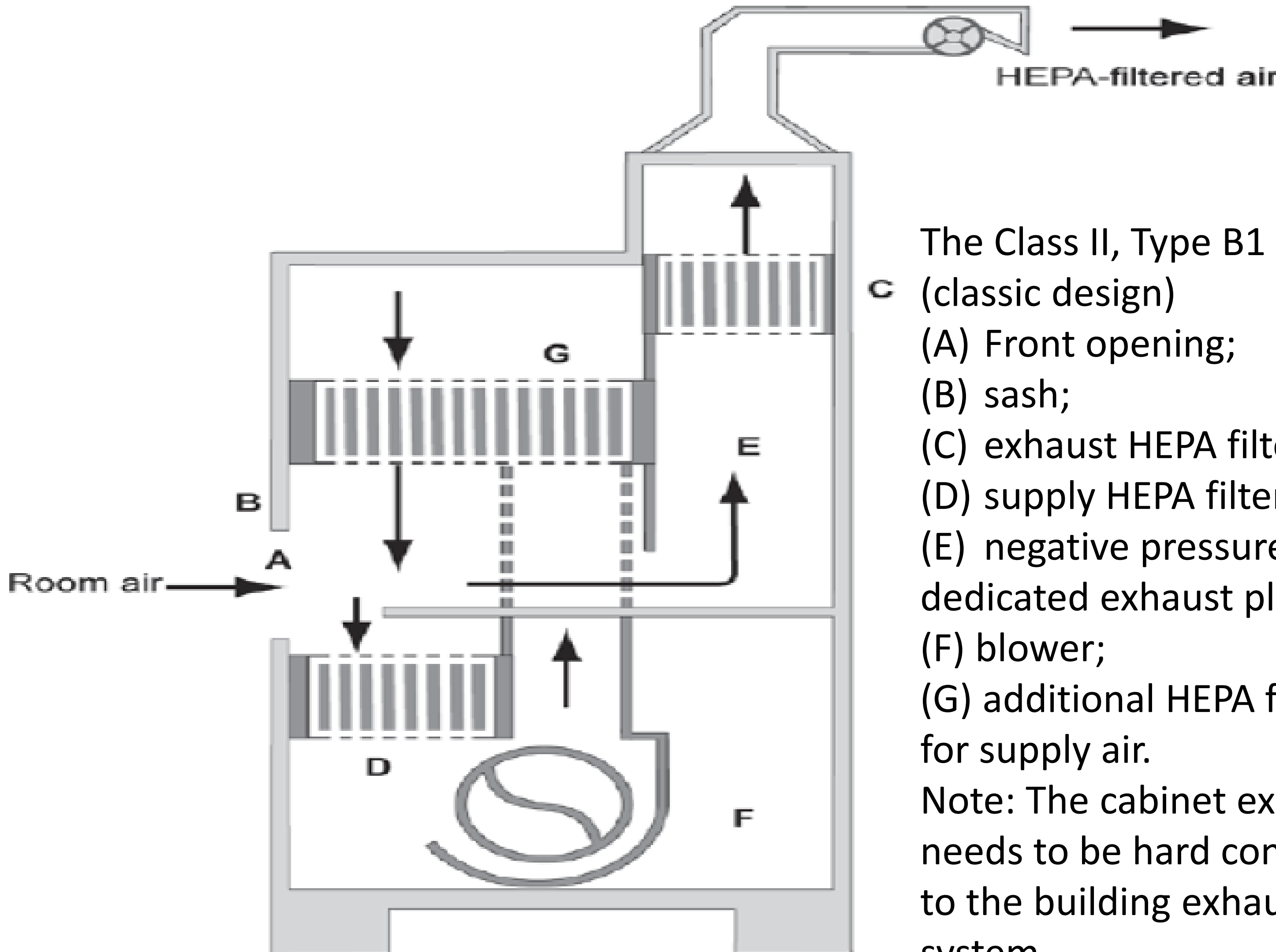
Class III Biological Safety Cabinet

BE&K All Hazard Receipt Facility



The Class II, Type B1 BSC (classic design)

(A) Front opening;
(B) sash;
(C) exhaust HEPA filter;
(D) supply HEPA filter;
(E) negative pressure dedicated exhaust plenum;
(F) blower;
(G) additional HEPA filter for supply air.

Note: The cabinet exhaust needs to be hard connected to the building exhaust system.

Introduction

- Class III BSCs represent the safest type of primary barrier providing a significant reduction in personnel and environmental risk.
- This high level of safety is provided by keeping potentially hazardous agents contained, while working with the agents from outside the barrier through protective gloves.

Definition

- A gas-tight enclosure with a non-opening view window. Access for passage of materials into the cabinet is through a dunk tank, that is accessible through the cabinet floor, or double-door pass-through box (e.g., an autoclave) that can be decontaminated between uses. Reversing that process allows materials to be removed from the Class III BSC safely. Both supply and exhaust air are HEPA filtered on a Class III cabinet. Exhaust air must pass through two HEPA filters, or a HEPA filter and an air incinerator, before discharge to the outdoors. Airflow is maintained by a dedicated, independent exhaust system exterior to the cabinet, which keeps the cabinet under negative pressure (minimum of 0.5” H_20).

- According to *Biosafety in Microbiological and Biomedical Laboratories –BMBL 5th Edition*.

- Class III Biological Safety Cabinets, a special type of glovebox, are designed to provide maximum protection for laboratorians from highly infectious biological agents (BSL-3 and BSL-4) and procedures that generate large quantities of bio-aerosols.
- Class III Biological Safety Cabinets are engineered to provide maximum protection for the operator by using a gas-tight enclosure that is completely sealed while giving visibility of the product through a viewing window.
- There is always a physical barrier between the researcher and the work. Long heavy duty gloves are attached in a gas tight manner to allow the researcher maximum protection and prevent direct contact with the hazardous materials.
- Access to the interior of the cabinet can be accomplished through a double-door pass-through "interchange" box that can be decontaminated between uses and/or a dunk tank that is accessible through the cabinet floor. Other transfer devices include integrated double-door autoclaves and Rapid Transfer Ports.
- Class III Biological Safety Cabinet have supply and exhaust air that is HEPA filtered with the exhaust air passing through two HEPA filters (or a HEPA filter and an air incinerator before discharge to the outdoors). The air flow and negative differential pressure is typically maintained by a dedicated independent exhaust system exterior to the cabinet which keeps the cabinet and all associated ducting under negative pressure.
- the Class III BSC is not designed for chemical operations; it is not explosion-proof or fire-proof, flammable materials should not be used inside the cabinet.

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- These Class III Biological Safety Cabinets are uniquely designed for the triage requirements of Laboratory Response Network (LRN) and Public Health Labs (PHL). The units utilize HEPA and ASZM-TEDA carbon filtration to provide the highest level of user protection against chemical and biological threats

All Hazards Receipt

- The Class III BSC provides an environment for the safe and secure containment, transportation and analysis of suspect nuclear, biological, chemical (NBC) terrorism evidence from the facility receiving area to the analytical laboratory. The units can be fitted with Rapid Transfer Ports (RTPs) to facilitate chain of custody procedures, secure storage of Select Agents, and to simplify work flow and processing.
- These Class III Biosafety Cabinets integrate with primary containment systems within the All Hazard Receipt Facility (AHRF). The technology was developed under a Cooperative Research and Development Agreement (CRADA) with the U.S. Army Edgewood Chemical and Biological Center.

Biological & Chemical Filtration

- Germfree specializes in filtration systems for both biological and chemical hazards. Germfree uses Type C HEPA filters to protect against biological hazards and by using several different types of carbon, Germfree can offer protection from TICs, TIMs, and NTAs.

- Germfree's filtration systems are typically integrated into Class III BSCs or to building ductwork systems. Germfree also offers complete HVAC mechanical space filtration modules that integrate into existing buildings and new construction.

- The BSC III is directly (hard) connected through the second exhaust HEPA filter of the cabinet to an independent building exhaust.
- Exhaust fans are sized carefully with full consideration given to volumetric airflow, static pressure, and total required capacity for the system.
- Power requirements for the emergency generator or Uninterruptible Power Supply (UPS) supporting the Class III BSC has proper connection and a failsafe operation.

- Potential events and emergency situations should be reviewed and tested.
- The dampers (actuating and manual), duct system, exhaust connection, external alarms, and room/facility balance should be tested.

Materials of Construction

- The Class III BSC is constructed of all welded 10 gauge type 316 Stainless Steel with interior coved corners and radiused bends. The Stainless Steel is polished to a 180-grit pharmaceutical grade (#4) finish. The construction and finish facilitate cleaning and decontamination; however, proper selection and usage of cleaning and sanitizing chemicals are necessary in order to maintain the finish of the stainless steel.

Gloves

- Gloves are a critical component of the protective barrier and the primary interface with operations inside the Class III BSC.
- Glove selection must be suitable for the needs and circumstances of all projected work.
- Gloves are also available in different thicknesses and hand sizes. A balance of dexterity and protection is considered.
- To reduce fatigue, glove ports are constructed with a slightly extended lip enabling the user to rest their arms.
- Gloves are date stamped and should pass inspection and testing for integrity.
- The useful life of gloves varies significantly depending on Class III BSC operational conditions, chemicals, sterilization methods, temperatures, etc.

Gloves cont.

- Butyl gloves left in the bag and stored at 50-85 degrees Fahrenheit have a 3 year shelf life.
- Once gloves are put into use, longevity will vary with operation.
- Gloves should be stored flat, not folded. Over time, leaks can develop along the creased areas where gloves were folded.
- Gloves that are too large create a ballooning effect making it very difficult to manipulate equipment such as pipettes, small tubes, plates and other common items. This increases the risk of a spill, contamination of the material and worker fatigue.

Operation

- Prior to operations, all gloves should be visually inspected and replaced if punctures, “dry rot,” creases, or other defects are found. Check between fingers, palm area, and tops of gloves for holes, discoloration, and any imperfections.
- Also pay particular attention to the glove area around the glove port(s), making sure there are no holes, stressed, or age related problems.
- Damaged gloves should be replaced immediately.
- Performing a 10 minute Rate of Rise test is recommended on a weekly basis.

Glove Ports

- The Class III BSC has six 13”x9” oval (gloves have 10” cuff) double-grooved stainless steel glove ports on the viewing windows. The double-groove design allows for glove changes without breaking containment.
- Gloves are sealed onto the glove ports by the use of three EPDM O-rings. Each glove has one O-ring built in the cuff, two additional O-rings fit over the glove on the glove port grooves. The three O-rings ensure the gloves will not move and ensure a seal.
- An EPDM trim guard is also provided to the edge of each glove port to protect gloves from any puncturing or tearing.

See photo on next slide

Glove Ports

Pass Through Chamber

- The primary use of a pass-through chamber is to allow for clean materials to be passed into the Class III BSC.
- Potentially contaminated materials should not exit the Class III BSC via the pass-through chamber unless they have been surface decontaminated and double contained in a secondary leak proof unbreakable container.
- All exterior surfaces of the secondary container should be wiped down or sprayed with decontaminant before being placed in the chamber.

Continued on next page

- The pass-through chamber has two doors, one which opens to the laboratory room, and the other which opens to the interior of the Class III BSC (inter-chamber door). The chamber doors are electro-mechanically interlocked, which prevents more than one door from being opened at a time. Once the inter-chamber door has been opened, the chamber should be sprayed and surface decontaminated (i.e. at the end of the experiment or prior to opening the door that interfaces with the laboratory room).
- The pass-through chamber window is sealed with a silicone gasket and doors are sealed with EPDM gaskets. This pass-through chamber features a passive purge filtration system, which means a dedicated air supply and exhaust is HEPA filtered through 12”x12”x3” HEPA filters. When pass-through supply and exhaust valves are open, fresh air exchanges are continuous.

HEPA Filters

- HEPA filters are rated at 99.99% efficiency at 0.3µm particle size. (The filter is more fficient for particles larger or smaller than 0.3 µm). The air supply for the Class III BSC is filtered through a single 12”x12”x3” HEPA filter. The Class III BSC exhaust consists of a double-HEPA filtration system for each compartment, utilizing 12”x12”x3” independently scannable HEPA filters. Supply and exhaust connections are made with manually adjustable 3” and 4” gas tight butterfly valves.

Decontamination Ports

- The 1.5” stainless steel ports allow for gas decontamination of the Class III BSC using a gas or vapor decontaminant. Decontamination can be isolated to the cabinet, Pass Through, or filter housings only if the corresponding valves are closed. Sanitary 1.5” diameter quick clamps for connection to a decontamination gas generator are included; a transition adapter to 1.5” diameter cam and groove fitting is not provided.

Windows

- The viewing windows are 3/8” thick and made of polycarbonate. They are sealed to the Class III BSC with stainless steel frames and water jet cut EPDM gaskets. Glove ports are sealed into the windows with EPDM gaskets.

Lighting

- The interior of the Class III BSC is illuminated by fluorescent lights in housings mounted on the exterior top. The lights and housings are isolated from the work area by polycarbonate windows. They are sealed with stainless steel frames and seamless EPDM gaskets, which allow the lights to be changed without breaking containment.
- See Maintenance Section for light bulb replacement instructions.

Bag In/Bag Out System (BIBO)

- Each filter housing on the Class III BSC is equipped with a BIBO system. This system allows the operator to replace HEPA filters without releasing any contaminants from loaded filters. The filter is removed from the housing directly into the bag; the bag is then sealed, decontaminated, and properly disposed of. The BIBO bags are constructed of PVC material and sealed to the filter housings with woven nylon straps.

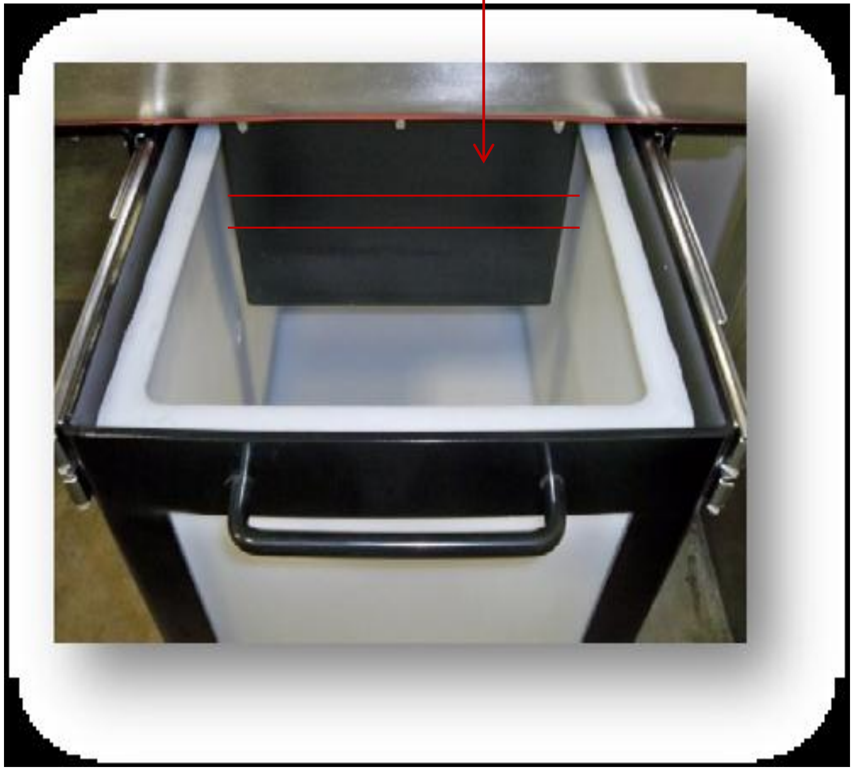
Dunk Tank

- Dunk tanks allow for the passage of potentially contaminated materials out of the Class III BSC without breaching containment. It also allows for live samples to be removed for transfer to another lab. Materials are double contained in a leak proof outer container and kept in contact with a chemical decontaminating solution in the dunk tank for a prescribed period of time. The laboratory SOPs specify the decontaminant, contact time, replacement frequency, and how recently it should be prepared prior to conducting work in the Class III BSC.

Dunk Tank cont.

- The decontaminant level must be checked to ensure it is at the specified fill level. Level should be approximately three inches above the bottom of the chute that bisects the dunk tank into the two regions. Having the liquid decontaminant level above this level is necessary to maintain proper containment and operational performance of the Class III BSC.
- However, the decontaminant level should not be filled more than four inches above the bottom of the chute; this could potentially result in overflow. (Red lines represent approximately 3” and 4” above the bottom edge of chute).

Liquid filled 3” to 4” above bottom of chute.



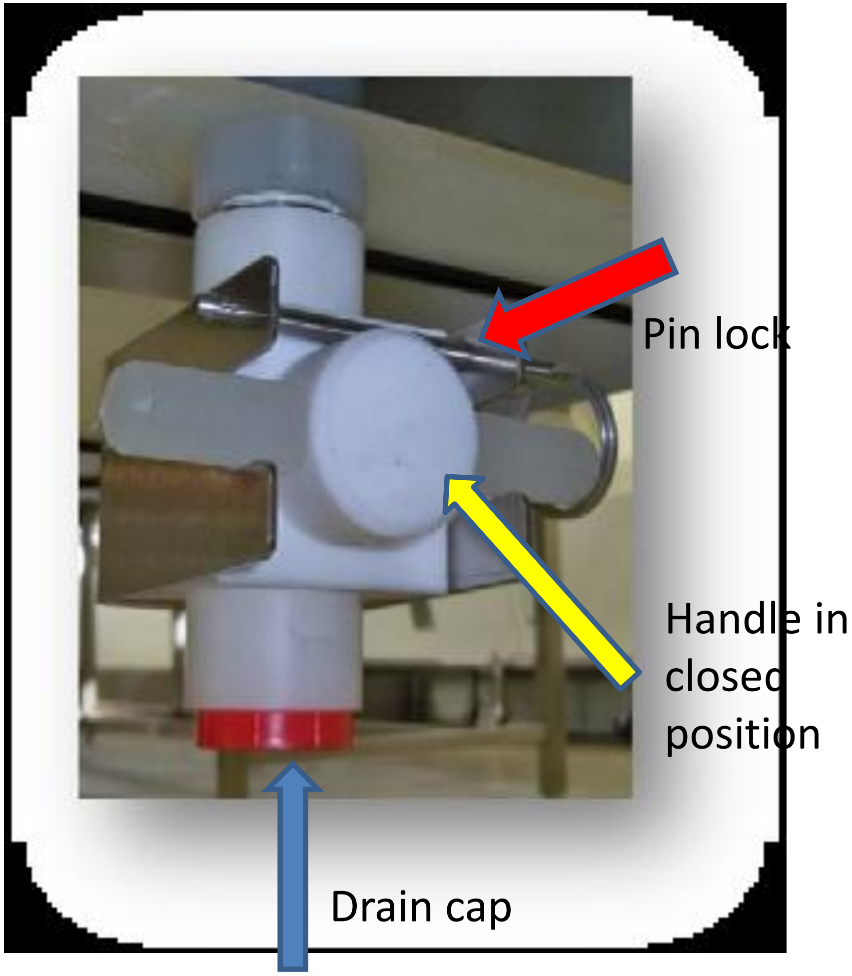
Dunk Tank cont.

- The dunk tank is accessible from the work area through a clear polycarbonate lid. The lid is clear to allow the user to see the decontaminant level as well as items in the dunk tank.
- The liquid solution in the dunk tank will move in direct proportion to the relative pressure at which the Class III BSC is operating. One inch water gauge of negative differential pressure will cause an inch rise in fluid level on the portion of the dunk tank which is inside the Class III BSC.
- Dunk tanks can be designed with coved or oblong shapes for ease of cleaning, may be slightly graded to ease draining, and can include ‘cages and hooks or tongs’ to keep containers and bags submerged and to retrieve the cages from the bottom of the tank more easily. The tank and cage should be designed to accommodate the largest item exiting the dunk tank.

Dunk Tank cont.

- The dunk tank is designed to slide out from under the surface of the Class III BSC, eliminating protrusions and making the process of transferring materials more convenient. The dunk tank slides on heavy-duty stainless steel roller-bearing rails for smooth operation.
- The dunk tank frame is coated with a high performance polymer powder coating to protect the stainless steel from the corrosive effects of decontaminants. The dunk tank chute is sealed to the cabinet with a ¼” seamless silicone gasket.
- The dunk tank features a corrosion resistant .5” drain valve for tank draining and cleaning.

- To drain the dunk tank, follow these steps:
  - Pull pin lock out of the locking frame.
  - Unscrew red drain cap
  - Turn valve handle open (up & down position)
  - After draining is complete, close valve and replace pin lock.
- Laboratory SOPs specify the appropriate method of disposal for the decontaminating solution.

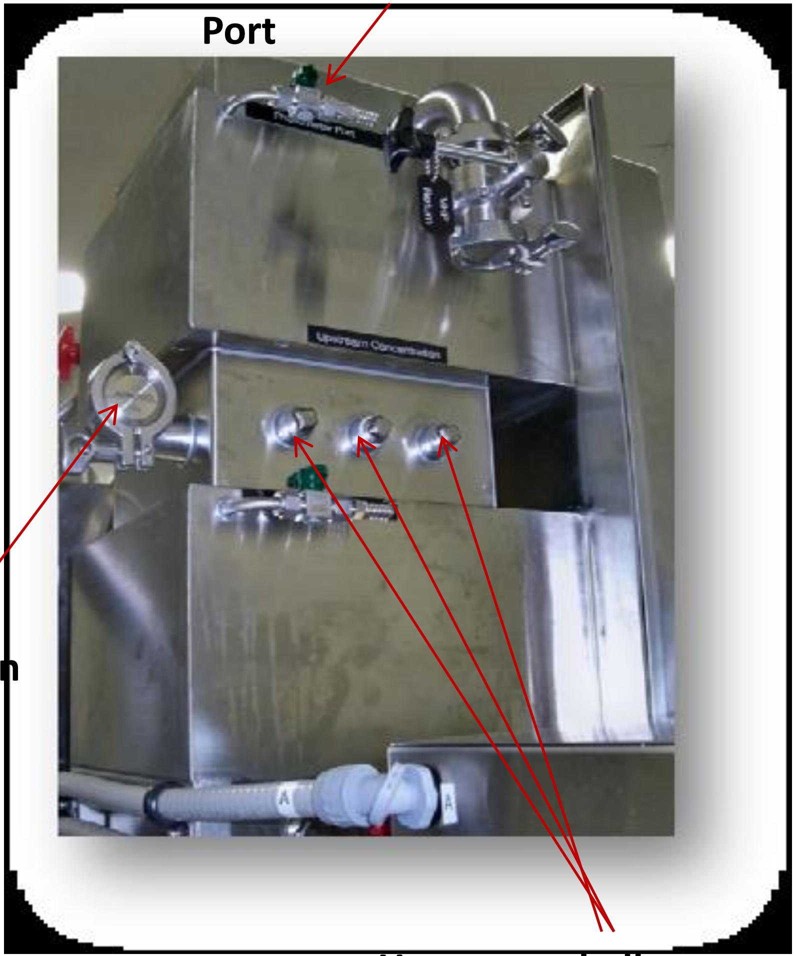


Blower Motor

- The necessary negative pressure for the Class III BSC system is maintained by a TMK 315-2 blower motor. It is housed in a sound dampening stainless steel box and is mounted on heavy duty caster for mobility. The blower housing has a 4” to 6” transition flange which connects with the facility ventilation system.
- (See Appendix B for Blower specifications)

Upstream & Downstream Aerosol Ports

- Each filter housing is equipped with upstream challenge concentration ports, Aerosol injection ports, and downstream photometer ports (detection ports). An aerosol challenge is introduced upstream of the HEPA filter, and the downstream side of the HEPA is scanned to test filter integrity.
- Note: Aerosol Challenge testing should only be performed by a contractor or trained personnel.



CBR Filtration System

The Chemical Biological & Radiological Agent (CBR) Filtration System is designed to filter out any chemical agents that may be present in the Class III BSC system. The filter housing contains two carbon filters (12”x24”x2”), which remove contaminants by adsorption. The housing is equipped with a sampling valve which allows for testing of the first carbon filter for saturation or breakthrough while the filters are in place. The second carbon filter maintains safe filtration in the event that the first filter is compromised. The filter housing is constructed with a bag-in/bag-out (BIBO) design, allowing filter changes without breaking containment. Gas-tight shut off valves are provided at the supply and exhaust connections of the system for complete sealing of the Filter Housing during transport and filter changes.

- Note: Carbon filter testing should only be performed by a contractor or trained personnel

Electrical Receptacles

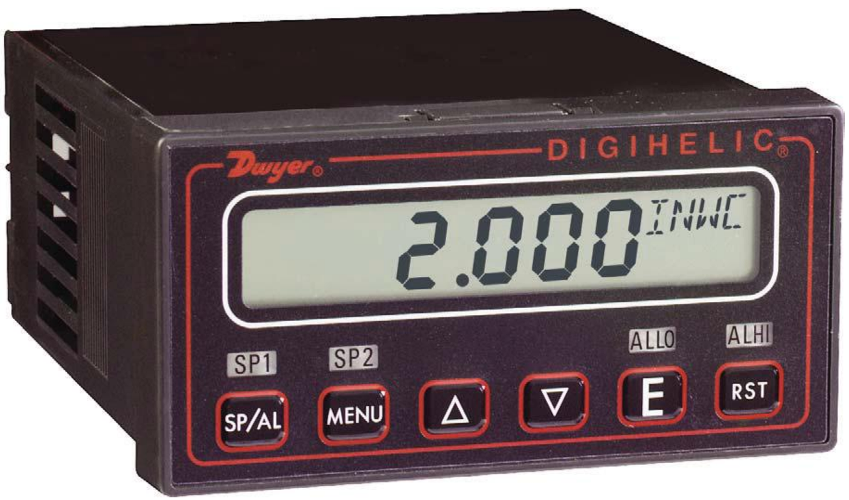
- The Class III BSC features electrical receptacles on the interior and exterior of the cabinet. Inside the work area are six hanging receptacles used for powering equipment inside the cabinet. The receptacles are sealed into the work area via a sealed plug connection, and are removable and replaceable if they become contaminated.
- To remove the receptacle, simply unscrew the connector at the top of the receptacle cord (indicated in picture).

Glove Cord

- Below each window are blue bungee cords. These cords are used to secure unused gloves outside the cabinet (as shown).
- During operation, unused gloves significantly impede user visibility of the work area. Additionally, gloves pulled into the cabinet puts stress on the glove material. During operations, if gloves are not being used, pull them outside the cabinet and tuck under the blue glove cord.
- This practice will help gloves last longer.

Digihelic Gauge

- The DigihelicÂ® differential pressure controller is a 3-in-1 instrument possessing a digital display gauge, control relay switches, and a transmitter with current output. Combining these three features in a cost efficient way to measure pressure, velocity and flow. The DigihelicÂ® can achieve a 0.5% full scale accuracy, making it the perfect controller for glove boxes, hoods and clean rooms.



System Operating Information

- Set Up
  - The Class III BSC operates under negative pressure in relation to the area in which it is situated. This negative pressure provides the increased level of safety required in the event of a breach of containment, such as a leak in a glove.
  - Negative pressure is maintained throughout the Class III BSC, ducting, and Filtration System. Hazardous materials are not exhausted to the environment or returned back into the system.
  - Pressure gauges monitor Class III BSC pressure relative to the surrounding environment. Mechanical pressure gauges will operate without electricity, in the event of power loss.
  - If Class III BSC pressure rises above -0.5" H_2O the alarm will sound. Unless negative pressure can be immediately regained, Class III BSC Supply and Exhaust valves should be closed, and decontamination and test sample safety procedures should be initiated.

Safety Practices

- Advance Planning & Good Technique
  - The successful use of the Class III BSC as a safety tool depends on two factors: advance planning and good operational practices. Even the most sophisticated and elaborate systems are unsafe if proper technique is not employed. It is, therefore, the responsibility of the safety officer or head of the particular project to train the personnel who will use the unit and to ensure good technique is maintained.
  - Planning is a critical part of laboratory safety. To achieve maximum safety and utility of the Class III BSC take into account all equipment and materials necessary for the proposed operation and outline the procedural details in advance. The best way to accomplish this is by the use of a checklist and/or protocol that includes the equipment, apparatus, tools, supplies, and other details necessary for the successful completion of the proposed operation. Every process, procedure, and item involved in an experiment must be carefully outlined and planned for.
  - The order of events should also be clearly listed, with the sequence in which materials must be passed into or out of the Class III BSC particularly well detailed, especially if cross-contamination is a concern.

Safety Practices

- Gloves
  - Gloves are the most susceptible component of the Class III BSC system. If there is a containment breach, more often than not, it is due to a glove leak. For this reason, it is important to inspect gloves regularly; before and following each use of the Class III BSC. A quick pressure test will indicate if there is a glove leak. It is also important to have spare gloves readily available.
  - All operators should be practiced in glove replacement. Furthermore, laboratory personnel should understand protocol in the event of a glove leak.

Safety Practices

- Personal Protective Equipment (PPE)
  - Laboratory personnel should always wear appropriate Personal Protective Equipment (PPE) when using this equipment (e.g. protective clothing, eye protection, etc.). Appropriate PPE should be specified in the recommended safety procedures corresponding to the work being performed in the Class III BSC.

Class III BSC Start-up Instructions

- Visually inspect Class III BSC elements, particularly for damage to the exposed surfaces of the HEPA filters, gloves, o-rings and hoses. Make sure duct clamps are tight and in place.
- Close all openings.
- Open the Supply and Exhaust air valves

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Class III BSC Start-up Instructions

- Leak pressure test the Class III BSC.
  - ►Turn power switch on.
  - ►Close the Supply Air valve. This will increase negative pressure and pull the gloves into the cabinet. Draw approximately -3.5” H_2O.
  - ►Close the Exhaust Air Valve.
  - ►Turn off the Filtration System blower switch.
  - ►Slowly reduce negative pressure by slightly opening the Supply Air Valve until pressure gets close to -3” H_2O, then close slightly.
  - ►Record pressure on Digihelic Pressure Gauge.
  - ►After 10 minutes elapses, record the new pressure reading. Pressure should not rise more than .5” H_2O in 10 min.
  - ►If there is less than .5” H_2O difference between the start and finish pressure readings the cabinet is considered leak-tight.
  - ►If the difference between the start and finish pressure readings exceeds .5” H_2O, the unit is not considered operational and the source of the leak must be found and corrected. (See Section IV. Troubleshooting)

- Note that even small temperature changes within the cabinet and/or Laboratory will have a dramatic effect on the pressure within the Class III BSC. This test should only be conducted when a stable temperature has been achieved. The use of accurate thermometers inside and outside the box is recommended

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Class III BSC Start-up Instructions

- Test the Pressure Alarm
  - Ensure Supply and Exhaust Air valves are fully open.
  - Turn on Filtration System
  - Close the Supply Air Valve until cabinet pressure registers between -1” H_2O and -1.5” H_2O.
  - Record negative pressure attained and time
  - Momentarily close the Exhaust Air Valve
  - Alarm should sound when indicated pressure rises above -.5” H_2O.
  - Silence the Alarm, then return valve to initial position after verification. Return Exhaust Air Valve to initial position verifying pressure registers between -1” H_2O and -1.5” H_2O.

Set Operational Flow and Pressure

- Turn power switch on, gloves should pull into cabinet
- Pull off a glove from one of the glove ports.
- Using an anemometer, take an air velocity measurement from the center of the open glove port.
- Inflow velocity should measure at a minimum 100 ft/minute.
- Adjust exhaust valve to attain 100 ft/min inflow through open glove port.
- Secure glove back onto glove port.
- Adjust supply valve to attain desired operational pressure.
- Begin to use the Class III BSC.

Gas Decontamination

(To be performed by contractor or trained personnel)

1). Confirm Decontamination Port Shut- Off valves are closed.

2). Remove caps from ports.

3). Connect hoses from aerosolized gas source to ports using gaskets and clamps.

4). Follow decontaminant manufacturer's procedures for decontamination.

5). After decontamination cycle has completed, close shut-off valves, remove hoses, and replace caps.

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Gas Decontamination

- Hydrogen Peroxide Vapor (HPV) is compatible with, and safe for, a wide range of materials used in the construction of Class III Biological Safety Cabinets, including 304 and 316 series stainless steel. It is also safe for a wide range of plastics including polycarbonate as well as gasket material including silicone and EPDM. Additional compatibility and life cycle testing information will be provided by the manufacturers of the vaporized hydrogen peroxide systems: Steris www.steris.com and Bioquell www.bioquell.com.

Maintenance Schedule

Task	Frequency
Inspect Gloves/Replace gloves & O-rings if necessary	Daily/Before & after each use
Inspect Glove Port Trim Guard/Replace if necessary	Monthly/Specified in SOPs
Perform 10 minute Rate of Rise Pressure Test	Weekly
General Cleaning	Discretionary/Specified in SOPs
Inspect Dunk Tank solution level/add if necessary	Daily/Weekly
Rinse work area with fresh water if bleach is used	Discretionary/Specified in SOPs
Decontaminate Class III BSC	Discretionary/Specified in SOPs
Replace HEPA Filters	Annually/Specified in SOPs
Replace Circuit Breakers	Discretionary/As Needed
Test GFCI	As Needed
Replace Electrical Receptacles	As Needed if Contaminated
Replace Light Bulbs	Discretionary/As Needed
Re-Certification	Annually
Tighten Window/Filter Housing Hardware	At annual certification

Maintenance

- The stainless steel is impervious to most chemicals and can be cleaned with any solvent or stainless steel cleaner. However, if routine cleaning with strong solutions of sodium hypochlorite (bleach) is anticipated, care should be taken to avoid repeated, prolonged exposure of the stainless steel. If bleach is used, it is necessary to immediately rinse thoroughly with fresh water.

- The Class III BSC's polycarbonate viewing window can be periodically cleaned with a soft, dry cloth to remove dust or particulate accumulation. If desired, a solution of 70% isopropyl alcohol or commercially available detergent may be used to decontaminate the surfaces. Commercial window cleaner containing ammonia and abrasive cleaners are INCOMPATIBLE with the polycarbonate surfaces and should NEVER BE USED. For aesthetic purposes, an anti-static cleaner may be applied to prevent accumulation of particulates on the exterior.

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Maintenance

- Care should be taken during the cleaning of the equipment to avoid wetting the HEPA filters. If a HEPA filter becomes wet, it should not be assumed that it has been damaged. Simply turn off the unit and allow sufficient time for the filter media to dry. In extreme cases, it is advisable to have the unit recertified prior to use.
- HEPA filters should be stored in a place where the filter media will not be damaged, punctured, or touched.
- Carbon filters absorb moisture; it is best to store them in areas with low relative humidity

Replacing Class III BSC Gloves

- During Routine Maintenance

  1. Visually inspect the new gloves for defects before installation. Then, during routine maintenance, when the Class III BSC is clean, simply remove the tape and the O-ring from the glove port, pull off the gloves, and replace the gloves with date stamped new gloves. Be sure to position the end of the glove on the innermost gloveport groove.

  2. Before replacing the O-ring, make sure the thumbs on the gloves are pointed upward. Check the O-ring for snugness of fit, cracks, and replace if necessary. Attach the O-ring over the outermost groove on the glove port and, finally, attach a new piece of tape over the inner groove.

  3. After changing gloves, it is advisable to perform the Class III BSC leak test, and confirm that it still attains acceptable negative pressure

Replacing Class III BSC Gloves Steps 1-7

- During Operations*

  1. To change gloves during operations with a potentially contaminated work area, decontaminate as much of the glove and surrounding area as possible inside the cabinet. Only one glove can be changed at a time. Visually inspect new glove for defects before installation. Wear proper protective equipment.
  ●See Diagram 1.

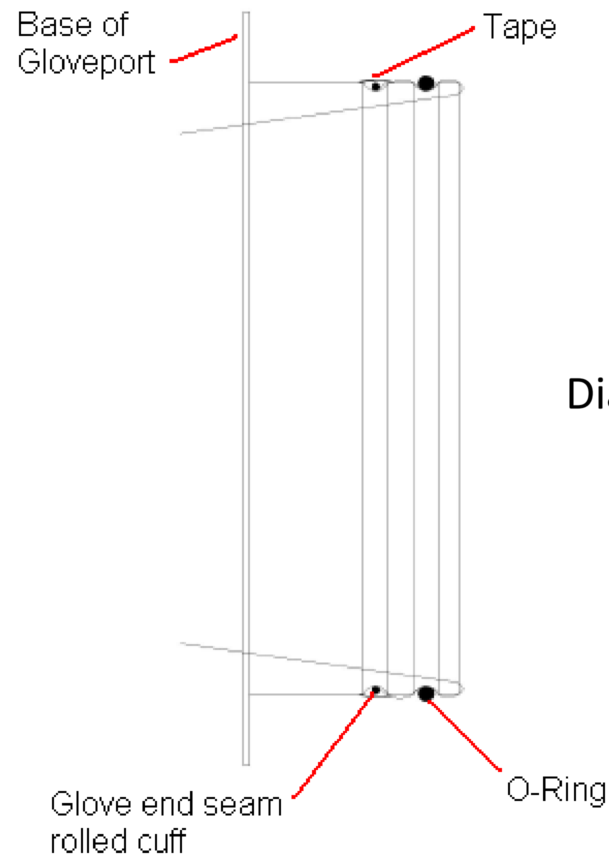


Diagram 1

*Glove over glove change out technique

Replacing Class III BSC Gloves

2. Remove the tape and O-ring, and carefully slide the rolled cuff of the damaged glove from the inner glove groove to the outer glove groove.

- See Diagrams 2 and 3.

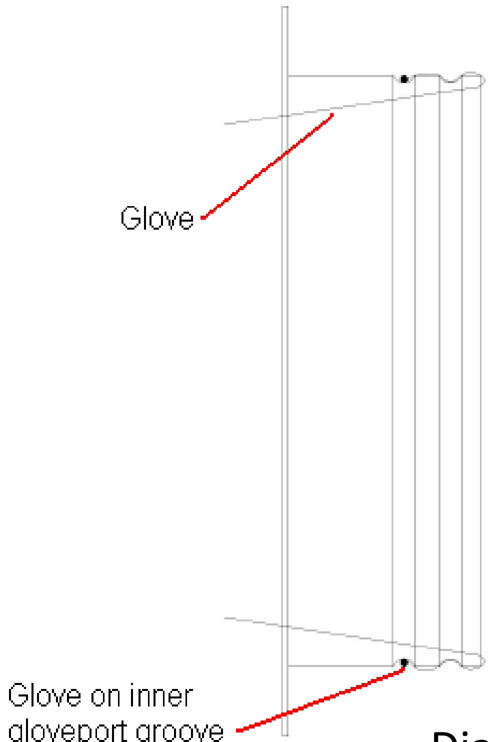


Diagram 2

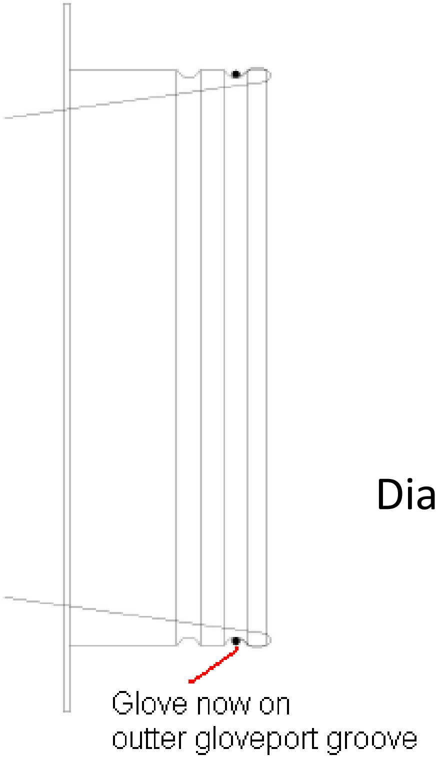


Diagram 3

Replacing Class III BSC Gloves

3. Orient the new glove so it is thumb up, and push it inside the damaged glove. Once it is inside the cabinet, slide the cuff of the new glove over the old glove cuff until the end is seated in the inner groove.

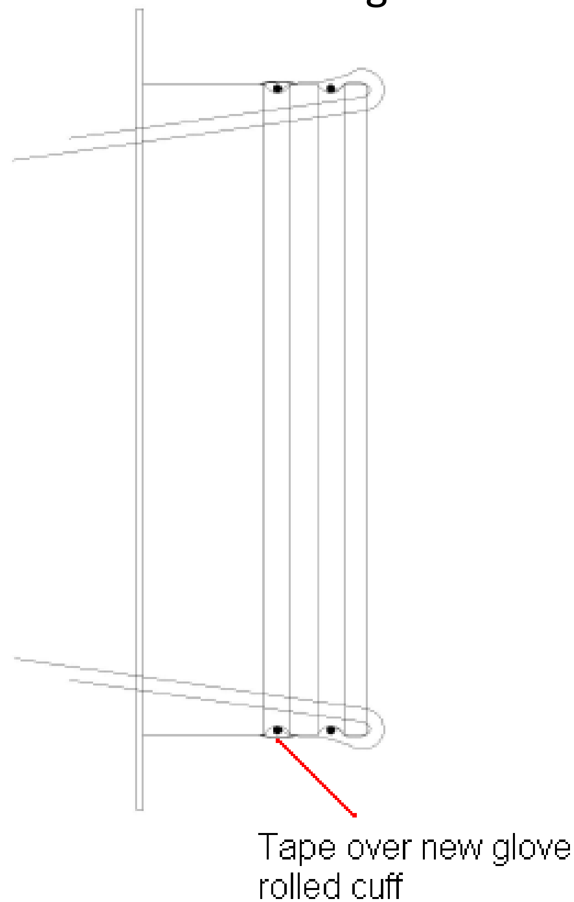
- See Diagram 4.

Diagram 4

Replacing Class III BSC Gloves

4. Attach a new piece of tape over the inner groove as shown in Diagram 5.

Diagram 5

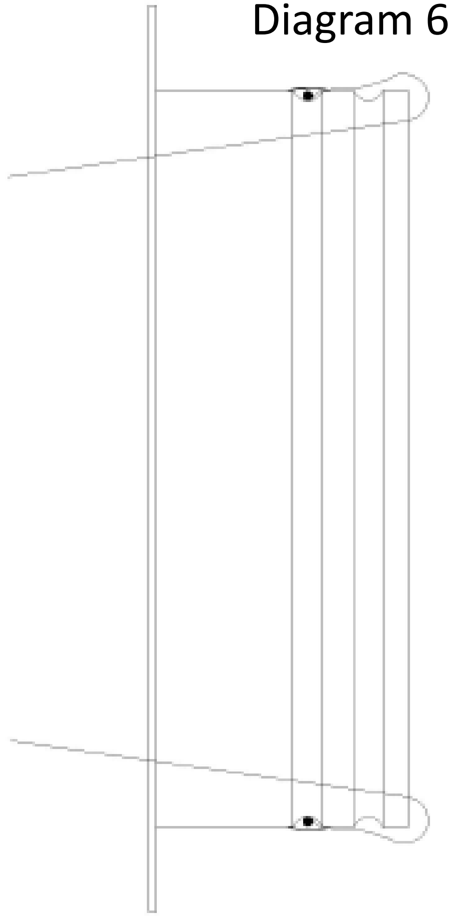


Replacing Class III BSC Gloves

5. Place hand in adjoining gloveport glove and reach over to the damaged glove. Pull damaged glove into the work area while using your free hand to make sure the new glove cuff remains in place on the gloveport.

- See Diagram 6.

Diagram 6



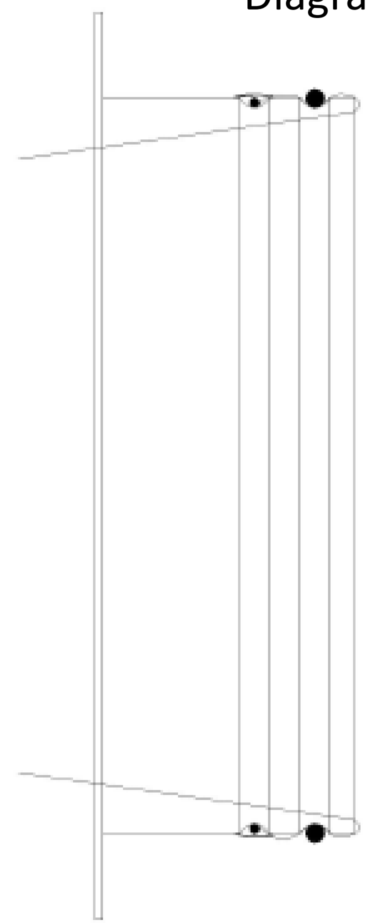
Replacing Class III BSC Gloves

6. Make sure there are no twists or wrinkles in the new glove. Slide the O-ring over the glove to the outer glove groove.

    - See Diagram 7.

7. After changing the glove, perform the leak test and confirm the unit still attains acceptable negative pressure.

Diagram 7



Emergency Procedures

- Electrical power failure
- Glove tear and/or breach
- Spill

- The Class III BSC is designed to mitigate risks associated with potentially hazardous biological agents, as it provides a complete barrier between the agents of concern and the operator. It is important to realize that this barrier is still maintained in the event of a potentially hazardous situation.

Emergency Procedures

- All Class III BSC operators must have a clear understanding of the risks associated with the particular procedures being performed, and be trained on emergency protocol. Emergency procedures should be posted where they are clearly visible to all personnel.
- Any possible exposure to hazardous agents should be immediately reported to the laboratory director. It is also recommended that Emergency Procedures be reviewed annually, and are revised and/or updated as needed.

Spill

- A spill in a Class III BSC should be maintained within the confines of the work deck, with the possibility of liquid draining into the dunk tank.

Glove tear and/or breach

- The Class III BSC is designed to afford operator protection in the event of a glove tear and/or breach. Inward airflow will be maintained through the opening in a manner consistent with a Class I BSC. Replacement gloves need to be readily available and operators need to be trained on glove-over-glove change out.

Electrical power failure

- If there is a power failure of the facility exhaust system, supply and exhaust valves should be closed. For most other concerns it is best to maintain supply and exhaust vales in operating positions.

References

- http://www.germfree.com/product-lines/class-iii-biosafety-cabinets/all-hazard-receipt/all-hazard-receipt/
- http://www.ehow.com/list_6652620_hepa-classifications.html
- http://ehs.unc.edu/manuals/laboratory/docs/lsm16.pdf