

Procedures for the Effective Use of Biological Safety Cabinets



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This corporate guideline/procedure is intended as a minimum requirement to be applied by individual departments in collaboration with Occupational Health and Safety (OH&S) and Facilities Management.

1.0 DEFINITIONS

CLEAN AIR BENCHES

In the case of clean air benches, there is reverse HEPA filtered laminar airflow towards the worker. Clean air benches provide product protection only. A clean air bench is NOT a biological safety cabinet. The worker is directly exposed to aerosols and particulates from the work. Clean air benches are not to be used for Containment Level 2, 3 or 4 agents or radioisotopes. They are to be used where only a flow of clean air is required.

BIOLOGICAL SAFETY CABINETS

A biological safety cabinet is a ventilated cabinet which uses a variety of combinations of HEPA filtration, laminar air flow and containment to provide personnel, product and/or environmental protection against biohazardous agents or nanoparticles. It is distinguished from a chemical fume hood by the presence of HEPA filtration and the laminar nature of the airflow. For fume hood use please see "Laboratory Health and Safety Manual", OH&S, Section 10.3.

Biological safety cabinets must NOT be used for procedures with hazardous chemicals unless verified by Occupational Health and Safety.

Nanoparticles are defined as 1 – 100 nanometers in any plane. Nanoparticles must be handled in an appropriate biological safety cabinet.

For more information on the nanotechnology program see:
www.uwo.ca/hr/safety/topics/nanotechnology.html

There are three classes of biological safety cabinets -

Class I:

These cabinets have unrecirculated airflow directed away from the user that is discharged through a HEPA filter. Class 1 cabinets provide protection to the user and protection of the environment but no protection to the work.

Class 1 cabinets are suitable for some work procedures at Containment level 1 and 2 if no protection of the work is required.

Class II types:

Class II cabinets provide a high degree of protection to the worker, the work and the environment. They are suitable for work at Containment Level 1, 2, 3 and 4 and are divided into two types (A and B) on the basis of construction type, airflow velocities and patterns and exhaust systems.

Class II, Type A1

Class III:

These are totally enclosed, gas-tight cabinets with HEPA filtered supply and exhaust air. The cabinet is kept under negative pressure of at least 120Pa and airflow is maintained by an exterior exhaust system. The work surface is accessed only through glove ports or sealed air locks. These cabinets provide a totally contained area to protect the worker, the work and the environment and are suitable for work at Containment Level 4. Removal of material from the cabinet must be through a dunk tank, double door autoclave or air-lock pass-through for decontamination. Interlock or protocols must be used for the autoclave and pass-through doors to prevent both doors from being open at the same time.

2.0 USE OF CLEAN AIR BENCHES

Notify the Biosafety Officer if a clean air bench is to be installed, moved or relocated from another institution. Benches acquired from another institution or from another laboratory on campus must be decontaminated before being moved to Western laboratories. Documentation will be required.

3.0 USE OF BIOLOGICAL SAFETY CABINETS

For procedures on starting-up, working-in and cleaning-up Biological Safety Cabinets see Appendix 1.

Notify the Biosafety Officer if a biological safety cabinet is to be ordered, installed, moved or relocated from another institution. The proposed location for the cabinet must be known. Cabinets acquired from another institution or from another laboratory on campus, must be decontaminated before being moved to Western laboratories. Documentation will be required.

New cabinets or cabinets which have been moved must be recertified after they are installed in their new location. All Class II biological safety cabinets must be recertified annually by an approved testing service (See sections 4 & 5 below).

A University Biological Agents Registry Form must be completed for all of the agents that will be used in the cabinet. Physical Plant and Capital Planning Services must be consulted for installation requirements.

1. Purchase of biological safety cabinets:

The class of cabinet selected will depend on:

- a) the Risk Level of the agent to be used
- b) the degree of protection required for the work
- c) whether volatile chemicals, radioisotopes, or nanoparticles will be used in the cabinet.
- d) the type of procedures to be carried out in the cabinet

2A. Relocation of cabinets

The Biosafety Officer must be informed before a biological safety cabinet is relocated. Generally the relocation will involve decontamination with formaldehyde before the cabinet is moved and recertification after relocation as required in NSF Standard 49 and/or CSA Standard Z316.3. If a cabinet is to be relocated to a laboratory at Western from a laboratory at another institution, documentation will be required by the Biosafety Officer to confirm decontamination at the previous location before the cabinet can be moved to a laboratory at Western. Recertification will then be required at Western after the cabinet is installed.

3. Maintenance and cleaning

The stainless steel surfaces inside the cabinet should be wiped with 70% ethanol or isopropanol on completion of work or after any spill. Wescodyne solution may also be used but it may stain the surfaces. A small amount of detergent may be added to the ethanol to assist in the removal of soil. Bleach is not recommended for this use as it may lead to corrosion of the steel surfaces unless they are thoroughly rinsed after the bleach has been used. Periodically the work surface should be lifted (with the cabinet running) and the spill area underneath should be cleaned and disinfected. Spilled medium in this area will allow microbial growth and can be a source of contamination.

3A. Changes of filters

Filters **MUST** be decontaminated with formaldehyde gas before they are changed. Once decontaminated, they can be disposed of as non-hazardous waste. This measure will protect workers and the environment from biohazards.

4. Certification

New biological safety cabinets **MUST** be certified by an approved certification company on installation, and before use. Please consult the Biosafety Officer to obtain the names of the approved certification companies. Documentation of this certification must be posted

HEPA filtered infected animal enclosures MUST also be recertified annually. The Biosafety Officer and Facilities Management organize the recertification of Class II cabinets in use on campus at Western annually. Recertification can be arranged at other times by the researcher provided that an approved company is used. Documentation of this certification must be posted in the lab near or on the hood and kept on file by the Biosafety Officer. A label must be affixed to the cabinet stating the certification date, the date of the

c) The intensity of the lamp also decreases with time. Lamp intensity must be checked with a meter if the sterilizing capacity of the UV is to be verified.

d) The intensity of the lamp is drastically affected by an accumulation of dust and dirt on the lamp. Therefore the lamp must be cleaned at least weekly.

The lamp must never be on while an operator is working at the cabinet. The UV light will reflect off the steel surfaces and some will reflect out into the room through the work opening, the lamp must be turned off if a worker is in the same room.

SOURCES OF INFORMATION:

Public Health Agency of Canada, Laboratory Biosafety Guidelines, 3rd edition, 2004.

Canadian Food Inspection Agency, Containment Standards for Veterinary Facilities, 1996.

Canadian Standards Association, Biological Containment Cabinets (Class I and II): Installation and Field Testing, 2002.

Appendix 1

Starting- up Procedures:

1. Turn off UV lights if in use and ensure that the sash is in the appropriate position.
2. Turn on fluorescent light and cabinet blower.
3. Check the air intake and exhaust grilles for obstructions.
4. If the cabinet is equipped with an alarm, test the alarm and turn it 'on'.
5. Confirm inward airflow by holding a tissue at the middle of the edge of the viewing panel and ensuring that it is drawn in.
6. Disinfect the interior surfaces with a suitable noncorrosive disinfectant.
7. Assemble all materials required for the procedure and load them into the cabinet without obstructing the air grilles. Segregate clean items from those that may be contaminated.
8. Wait 5 minutes to remove airborne contaminants from the work area.

Working- in Procedure :

1. Wear protective clothing and gloves as appropriate.
2. Perform procedures as far to the back of the work area as possible.
3. Avoid movement of materials or excessive movement of hands and arms through the front access opening during use. When you enter or exit the cabinet do so in a straight on fashion. After entering allow the cabinet to stabilize before resuming work.
4. Keep discarded, contaminated material to the back of the cabinet and do not discard materials in containers outside the cabinet.
5. Do not work with open flames inside the cabinet.
6. If there is a spill, decontaminate the surfaces of all objects within the cabinet and the working area while the cabinet is still in operation.

Cleaning- up Procedure :

1. Allow the cabinet to run for 5 minutes with no activity.
2. Close or cover open containers before removing them from the cabinet.
3. Surface disinfect objects in contact with contaminated material before removal from the cabinet.
4. Remove contaminated gloves and dispose of them as appropriate; wash hands.
5. Use clean gloves and ensure all materials are placed into biohazard bags within the cabinet.
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