

Environmental Health & Safety

Biohazards

1. Scope

The majority of the criteria presented in this chapter are taken from Biosafety in Microbiological and Biomedical Laboratories (BMBL), 6th Edition authored by the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH). The criteria presented in this chapter are for general-use Biosafety Containment Levels 1, 2, and 3 for biological research laboratories. If vertebrate animals are involved in research with biohazardous materials, requirements of animal biosafety laboratories (ABSL), also provided in the BMBL, will apply as well. Furthermore, this chapter does not include specific requirements of the NIH Guidelines for Recombinant DNA research that could apply to research involving recombinant or synthetic nucleic acids, transgenic plants, large-scale culture of biohazards, etc.

2. Basic Laboratory Design for Bio-Safety Level 1

- a. Each laboratory should have doors to control access.
- b. Each laboratory must have a sink for hand washing.
- c. An eyewash station must be readily available. [See Emergency Washing Equipment Standards for design details.](#)
- d. The laboratories should be designed for easy cleaning.
- e. Carpets and rugs shall not be used.
- f. Spaces between furniture and equipment should be accessible for cleaning.
- g. Furniture must be covered with a non-porous material for easy cleaning.
- h. Laboratory Furniture must be capable of supporting anticipated loads and uses.
- i. Bench tops shall be impervious to water, and resistant to acids, alkalis, organic solvents, and moderate heat.
- j. Approved methods for decontamination of infectious or regulated laboratory wastes shall be available (e.g., autoclave, chemical disinfection or other decontamination procedure approved by the University Biosafety Officer (BSO) or designee).
- k. Windows shall be fixed and not operable unless existing condition requires them to open for ventilation. If operable, they must be fitted with screens.

3. Basic Laboratory Design for Bio-Safety Level 2

In addition to the requirements for a BSL 1 laboratory, the following are required:

- a. Doors should be self-closing and have locks in accordance with institutional policies.

- b. The sink for hand washing should be located near the exit door.
- c. Vacuum lines should be protected with High Efficiency Particulate Air (HEPA) filters. The preferred location of the HEPA filter is in the lab so as to minimize contamination of vacuum lines. If managed by lab, ensure system design supports this approach.
- d. An approved method for decontaminating all laboratory wastes should be available in the facility. Optimize location to minimize travel distance for users.

4. Basic Laboratory Design for Bio-Safety Level 3

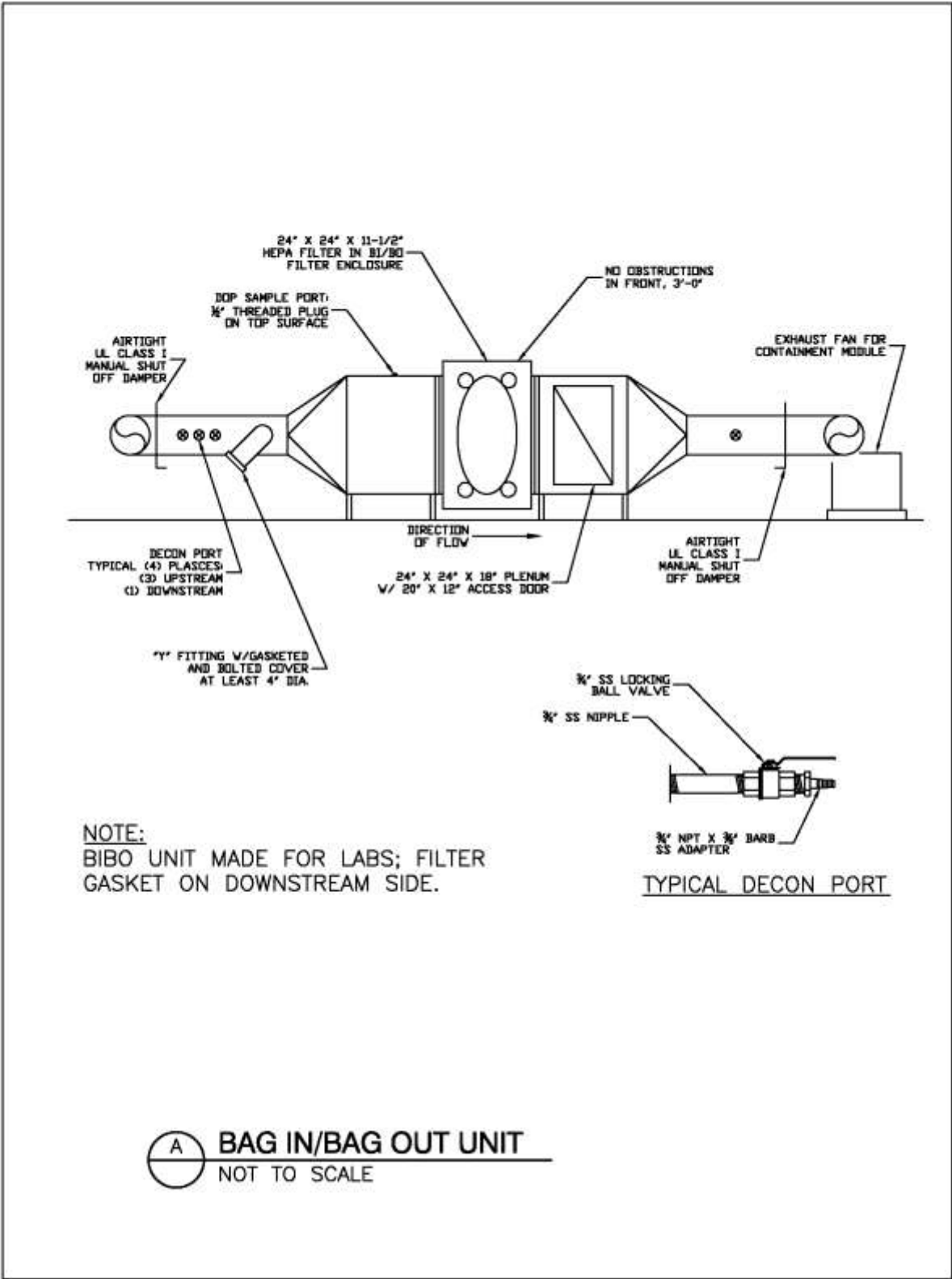
For questions on BSL-3 lab design, contact EH&S BSL-3/Select Agent Program at uwsa@uw.edu.

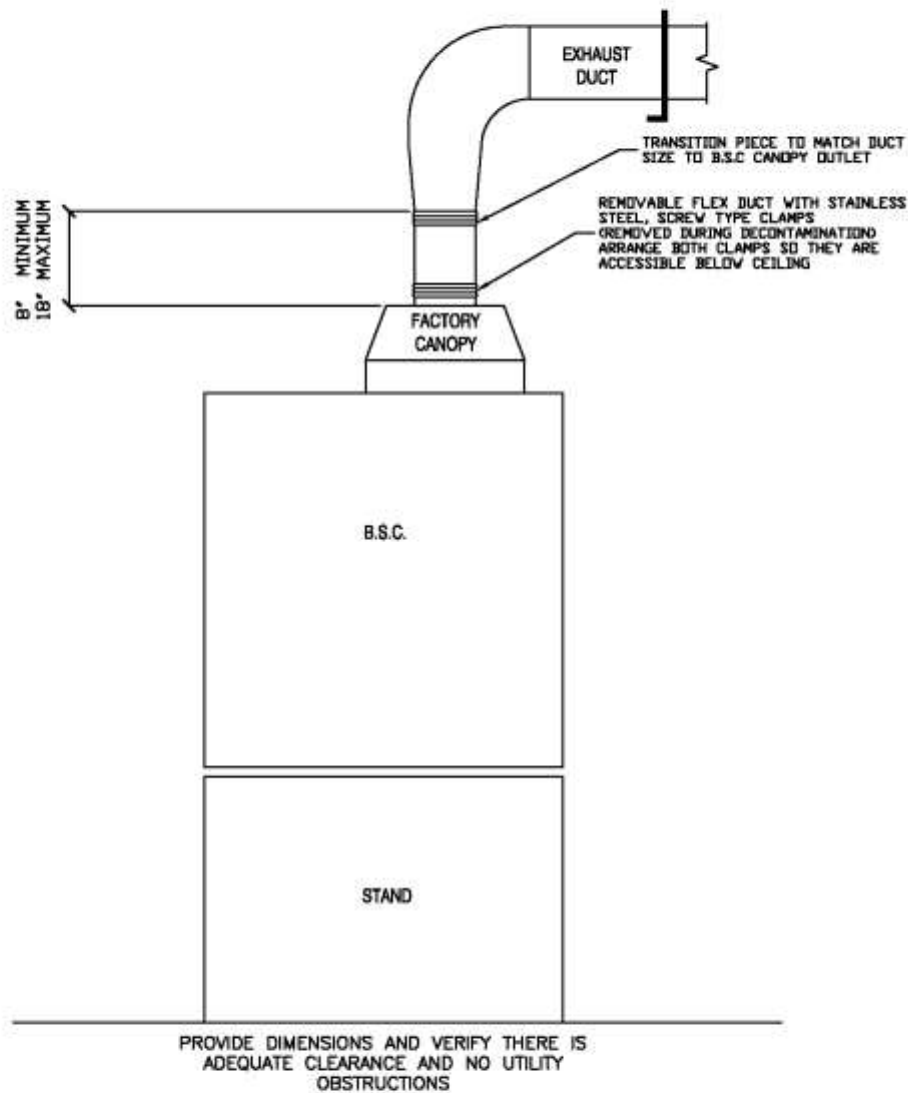
5. Biological Safety Cabinets

- a. Review EH&S website at <https://www.ehs.washington.edu/biological/biological-safety-cabinets> for information concerning BSC selection, location, procurement, and certification.
- b. Locate the biological safety cabinets (BSC) away from doors, operable windows, high-traffic, ventilation diffusers and other possible airflow disruptions; use a guideline of six feet of separation.
- c. Provide a minimum of six feet of clearance between BSCs installed directly opposite another.
- d. Do NOT plumb the BSCs with natural gas.
- e. Design Biological Safety Cabinets (BSC) to be installed as follows:
 - a. Class II, Type A2 BSC shall be connected to the general exhaust system via a thimble connection unless approved by EH&S to recirculate into the room. The thimble will be provided by the BSC manufacturer and installed per manufacturer's instructions and exhausted per Figure B at the end of this chapter.
 - b. Class II Type B2 BSC shall be directly (hard) connected to a dedicated exhaust system.
 - c. Class II Type B BSCs shall be interlocked with the exhaust fan so they shut down and alarm in the event of an exhaust fan/system failure.
 - d. Class II Type B BSC exhaust shall be provided with a gas-tight valve that is accessible from the front or side of the cabinet; the purpose of this valve is to facilitate decontamination of the BSC.
- f. Provide each Class II Type B BSC with a dedicated exhaust system unless an alternative design is demonstrated to provide the precise control necessary for cabinets to stay in tight tolerance limits.
- g. Provide each Class II Type B BSC with a bypass system for exhausting the room when the BCS fan is turned off; turning the BSC fan off saves filter life and the bypass facilitates decontamination of the BSC.
- h. Thimble connection exhaust airflow shall be 120-125% of the BSC manufacturer's exhaust specification.

- i. Provide at least ten inches of clearance above a recirculating Class II A2 BSC; this is to facilitate decontamination of the exhaust HEPA filter.
- j. Provide at least four inches of clearance behind and on the non-utility side, and six inches clearance on the utility side of the cabinet.
- k. Provide a NEMA 5-20 (20-amp) receptacle located high so that unit may be easily unplugged for servicing.
- l. Specify BSC to be seismically anchored per manufacturer recommendations and include seismic braces and other necessary components in the purchase.
- m. Biosafety cabinets must be certified by University EH&S technicians prior to substantial completion and use. This should be scheduled directly with the EH&S technician at least 2 weeks prior to required certification date.

Bag In/Bag Out Unit Detail





B BIO SAFETY CABINET DUCT CONNECTION DETAIL
NOT TO SCALE