

BIOSAFETY CABINETS

Note: All Biosafety cabinet purchases at Stanford University must be approved by the Biosafety officer.

Biosafety cabinets are used to provide primary containment in the laboratory when the investigator is using potentially infectious materials. There are three types of biological safety cabinets:

Class I: The Class I biological safety cabinet is an open-front negative pressure cabinet. The exhaust air from the cabinet is filtered by a high-efficiency particulate air (HEPA) filter. **The Class I biosafety cabinet will provide personnel and environmental protection, but not product protection.**

Class II: The Class II vertical laminar-flow biological cabinet is an open-front, ventilated cabinet. This cabinet provides a HEPA-filtered, recirculated mass airflow within the work space. The exhaust air from the cabinet is also filtered by HEPA filters. Thus, **the Class II biosafety cabinet will provide personnel, environment and product protection.** While HEPA filters are effective for trapping particulates and infectious agents, these filters will not capture volatile chemicals or gases

Class III: The Class III cabinet is a totally enclosed ventilated cabinet of gas-tight construction. Operations within the Class III cabinet are conducted through attached rubber gloves. When in use, the Class III cabinet is maintained through negative air pressure of at least 0.5 inches water gauge. Supply air is drawn into the cabinet through HEPA filters. The cabinet exhaust air is filtered by two HEPA filters, installed in series, before discharge outside of the facility. The exhaust fan for the Class III cabinet is generally separate from the exhaust fans of the facility's ventilation system.

The use of a **Class II** cabinet in the microbiological laboratory offers the additional capability and advantage of protecting materials contained within it from extraneous airborne contaminants. This capability is provided by the HEPA-filtered, recirculated mass airflow within the workspace.

Personnel protection provided by **Class I and Class II** cabinets is dependent on the inward airflow. Since the face velocities are similar, they generally provide an equivalent level of personnel protection. **The use of these cabinets alone, however, is not appropriate for containment of highest-risk infectious agents because aerosols may accidentally escape through the open front.** When Class III cabinets are required, all procedures involving infectious agents (usually Classes 3, 4 or 5) are performed within them.

The majority of biological safety cabinets purchased at Stanford University are the Class II cabinet. The Class II cabinet is the most versatile and economical one available on the market. It is suitable for the containment of biohazardous materials and unlike the Class I biosafety cabinet, it is also suitable as a sterile environment for cell cultures.

Some laboratories have purchased laminar flow clean benches for work which may have to be performed in a Class II biosafety cabinet. A laminar flow clean bench will not provide personnel protection since the air is not HEPA-filtered prior to exhaust across the work area. A laminar flow clean bench **MUST NOT BE USED** for any work with **Class 2 or 3** agents.

THERE ARE FOUR TYPES OF CLASS II CABINETS:

Class II, type A: this does not have to be vented, which makes it suitable for use in laboratory rooms which cannot be ducted. This cabinet is acceptable for use of low to moderate risk agents in the absence of volatile toxic chemicals and volatile radionuclides.

Class II, type B1: this cabinet must be vented, with 30% of the air exhausted from the cabinet while 70% is recirculated back into the room. This cabinet may be used with etiologic agents treated with minute quantities of toxic chemicals and trace amounts of radionuclides required as an adjunct to microbiological studies if work is done in the directly exhausted portion of the cabinet, or if the chemicals or radionuclides will not interfere with the work when recirculated in the downflow air.

Class II, type B2: this cabinet must be totally exhausted, with 100% of the air exhausted through a dedicated duct. This cabinet may be used with etiologic agents treated with toxic chemicals and radionuclides required as an adjunct to microbiological studies.

Class II, type B3: this must be vented. 70% of the air is exhausted from the cabinet while 30% is recirculated. This cabinet may be used with etiologic agents treated with minute quantities of toxic chemicals and trace quantities of radionuclides that will not interfere with work if recirculated in the downflow air.