

CASE STUDY

BSL-3 Laboratory Commissioning



MSC successfully completed comprehensive HVAC commissioning for a BSL-3 laboratory facility. BSL-3 labs are specialized environments dedicated to research involving infectious agents and other biohazards requiring meticulous containment measures, specialized ventilation systems, and sealed environments to ensure researcher safety and compliance with stringent regulatory standards.

The MSC commissioning team executed a multi-phase testing and verification process that encompassed all critical lab areas. Our work included thorough pressure testing of lab spaces and airlocks to verify containment integrity through degradation testing. We performed extensive pressure testing on all ductwork, air handlers, exhaust systems, bubble-tight dampers, HEPA housings, and air valves to meet strict containment requirements.

During the installation verification phase, MSC technicians confirmed that all HVAC components—including filters, fans, VFDs, sensors, and controls—matched approved submittals and met design specifications. Our team completed all necessary instrument calibrations to ensure accurate system monitoring and control.

The functional testing phase began with systematic equipment start-up and verification of basic operational sequences. MSC's air balancing specialists achieved all air change rates specified by the design engineer, meeting the strict requirements for this critical environment. While BSL-3 laboratories typically require between 6-10 air changes per hour as an industry standard, each facility's requirements are determined by its specific design and usage parameters.

Critical pressure differential testing was performed across the facility, focusing on:

- The non-containment area outside the BSL-3 lab
- The neutral reference point for pressure cascade initiation
- Strategic Monitoring points throughout airlocks and high-containment areas

Maintaining stable differential pressures while ensuring proper air exchange rates required precise calibration and control. MSC's engineers utilized high-quality differential pressure transmitters and implemented precise control strategies to maintain the required pressure relationships.

Results:

After establishing stable baseline operations, MSC successfully conducted comprehensive performance testing that validated the system's response to various scenarios, including:

- Air handler and exhaust changeovers
- Airlock operation
- Fan failure conditions
- Decontamination procedures
- Power loss scenarios

Through detailed system knowledge and expertise, MSC achieved optimal PID loop tuning and system timing, delivering a fully functional, safe, and reliable environment to consistently meet all BSL-3 containment requirements. This project adds to MSC's portfolio of successful BSL-2, BSL-3, and BSL-4 laboratory projects, further establishing our leadership in this specialized field.