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## E. Biosafety Ventilation Equipment

Biological safety cabinets are the principal equipment used to provide physical containment. They are used as primary barriers to prevent the escape of aerosols into the laboratory environment. This is an important function because most laboratory techniques are known to produce inadvertent aerosols that can be readily inhaled by the laboratory worker. Certain cabinets can also protect the experiment from airborne contamination. The selection of a Biological Safety Cabinet is based on the potential of the laboratory technique to produce aerosols and the need to protect the experiment from airborne contamination.

Three types of Biological Safety Cabinets are used in the microbiological laboratory: the Class I, the Class II, and the Class III cabinets. They are as follows:

1. The Class I Biological Safety Cabinet

a. The Class I cabinet is a ventilated cabinet that may be used in three operational modes: (1) with a full-width open front, (2) with an installed front closure panel without gloves, and (3) with an installed front closure panel equipped with arm-length rubber gloves. Materials may be introduced and removed through the panel opening and, if provided, through the hinged front view panel or a side UV air look. Lights, vacuum, gas (do not provide if cabinet is to be operated, sealed, and with gloves installed), water, and drain can be provided. The materials of construction shall be selected to withstand wear, corrosive action of gases and liquids, and decontaminants. Room air flowing into the cabinet prevents the escape of airborne contaminants from the cabinet work area. It flows across the work space, over and under a back wall baffle, out through a HEPA filter and blower in an overhead duct to the building air exhaust system or outdoors. When operated with a full-width open front, a minimum inward face velocity normal to the work opening of at least 75 fpm is required.
b. Protection is provided to the user and the environment, but not to the product (experiment). A wide range of activities is accommodated using equipment as varied as pipetting aids, burettes, pH meters, sonicators, shielded centrifuges, blenders, and lyopilizers. Chemical carcinogens and low levels of radioactive materials and volatile solvents can be used in Class I cabinets with minimum face velocities of 100 fpm. When these materials are used in the Class I cabinet, a careful evaluation shall be made to determine that concentrations do not reach dangerous levels or cause problems of decontamination of the cabinet.
c. The cabinet is a partial containment unit. Its primary barrier-function can be compromised by the pumping action of sudden withdrawal of the hands, the opening and closing of the room door, or rapid movements past the front of the cabinet. Aerosols created in large quantities may overcome even higher face velocities. Also,

hazardous materials. Such protection is dependent on technique and the use of gloves and other protective clothing.

2. The Class II Biological Safety Cabinet
    a. The Class II cabinet is commonly known as a laminar airflow Biological Safety Cabinet. Class II cabinets have a front opening for access to the work space and for introduction and removal of materials. Airborne contaminants in the cabinet are prevented from escaping across this opening by a curtain of air formed by (1) unfiltered air flowing from the room into the cabinet and (2) HEPA filtered air supplied from an overhead grille in the cabinet. This curtain of air also prevents airborne contaminants in the room from entering the work space of the cabinet across