

Biosafety Containment Laboratory Requirements

The purpose of this document is to aid project managers and Principal Investigators in the design and construction of biosafety containment laboratories. The general guidelines presented here are for Biological Safety Level 1 and 2 containment laboratories, as those are the only containment levels present at Carnegie Mellon University. These guidelines comply with requirements specified in the Centers for Disease Control and Prevention's/National Institute of Health's publication, *Biosafety in Microbiological and Biomedical Laboratories, 5th Edition* and the *NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules*.

If vertebrate animals are involved in research with biohazardous materials, special precautions are required. Requirements will be determined on a case-by-case basis by EH&S personnel.

Basic Laboratory Design for Biological Safety Level 1 (BSL-1) Containment

- Each laboratory shall contain a sink for hand washing.
- The laboratories shall be designed for easy cleaning.
- Rugs shall not be used.
- Bench tops shall be impervious to water and resistant to acids, alkalis, organic solvents, and moderate heat.
- Approved and accepted methods for decontamination of infectious or regulated laboratory wastes are available (e.g. autoclave, chemical disinfection, or other decontamination system approved by the Biological Safety Officer, Andrew Lawson).
- The autoclave need not be in the actual lab room. Autoclave installations need to be approved, in writing, as a pressure vessel, by a mechanical professional engineer. Contact Andrew Lawson of EH&S at (412) 268-8405 or at alawson@andrew.cmu.edu to obtain this approval.
- Laboratory furniture shall:
 - Be sturdy;
 - Be capable of supporting anticipated loading and uses;
 - Have upholstery that is liquid-proof and is easily cleaned and decontaminated;
 - Have spaces between and under benches, cabinets and equipment that are accessible for cleaning.
- If the laboratory has windows that open, they shall be fitted with fly screens.
- Doors shall be lockable.
- Laboratories should be designed in order to incorporate proper ergonomic conditions for the tasks to be performed within the facility.

Basic Laboratory Design for Biological Safety Level 2 (BSL-2) Containment

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

- Floors shall:
 - Have a slip-resistant, smooth, hard finish;
 - Be liquid tight, monolithic/seamless or with welded seams;
 - Have recommended flooring material covered 4 inches up the wall or have a cove-base that is installed to create a water-tight seal to the floor.

- Walls shall be durable, washable, and resistant to detergents/disinfectants and use durable glossy acrylic or epoxy paint or equivalent.
 - Exposed corners and walls shall be protected from damage by carts.
 - Ceiling height shall provide a minimum of 12 inches of clearance above biological safety cabinets. A ceiling height of at least 10 feet is recommended. (Note: If the laboratory has a sprinkler system, 18 inches or more clearance above fixtures may be needed to comply with local fire codes.)
 - Doors shall:
 - Be self-closing, self-locking and open inward;
 - Have fire ratings as required.
 - Wall/ceiling penetrations shall be kept to a minimum and be sealed with fire retardant material.
 - Eyewashes shall be provided in the laboratory and a safety shower shall be located in close proximity. The safety shower/eyewash shall comply with ANSI Z358.1. To obtain the requirements of this standard, contact Andrew Lawson of EH&S at (412)268-8405 or at alawson@andrew.cmu.edu
 - Rooms with autoclaves shall be provided with a floor drain or drains.
Note: A canopy hood is recommended over each end of autoclaves.
 - Mechanical ventilation systems shall provide an inward flow of air without recirculation to spaces outside of the laboratory.
 - Biological safety cabinets shall be installed in such a manner that fluctuations of the room supply and exhaust air do not cause the biological safety cabinets to operate outside their parameters for containment.
 - Biological safety cabinets shall be located away from:
 - Doors,
 - Windows that can be opened,
 - Heavily traveled aisles and passageways,
 - Other potentially disruptive equipment so as to maintain the biological safety cabinet's air flow parameters for containment.
- Note: Foot, knee, or automatically operated sinks are highly recommended!**

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