

FREQUENTLY ASKED QUESTIONS

Q. How do Biological Safety Cabinets differ from Chemical Fume Hoods?

Class II BSCs provide personnel, product, and environmental protection from biohazards by removing particulates, using HEPA filters. BSC's recirculate a portion of the air and may or may not exhaust to the outside. Chemical Fume Hoods provide personnel protection from fumes, gasses, and vapors by removing them from the work area and exhausting them, always, to the outdoors. In a fume hood none of the air is recirculated.

Q. How do Biological Safety Cabinets differ from Clean Benches?

Clean Benches provide product protection by directing HEPA-filtered clean air from the top or back of the work space out toward the operator. They do not provide personnel or environmental protection, and should not be used with infectious agents and/or hazardous materials.

Q. Are all cabinets with a view screen Biological Safety Cabinets?

No, some fume hoods and clean benches also have view screens.

Q. Do HEPA filters remove viruses?

Yes, HEPA (High Efficiency Particulate Air) filters in BSCs remove 99.99% of particles 0.3 microns in diameter, and are even more efficient at filtering larger and smaller particles.

Q. Do HEPA filters remove gasses and vapors?

No, HEPA filters remove particles only. Gasses and vapors pass through the boron silicate microfibers in the filter.

Q. Why are BSC's certified?

Biological Safety Cabinets are certified to ensure the cabinets operate as designed. Cabinets should be certified when they are installed or relocated, when a new filter is installed, and on a regular basis – at least annually. Certifiers check:

- The cabinet airflow.
- The HEPA filters for leaks.
- The cabinet itself for leaks, if it has been moved.

Biological Safety Cabinets (BSC's)

LABORATORY VENTILATION EQUIPMENT TYPES

Type	Uses	Protection			HEPA Filter
		Personnel	Product	Enviro	
Chemical Fume Hood	Working with hazardous gasses or vapors	gasses & vapors only	NO	NO	NO
Clean Bench	Producing nonhazardous products that must be contaminant free	NO	YES	NO	YES
Class I BSC	Working with low to moderate risk biological agents	YES	NO	YES	YES
Class II BSC	Working with low to moderate risk biological agents	YES	YES	YES	YES
Class III BSC	Working with high risk agents or hazardous materials	YES	YES	YES	YES
Negative Pressure Isolator	Producing potentially hazardous products	YES	YES	YES	YES
Positive Pressure Isolator	Producing products in a clean environment	NO	YES	NO	YES

Chemical fume hoods protect personnel from gasses and vapors; they do not protect the product or environment. Clean benches offer product protection only; they do not provide personnel or environmental protection from particulates. Isolators provide protection specific to each design.

Biological Safety Cabinets are classified as Class I, Class II, and Class III containment systems:

- Class I BSCs are partial containment cabinets, which provide personnel and environmental protection but not product protection.
- Class II BSCs are partial containment cabinets providing personnel, product, and environmental protection. They are the most commonly used type of BSC (and are the subject of this training).
- Class III BSCs are gas-tight absolute containment enclosures that provide a physical barrier between the user and the agents. They provide product, personnel, and environment protection from highly infectious agents or hazardous materials.

Only Class II and Class III Biological safety cabinets protect personnel, product, and the environment from particulates.

Biological Safety Cabinets (BSC's)

CLASS II BSC TYPES

Type	Recirculation	Mechanical	Particulate Protection	Vapor / Gas Protection
A1	Recirculates a portion of the air and exhausts a portion of the air.	For Type A1 Cabinets Manufactured within NSF Standard 49 - 2002 and NSF Standard 49 - 2007: May have contaminated ducts and plenums under pressure positive to the room. For A1 Cabinets Manufactured since NSF Standard 49 - 2008: All biologically contaminated ducts and plenums are under negative pressure or surrounded by negative pressure.	Personnel, work area (products) and environment	if exhausted to room, NONE If exhausted to facility exhaust system, protects personnel. If exhausted to a treated facility exhaust system protects personnel, product, and environment.
A2	Recirculates a portion of the air and exhausts a portion of the air.	100 FPM intake; biologically contaminated plenum under negative pressure or surrounded by negative pressure	Personnel, work area (products) and environment	
B1	Recirculates air that flows into front grille and exhausts air through dedicated exhaust duct at rear grille.	100 FPM intake; biologically contaminated plenums are negative to the room or surrounded by negative pressure plenums	Personnel, work area (products) and environment	Offers more protection to personnel and product the closer the vapor source is located to rear of work area; (Protect environment if exhausted to treated system)
B2	Exhausts 100% of total air into the atmosphere after filtration through a HEPA filter without recirculation in the cabinet or return to the laboratory room air.	100 FPM intake; all ducts and plenums are under negative pressure, and all contaminated ducts are under negative pressure or surrounded by directly exhausted negative pressure ducts or plenums	Personnel, work area (products) and environment	Protects personnel; (protects environment if exhausted to treated system)

Biological Safety Cabinets (BSC's)

CLEANING THE BSC

A suggested cleaning schedule is shown below. The schedule and methods are applicable to most BSCs. Refer to your biological safety cabinet's user manual for specific recommendations.

Weekly

Using a dust free cloth and appropriate glass cleaner, clean the sash - inside and out. Turn the lamps off and allow it to cool completely (UV, fluorescent or incandescent). Clean the surface of lamps with 70% ethanol and a dust free cloth. Allow the ethanol to fully evaporate before turning the lamps back on.

Monthly / As Needed

Using a damp cloth, clean the exterior surfaces of the BSC to remove any accumulated dust.

Semi-Annually

Clean and disinfect the pan beneath the BSC work surface (lower plenum). (This area should also be cleaned each time there is a spill in which material flows into the pan.) See the BSC manual for instruction on accessing this area.

Be sure to:

- Follow state and local regulations for the disposal of liquid waste.
- Remember to close the drain valve after cleaning the pan.

1. What are the three types of protection provided by biological safety cabinets?

Personnel Protection Product Protection Environmental Protection

2. How does the BSC provide the three types of protection? (Mark all that apply)

- The HEPA supply filter removes any particles in the air that might contaminate the product.
- Bi-directional air flow within the cabinet helps prevent product contamination.
- The outside air flowing into the front grilles keeps cabinet air from coming out into the laboratory, where it could harm personnel.
- Air passes through a HEPA filter before it is exhausted into the environment.

3. A HEPA Filter is least efficient capturing particles that are:

- Smaller than 0.3
- 0.3 micrometers in size
- Greater than 0.3 micrometers in size

4. Do HEPA filters remove gases and vapors?

- Yes
- No

5. When a biological safety cabinet is certified, it is checked for balanced airflow and leaks in the HEPA filter.

- True
- False

6. When must a biological safety cabinet be certified? (Mark all that apply.)

- When it is installed.
- When it is relocated.
- When the HEPA filter is replaced.
- At least annually.
- Every 3 years.

7. What happens when the viewing screen is raised higher than the recommended position? (Mark all that apply.)

- An alarm may sound.
- You may not be able to lower the screen.
- It can disrupt air flow.

8. You can use the BSC to store equipment or chemicals if you disinfect the items before storing them in the cabinet.

- True
- False

9. You should organize your work space in the BSC with **clean** items on one side, **dirty** items on the other, and you should work **in the middle**.

10. Name three things that can disrupt the BSC air flow.

Doors opening and closing; people walking by, clothing flapping, making sweeping movements, placing items over the grilles, having an open flame

11. Which of these should NOT be placed in the BSC? (Mark all that apply.)

- Bunsen Burner
- Sterile Loops
- Clipboards and Pencils
- Labeled Test Tubes
- Items not needed for the procedure you are doing

12. If there is a spill of infectious material in the BSC, you should place an absorbent towel on top of the spill, wet it with disinfectant and immediately wipe up the spill.

- True
- False - **You must wait for the kill time of the disinfectant**

13. If there is a spill of infectious material in the BSC, you should remove your gloves inside the cabinet and dispose of them as waste, and then wash your hands.

- True
- False

14. If the BSC malfunctions and an alarm sounds, you should turn off the cabinet before covering exposed product and closing any open containers.

- True
- False

15. When cleaning up after completing a procedure, what is the correct order of the clean-up procedure? (Write the appropriate step number next to the step.)

- 2** Clean and disinfect outside surfaces of all containers before removing them from the cabinet. Autoclave everything that may have come into contact with the organisms.
- 5** Leave the cabinet per your facility's protocol.
- 1** Seal up everything that's been in contact with the agent(s) in a biohazard bag or container
- 4** Remove your gloves and dispose of them, then wash your hands.
- 3** Disinfect the cabinet.