

General Biosafety Training: Course 260c

Biosafety Program, EHS Office

BMBL Section III

Table 1. Summary of Recommended Biosafety Levels for Infectious Agents

BSL	Agents	Practices	Safety Equipment (Primary Barriers)	Facilities (Secondary Barriers)
1	<p>Not known to consistently cause disease in healthy adults</p> <p>Examples: Bacillus subtilis, E. coli K12 strains, insect cell lines, murine or avian cell lines, bacteriophage</p>	<p>Standard Microbiological Practices</p>	<p>None required</p>	<p>Open bench top sink required</p>
2	<p>Associated with human disease, hazard = percutaneous injury, ingestion, mucous membrane exposure</p> <p>Examples: HBV, HCV, Salmonella typhimurium, human blood, primary human cells, human cell lines, Staphylococcus aureus, Streptococcal spp., non-human primate cell lines, vaccine strains of virulent agents (BCG, Sterne strain of B. anthracis), Helicobacter pylori, Listeria monocytogenes</p>	<p>BSL-1 practice plus:</p> <p>Limited access</p> <p>Biohazard warning signs</p> <p>"Sharps" precautions</p> <p>Biosafety manual defining any needed waste decontamination or medical surveillance policies</p>	<p>Primary barriers = Class I or II BSCs or other physical containment devices used for all manipulations of agents that cause splashes or aerosols of infectious materials; PPEs: laboratory coats; gloves; face protection as needed</p>	<p>BSL-1 plus:</p> <p>Autoclave available</p>
3	<p>Indigenous or exotic agents with potential for aerosol transmission; disease may have serious or lethal consequences</p> <p>Example: HIV (lab quantities may be handled at BL2+), Mycobacterium tuberculosis,</p>	<p>BSL-2 practice plus:</p> <p>Controlled access</p> <p>Decontamination of all waste</p> <p>Decontamination of lab clothing before laundering</p> <p>Baseline serum</p>	<p>Primary barriers = Class I or II BSCs or other physical containment devices used for all open manipulations of agents; PPEs: protective lab clothing; gloves; respiratory protection as needed</p>	<p>BSL-2 plus:</p> <p>Physical separation from access corridors</p> <p>Self-closing, double-door access</p> <p>Exhausted air not recirculated</p> <p>Directional airflow into laboratory</p>
4	<p>Dangerous/exotic agents which pose high risk of life-threatening disease, aerosol-transmitted lab infections; or related agents with unknown risk of transmission</p> <p>No work with BL4 agents allowed, examples: Ebola, Marburg, Lassa, Sabia viruses Smallpox virus</p>	<p>BSL-3 practices plus:</p> <p>Clothing change before entering</p> <p>Shower on exit</p> <p>All material decontaminated on exit from facility</p>	<p>Primary barriers = All procedures conducted in Class III BSCs or Class I or II BSCs in combination with full-body, air-supplied, positive pressure personnel suit</p>	<p>BSL-3 plus:</p> <p>Separate building or isolated zone</p> <p>Dedicated supply and exhaust, vacuum, and decon systems</p> <p>Other requirements outlined in the text</p>