



**Department of Health and Human Services**  
**Centers for Disease Control and Prevention (CDC)**  
**Division of Select Agents and Toxins (DSAT)**  
**Atlanta, Georgia**

**Date:** December 11, 2014

**Subject:** BSL-3/ABSL-3 HVAC and Facility Verification

The Center for Disease Control and Prevention (CDC)'s Import Permit Program regulates the importation of infectious biological agents, infectious substances, and vectors of human disease into the United States.

**Authority:**

Under the authority of section 361 of the Public Health Service Act (42 U.S.C. §264), the Secretary of the U.S. Department of Health and Human Services is authorized to make and enforce regulations to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the United States and from one State into any other State. The Foreign Quarantine regulations (42 CFR Part 71) set forth provisions to prevent the introduction, transmission, and spread of communicable disease from foreign countries into the United States. Part 71, Subpart F (Importations) contains provisions for importation of infectious biological agents, infectious substances and vectors (42 CFR §71.54), requiring persons to obtain a permit issued by the CDC before importing, or distributing after import, any of these materials.

Section 71.54(b)(3) of these regulations provides that the a person may not import into the United States any infectious biological agent, infectious substance, or vector unless the importer has implemented biosafety measures commensurate with the hazard posed by the infectious biological agent, infectious substance, and/or vector to be imported, and the level of risk given its intended use.

Biological safety cabinets protect laboratorians by providing primary containment of microbiological hazards, through high efficiency particulate air (HEPA) filtration of cabinet air and the presence of either a protective air curtain, or a physical barrier, between the cabinet's work space and the laboratory room. Secondary containment of hazards is achieved by separating the laboratory from non-laboratory areas or from the outside. The heating, ventilation and air conditioning (HVAC) system design separates potentially contaminated laboratory air from areas outside the laboratory by maintaining the BSL-3/ABSL-3 areas at negative pressure to adjacent areas, by preventing re-circulation of laboratory exhaust air to other areas of the building, and by employing special engineering controls that prevent the occurrence of laboratory airflow reversals to outside the containment boundary.

Given the significant role that biological safety cabinets HVAC systems play in biological risk control, it is important that these devices and systems be used and maintained in accordance with their design specifications. The following statement provides the policy of the CDC Import Permit Program regarding the maintenance of biological cabinets and laboratory HVAC systems.

**1. Policy Statement, BSL-3/ABSL-3 HVAC Verification:**



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It is the policy of the Centers for Disease Control and Prevention that a BSL-3/ABSL-3\* facility is required to have a ducted air ventilation system. (\*Note: This policy statement is only applicable to entities working in a BSL-3 laboratory with an organism that requires BSL-3 containment. This policy does not apply to entities working in a BSL3 laboratory with an organism that does not require BSL-3 containment.) This system must provide sustained directional airflow by drawing air into the laboratory from “clean” areas toward “potentially contaminated” areas. The laboratory shall be designed such that under failure conditions the airflow will not be reversed.

In order for a BSL-3/ABSL-3 HVAC to meet this requirement, initial HVAC design verification must be performed and documented by someone with experience and expertise with the HVAC system prior to operation. This initial HVAC design verification ensures that secondary containment is maintained under failure conditions to prevent possible exposure of personnel outside the containment boundary. After HVAC verification is initially documented, the testing need not be repeated, providing no major changes have been made to, or major problems noted with, the HVAC system.

Examples of major changes to the HVAC system include:

- Replacement of exhaust or supply fans that serve the BSL-3/ABSL-3 containment areas,
- Replacement of ductwork valves or dampers that serve these areas,
- Replacement or repair of HVAC system control wiring,
- Building automation system logic programming changes,
- Structural changes to the BSL-3/ABSL-3 rooms, or
- Addition or removal of hard-ducted BSCs or fume hoods.

Examples of major problems with HVAC performance include:

- Frequent failures of the HVAC system,
- Supply-exhaust interlocking system failure,
- Observation that directional air flow is reversed under normal conditions,
- Observation that HVAC alarms are not working, or
- Observation that any BSCs with an HVAC connection are not working properly.

Documentation provided to CDC’s Import Permit Program of verification of HVAC design functionality under failure conditions must demonstrate that under exhaust fan or normal power failure conditions, or during normal power start-up, there is no reversal of air which originates within the BSL-3/ABSL-3 laboratory or vivarium room that travels all of the way outside the containment boundary. The failure conditions for HVAC verification include:

1. Mechanical failure of exhaust fan or fan component(s):
  - a. If redundant fans are present, the ability to transition to the alternate fan without reversal of air flow from potentially contaminated laboratory space into “clean” areas surrounding the laboratory must be verified.



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- b. If no redundancy is present in the laboratory HVAC system, the capacity to transition from sustained inward air flow into the laboratory to a “static” condition i.e., no air flow out of the laboratory, must be verified.
  2. Simultaneous power failure supporting supply and exhaust fan components:
    - a. If emergency power supply is available for the laboratory HVAC system, the ability to transition from “normal” power to the backup system without a reversal of air flow from the laboratory should be verified.
    - b. If no backup power supply is available, the ability of the HVAC system to transition to a “static” condition, i.e., no outward air flow, should be verified.
  3. Return from power failure to “normal” operating conditions:
    - a. If emergency power supply is available, it should be verified that the ability exists to transition from backup power to normal power without a reversal of air flow from the laboratory.
    - b. If no backup power supply is available, the ability of the HVAC system to return to normal operating conditions, without a reversal of air flow from laboratory spaces to clean areas surrounding the laboratory should be verified.

**Note:** A facility may be considered to pass the HVAC verification tests as long as laboratory air does not exit the containment barrier of the facility. The BSL-3 anteroom is considered to be within the containment envelope. A positive pressure excursion is not necessarily an airflow reversal; if a brief, weak positive pressure excursion is noted, a repeat test may be performed with airflow observation using an airflow indicator such as a smoke stick, or dry ice in a container of water, at the base of the closed laboratory door to confirm whether airflow reversal is occurring.

This policy statement is based on the biosafety standards established by the *Biosafety in Microbiological and Biomedical Laboratories* (BMBL), 5<sup>th</sup> edition:

- BSL-3 D9: “The laboratory shall be designed such that under failure conditions the airflow will not be reversed.”
- ABSL-3 D6: “The ABSL-3 animal facility shall be designed such that under failure conditions the airflow will not be reversed.”

## **2. Policy Statement, BSL-3/ABSL-3 Facility Verification:**

In addition to initial HVAC verification and re-verification as described above, the following are the minimum facility verification requirements that an entity is expected to perform and document initially for a BSL-3 or ABSL-3 laboratory and again at least annually.

1. The means of detecting air flow (tell tale, magnehelic or digital gauge, Baulin-Tube®, etc.) has been confirmed to accurately reflect observed air flow. It is recommended, but not required, that digital or magnehelic gauges be calibrated annually.
2. Inward directional airflow has been confirmed by observation for the laboratory.



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3. Decontamination systems (autoclave, room decontamination systems, digesters, liquid effluent systems, etc.) have been confirmed to be operating correctly.
4. If a Building Automation System (BAS) has the capacity to monitor and record performance measurements e.g., differential pressures, the entity is encouraged to capture and store data from potential failure events, drills, etc. This information may provide verification of system performance. In addition, any programmed BAS alarms should be verified for proper functioning.
5. All alarms (fire, air flow, security, etc.) have been checked and are functioning according to established specifications.
6. Laboratory HVAC HEPA filters, if present, have been certified annually.
7. Exhaust fan motors have been checked and routine maintenance conducted.
8. The laboratory has been checked for unsealed penetrations, cracks, breaks, etc. and these have been repaired if present.
9. All biological safety cabinets have been certified annually.
10. Seals on centrifuges, Class III cabinets, gloves on Class III cabinets, etc. have been checked and replaced if required.
11. Drench showers, eye wash stations, and hands free sinks have been confirmed to be operating properly.

**Note:** Entities may choose to perform additional facility verification beside what is listed above.

This policy statement is based on the biosafety standards established by the Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th edition:

- BSL-3 D15: “The BSL-3 facility design, operational parameters and procedures must be verified and documented prior to operation. Facilities must be re-verified and documented at least annually.”
- ABSL-3 D14: “The ABSL-3 facility design and operational procedures must be documented. The facility must be tested to verify that the design and operational parameters have been met prior to use. Facilities should be re-verified at least annually against these procedures as modified by operational experience.”

This policy statement is effective December 14, 2014.

This policy statement will be provided to each permittee on or before the effective date. A copy of this policy statement may also be found at <http://www.cdc.gov/od/eaipp/>.

Any question concerning this policy may be addressed by contacting CDC’s Import Permit Program at 404-718-2077.



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A handwritten signature in black ink, reading "Robbin S. Weyant", is centered on the page. The signature is written in a cursive, flowing style.

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