

Biosafety cabinet decontamination guidelines

Introduction

Cleaning a biosafety cabinet or BSC, is an important function in terms of both containment and sterility. Aseptic technique and daily decontamination will eliminate the majority of contaminants. In addition, periodic and thorough decontamination routines, including disinfecting all removable parts and surfaces is recommended by the manufacturer and is a good laboratory practice to reduce wear on the equipment and provide greater safety to you, your samples and the environment.

Extreme caution should be observed when decontaminating BSCs. For example, use caution when wiping BSC surfaces to avoid injury from broken glass that may be present and sharp metal edges. When removing internal parts of the cabinet, it is best to work with a partner as some of the workbenches and grilles may be heavy and have sharp edges. Proper personal protective equipment, or PPE must be used.

BSCs that have been used for work involving infectious materials must be decontaminated before high efficiency particulate air or HEPA filters are changed, when the BSC is moved, or when maintenance work is planned. Generally, this decontamination would be performed by a third party using formaldehyde gas, hydrogen peroxide vapor, or chlorine dioxide gas.

However, these guidelines address routine periodic decontamination of most BSCs used in BSL-1 and BSL-2 settings. Always refer to the manufacturer's operation and maintenance manual for instructions on periodic decontamination procedures. These guidelines are intended to be supplemental and are not a replacement for the manufacturer's recommendations. For special decontamination procedures, please consult with ASU Biosafety and Biosecurity.

Personal protective equipment

Always wear appropriate PPE when working in or near the BSC and when performing decontamination procedures. At minimum, PPE includes a lab coat, gloves, and eye protection. Long pants and sturdy, closed-toed shoes which provide maximum foot protection are recommended. Whenever possible, tuck lab coat cuffs inside gloves. Isolation suits or gowns, double pairs of nitrile gloves, booties and respirators may be required depending on the agents used in the BSC and to protect from sensitivities to the disinfectants used.

Decontamination preparation

Plan on at least an hour or more of uninterrupted time to complete a thorough disinfecting routine. Schedule in advance with others in the lab in order to minimize down time. When performing a full decontamination, which includes removing internal parts such as the grille and work bench, it is best to set up an area adjacent to the BSC to place the items. Ensure that several layers of absorbent materials (e.g., lab bench protectors or soakers) are placed on the floor to soak up the disinfectant being used. It is also a good idea to have a partner help to move the heavier removable parts in and out of the BSC.

Determine the appropriate disinfectant based on the microbiological materials used in the BSC. Twenty to thirty minutes is generally considered an appropriate contact time for decontamination but this varies with the disinfectant and the microbiological agent. Manufacturer's directions must always be followed.

The use of chlorinated (bleach) or halogen chemicals may damage the stainless steel surfaces. For example, when using a 10 percent bleach solution, follow with a sterile distilled water rinse to remove any residue, and then with 70 percent ethanol or similar non-corrosive antimicrobial agent for final decontamination.

Instead of using paper towels which can cause lint, and to be more sustainable, consider using a squeegee type tool or a duster with disposable pads such as a clean room duster to wipe the internal surfaces. A less expensive and effective alternative is a sweeper floor mop (e.g., Swiffer) with a shortened handle. The disposable dry cloth can be soaked with disinfectant and then easily applied evenly to all surfaces. Remove and discard the cloth into the biohazard waste after use and repeat the procedure with a fresh cloth for the sterile distilled water and the 70 percent ethanol.

Decontamination procedure

For all decontamination steps, consider using a spray bottle with a mist setting to liberally apply disinfectant. Using an up and down, left to right sweeping motion ensures all surface areas are completely covered and no area remains dry. Always wait for the appropriate contact time to elapse then wipe excess liquid to remove. Follow with either sterile distilled water or 70 percent ethanol to remove any residue. Avoid spraying the ultraviolet, or UV light bulb and HEPA filter.

1. Turn on the BSC in normal operational mode with internal blower and light on.
2. Check the pressure on the magnehelic gauge. The pressure should be the same after cleaning and if not, could indicate the HEPA filter was disrupted and the BSC may require recertification.
3. Open the sash for normal operation. If the sash is fully opened fully and secured in this position, appropriate PPE must be worn, including a full-face HEPA filtered respirator at a minimum.
4. Allow for the normal purge time of at least five minutes before working the BSC.
5. Spray disinfectant on a biohazard waste bag and place it in the BSC to collect the used absorbent materials.
6. Remove and place any small removable parts on the workbench surface.
7. Working from left to right and top to bottom, spray disinfectant on all internal surfaces: the left wall, back wall, and right wall. Next, spray the workbench and the entire inside of the glass sash. Allow the disinfectant to soak while conducting the next steps.
8. Carefully loosen any thumbscrews to release the removable workbench surface.
9. To ensure thorough cleaning of the workbench area, these parts will be removed and cleaned outside of the BSC. Using a partner, remove the front perforated grille and removable workbench surface. Prop up against a sturdy surface adjacent to the BSC (e.g., lab bench) by positioning perpendicular on the floor on top of several layers of absorbent materials (e.g., lab bench protectors, soakers).
10. Clean the front perforated grille and removable workbench surfaces by spraying disinfectant onto the outward facing surfaces. Allow for appropriate contact time to elapse before scrubbing and wiping. Turn the pieces over and repeat the cleaning process.
11. Remove gloves and wash your hands with soap and water. Dry hands and put on a new pair of gloves before re-entering the BSC to complete the disinfection process under the workbench surface now that it is removed.
12. Inspect under the workbench surface. Using tongs or forceps, carefully remove any debris such as paper towels, stray sharps or broken glass.
13. Disinfect the under workbench surfaces including tray supports and the plenum drain area. Rinse by spraying sterile distilled water if required, and follow with spraying 70 percent ethanol. Wipe dry.
14. Once the grille and workbench have been thoroughly cleaned outside of the BSC, remove gloves and wash your hands with soap and water. Dry hands and put on a new pair of gloves before re-entering the BSC.

15. Using a partner, carefully replace and reposition the grille and removable workbench surface back into the BSC.
16. Carefully tighten any thumbscrews to secure the workbench surface in place.
17. Disinfect the grille and workbench surface.
18. Working from left to right and top to bottom, spray with sterile distilled water if rinse is required on all internal surfaces: the left wall, back wall, and right wall, then the workbench and the entire inside of the glass sash. Wipe dry.
19. Working from left to right and top to bottom, spray 70 percent ethanol on all internal surfaces: the left wall, back wall, and right wall, then the workbench and the entire inside of the glass sash. Wipe dry.
20. Transfer all waste materials into the biohazard bag, close the bag inside of the cabinet, and wipe with disinfectant prior to removal.
21. Repeat the check of the pressure reading on the manometric gauge. The pressure should be the same after cleaning and if not, could indicate the HEPA filter was disrupted and the BSC may require recertification.
22. Close down the BSC as usual, e.g., turn off the light and blower.
23. Remove all PPE and dispose in the biohazard waste.
24. Wash your hands with soap and water.

Special decontamination considerations

In addition to the main work zones within the BSC, attention should be given to areas such as the paper catch, prefilter, and plenum drain. The plenum drain area should be disinfected along with the other internal surfaces. Periodic and thorough disinfection provides the opportunity to also inspect and replace vacuum system parts and tubing and disinfect small equipment used in the BSC.

Dust the external surfaces of the BSC regularly and clean with a mild detergent and distilled water. Clean external glass sash surfaces with a glass cleaner or pre-moistened glass wipes. Dust and disinfect the chairs regularly paying particular attention to the areas of the chairs where gloved hands may have touched.

Some BSCs are designed with a permanent paper catch installed behind the rear divider panel of the work zone which is part of the return air path to the motor and blower. If the airflow is blocked in any way, it could affect the safe performance of the BSC. Therefore, the paper catch should be inspected and cleared no less than on a weekly basis and daily if procedures dictate the use of paper products. Any paper removed must be properly disposed of as a contaminated hazardous waste. These procedures also apply to BSCs configured with a prefilter.

If the perforated metal diffuser screen from the underside of the supply HEPA filter requires decontamination, consult the manufacturer's manual for removal and contact ASU Biosafety and Biosecurity for guidance. **Never touch or attempt to clean the HEPA filter.** If it is accidentally disrupted in any way, the BSC will require recertification before use.

References:

- [ASU Biosafety Manual](#).
- CDC/NIH [Biosafety in Microbiological and Biomedical Laboratories \(BMBL\)](#), 6th Edition, Appendix A – Primary Containment for Biohazards: Selection, Installation and Use of Biological Safety Cabinet.
- University of Texas Medical Branch at Galveston, Laboratory Biosafety Training Manual BSL-3, 2011.