near the rear of the cabinet. A disinfectant-soaked towel can be placed on the work surface to contain any spills or splatters that may occur.
- Open flames inside the cabinet create turbulence that can disrupt the pattern of air and compromise the safety of the operator and affect product protection (i.e., cause contamination). Flames can also damage the interior of the cabinet as well as the HEPA filters. If a burner is necessary to sterilize tools such as a loop or needle, consider the use of a touch plate burner that provides a flame on demand, and place it to the rear of the cabinet. Alternatively, electric furnaces or disposable, sterile tools can be used.
- If culture media or other fluids need to be aspirated, suction or aspirator flasks should be connected to an overflow collection flask containing disinfectant (the aspirated materials can then be discarded as noninfectious waste).
- When work is completed all items within the cabinet should be wiped down with disinfectant and removed from the cabinet. Do not use the interior of the BSC as a storage area since stray organisms may become "trapped" and contaminate future experiments. The interior surfaces of the cabinet should also be cleaned with a disinfectant. Let the blowers operate for five minutes with no activity inside the cabinet to purge the cabinet of contaminants.
- Investigators should remove their gowns and gloves and thoroughly wash their hands before exiting the laboratory.

4.1 Biosafety Cabinet Annual Certification

All biosafety cabinets at the University must be certified annually by an authorized contractor. Most of the biosafety cabinets on campus are certified by B&V Testing. You may contact them directly at: (800) 851-9081.

The certifications follow the NSF-49 Safety Standard for biosafety cabinets. The contractor will test down flow and inflow velocities, air flow patterns, the HEPA filter and perform a cabinet leak test to ensure that the BSC is working properly.

Guidelines for when a Biosafety Cabinet certification must be performed:

1. Before initial use
2. After moving a BSC from one location to another
3. After replacement of high efficiency particulate air (HEPA) filter(s)
4. At least annually
5. After possible contamination
6. Following a large spill or accident inside the BSC
7. When requested by the Biosafety Officer

4.2 Use of UV Light in a Biosafety Cabinet

If UV lights are used, they must be tested yearly to ensure that the appropriate wavelength for decontamination is emitted (254nm). Please note that dust particles on the light and on the surface of the biosafety cabinet will inhibit decontamination. If not used properly, UV light can also cause serious eye and skin injury. We recommend that biosafety cabinets be disinfected with the appropriate disinfectant (i.e., 10% bleach or 70% ethanol), instead of using a UV light.

4.3 Biosafety Purchasing Guidelines

All biosafety cabinets purchased at the University must meet the NSF-49 Safety Standard. There are a wide variety of biosafety cabinets on the market that are suitable for all types of research involving biohazardous materials (see table below). Before purchasing a biosafety cabinet, you will need to assess and evaluate the type of cabinet that would be suitable for the work conducted in your laboratory. Please contact the Biosafety Officer at EH&S for biosafety cabinet purchase recommendations at: 545-2682.

Comparison of Biological Safety Cabinets (from NIH, BMBL)

Type	Face Velocity (1fpm)	Airflow Pattern	Radionuclides/ Toxic chemical	Biosafety Levels	Product Protection
Class I open front	75	In at front; rear and top through HEPA filter	No	2,3	No
Class II, Type A	75	70% recirculated through HEPA; exhaust through HEPA	No	2,3	Yes
Class II, Type B1	100	30% recirculated through HEPA; exhaust via HEPA and hard ducted	Yes (low levels, volatility)	2,3	Yes
Class II, Type B2	100	No recirculation; total exhaust via HEPA and hard ducted	Yes	2,3	Yes
Class II, Type B3	100	Same as IIA, but plenum under neg. pressure to room and exhaust air is ducted	Yes	2,3	Yes
Class III	NA	Supply air inlets and exhaust through 2 HEPA filters	Yes	3,4	Yes

5.0 Key References

5.1 Maureen O’Leary, Ph.D., Program Head, Biosafety & Environmental Health Program, Department of Environmental Health & Safety, 117 Draper Hall, University of Massachusetts/Amherst, (413) 545-2682/Fax: (413)545-2600.

5.2 *Biosafety in Microbiological and Biomedical Laboratories*. CDC/NIH. 4th ed, 1999.

5.3 National Sanitation Foundation (www.nsf.org). NSF-49 Safety Standard.