



Biosafety Minimum Design Standards

Laboratory design standards based on Biosafety levels from the CDC 6th Edition of Biosafety in Microbiological and Biomedical Labs (BMBL)

This document should be used in the risk-based assessment required when designing biomedical and clinical laboratories. Each Biosafety laboratory at VCU must, at a minimum, meet these requirements and those outlined in the BMBL.

Biosafety Level 1	BSL-1
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1. Laboratories have doors for access control.
2. Laboratories have a sink for handwashing.
3. An OSHA/ANSI-compliant eyewash station is readily available in the laboratory.
4. The laboratory is designed so that it can be easily cleaned.
 - a. Carpet, rugs, and rough wall surfaces in laboratories are not appropriate.
 - b. Spaces between benches, cabinets, and equipment are accessible for cleaning.
5. Laboratory furniture and benches can support anticipated loads and uses.
 - a. Benchtops are impervious to water and resistant to heat, organic solvents, acids, alkalis, and other chemicals.
6. Laboratory windows that open to the exterior are fitted with screens.
7. Illumination is adequate for all activities and avoids reflections and glare that could impede vision.
8. Special containment devices or equipment, such as biosafety cabinets (BSCs) are installed in an appropriate space to minimize disruptive airflow/currents from HVAC.
9. Additional HVAC requirements (i.e. negative pressure, non-recirculating lab air) will be driven by the chemical inventory and use requirements.

Biosafety Level 2 and 2+	BSL-2 and BSL-2+
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BSL-2 and BSL-2+ - Includes all BSL-1 items, in addition:

1. Laboratory doors are self-closing and have locks in accordance with institutional policies.
2. Laboratories have a sink for handwashing.

3. An OSHA/ANSI-compliant eyewash station is readily available in the laboratory.
4. Laboratory windows that open to the exterior are not recommended.
 - a. However, if a laboratory does have windows that open to the exterior, they are fitted with screens.
5. HVAC systems must provide an inward flow of air from rooms / areas of low hazards into rooms/areas of high hazard.
6. Air must not be recirculated to spaces outside of the lab or suite, air should be supplied to the laboratory and then exhausted directly outside.
7. BSCs and other primary containment barrier systems are installed and operated in a manner to ensure their effectiveness.
 - a. BSCs are installed so that fluctuations in the room air supply and exhaust do not interfere with proper operations. BSCs are located away from doors, windows that can be opened, heavily traveled laboratory areas, and other possible airflow disruptions.
 - b. BSCs utilized with volatile or toxic chemicals can be connected to the laboratory exhaust system by either a canopy connection (Class IIA only) or directly exhausted to the outside through a hard connection (Class IIB, IIC, or III).
8. Case-by-case evaluation by the biosafety office and/or IBC may impact the need for onsite autoclaves, additional BSC capacity or other engineering controls.

Biosafety Level 3	BSL-3
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BSL-3 Includes all BSL-1/2/2+ items, In addition:

1. The Biosafety Officer (in collaboration with the Institutional Biosafety Committee) must approve the location and design of any BSL-3 facility.
2. An architect and engineer with experience in the design and construction of BSL3 facilities and containment laboratories should be considered for overall design responsibility.
3. BSL3 facilities must comply with conditions in the most current revision of the
 - a. CDC Biosafety in Microbiological and Biomedical Laboratories (BMBL)
 - b. NIH Design Requirements Manual for Biomedical Laboratories and Animal Research Facilities (DRM)
 - c. NIH Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules(NIH Guidelines)
 - d. National Institutes of Health Biosafety Level 3 Laboratory Certification Requirements
 - e. Industry standards and local/state code requirements.