



National Department of Health

Title: Use and Maintenance of Class I and Class II Biological Safety Cabinets

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1. Purpose of use and scope

Biological Safety Cabinets (BSC) are designed to protect the operator and the laboratory environment from exposure to infectious aerosols and splashes that may be generated when manipulating substances containing infectious agents. BSC are used in PNG clinical microbiology laboratories for blood culture and sputum processing, tuberculosis smear and genXpert procedures and COVID-19 testing.

All staff should have basic training in the use of biosafety cabinets and the use of UV lights to avoid damage to skin and eyes. The operator should wear a closed-front gown

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over garment and latex or vinyl gloves and safety glasses. These gloves should overlap the cuffs of the gown.

Biosafety cabinets are designed to be operated 24 hours a day and continuous operation helps to control the laboratory's level of dust and other air-borne particles i.e.: start cabinet in the morning and switch off at the end of the working day.

2. Principle

A class I BSC is an open-fronted ventilated cabinet with a unidirectional inward airflow away from the operator. Exhaust air is hard-ducted through high-efficiency particulate absorbing (HEPA) filters (Figure 1). The class I BSC provides protection for the **worker** and the **environment** but does not protect the **product** (specimens, strain cultures) against contamination.


A class II BSC additionally provides protection of the **product** (specimens, strain cultures) against contamination by recirculating part of the HEPA-filtered air in a laminar vertical flow inside the cabinet so that a "curtain " of clean air descends across the whole working surface. Class II BSC are either vented internally into the room after filtration (type A) or to the external air via ducting (Type B).

Both class I and II BSCs must be installed under the supervision of an engineer from (or authorized by) the manufacturing company.

3. Components/installation

The BSC should be located away from sources of air disturbance such as doors, windows, air-conditioning, and ventilation supply or return outlets, exhaust fans, etc. Personnel traffic in front of the BSC should be minimized to avoid disrupting the airflow.

The BSC must be connected to a suitable UPS system (with capacity for at least 15 minutes of extra running time) along with an inverter in any location where the electricity supply may be interrupted.

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4. Operation

4.1 Refer to G_90_WS_7 BSC use and maintenance for the processes required for:

- Preparation for work in a BSC
- Safe use
- Procedures after completing work in the BSC

5. Maintenance

In case of any problem or malfunction, an “Out of Service” notice must be displayed on the BSC indicating that it is not to be used until the problem has been diagnosed and corrected.


5.1 Refer to G_90_WS_7 BSC use and maintenance for daily and monthly maintenance requirements.

5.2 **Users are not to make any other repairs.** Repair and service of the BSC must be carried out by a qualified service professional. Any problem or malfunction detected must be reported to the laboratory manager, who will contact the maintenance contractor to correct the problem/malfunction as soon as possible. **HEPA filters must never be touched by personnel** and no attempt should be made to clean or disinfect filters using chemical or mechanical methods.

5.3 The BSC servicing form should be used for reporting incidents, accidents and/or mechanical problems. They should be kept on file for a minimum of 3 years.

5.4 **Annual certification:** This must be done by a qualified service professional before the BSC is put into service and annually thereafter. The BSC must be re-certified whenever it has been relocated, serviced or repaired and after HEPA filters have been changed. UV lights are replaced if required.

After re-certification, the service professional must issue a certificate indicating the performance characteristics of the BSC and safety compliance. The most recent inspection certificate must be displayed close to the BSC. Certificates should be retained in the archives for as long as the BSC is in use in the laboratory.

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6. Safety requirements

Warning: *In case of power failure during use, infectious particles are no longer trapped by the HEPA filter and flow back to the open front of the BSC, constituting a biohazard for personnel.*

6.1 At the end of each day, collect contaminated waste autoclave bags and autoclave as soon as possible.


6.2 Personal Protective Equipment: lab gown, gloves, eye protection and closed footwear required for all operations. Wash hands after discarding gloves at the end of BSC session.

6.3 Never work in the BSC with the UV lamp on.

6.4 Fumigation of the BSC is required *before*:

- Replacement of HEPA filters;
- Release of the BSC for use after a major biohazardous spill;
- Repair work requiring access to the sealed plenum;
- Service or replacement of the circulation fan or components;
- Maintenance work in contaminated areas;
- Performance tests requiring entry into contaminated areas;
- Movement of the BSC cabinet to another laboratory;
- Changing work programmes, e.g. to non-TB work;
- Release of the BSC cabinet for resale or salvage.

Fumigation must be carried out by a qualified service professional.

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7. Related documents

WHO Laboratory Biosafety Manual 4th Edition 2020	G_10_EX_001
Manufacturer's manual, specific to each BSC	To be held in equipment folder close to cabinet
BSC servicing form	G_90_WS_8
BSC use and maintenance	G_90_WS_7

8. Reference

8.1 [Maintenance manual for laboratory equipment](#), second edition Geneva, World Health Organization, 2008

8.2 [WHO Biosafety Manual Edition 4, 2020](#). The operation of class I and II BSC is described in detail in Section 4.