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User's Manual

Purifier[®] HEPA Filtered Enclosures & Purifier[®] Class I Filtered Enclosures

Models

3980200, 3980201, 3980202, 3980203, 3980220, 3980221,
3980222, 3980223, 3980300, 3980301, 3980302, 3980303,
3980320, 3980321, 3980322, 3980323, 3980400, 3980401,
3980402, 3980403, 3980420, 3980421, 3980422, 3980423

To receive important product updates,
complete your product registration card
online at register.labconco.com

Please read the User's Manual before operating the equipment.

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The warranty for Purifier® HEPA Filtered Enclosure and Purifier® Class I Filtered Enclosures will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner. Warranty is non-transferable and only applies to the owner (organization) of record.

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Under no circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This warranty is exclusive and in lieu of all other warranties whether oral, or implied.

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The United States Interstate Commerce Commission rules require that claims be filed with the delivery carrier within fifteen (15) days of delivery.

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If you have questions that are not addressed in this manual, or if you need technical assistance, contact Labconco's Customer Service Department or Labconco's Product Service Department at 1-800-821-5525 or 1-816-333-8811, between the hours of 7:30 a.m. and 5:30 p.m., Central Standard Time.

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CHAPTER 1

INTRODUCTION

Congratulations on your purchase of a Labconco Purifier® HEPA Filtered Enclosure or Purifier® Class I Filtered Enclosure. Your enclosure provides personnel protection through superior containment. It is the result of Labconco's more than 50 years of experience in manufacturing fume hoods and more than 30 years of experience in manufacturing filtered enclosures.

These enclosures will effectively contain toxic, noxious, or biohazardous particulates when properly installed and operated. Each enclosure uses a single HEPA filter, which is rated at least 99.99% efficient for 0.3-micron particles. Additionally, an accessory Odor Control carbon filter may be added to adsorb nuisance odors from organic vapors, formaldehyde or ammonia and amines. The Purifier enclosures offer many unique features to enhance safety, performance, and energy savings. To take full advantage of them, please acquaint yourself with this manual and keep it handy for future reference. If you are unfamiliar with how high performance HEPA filtered enclosures operate, please review *Chapter 4: High Performance Features and Safety Precautions* before you begin working in the enclosure. Even if you are an experienced user, please review *Chapter 5: Using Your HEPA Filtered Enclosure*, which describes the Purifier features so that you can use the filtered enclosure efficiently. For hazardous biological applications requiring user protection but not product protection, Labconco recommends the purchase of a Class I enclosure, which includes a UV light for general surface decontamination. For general hazardous biological applications, particulates, and nuisance powders, Labconco recommends the use of the Purifier HEPA Filtered Enclosure. See chart below and contact Labconco for additional ordering information.

No.	Application	Product	Filters	Bag-in/Bag-out HEPA	UV Light
1.	Nuisance Powders, Biohazardous Materials	Purifier HEPA Filtered Enclosure	HEPA	NO Decontamination Required	NO
2.	Nuisance Powders, Biohazardous & Volatile Chemicals	Purifier HEPA Filtered Enclosure	HEPA and Carbon*	NO Decontamination Required	NO
3.	Biohazardous Materials & Nuisance Powders	Purifier Class I Enclosure	HEPA	NO Decontamination Required	Included for Surface Decontamination
4.	Biohazardous Materials, Nuisance Powders & Volatile Chemicals	Purifier Class I Enclosure	HEPA and Carbon*	NO Decontamination Required	Included for Surface Decontamination

* It is recommended that a Labconco product specialist review the chemical application to determine if it is suitable. Consult Chapter 5 and Chapter 6.

About This Manual

This manual is designed to help you learn how to install, use, and maintain your filtered enclosure. Instructions for installing optional equipment or accessory carbon filters on your filtered enclosure are also included.



If the unit is not operated as specified in this manual it may impair the protection provided by the unit.

Si l'unité n'est pas utilisée comme spécifié dans ce manuel il peut diminuer la protection fournie par l'unité.

Chapter 1: Introduction provides a brief overview of the filtered enclosure, explains the organization of the manual, and defines the typographical conventions used in the manual.

Chapter 2: Prerequisites explains what you need to do to prepare your site before you install the filtered enclosure. Electrical and service requirements are discussed.

Chapter 3: Getting Started contains the information you need to properly unpack, inspect, install, and certify the filtered enclosure.

Chapter 4: High Performance Features and Safety Precautions explains how the Purifier filtered enclosure operates and the appropriate precautions you should take when using it.

Chapter 5: Using Your Filtered Enclosure discusses the basic operation of how to prepare, use and shut down your filtered enclosure.

Chapter 6: Maintaining Your Filtered Enclosure explains how to perform routine maintenance on the filtered enclosure.

Chapter 7: Accessorizing Your Filtered Enclosure explains acceptable modifications to the filtered enclosure or how to add accessories.

Chapter 8: Troubleshooting contains a table of problems you may encounter while using the filtered enclosure including the probable causes of the problems and suggested corrective actions.

Appendix A: Components and Replacement Parts contains labeled diagrams of all of the components of the filtered enclosures.

Appendix B: Dimensions and Exhaust Options contains comprehensive diagrams showing all of the dimensions for the filtered enclosures.

Appendix C: Filtered Enclosure Specifications contains the electrical requirements for filtered enclosures. Wiring diagrams are also included.

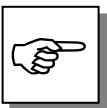
Appendix D: Quick Chart provides a table of airflow and test data for the filtered enclosures.

Appendix E: References lists the various resources available that address laboratory ventilation and biosafety.

Typographical Conventions

Recognizing the following typographical conventions will help you understand and use this manual:

- Book, chapter, and section titles are shown in italic type (e.g., *Chapter 3: Getting Started*).
- Steps required to perform a task are presented in a numbered format.
- Comments located in the margins provide suggestions, reminders, and references.
- Critical information is presented in boldface type in paragraphs that are preceded by the exclamation icon. Failure to comply with the information following an exclamation icon may result in injury to the user or permanent damage to the enclosure.
- Critical information is presented in boldface type in paragraphs that are preceded by the wrench icon. A trained certifier or contractor should only perform these operations. Failure to comply with the information following a wrench icon may result in injury to the user or permanent damage to your hood.
- Important information is presented in capitalized type in paragraphs that are preceded by the pointer icon. It is imperative that the information contained in these paragraphs be thoroughly read and understood by the user.



2'

3'

- A number icon precedes information that is specific to a particular model of enclosure. The 2' icon indicates the text is specific to the 2-foot wide model. The 3' icon indicates the text is specific to the 3-foot model, etc.

4'



- CAUTION – See Manual. When this symbol is on the unit it indicates a caution that is detailed in this manual.
- ATTENTION - Voir manuel. Lorsque ce symbole est sur l'unité, il indique une mise en garde qui est indiqué dans ce manuel.

CHAPTER 2

PREREQUISITES

Before you install the filtered enclosure, you need to prepare your site for installation. You must be certain that the area is level and of solid construction. In addition, a dedicated source of electrical power should be located near the installation site to power the filtered enclosure, and other apparatus. Additionally, the enclosure should be strategically placed in the lab to provide efficient workflow.

Carefully read this chapter to learn the requirements for your installation site:

- The support, vibration and movement requirements.
- The location and air current requirements.
- The exhaust and blower requirements.
- The electrical power requirements.
- The space requirements.

Refer to *Appendix B: Purifier Dimensions* for complete enclosure dimensions.

Refer to *Appendix C: Purifier Specifications* for complete filtered enclosure electrical and environmental conditions, specifications and requirements.

Support, Vibration and Movement Requirements

At a minimum, the supporting structure usually consists of a base cabinet and chemically-resistant work surface.

- A stand or mobile bench is not recommended if the enclosure will be used for precise weighing of powders.

Location and Air Current Requirements

The Purifier Filtered Enclosures have been designed to contain hazards by negating typical cross drafts and turbulence within the opening. However, as a precautionary safety measure and a higher level of quality management, it is recommended that the enclosure be placed in an area to avoid:

- High traffic areas where walking might cause an air disturbance or be a nuisance.
- Overhead or wall HVAC diffusers, fans, radiators or other lab equipment producing air currents.
- Next to doorways or windows that may be opened.



Do not position the unit so that it is difficult to operate the main disconnect device.

Ne placez pas l'appareil de sorte qu'il est difficile de faire fonctionner le dispositif principal de déconnexion.

Exhaust and Blower Requirements

The Purifier Class I Enclosure and Purifier Filtered Enclosure use an integral motorized impeller to draw room air past the operator and through the enclosure. This contaminated air is then pushed through the HEPA filter. The HEPA-filtered exhaust air is then forced out the top of the enclosure. An optional carbon filter may be installed on the downstream side of the HEPA filter to protect against nuisance odors.

The HEPA-filtered exhaust air can be recirculated into the laboratory or exhausted outside with the addition of the thimble exhaust connection and remote blower listed in Chapter 7. Data for the exhaust volume and enclosure static pressure loss are listed for each filtered enclosure model at face velocities of 60, 75, 80, 90, 100, and 105 fpm.

Enclosure Width	Model Description	Face Velocity (fpm)	Exhaust Volume (CFM)	Noise Pressure db(A)	Max. Equivalent Resistance of 6" Duct (Ft)	Max. External Static Pressure
2'	2' Purifier Class I Enclosure 2' Purifier HEPA Filtered Enclosure	60	85	48-53	400	.20"
		75	110	49-55	220	.19"
		80	115	50-56	200	.18"
		90	130	51-57	140	.16"
		100	145	53-58	80	.13"
		105	155	54-59	70	.12"
3'	3' Purifier Class I Enclosure 3' Purifier HEPA Filtered Enclosure	60	130	48-53	130	.15"
		75	165	52-56	65	.12"
		80	175	53-57	50	.11"
		90	200	55-58	35	.09"
		100	220	58-61	25	.08"
		105	230	60-64	20	.07"
4'	4' Purifier Class I Enclosure 4' Purifier HEPA Filtered Enclosure	60	175	49-54	100	.20"
		75	220	54-58	60	.19"
		80	235	58-61	50	.18"
		90	265	60-63	35	.16"
		100	295	62-66	25	.13"
		105	310	64-67	20	.12"

Proper blower selection can be determined from these exhaust requirements and the total system static pressure loss. For outside exhaust, the enclosure must be connected to either a dedicated blower or a house exhaust system.

Labconco offers accessory remote blowers listed in Chapter 7. Contact Labconco for blower sizing assistance.



If the enclosure is connected directly to a house exhaust system, an adjustable damper (or valve) must be installed to control the airflow properly. This is equally important when a house exhaust system is controlling multiple filtered enclosures. See Chapter 7 for accessory adjustable damper ordering information.

Electrical Requirements

Standard duplex electrical receptacles should be nearby for connecting the filtered enclosure, or other equipment. The enclosures include iris pass-throughs to allow electrical cords through the back of the enclosure without leaving a large hole for contaminants to escape.

Space Requirements

The dimensions for the different models are shown in *Appendix B: Dimensions*.

CHAPTER 3

GETTING STARTED

Now that the site for your filtered enclosure is properly prepared, you are ready to unpack, inspect, install, and validate your system. Read this chapter to learn how to:

- Unpack and move the enclosure.
- Set up the enclosure with the proper supporting structure and work surface.
- Connect to an exhaust system if applicable.
- Installation of HEPA and accessory Odor Control carbon filters.
- Connect the electrical supply.
- Set the face velocity with the speed control adjustment.
- Arrange validation for the enclosure.
- Seal the enclosure to the work surface.

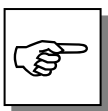
Depending upon which model you are installing, you may need common mechanical and electrical installation tools in addition to 5/16", 3/8", 7/16", and 1/2" wrenches, ratchets, sockets, a nut driver set, a flat-blade screwdriver, a Phillips screwdriver, and a carpenter level to complete the instructions in the chapter.



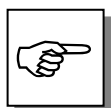
Each enclosure model weighs between 125 to 195 lbs. each (55 to 85 kg). The shipping container allows for lifting with a mechanical lift truck or floor jack. If you must lift the enclosure manually, follow safe-lifting guidelines. Do not lift by the front air foil.

Unpacking the Enclosure

Carefully remove the shrink-wrap or carton on the enclosure and inspect it for damage that may have occurred in transit. If damaged, notify the delivery carrier immediately and retain the entire shipment intact for inspection by the carrier.



DO NOT RETURN GOODS WITHOUT THE PRIOR AUTHORIZATION OF LABCONCO. UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED.



IF ENCLOSURE WAS DAMAGED IN TRANSIT, YOU MUST FILE A CLAIM DIRECTLY WITH THE FREIGHT CARRIER. LABCONCO CORPORATION AND ITS DEALERS ARE NOT RESPONSIBLE FOR SHIPPING DAMAGES.

The United States Interstate Commerce Commission rules require that claims be filed with the delivery carrier within fifteen (15) days of delivery.

Do not discard the packing material until you have checked all of the components and tested the enclosure. We recommend that you do not remove the enclosure from its shipping container until it is ready to be placed into its final location. Move the unit by placing a flat, low dolly under the shipping skid, or by using a floor jack.



Do not move the enclosure by tilting it onto a hand truck.

Installing the Filtered Enclosure on a Supporting Structure and Work Surface

Use caution when lifting or moving the enclosure. When installing the enclosure onto a chemical-resistant work surface or benchtop, ensure that the structure can safely support the combined weight of the enclosure and any related equipment. The work surface should be at least as wide as the enclosure to properly support it. The front of the enclosure should be aligned within 0.36" of the front of the work surface. Mounting holes are provided in the Labconco accessory work surfaces to secure the enclosure.

Work Surface Specifications

The work surface should be smooth, rigid, and durable, such as a chemical-resistant epoxy resin. The surface should be non-porous and resistant to the biohazards, powders, solvents and chemicals used in conjunction with the Purifier Filtered Enclosure. The work surface should also contain a dished recessed area for containing primary spills.

Work Surface and HEPA Filtered Enclosure Installation

1. Level the base cabinets and the work surface. Work surface should be placed flush with the front of the base cabinet as shown in Figure 3-1.
2. Position the work surface in its intended location and with the front of the work surface towards you. (Rear mounting holes are located close to the rear edge.)
3. Secure the work surface to the base cabinet with a structural adhesive or silicone sealant.
4. Insert the supplied mounting screws in the four holes. Allow a minimum of 1/8" clearance under the head of the screw for positioning the enclosure.
5. Place the enclosure on the work surface and slide the rear flange and front air foil flanges under the mounting screw heads.
6. Tighten the four screws to complete the installation.

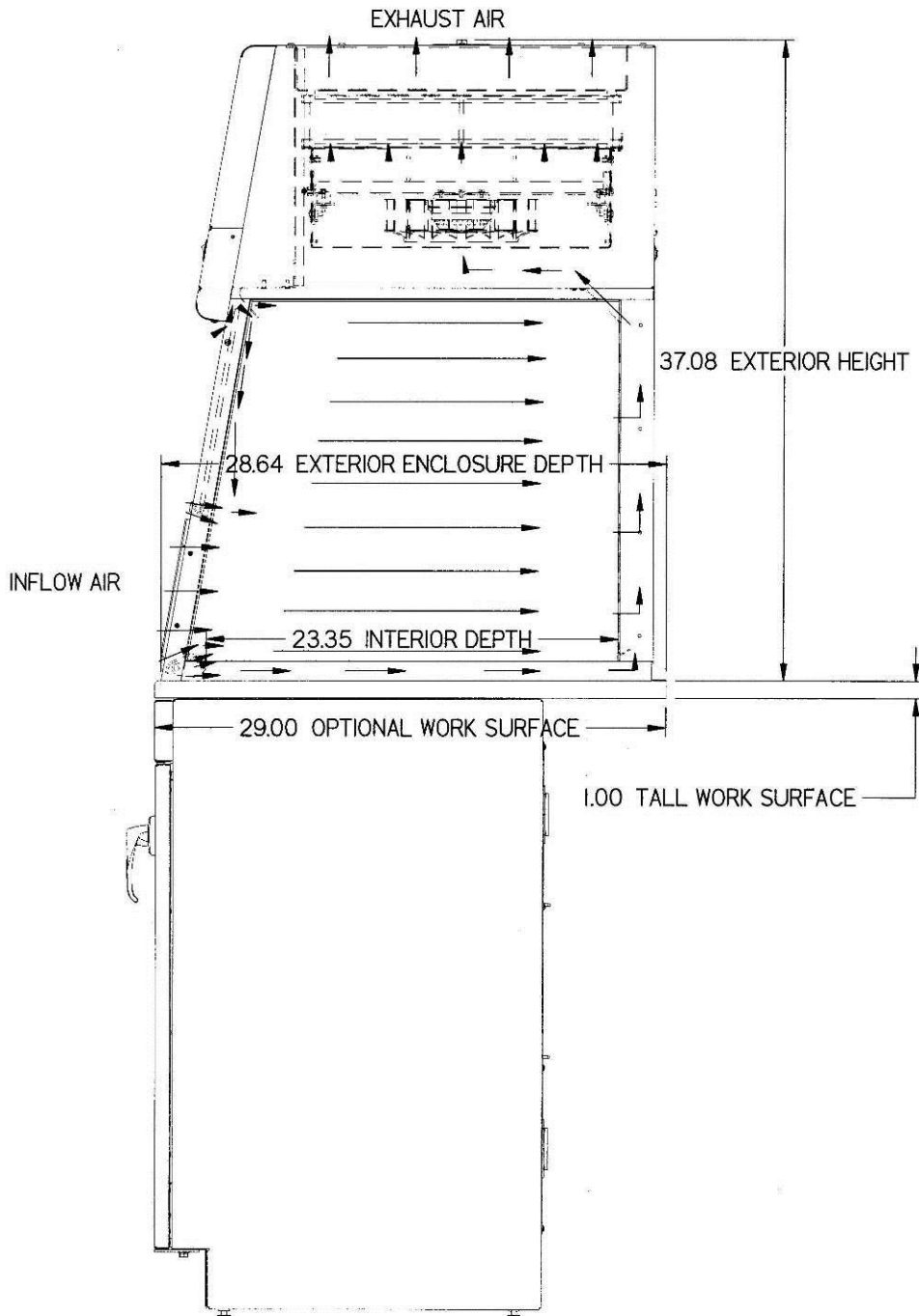
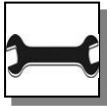


Figure 3-1
Filtered Enclosure Installation

Connecting to the Exhaust System (Optional)



ATTENTION: The weight of the exhaust ductwork system must be supported independently of the enclosure superstructure or damage may occur.



The exhaust system should be installed by a qualified HVAC contractor.

Thimble exhaust connection aids in the removal of chemicals or applications where a higher degree of biohazard and particulate removal is required. See Chapter 7 for ordering thimble exhaust for the Purifier HEPA Filtered Enclosure or Purifier Class I Enclosure. Both 6" for house exhaust and 5" for connection to a FilterMate Portable Exhauster are available. Review Chapter 2 for exhaust prerequisites and review Chapter 7 for ordering blower exhaust equipment. See figure 3-2 and figure B-2 for thimble exhaust on Purifier filtered enclosures.

Consult Labconco Customer Service should you require help sizing your blower for the exhaust volume and system static pressure loss.



To ensure compatibility, the selected exhaust duct material should match the enclosure, procedures and chemical applications.

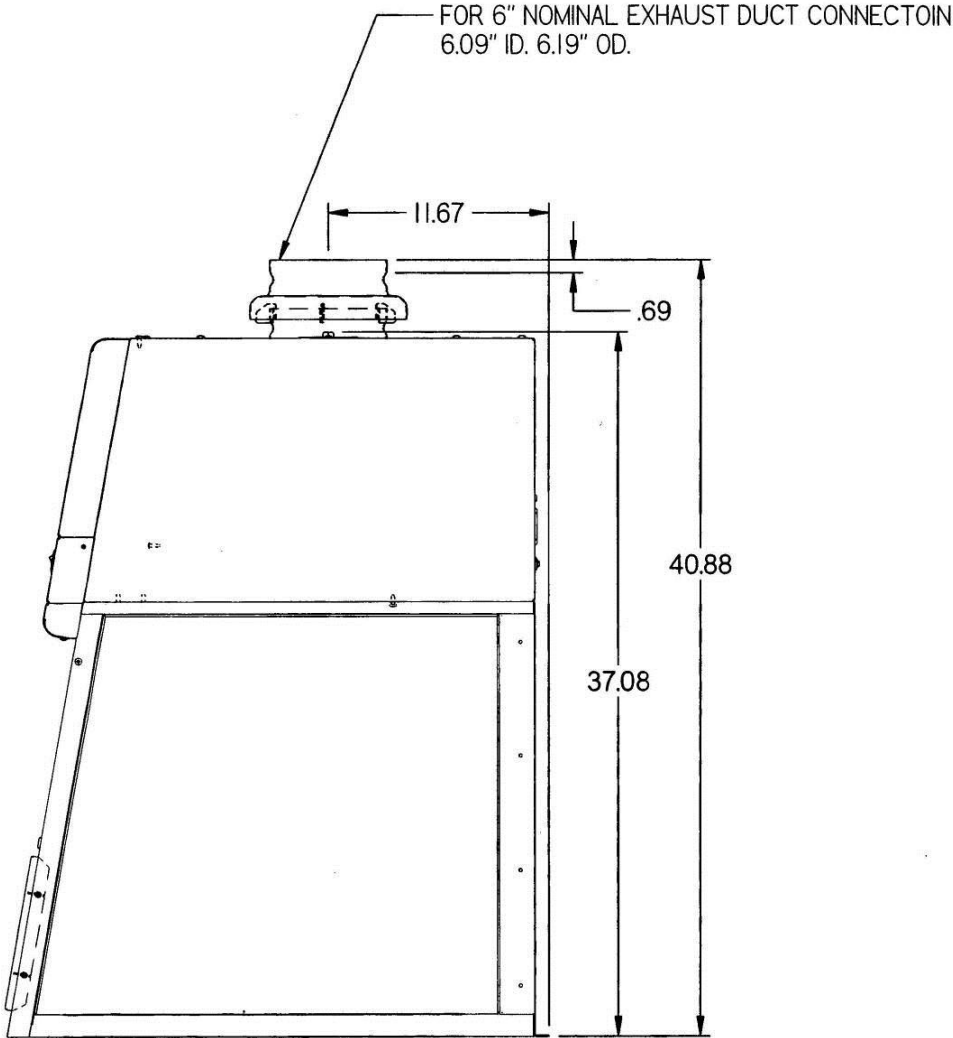


Figure 3-2
Thimble Exhaust Connection shown installed on
Purifier Models (Optional)
Part #3924400 (2'), 3924401 (3'), and 3924402 (4')

Installation of HEPA Filters and Accessory Odor Control Carbon Filters

HEPA

HEPA Filters

HEPA filters are shipped installed with the gasket on the downstream side. The HEPA filters are leak checked at Labconco. A second leak check should be performed before using the enclosure and at least annually thereafter. Consult your Safety Officer and Chapter 6 for the HEPA Filter Leak Test. See Figure 4-2 for HEPA filter location, HEPA filter gasket, and filter clamp bolts. The Purifier enclosures require decontamination of biohazardous materials or are used with non-biohazardous materials or nuisance powders. All seams upstream of the HEPA filter are jacketed by negative pressure. This intrinsically safe design ensures containment.

ACCESSORY CARBON

Carbon Filters (Accessory for Odor Control only)

For carbon filter installation, first remove the upper perforated cover, secured by Phillips head screws, on the top of the enclosure. See Figures 4-1 and 4-2 for location of the upper perforated cover. See Chapter 7 for a list of available carbon filters. All carbon filters are simply gravity installed with the gasket side down and down stream on the exhaust side of the HEPA filter. Install the correct carbon filter for the application.

HEPA

CARBON

CARBON

Filter Type	Appropriate Use
HEPA 2' 3707900 3' 3707901 4' 3707902	HEPA filters are high-efficiency particulate air filters having a particulate removable efficiency of 99.99% for particles with a diameter of 0.3 micron.
Organic Vapor Activated Carbon 2' 3937200 3' 3937300 4' 3937400	Adsorbs organic compounds designated by NIOSH guidelines as acceptable for use with chemical cartridge-type respirators. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.
Formaldehyde (Formalin) 2' 3937201 3' 3937301 4' 3937401	Formaldehyde requires the use of an impregnated carbon for the treatment of formaldehyde. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.

	Filter Type	Appropriate Use
CARBON	Ammonia and Amines 2' 3937202 3' 3937302 4' 3937402	Treats ammonia, low molecular weight amines and other bases designated by NIOSH as acceptable for use with ammonia cartridge type respirators. Requires the use of an impregnated carbon. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.
CARBON	Acid Sulfur 2' 3937203 3' 3937303 4' 3937403	Impregnated carbon adsorbs mineral acids and sulfur compounds designated by NIOSH as acceptable for use with chemical cartridge-type respirators. Concentrations in the enclosure's work area must not exceed the IDLH for the chemical and the exhaust from the enclosure must not exceed the TWA.



Important: Carbon filters do not provide any particulate protection, but provide odor control.

Connecting the Electrical Supply Source to the Filtered Enclosure

115V Models

Simply connect the 115V power cord supplied to the IEC electrical supply plug on the back of the enclosure. If using at 50 Hz operations, blower performance maximum airflow will be reduced by 17%.

230V Models

The above procedure applies for the 230V except it is shipped without a plug. Install the appropriate plug for your electrical specifications per local codes.



Do not use any detachable power cord that is not adequately rated for the unit.

Ne pas utiliser un fil électrique amovible qui n'est pas du tension nominale de l'appareil.

Set the Face Velocity with the Speed Control Adjustment

Adjustment of the speed control gives the correct face velocity and is located behind the front panel. The face velocity should be from 75 to 105 fpm for biohazardous operations. (Consult your Safety Officer for airflow recommendations for your application). Containment is maximized at a setting within this range. Working at the lowest face velocity appropriate for the application will give the quietest operation. Face velocity measurements are made

using an anemometer. An electric anemometer can be obtained from your laboratory supply dealer. Face velocity measurements should be taken in accordance with the *Industrial Ventilation Manual*. Using a small Phillips screwdriver, adjust the speed control to give the required face velocity. See Figures 6-1 and 6-2 in Chapter 6 to locate the speed control. The face velocity is increased by turning the speed control counter clockwise and clockwise to decrease face velocity.

Validating the Vented Enclosure

To determine the actual face velocity at the sash opening, airflow velocity readings are taken. This should be done across the sash opening of the enclosure in accordance with the *Industrial Ventilation Manual*. (See Appendix E) The “average face velocity” is achieved by taking readings in two rows across the enclosure with the readings 6" from the ends and evenly spaced every 12"; the first row is 3" down from the upper sash foil and the second row is 3" up from the work surface. A total of four readings will be taken for the 2' enclosure, six readings taken for the 3' enclosure and eight readings taken for the 4' enclosure and then averaged. Refer to Chapter 2 for proper airflow volumes for your particular model.

The Purifier enclosures have been tested at Labconco's airflow test facility per ASHRAE 110-1995. All enclosures achieve an “as manufactured rating” of less than 0.05 part per million (ppm) at 4 liters per minute (lpm); AM <0.05 (Consult Labconco for individual ratings). For “field use” ASHRAE testing contact Labconco for a certified on-site contractor. Labconco also performed extensive ASHRAE testing to validate the enclosures for gas containment. For copies of these validation reports, contact Labconco Customer Service.

The Purifier Enclosures were also subjected to Biological Containment testing, using a modified Personnel Protection Test, as described in NSF/ANSI Standard Number 49. An aerosol challenge of approximately 5×10^8 spores of *Bacillus subtilis var Niger* were released in the enclosure and appropriate air sampling equipment established the number of spores that escaped through the sash opening. Each size enclosure was tested three times. All three sizes of the enclosure were tested at 75 FPM inflow and typically 1 or less than one spore escaped from the enclosure during each of the tests.

The Purifier Enclosures were also subjected to an industrial hygiene air-monitoring study to confirm the performance of the enclosure for powders. The Purifier Enclosures demonstrated excellent containment when used by an operator using excellent technique and good containment when used by an operator using marginal technique. While no enclosure can compensate for improper technique, these tests confirm the Purifier Enclosures provide a safe working environment.



NOTE: Face velocity profiles and smoke testing should be performed frequently per your organization's quality system to ensure safe performance.

Sealing the Filtered Enclosure to the Work Surface

When the filtered enclosure has been set in place, ducted, (if necessary), and wired, it may be sealed at the work surface to prevent spilled materials from collecting under the walls. A bead of silicone sealant is recommended to seal the filtered enclosure to the work surface.

CHAPTER 4

HIGH PERFORMANCE

FEATURES AND SAFETY

PRECAUTIONS

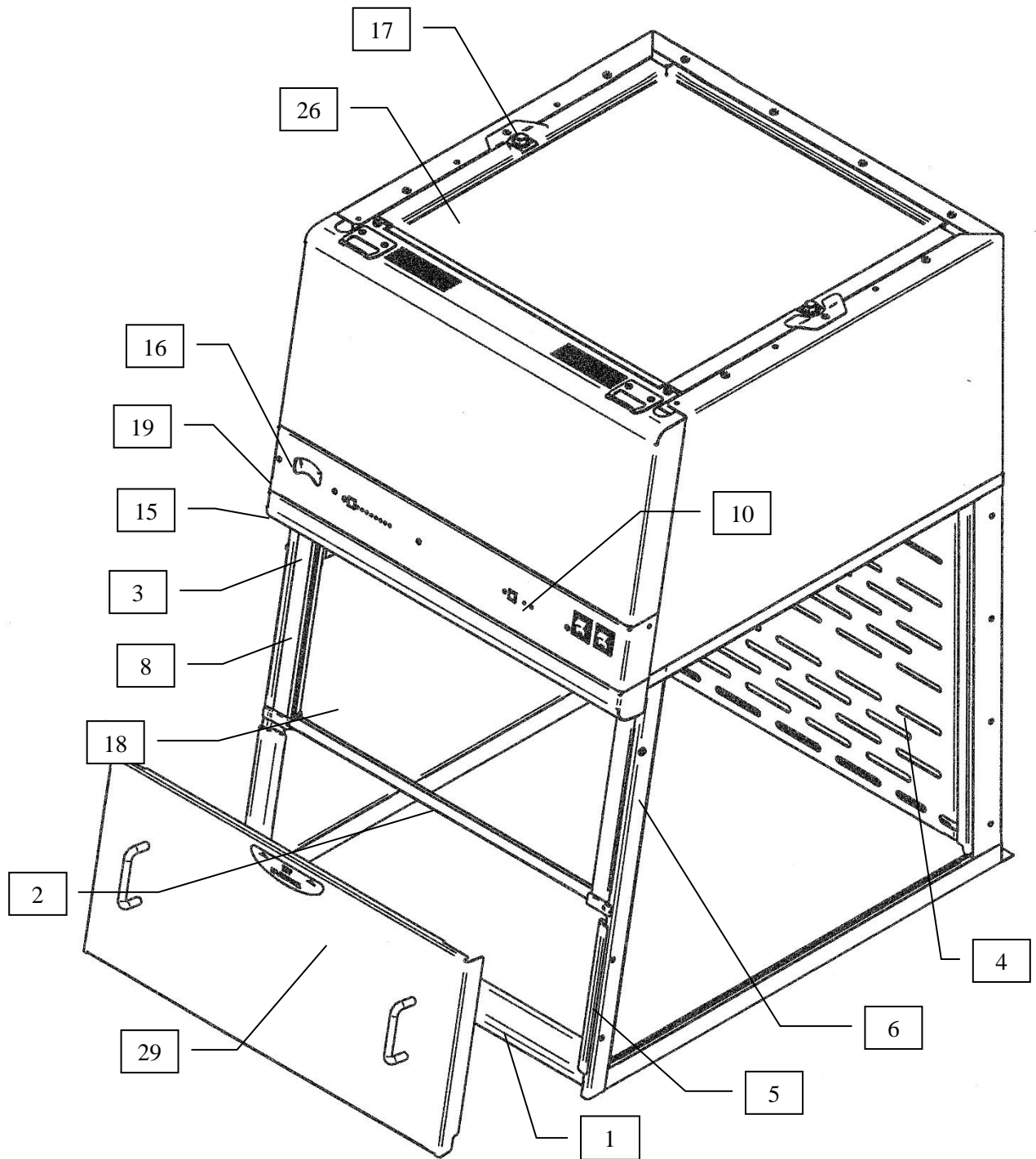
High Performance Features

The patented¹ Purifier HEPA Filtered Enclosure and Purifier Class I Enclosure are designed to meet the needs of the laboratory scientist, and provide superior containment while operating at velocities between 75-105 feet per minute. The filtered enclosures have been tested to effectively contain toxic, noxious, and biohazardous materials when properly installed and operated. What makes the filtered enclosures so unique is the revolutionary way they direct air into and through the contaminated air chamber. Labconco engineered the filtered enclosures to minimize the effects of turbulence. The containment-enhancing and aerodynamic designs of the upper sash foil, side air foils, lower air foil, upper dilution air supply, and rear perforated baffle all work in concert to produce horizontal airflow patterns that significantly reduce powder, chemical and biological material concentrations through the work area.

These concentrations of materials are predominantly removed on the “first pass” of airflow through the chamber resulting in high performance containment. The plenum and the HEPA filter are jacketed by negative pressure. Should a leak occur in the filter gasket or the plenum, the contaminated air is recaptured and refiltered.

The Purifier Class I Enclosure and Purifier HEPA Filtered Enclosure have an access port located behind the front panel. For HEPA filter removal in biohazardous applications on Purifier enclosures, the HEPA filter will require decontamination before removal. Users of all equipment are encouraged to routinely check airflow or purchase a model with an airflow monitor.

¹ U.S. Patent No. 6,461,233



Not Shown 7, 9, 10, 11, 12, 13, 20, 21, 22, 23, 24, 25, 28 (See Figure 4-2)

Figure 4-1

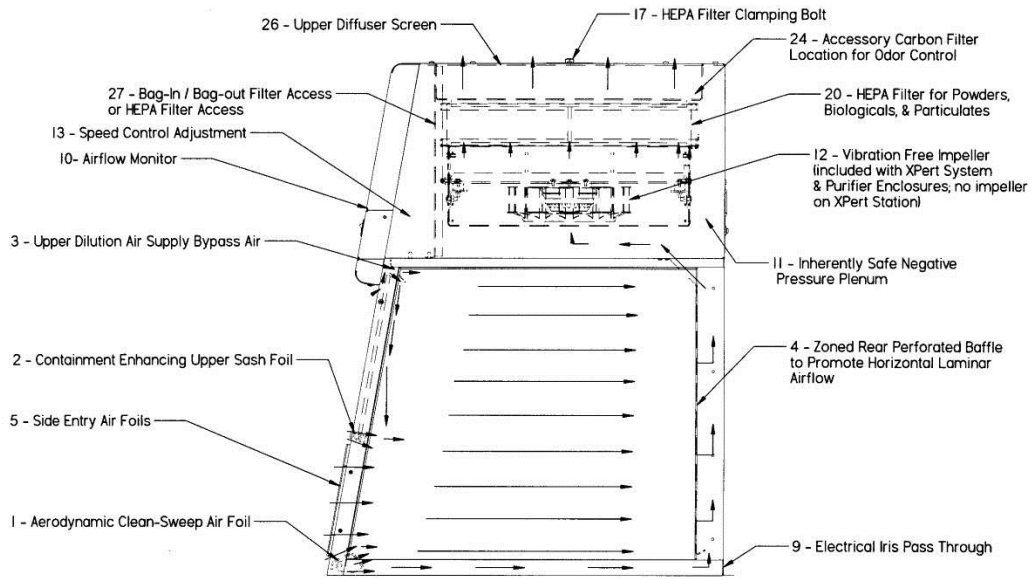
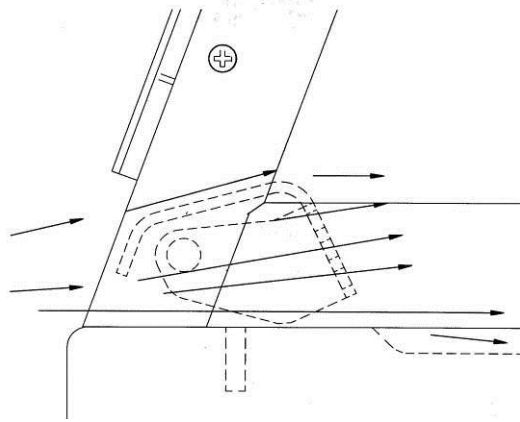


Figure 4-2
HEPA Filtered Enclosure Airflow Diagram

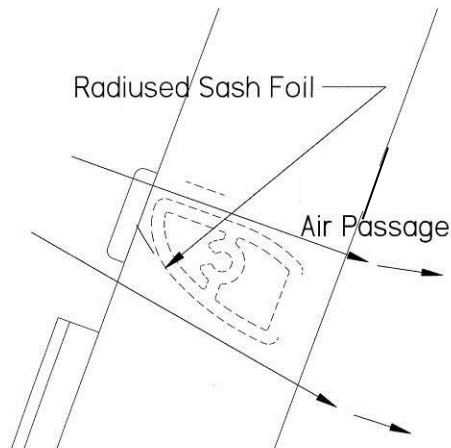
1. **Aerodynamic Clean-Sweep™ Air Foil** has a unique shape that allows air to sweep the work surface for maximum containment. The Clean-Sweep™ openings create a constant protective barrier from contaminants. Should the operator inadvertently block the airflow entering the air foil, air continues to pass under the air foil and through the Clean-Sweep openings. See Figures 4-1 and 4-3.

Figure 4-3



2. **Containment-Enhancing Upper Sash Foil** includes an open air passage directly atop the sash foil to bleed air into the hood chamber and direct chemical, powder and particulate materials away from the sash opening. The radiused sash foil sweeps airflow into the hood with minimal turbulence. See Figures 4-1 and 4-4.

Figure 4-4



3. **Upper Dilution Air Supply** provides bypass air from above the work area. This feature constantly bathes the inside of the sash with clean air and reduces powders, particulate materials and chemical fumes along the sash plane, near the critical breathing zone. Five to seven percent of the required air volume is introduced through the upper dilution air supply. The upper dilution air supply also reduces stagnant pockets of air in the upper interior. See Figure 4-2.
4. **Zoned Rear Perforated Baffle** directs horizontal laminar air streams to the three-zoned sections of the perforated baffle. The three-zoned sections have increasingly more open area at the bottom that help form laminar airflow. This minimizes the potential for air to roll forward preventing contaminants from moving toward the sash opening. The majority of contaminants are highly diluted, captured and removed on the first pass through the enclosure. See Figures 4-1 and 4-2.
5. **Side-Entry Air Foils** allow turbulence-free air to enter the enclosure from the sides and allow clean air to sweep the interior walls of the enclosure. See Figures 4-1 and 4-2.
6. **Ergonomic Slope** of 10 degrees provides maximum visibility, and comfort reduces glare, thereby minimizing operator fatigue. See Figure 4-1.
7. **Internal Depth of 23"** provides necessary depth to support modern balances and other auxiliary equipment without extending outside the enclosure or resting on the lower air foil. See Figure 4-1
8. **Safety Glass Sash with Spring-Loaded Latch** has a wiping seal to contain contaminants and features a spring-loaded latch to secure sash open for loading and cleaning. The sash must be down for normal operation. See Figure 4-1.
9. **Utility Ports with Iris** allows electrical cords and data cords to pass through the back of enclosure without leaving a large hole for contaminants to escape. The enclosure ships with solid plugs. Iris plugs are included with the User's Manual. See Figure 4-1 and 4-2.
10. **Accessory Guardian™ Airflow Monitor** continuously monitors airflow. An audio/visual alarm alerts the user to low airflow conditions. The Guardian™ Airflow Monitor is an available option on all Purifier models. See Figure 4-1 and 4-2.
11. **Inherently Safe Impeller** has a negative pressure plenum that surrounds the positive pressure impeller so that if a leak should occur, the unfiltered air is captured and refiltered. See Figure 4-2.
12. **Vibration-Isolated Motorized Impeller** has vibration isolation supports, which eliminates transfer of vibration to the work surface. This is extremely useful in weighing operations with precision balances. The impeller wheel is also dynamically balanced. See Figure 4-2.
13. **Speed Control** regulates the speed of the motorized impeller and is used by the certifier to validate and adjust the inflow velocity. Located behind the front panel. See Figure 4-2.

14. **Space-Saving Design** increases effective laboratory workspace, because the impeller and HEPA filter are contained within the enclosure, a separate filtered blower module is not required. See Figure 4-1
15. **Fluorescent Lamp** is located above the work area, out of contact with contaminated air. A safety glass window beneath the lamp distributes the light evenly across the work surface. See Figure 4-1.
16. **Filter System Pressure Gauge** indicates the total system pressure across the HEPA filter and pressurized plenum to help predict HEPA filter loading. See Figure 4-1.
17. **Filter Clamping Bolt** evenly seals the HEPA filter to the frame of the enclosure. See Figure 4-1 and 4-2.
18. **Sash.** The sash is constructed of 1/4 inch tempered safety glass. It pivots up for loading and cleaning. See Figure 4-1
19. **Control Panel.** The control panel, which is located above the sash, contains the filter system pressure gauge, control switches and the electronics. See Figure 4-1.
20. **HEPA (High Efficiency Particulate Air) Filter** is rated to remove 99.99% of all particles 0.3 micron in size. See Figure 4-2.
21. **Lamp Ballast (Not Shown)** for the fluorescent lamp is located behind the control panel.
22. **UV (Ultraviolet) Lamp (Not Shown)**, found only on Purifier Class I Enclosure, allows the operator to surface disinfect the work area of the enclosure when it is not in use. The UV will not penetrate the plane of the sash and lower airfoil (see item 29).
23. **Accessory Work Surface (Not Shown)** is dished and contoured to fit the dimensions of the enclosures to contain spills.
24. **Accessory Odor-Control Carbon Filters** are available for nuisance odor control. Accessory carbon filters are designed to remove trace amounts of noxious fumes; capacity is not adequate to remove continuous fume generation. The carbon filters are supported above the HEPA filter and the gasket side is down and compressed by the weight of the carbon filter. Carbon filters are listed in Chapter 7. See Figure 4-2.
25. **Accessory Thimble Exhaust Connections** are available to duct the Purifier Class I Enclosure and Purifier HEPA Filtered Enclosure to the outside. The Thimble Exhaust Connection allows the operator additional protection from hazardous fumes or vapors and should be used if the carbon filter capacity is not adequate. Each Thimble Exhaust Connection includes an epoxy-coated steel exhaust transition adapter designed for 6" diameter nominal duct. See Figure 3-2 in Chapter 3 and figure B-2 in appendix B.
26. **Upper Diffuser Screen** provides protection for the HEPA Filter and (LED) airflow sensor. See Figure 4-1 and 4-2.

27. **HEPA Filter Access Port** to access HEPA filter during filter changing procedures. For harmful powders and particulates, the true bag-in/bag-out procedure is used to properly dispose of the contaminated HEPA filter. See Figure 4-2.
28. **Utility Shelves (Not Shown)** allows the user to hold items on shelves inside the enclosure. See Chapter 7.
29. **UV Closure Panel** provides protection when the UV lamp is on. The panel must be in place for the UV lamp to work.

Safety Precautions

1. Although the enclosure has been engineered to maintain optimum operator safety, caution should always be used while working. Prior to using the enclosure, check to make sure that the exhaust blower is operating and that air is entering the enclosure at its specified face velocity. The use of an airflow monitor is recommended to alert the user to a problem with airflow.
2. Use good housekeeping in the enclosure at all times. Clean up spills immediately. Periodically clean enclosure interior.
3. Do not overload the work surface with apparatus or work material. The safe operation of the enclosure is based upon having proper airflow through the structure. Do not place large objects directly on the work surface. Instead, elevate the object 3/4" on blocks to allow a flow of air under the object and into the rear baffle exhaust slots. Ensure blocks are level and secured in place.
4. Blocking large portions of the rear baffle will change the airflow pattern in the enclosure causing turbulence. (Do not store containers or supplies against the rear baffle, as this will affect airflow).
5. Always work with your hands as far back into the enclosure as possible. Keep all biohazardous materials, chemicals and apparatus inside the lower air foil of the enclosure.
6. Do not work in this enclosure without the exhaust system running.
7. Perchloric acid use in this enclosure is prohibited.
8. High-level radioisotope materials are prohibited in this enclosure. Consult your Safety Officer.
9. Avoid cross drafts and limit traffic in front of the enclosure. Air disturbances created may draw contaminants out of the enclosure.
10. A qualified certification technician should test the enclosure before it is initially used. The enclosure should be validated whenever it is relocated.
11. The use of safety goggles, protective clothing, gloves and any other personal protective equipment recommended by your safety officer should be used.

12. The sash must remain in the down position while using the enclosure.
13. Proper performance of the enclosure depends largely upon its location and the operator's work habits. Consult the references in *Appendix D*.
14. The enclosure should be recertified whenever it is serviced or at least annually thereafter.
15. The HEPA filter provides personnel and environmental protection from particulate matter. Because room air is drawn over the work surface during operation, this enclosure should not be used for operations requiring product protection from environmental contamination.
16. Avoid the use of flammable gases or solvents in the enclosure if possible. Care must be taken to ensure against the concentration of flammable or explosive gases or vapors. Use of an open flame should be avoided in the enclosure. Open flames may disrupt the airflow patterns in the cabinet, burn the HEPA filter and damage the filter's adhesive. Gases under high pressure should not be used in the enclosure as they may disrupt the airflow patterns of the cabinet.
17. HEPA filters are only effective for entrapment of particulate matter. Manipulations that generate gases or vapors from toxic chemicals or radionuclides, must be evaluated carefully from the standpoint of buildup to dangerous levels, the decontamination of the enclosure and compliance with applicable regulations.
18. The surface of the HEPA filter is fragile and should not be touched. Care must be taken to avoid puncturing the HEPA filter during installation or normal operation. If you suspect that a HEPA filter has been damaged DO NOT use the enclosure; contact a local certification agency or Labconco.
19. The HEPA filter in the enclosure will gradually accumulate airborne particulate matter from the room and from work performed in the enclosure. The rate of accumulation will depend upon the cleanliness of the room air, the amount of time the enclosure is operating and the nature of work being done in the enclosure. With normal usage, the HEPA filters will last two to five years before requiring replacement.
20. Avoid direct exposure to ultraviolet (UV) radiation; NEVER work in the Purifier Class I Enclosure when the UV light is on. Verify the sash is closed and the UV closure panel is in place before turning on the UV light
21. Ensure that the filtered enclosure is connected to an electrical service in accordance with local and national electrical codes. Failure to do so may create a fire or electrical hazard. Do not remove or service any electrical components without first disconnecting the filtered enclosure from electrical service.
22. Use of an open flame must be avoided with the enclosure. Open flames may disrupt the airflow patterns in the enclosure and cause a fire hazard with volatile solvents.

23. Increase the face velocity by adjusting the speed control of the motorized impeller or change the HEPA filter when the face velocity falls below acceptable limits established by your Safety Officer.
24. Exhaust carbon filters and HEPA filters are disposed as hazardous waste. The user is responsible for recording the chemicals adsorbed or treated by the filters and disposing properly. HEPA filters should be decontaminated before disposal on Purifier enclosures.
25. Ensure only trained operators use the enclosure. New users should review the User's Manual and become familiar with the operation of the enclosure.
26. If the filtered enclosure is to be used in a confined space, make sure the space is well ventilated and the concentration of toxic contaminants cannot accumulate greater than the TWA.
27. Proper operation of the enclosure depends largely upon the enclosure location and the operator's work habits. The enclosure should be located away from traffic patterns, doors, fans, ventilation registers, fume hoods, and any other air-handling device that could disrupt its airflow patterns. Consult *Chapter 2: Prerequisites* and *Chapter 3: Getting Started* sections of this manual for further details.
28. Only nuisance powders, biohazardous and particulates removed by HEPA filters and trace chemicals which can be safely adsorbed and treated with specific carbon based filters are appropriate for use in this enclosure.
29. The warning properties (i.e., odor, taste) of the volatile organic compounds or other material being used in the enclosure must be adequate to provide an early indication that the carbon filter may be saturated or inadequate. Contact Labconco for help with chemical assessment.
30. Use the smallest possible quantity of chemical(s) within the enclosure and never exceed the amount, which can be effectively adsorbed by the Odor Control carbon filter before breakthrough.
31. Adjust face velocity to fall between 75 and 105 FPM for biological procedures.
32. Leave the blower on for at least one minute after work in the enclosure has been completed.
33. If a chemical, powder or particulates are spilled on the work surface, **DO NOT** switch off the blower until all traces have been removed.
34. Tag enclosures with appropriate warning, if filters have been removed for service.
35. If the blower fails during use, processes should cease and the area should be vacated and ventilated.
36. Always refer to the NIOSH Pocket Guide to Chemical Hazards before proceeding. For additional help with filter and chemical selection contact Labconco at 1-800-821-5525 or 1-816-333-8811.

CHAPTER 5

APPROPRIATE APPLICATIONS FOR YOUR FILTERED ENCLOSURE

Now that the installation of your filtered enclosure is completed, you are ready to use your filtered enclosure. Read this chapter to learn about:

1. Routine Daily Work Procedures.
2. Suitable Applications.
3. Appropriate HEPA Filter Applications, Suitability and Guidelines.
4. Odor Control Carbon Filter Applications.
5. Definition of Terms.
6. Appropriate Chemicals for Odor Control Carbon Filters.
7. Hazardous Misapplications for Odor Control Carbon Filters.
8. Chemical Carcinogen use with Odor Control Carbon Filters.
9. Prohibited Acid Use.

Routine Daily Work Procedures

Planning

- Thoroughly understand procedures and equipment required before beginning work.
- Arrange for minimal disruptions, such as room traffic or entry into the room while the enclosure is in use.

Start-up

- Turn on exhaust system and accessory light. Turn off the UV light, if equipped.
- Only raise the sash for loading and cleaning.
- Check the baffle air slots for obstructions.
- Allow the enclosure to operate unobstructed for 1 minute.
- Wear a long sleeved lab coat and rubber gloves. Use protective eyewear. Wear a protective mask if appropriate. Consult your Safety Officer for additional personal protective equipment recommendations.

Loading Materials and Equipment

- Load only the materials required for the procedure. Do not overload the enclosure.
- Do not obstruct the air foil, or rear baffle slots.
- Large objects should not be placed close together and should be elevated above the work surface to permit airflow to sweep under the equipment.
- After loading, wait one minute to purge airborne contaminants from the work area.

Work Techniques

- Keep all materials inside the lower air foil, and perform all contaminated operations as far to the rear of the work area as possible.
- Segregate all clean and contaminated materials in the work area.
- Avoid using techniques or procedures that disrupt the airflow patterns of the enclosure.

Final Purging

- Upon completion of work, the enclosure should be allowed to operate for two to three minutes undisturbed, to purge airborne contaminants from the work area before shutting down the blower.
- If equipped, install the UV closure panel and turn on the UV light to decontaminate the work area as determined by your Safety Officer.

Unloading Materials and Equipment

- Objects in contact with contaminated material should be surface decontaminated before removal from the enclosure.
- All open trays, weigh vessels or containers should be covered before being removed from the enclosure.

Shutdown

- Turn off the exhaust system and light.
- Turn off the UV light, if applicable.

Suitable Applications

NIOSH (National Institute for Occupational Safety and Health, USA) has established guidelines for chemical cartridge and HEPA filtered respirators. Suitable applications for the filtered enclosures are based on these guidelines. As with respirators, chemical contaminants are adsorbed or treated by carbon; particulates, powders and biohazardous materials are filtered by the HEPA filter before air is returned to the room. Biohazardous materials or other hazardous solids can be used with the HEPA filtered enclosure as long as appropriate decontamination occurs before filter changing operations. See Chapter 6 for decontamination procedures.

Listed below are suitable applications for HEPA filters and accessory Odor Control Carbon Filters.

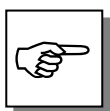
HEPA Filter Applications, Suitability and Guidelines

- Biohazardous materials and hazardous solids to protect only the operator and the surrounding environment.
- Weighing of powders.
- Release of particulates using a HEPA filter.
- Powder or particulate procedures traditionally performed on an open bench.
- The HEPA filtered enclosure provides personal and environmental protection from particulate matter, hazardous powders and biohazardous materials. Because room air is drawn through the enclosure during operation, this enclosure should not be used for operations requiring sample protection from environmental contamination.
- HEPA filters are only effective for entrapment of particulate matter, hazardous powders and biohazardous materials. Manipulations that generate gases or vapors, i.e., toxic chemicals or radionuclides, require the use of a HEPA and carbon filter in combination. Otherwise the enclosure should be ducted to the outside. The surface of the HEPA filter is fragile and should not be touched. Care must be taken to avoid puncturing the HEPA filter during installation. If you suspect that a HEPA filter has been damaged, DO NOT use the enclosure. See Chapter 6 for Replacing the HEPA Filter.
- The HEPA filter will gradually accumulate airborne particulate matter from the room and from work performed in the enclosure. The rate of accumulation will depend upon the cleanliness of the room air, the amount of time the enclosure is operating, and the nature of work being done. With normal usage, the HEPA filters will last two to five years before requiring replacement.
- Each filtered enclosure is provided with a HEPA filter. For biohazardous materials, follow the Decontamination Procedure in Chapter 6 for disposal instructions.

Odor Control Carbon Filter Applications (sold as an accessory)

- Release of low concentrations of vapors effectively adsorbed or treated in carbon based filters.
- Treatment of low-level carcinogens or suspected carcinogens. (See Chemical Carcinogens in Chapter 5)
- Procedures that may have traditionally been done on the open bench (low levels only).
- Odoriferous chemicals that are an unpleasant nuisance.

Other applications, not fitting the above guidelines, would be better suited with the exhaust ducted to the outside. The exhaust connection kit (See Chapter 3 and Chapter 7) can be added to the filtered enclosures for ducting to the outside. Labconco also manufactures fume hoods and Class II Biological Safety Cabinets for exhausting to the outside. Consult Labconco product specialist for additional information.



REFERENCES TO NIOSH OR OSHA GUIDELINES AND REGULATIONS APPLY TO ANY WORK PLACE UNDER THE JURISDICTION OF THE U.S. DEPARTMENT OF LABOR. OTHER COUNTRIES OUTSIDE THE U.S. HAVE ESTABLISHED STANDARDS, WHICH MAY DIFFER SLIGHTLY FROM THOSE USED AS GUIDELINES FOR THIS PRODUCT. IT IS THE USER'S RESPONSIBILITY TO BECOME AWARE OF LOCAL REGULATIONS GOVERNING THE SAFE USE AND DISPOSAL OF CHEMICALS, CARBON AND HEPA FILTERS. KNOWLEDGE OF ESTABLISHED SAFE EXPOSURE LEVELS IS IMPERATIVE TO THE PROPER USE OF FILTERED ENCLOSURES.

Definition of Terms

NIOSH – National Institute for Occupational Safety and Health/Mine Safety and Health Administration. (U.S.A.)

TWA – Recommended Exposure Limits expressed as a Time Weighted Average. The exposure limit for that chemical for up to a 10-hour workday, 40 hours a week. Expressed in units of parts per million or milligrams per cubic meter.

Odor Threshold – The value in parts per million or milligrams per cubic meter for which one might expect to smell a chemical's presence in the air. This value is very subjective and detection will vary with the sensitivity of one's nose. The period of time until the odor threshold is reached in the exhaust stream can be estimated from Labconco exclusive computerized filter modeling program. Contact Labconco on carbon filter life for specific applications. See Chapter 6.

Saturation Level or Time – There is a limit to the amount of chemical that can be adsorbed by activated carbon, or neutralized by chemically-treated carbon. Once the capacity of the carbon is reached, it is considered to be saturated and will adsorb (or neutralize) no further material; the outlet concentration of the chemical will equal the inlet concentration from that point until the filter is replaced. (Note that the capacity of activated carbon is not a constant, but varies with the inlet concentration). Labconco Technical specialists can determine with the computerized carbon-modeling program the estimated time saturation for a particular chemical. When using a HEPA filter alone in all filtered enclosures or in combination with an Odor Control carbon filter, the speed control will need to be increased to allow for HEPA filter loading. Measure filtered enclosure face velocity with an anemometer.

IDLH (Immediately Dangerous to Life and Health) – An atmosphere that poses an immediate hazard to life or produces immediate irreversible health effects. IDLH concentrations should not be approached in the enclosure.

Appropriate Chemicals for Odor Control Carbon Filters

Below is a general set of rules to determine appropriateness of chemical usage.



Selected organic chemicals considered to be occupational carcinogens by NIOSH can be used in the filtered enclosure with carbon filters under rigid restrictions. See separate discussion on carcinogens for special instructions.

Organics must have time weighted exposure limits (TWA) of 1 PPM or greater.

Chemicals must have a detectable odor at concentrations below the TWA for the chemical.

Chemicals must be designated by NIOSH guidelines as acceptable for use with chemical cartridge-type respirators (the exception is formaldehyde and ammonia/amines, which used impregnated carbon). Chemicals not listed by NIOSH in the Pocket Guide must be approved by Labconco Product Specialist (or Engineering).

Inlet concentration must never exceed the IDLH (Immediately Dangerous to Life and Health) concentrations.

Chemicals having a recommendation by NIOSH of at least “Escape GMFOV” (Gas Mask Full-Face Respirator).

When evaporating a mixture of chemicals, the chemical having the lowest TWA will be used to determine if the mixture meets the guidelines.

Call a Labconco Product Specialist at 1-800-821-5525 for assistance in chemical appropriateness.

Hazardous Misapplications for Odor Control Carbon Filters with Volatile Chemicals

There is one scenario where the accessory carbon filter misapplication would be a part of a hazardous condition. If the user continues to operate the enclosure with any of the following conditions present a potentially hazardous condition will exist:

1. The inlet concentration of vapors is greater than the TWA.
2. The carbon filter becomes saturated.
3. The ventilation of the room is insufficient to dilute the exhaust of the enclosure to below the TWA for the chemical.

When the inlet concentration is greater than the TWA, extra measures must be taken to monitor the filter and number of room air exchanges.

Chemical Carcinogen Use with Odor Control Carbon Filters

Selected carcinogens may be used safely with Odor Control carbon filters under the following restrictions.



The use of a vented fume hood or ventilated enclosure with ducting to the outside is always the preferred method when working with carcinogens. The Odor Control carbon filters should only be used, as a last resort when venting to the outside is not an option.

The potential carcinogens are listed in the NIOSH Pocket Guide to Chemical Hazards as “Ca.” Each potential carcinogen must have a TWA of 1 or greater; have minimum respirator recommendation of Escape GMFOV, and an odor threshold significantly lower than the TWA for the chemical. The inlet concentration or the evaporation rate of the chemical must never exceed the TWA for the chemical.

Consult a Labconco Technical Specialist for estimated saturation life. See Chapter 6 for an example of estimating saturation life. Another source is the Labconco chemical guide for carbon filtered enclosures.

Prohibited Acid Use

The Purifier HEPA and Purifier Class I filtered enclosures motorized impeller cannot be exposed to heavy acid use. Where applications require the use of heavy acids, a separate ventilated enclosure or vented fume hood should be used with a remote blower ducted to the outside. No exceptions are permitted, as the impeller life span will be limited with acid use. Accessory odor control acid-sulfur filters are only used with very light duty acids.

CHAPTER 6

MAINTAINING YOUR FILTERED

ENCLOSURE

Monitoring airflow and changing the filters is the primary maintenance required. Decontamination may be required and is reviewed in Chapter 6. Certification and recertification is reviewed in Chapter 6.

Review this chapter on maintenance for the following:

1. Routine Maintenance.
2. Decontamination.
3. Determination of when to replace the HEPA filters.
4. How to install a new HEPA filter.
5. HEPA filter leak test.
6. Speed control adjustment and setting the inflow face velocity.
7. Operating and calibrating the airflow monitors.
8. Determination of when to replace Odor Control carbon filters and how to replace.
9. Calculating Odor Control carbon filter life.
10. Initial certification.
11. Re-certification.
12. Fluorescent light replacement.
13. UV light replacement on Purifier Class I.
14. Motorized impeller replacement.
15. Speed control replacement.

Routine Maintenance Schedule

Weekly

- Wipe down the interior surfaces of the enclosure with a disinfectant or cleaner, depending upon the usage of the unit and allow to dry.
- Using a damp cloth, clean the exterior surfaces of the enclosure, particularly the front and top to remove any accumulated dust.
- Operate the exhaust system, noting the airflow velocity through the enclosure using a source of visible smoke. Airflow monitors are recommended for constant monitoring.

Monthly (or more often as required)



- Determine the actual face velocity through the sash opening of the enclosure where the average reading should be at the specified velocity. (Use calibrated thermal anemometer or other approved apparatus). Airflow alarms are recommended for constant monitoring.
- The enclosure rear baffle should be checked for any blockage to ensure that the enclosure is maintaining proper airflow.

HEPA

- All weekly activities.
- Check face velocity. Increase speed control or change HEPA filter when face velocity of the enclosure drops below the recommended speed for your facility or if the airflow alarm monitor alerts you. Airflow monitors are recommended.

CARBON

- While the enclosure is filled with the contaminant, test filter condition on Odor Control carbon filters using the appropriate gas detector tube at intervals of 20% of the total estimated time. The exception to the 20% recommendation is formaldehyde or any carcinogen or suspected carcinogen. These hazardous chemicals must be checked at least every 10% of the total estimated time. Gas detector tubes for the specific chemicals that are being used in the enclosure can be obtained from your laboratory supply dealer.

CARBON

- Replace Odor Control carbon filters when chemical breakthrough is indicated by odor, time, detector tube, or for some chemicals, analytical instrumentation. See “Replacing Odor Control Carbon Filters” section of this manual in Chapter 6.

Annually

- Replace the fluorescent lamps. Replace UV lamps if equipped.
- Verify proper operation of the UV closure panel safety switch.
- Have the enclosure validated by a qualified certification technician. See Certification and Recertification in *Chapter 6*.
- All monthly activities.

Decontamination

When used in conjunction with biohazards, the Purifier Class I Enclosure and Purifier HEPA Filtered Enclosure should be decontaminated with formaldehyde gas before:

- maintenance work in contaminated areas
- HEPA filter changes
- moving the cabinet to a new location
- changing research programs
- after a gross spill of biohazardous material

The procedures for performing a gaseous decontamination are thoroughly outlined in the U.S. Department of Health, Education and Welfare booklet entitled *Formaldehyde Decontamination of Laminar Flow Biological Safety Cabinets*, available from NIH, Division of Safety, Bethesda, MD 20892, call 301-496-2801, or from Labconco Corporation.

Determination of When to Replace HEPA Filters

The HEPA filters in the filtered enclosures gradually accumulate airborne particulate matter and powders from the enclosure and room. The rate of accumulation will depend upon the cleanliness of the room air, the amount of time the enclosure is operating, and the nature of work being done in the enclosure. In typical installations and usage, the HEPA filters will last two to five years before requiring replacement. Replace HEPA filters when face velocity drops below the recommended 75-105 fpm velocity, and the speed control is adjusted to full speed. Replace HEPA filters if it fails the HEPA Filter Leak Test in *Chapter 6*.

How to Install a New HEPA Filter

NOTE: The enclosure must be properly decontaminated before servicing the HEPA filter. Only a qualified certifier should service the HEPA filter. After the HEPA filter is replaced, the enclosure **MUST** be certified. See Figure 6-1.

1. Unplug the enclosure.
2. Remove the front panel by loosening the two screws that secure it, and then remove the filter access cover.
3. Using a 9/16" deep socket, loosen the filter clamp bolts located on top. Refer to Figures 4-1 and 4-2.
4. With the clamp bolts loosened, the HEPA filter-clamping frame should be clear of filter. Carefully pull the filter straight out of the enclosure and discard properly.
5. With the filter removed, inspect the clamping frame and the frame of the cabinet for damage.

6. Cover the surface of the new HEPA filter gasket with a light coating of silicone grease, if desired.
7. Install the new HEPA filter by pushing it straight into the cabinet, ensuring that it is correctly oriented with the gasket facing up on the exhaust side of the enclosure. The filter gasket is surrounded by a negative pressure plenum and the gasket will not leak. Be sure the filter fits properly.
8. Tighten the clamp bolts uniformly until the filter gasket is properly compressed against the frame. Inspect the seal thoroughly before proceeding.
9. Reinstall the filter access cover and the front panel.
10. Plug the enclosure in and have it recertified before use.

ATTENTION: The filter clamp bolts should only be tightened enough to ensure a proper seal at maximum tightness. The filter gasket should be compressed 50% or less.



Do NOT contact blower wheel while still in motion.

NE PAS être en contact avec la roué du ventilateur tant qu'il est en marche.

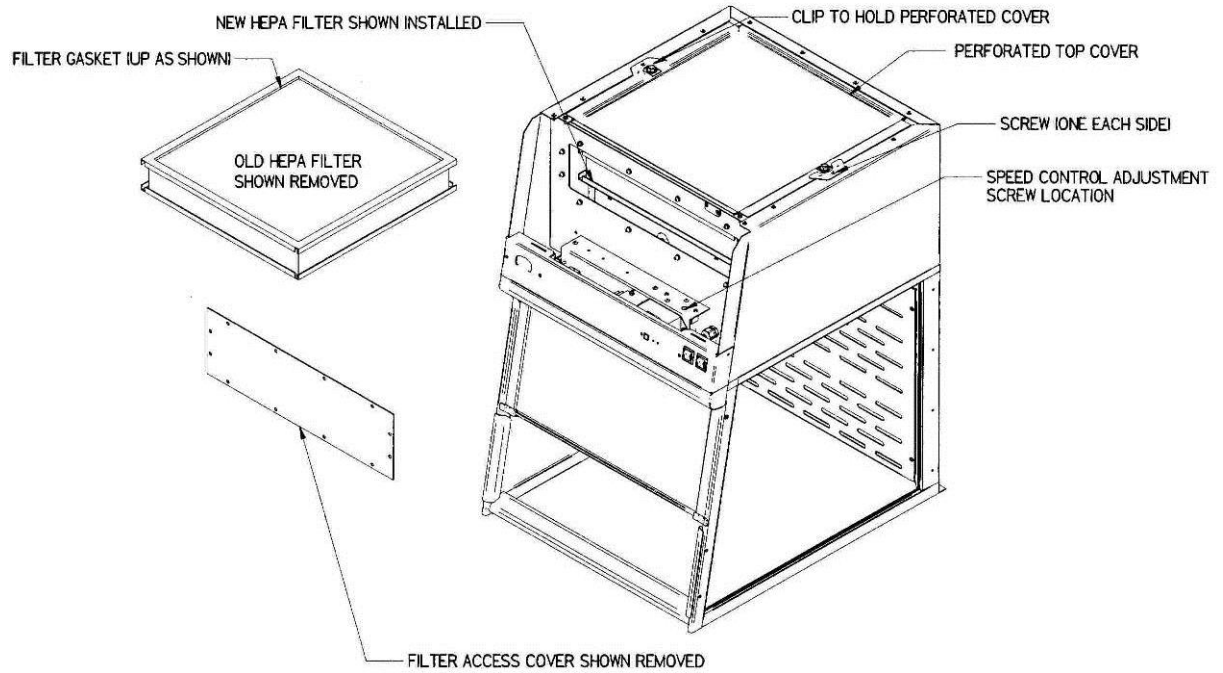


Figure 6-1
HEPA Filter Changing Diagram & Filter Leak Test Diagram

HEPA

HEPA Filter Leak Test

Purpose

After installing the new HEPA filter, the HEPA filter should be leak checked. This test is performed to determine the integrity of the HEPA filter, the filter housing, and the filter mounting frames. Leak testing is to be done by a qualified technician with calibrated equipment. Remove the top perforated exhaust cover by using a Phillips screwdriver to unfasten the (2) screws used to secure (2) clips. See Figure 6-1. The filter passes the leak test at .01% or better. Reference Leak Testing and Photometer scanning from the Institute of Environmental Services (IES-RP-CC001.3)

Apparatus

1. **An aerosol photometer ATI model 2D, 2E, 2G or equivalent.** Air Techniques Hamilton Associates inc. 11403 Cron Ridge Dr. Owings Mills, MD 21117
2. **One aerosol generator of the Laskin nozzle(s) type.** An aerosol of mineral oil or suitable liquid shall be created by flowing air through it. The compressed air supplied to the generator should be adjusted to a pressure of 10 ± 1 psig. during operation. Air Techniques Inc. Model TDA-4A or equal. One nozzle at 10 psig is (67.5 cfm x 100ug/l)/(Vol. of air), For the 2' at 90 fpm or 130 cfm, one nozzle @ 10 psig is 13,500/130 cfm = 52 ug/l. For the 3' at 90 fpm or 200 cfm, one nozzle @ 10 psig is 34 ug/l. For the 4' at 90 fpm or 265 cfm, one nozzle at 10 psig is 26 ug/l.
3. **Mineral oil** (Catalog #1491400).
4. **Sampling Nozzle, Rectangular 1/2" x 3-1/4"**, Air Techniques, Inc.

Procedure

For the ATI 2G Photometer

1. Turn on the photometer and allow it to operate for a minimum of 5 minutes. Leave the valve in the "CLEAR" setting.
2. Press the "ENTER" keypad. Press the "REF" keypad.
The display will display "P1" for approximately 1 second, and then display a numerical value.
3. The display will display "P1" for approximately 1 second, and then display a numerical value.
4. Using the "^" or "v" keypads, respectively, increase or decrease the numerical value until it equals 52 (2'), 34 (3'). 26 (4') for the enclosure at 90 fpm inflow velocity.
5. Press the "ENTER" Keypad. The photometer will scan for 15 seconds, and then the "0" keypad will flash. Press the "Enter" keypad. The unit will scan for 5 seconds, the display will read "0000," and the unit will sound a confirming tone.

6. Set the valve to “DOWNSTREAM.” Place the palm of your hand over the sampling port of the pistol. There should be a strong vacuum at this port. If the vacuum is weak, contact Air Techniques Hamilton Associates.
7. Turn the enclosure on and let it operate for a minimum of 5 minutes.
8. If necessary, adjust the speed control of the enclosure to maintain the following airflows at 90 fpm; 2' (130cfm), 3' (200 cfm, 4' (265 cfm.)
9. Position the aerosol generator discharge in the intake of the baffle inside the enclosure.
10. Start the aerosol generator (Pressure to be +/- 1 PSIG). Ensure that one Laskin nozzle is in the “open” position.
11. Allow the generator to operate for a minimum of 15 seconds. For all integral motorized impeller models, scan the downstream exhaust side of the HEPA filter by passing the sampling nozzle of the gun in slightly overlapping strokes over the entire surface the filter, with the sampling port not more than 1 inch from the surface of the filter media. Scan the entire periphery of the filter and the gasket between the filter frame and the enclosure frame. Scanning shall be done at a traverse rate of not more than 2 inches per second.

NOTE: For the Purifier Enclosures ducted to the outside, place the sampling nozzle in the center of the remote blower exhaust.

Acceptance

Aerosol penetration shall not exceed 0.01 percent measured by the photometer.

Setting the Inflow Face Velocity with the Speed Control Adjustment

1. Remove the front panel by loosening the (2) Phillips screws on top that secure the front panel.
2. The speed control is located on the electrical subassembly located behind the switched control panel and below the front panel. See Figure 6-1.
3. Adjust the speed control with a small Phillips screwdriver by turning the screw counterclockwise to increase blower speed or clockwise to decrease the blower speed. The speed control is very sensitive, so proceed with caution.
4. Measure the inflow velocity per the averaging technique outlined in Chapter 3 and adjust the speed control slowly for the desired speed. Allow the speed to stabilize and re-measure the inflow velocity to confirm.
5. Replace the front panel and tighten the screws.

Calibrate and Operate the Airflow Monitor

Guardian Airflow Monitor (LED Monitor)

Refer to Figure 6-2 for operation and calibration.

Options

Labconco Airflow Monitor / Airflow Switch Operation

The Guardian Airflow Monitor (LED) consists of a circuit board and an airflow switch. This switch indicates airflow as safe or low. It does not provide an actual face velocity, but a small setscrew in the back of the sensor can adjust the airflow level that it classifies as “good/safe” or “low/alert.”

The circuit board provides power to the sensor and also contains a “safe (green)” and “alert (red)” airflow LED indicators, as well as a “SILENCE ALARM” button to quiet the audio alarm. When first powered up, the PCB will light both red and green LED indicators and sound the alarm to indicate it is working. After 5 seconds, the air monitor will indicate either good or bad airflow based on what the connected airflow switch detects. For low airflow, the unit will wait for 10 seconds of bad indications before it sounds both the audio alarm and the red “alert” LED indicator. If the “SILENCE ALARM” button is pressed, the audio alarm will be silenced, but the red “alert” LED will remain on. The alarm is silenced indefinitely unless an airflow change is detected. If safe airflow is later detected for 10 seconds, the green “safe” LED will be lit and the “alert” (red) LED will be shut off. At any time the airflow is safe/good, one can press the SILENCE ALARM test button and the audio alarm and the red LED will turn on as long as this button is held down. The PCB has also a two-pin connector for use as an external output with isolated relay contacts that close when the red/alert LED is lit (low airflow). These relay contacts are not affected by the “SILENCE ALARM” button.

The PCB is mounted behind the front panel using standoffs and an appropriate label is used to highlight the “SILENCE ALARM” button with clear areas for the red and green LED’s. No holes to allow sound to be broadcast louder are necessary.

The PCB can be prepared as a factory special with an additional connector for the following external inputs, and having the following possible functions:

- External Alarm allows an external signal to sound the alarm, such as a sash open switch, or a “fail” signal from the building airflow system.
- Alarm Disable allows an external signal to prevent a “low” airflow alarm from occurring.
- Night Setback allows an external signal to prevent a “low” airflow alarm from occurring (not any different from Alarm Disable above other than the terminology.)
- Contact Labconco for ordering information on this special PCB.

Calibration

1. Ensure the flow switch and alarm circuit board are installed and operational.
2. Allow the enclosure to operate for at least two minutes.
3. If factory installed, the monitor will alarm at 60 ± 10 fpm with the inflow velocity set at 90 ± 10 fpm.
4. To change the factory setting, set the inflow velocity required by your Safety Officer to the desired alarm condition using the speed control adjustment procedure outlined in Chapter 6. Once the alarm condition is set, use a small screwdriver to turn the adjustment screw on the airflow switch counterclockwise (facing the screw) until the “low” airflow red LED lights and the audible flow alarm sounds.
5. Adjust the inflow velocity to the nominal operating point required by your Safety Officer.
6. Over time the HEPA filter will load and eventually slow the inflow velocity. Once the alarm condition is met, simply increase the speed control outlined in Chapter 6 or replace the HEPA filter if the speed control is maximized.
7. The table below lists typical alarm conditions based on normal operating conditions. Typical alarm conditions are set at face velocities of 10 to 30 feet per minute below the normal operating conditions due to supply air and exhaust air fluctuations, as well as room air cross drafts. Consult your Safety Officer for proper operating speeds.

Enclosure Operating In-Flow Speed	Alarm Condition Set Point Speed
100 ± 10 fpm	70-90 fpm
90 ± 10 fpm	60-80 fpm
80 ± 10 fpm	50-70 fpm
70 ± 10 fpm	50-60 fpm
60 ± 10 fpm	50 fpm

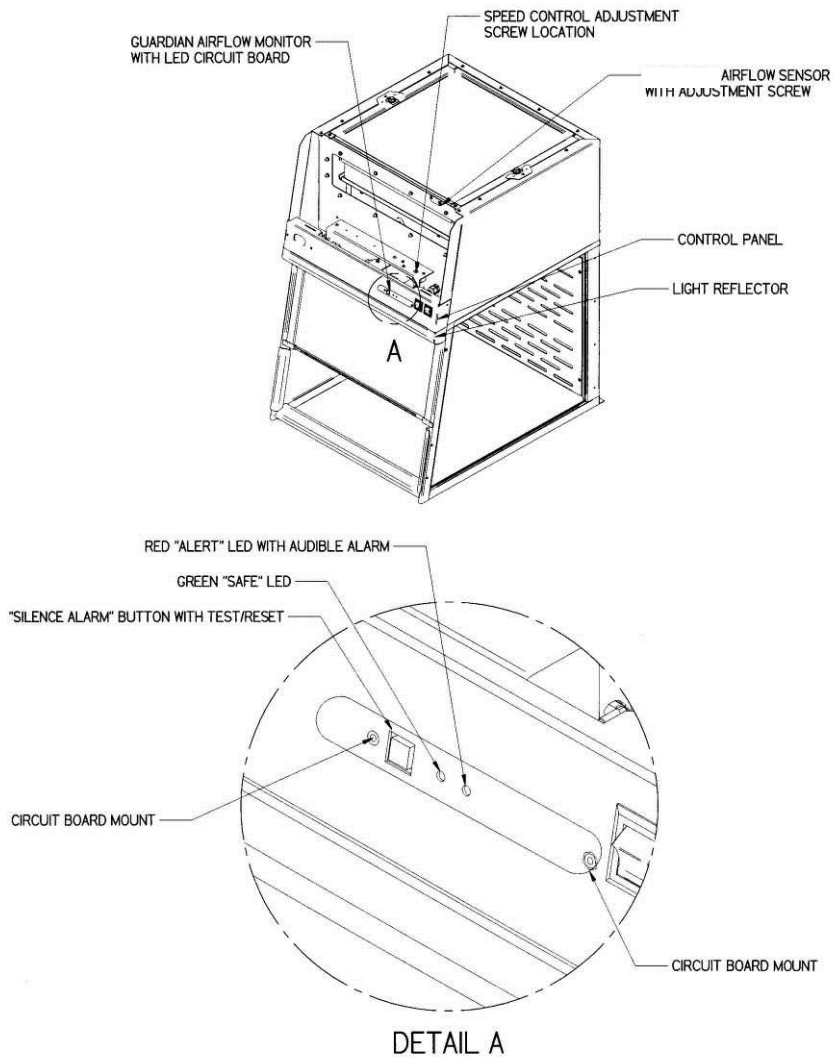


Figure 6-2
Guardian Airflow Monitor (LED) with Airflow Switch

Determination of When to Replace Odor Control Carbon Filters and How to Replace

The carbon filters **MUST** be replaced when any one of the following two conditions are met:

1. The filtered enclosure outlet (exhaust) concentration approaches the inlet concentration, indicating filter saturation.
2. The odor in the work area becomes intolerable or the concentration of the chemical in the work area is greater than the TWA.

There are four means of determining when it is time to change the carbon filters (not shown in the order of preference).

Odor - A person's sensitivity to odor, tolerance of odor and their comfort level under odoriferous conditions vary with the individual. While odor is an indicator that chemicals are passing through the carbon filter, several points need to be understood:

- Odor within the room is not necessarily an indication of saturation or hazardous exposure concentrations.
- Odor can be used as a prompt to sample the chemical concentration on the exit side of the carbon filter.
- Organic chemicals approved for use in the filtered enclosure have odors that are detectable before reaching the time weighted exposure limits.

Detection Tubes - Color change indicators can be used to measure the concentration of the chemical at the exit side of the carbon filter or in the outlet exhaust. A kit including syringe pump and flexible tubing can be purchased as an accessory from Labconco (Catalog # 6924900). Labconco Customer Service Representatives are supplied with detector tube catalog numbers, as well as telephone numbers to direct you to where to purchase these items.

For Organic, Formaldehyde and Ammonia, chemical specific detector tubes should be purchased when installing fresh filters. Each kit contains instructions on how many strokes of the syringe are required to obtain the stated sensitivity. The sampling syringe is connected to the filtered enclosure exhaust. Connect the syringe to the detector tube while the system is running and pull the air through the tube with the syringe. Each stroke of the syringe represents a 100-ml sample and corresponds to the number of strokes necessary to give the indicated color changes. Due to the wide variety of organics and varying TWA's, it is recommended that specific detector tubes be purchased directly from Sensidyne, Draeger or your laboratory supply dealer. Alternate detector pumps can also be purchased from your laboratory supply dealers. The vast majority of detector tubes available start measuring at the TWA. When a user observes a color change in the tube, they should replace the filter immediately. If no detector tube for your specific chemical is available, other means of detection must be used.

Time - For applications that have very consistent inlet concentrations and operating time, “Time” can be used to anticipate saturation or TWA levels based on prior experience. However, this does not replace the need for sampling. Consult Labconco technical specialist for an estimate of carbon filter life based on chemical usage. Detector tubes, or analytical instrumentation should **always** be used to determine concentrations in the carbon filter. It is recommended that the carbon filters be checked with detector tubes or other means at intervals of 20% of the total estimated filter life. The exception to the 20% recommendation is formaldehyde and any carcinogen or suspected carcinogen. These more hazardous chemicals must be checked at least every 10% of the total estimated time.

Analytical Instrumentation - This is the most accurate means of measuring concentrations of any chemical. It is the method of choice when no detector tubes are available or the tubes are not sensitive enough to measure at the TWA concentration for the chemical. This method is also to be used to determine saturation when the chemical concentration is below the measurement range of detector tubes.

Odor Control Carbon Filter Replacement Procedure – See Figures 4-1 and 4-2 for Carbon Filter Replacement.

1. The carbon filters are replaced by first removing the two screws, which hold the clips to secure the upper diffuser screen. Remove the screws, clips and upper diffuser screen.
2. Remove the carbon filter in a careful way to avoid the flow switch and HEPA filter.
3. Re-install the new carbon filter with the gasket down. Replace the upper diffuser screen, clips and two screws.
4. The weight of the carbon filter with the gasket down will compress the gasket.

Calculating Odor Control Carbon Filter Life

Labconco developed a modeling program to estimate the filter life for typical carbon filters. Since filter life is dependent on the chemical used, the airflow, filter size, and the dwell time, refer to the Chemical Guide for the Paramount® Filtered Enclosure. The estimated life for Odor Control carbon filters for the filtered enclosures is conservatively calculated at 50% or half of the published values for the Paramount in the Chemical Guide. For example, if you use isopropyl alcohol to disinfect and use approximately 100 ml per week during 2 hours of use per day then follow these steps to calculate the concentration in parts per million (ppm).

Steps for Calculating PPM and Filter Life

1. Determine the amount of the proposed chemical lost to evaporation over a given amount of time. For example, if you use isopropyl alcohol and lose approximately 100 ml per week during 2 hours of use per day.
2. Convert the amount lost into ml/min. For this example:

$$\frac{100 \text{ ml}}{\text{week}} \times \frac{1 \text{ week}}{10 \text{ hours use}} \times \frac{10 \text{ hours}}{600 \text{ minutes}} = \frac{100 \text{ ml lost}}{600 \text{ minutes}} = .17 \text{ ml/min}$$

3. Convert ml/min to PPM by multiplying ml/min by the conversion factor found in the second to the last column on the right. For isopropyl alcohol $.17 \times 41 = 7.0$ PPM.
4. Find the PPM value on the chart that comes closest to the value you just calculated in step #3. In this example, round up to 10 PPM, which is close to the calculated 7.0. We may approximate the filter life to be around 155 hours of actual use, but use 50% of this for the Odor Control filters or 78 hours.
5. Insert the estimated filter life into the estimated usage to determine how long filters will last.

$$\frac{78 \text{ hours filter life}}{10 \text{ hours per week use}} = 7.8 \text{ weeks before filter saturation}$$

Formaldehyde only

For formaldehyde, use 10% of the impregnated carbon weight. Formalin is 37% formaldehyde by weight. The density of formalin is 1.08 g/ml.

Model Size	Filter Size	Pounds of Formasorb Carbon	Adsorbed weight of Formaldehyde	Adsorption Volume of Formalin
2'	18 x 18 x 1	7.0	0.7 lbs./318g	796 ml
3'	30 x 18 x 1	12.0	1.2 lbs./545g	1364 ml
4'	42 x 18 x 1	16.8	1.68 lbs./763g	1910 ml

Ammonia only

For ammonia, use 10% of the impregnated carbon weight. Assume use of a 50% solution of ammonia for these calculations.

Model Size	Filter Size	Pounds of Ammonasorb II Carbon	Adsorbed weight of Ammonia	Adsorbed Volume of 50% Ammonia Solution
2'	18 x 18 x 1	9.2	0.92 lbs./418g	836 ml
3'	30 x 18 x 1	13.5	1.35 lbs./613g	1226 ml
4'	42 x 18 x 1	18.9	1.89 lbs./859g	1718 ml

Initial Certification

The filtered enclosure has been certified at the factory for an inflow velocity of 90 ± 10 fpm along with the HEPA Filter Leak Test. The filtered enclosure should be certified for the proper inflow velocity. A HEPA filter leak test should be performed once installed to verify there has not been any damage incurred during transportation.

Re-Certification

Under normal operating conditions, the enclosure should be recertified at least annually if serviced. The certifier should perform the following tests.

- Inflow Velocity Test
- HEPA Filter Leak Test

In addition, the following tests should also be performed at the user's discretion:

- Measure of Line Voltage and Current
- Smoke Test to determine proper airflow patterns
- Lighting Intensity Test (when appropriate)
- Noise Level Test (when appropriate)
- Vibration Test (when appropriate)

Fluorescent Light Replacement

1. Disconnect the power.
2. Locate the small light reflector located under the control panel shown in Figure 6-2.
3. Remove the light reflector support by removing two Phillips screws on the bottom of the light reflector.
4. Rotate and remove the old fluorescent lamp.
5. Reinstall the new fluorescent lamp and light reflector in reverse order.
6. Power the unit up and try the new fluorescent lamp.

NOTE: For LED's on 3' and 4' enclosures only, see Appendix A.



THE LAMP(S) IN THIS PRODUCT CONTAIN MERCURY

Manage in accordance with local disposal laws. DO NOT place lamps in trash. Dispose as a hazardous waste. For information regarding safe handling, recycling and disposal, consult www.lamprecycle.org

CETTE LAMPE DANS CE PRODUIT CONTIENT DU MERCURE

Éliminez ou recyclez conformément aux lois applicables. Pour de l'information concernant des pratiques de manipulation sécuritaires et l'élimination sécuritaire et le recyclage, veuillez consulter www.lamprecycle.org

UV Light Replacement

1. Disconnect the power.
2. Locate the UV lamp located inside the enclosure.
3. Surface decontaminate the old UV light before handling it.
4. Rotate and remove the old UV lamp.
5. Reinstall the new UV lamp.
6. Power the unit up and try the new UV lamp (the UV closure panel must be installed).

Motorized Impeller Replacement

The motorized impeller must be replaced as a complete unit. When the motorized impeller is replaced, the capacitor may also be replaced. See Appendix A for Replacement Parts Diagram. See Figure 6-5 for an isometric view of the motorized impeller plenum assembly. The HEPA filter rests on top of the motorized impeller assembly.



Do NOT contact blower wheel while still in motion.

NE PAS être en contact avec la roué du ventilateur tant qu'il est en marche.

1. Wear appropriate personal protective equipment to decontaminate the filtered enclosure and then unplug from the electrical outlet.
2. Remove HEPA filter per the HEPA filter removal procedure outlined in this chapter.
3. Consult the wiring diagram in Appendix C of the manual and disconnect all the wires of the motorized impeller. Be sure to connect wires on the new motor in the same way the old motor was wired.
4. Remove four screws in the motor bracket that hold motor bracket to the supports with the vibration isolation mounts. Remove the motor and bracket.



ATTENTION: High-speed blower. Never operate impeller with housing off.

5. Replace the capacitor with a new one of equal voltage and capacity.
6. Reassemble the new motorized impeller by reversing the assembly steps.

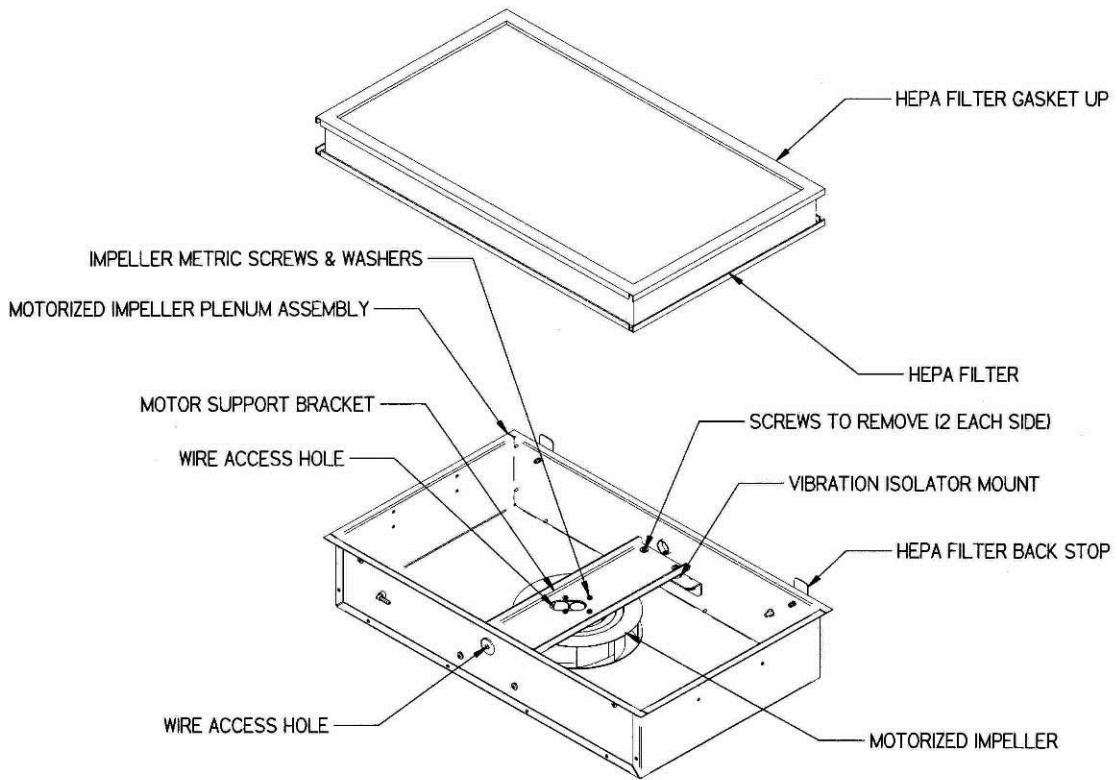


Figure 6-3
Motorized Impeller Replacement

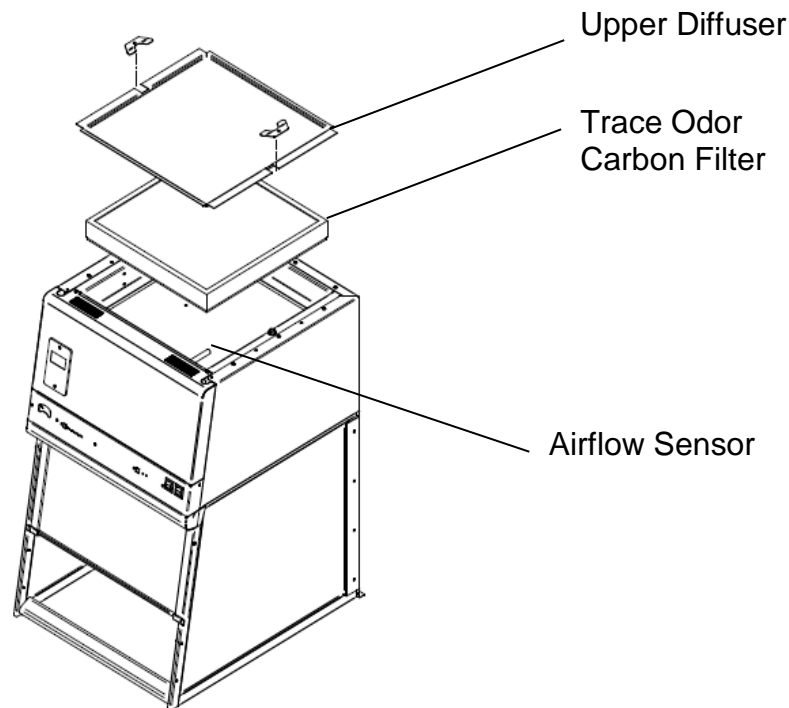
Speed Control Replacement

1. Remove the bracket that the speed control is attached to. See Figures 6-1, and 6-2.
2. Remove the two screws holding the speed control using a Phillips screwdriver. Refer to Appendix A for Replacement Parts Diagram.
3. Disconnect all wires leading to the speed control. Connect wires on new speed control in the same position as the old speed control.
4. Reassemble to the system in the same position and with the same screws that were removed earlier.

Trace Odor Carbon Filter Installation

In the event that low volumes of solvents are required, a Trace Odor Carbon Filter can be installed.

1. Remove the screws (2) located on each side of the upper diffuser.
2. Lift and remove the upper diffuser.
3. Place the Trace Odor Carbon Filter on top of the HEPA filter with the gasket-side DOWN. Use care when maneuvering past the airflow sensor. Be careful not to harm the HEPA filter media that is exposed.
4. Replace the upper diffuser
5. Replace all screws.

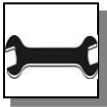


CHAPTER 7

ACCESSORIZING AND MODIFYING YOUR FILTERED ENCLOSURE

There are several ways to accessorize and modify the filtered enclosure for your individual requirements. These include the addition of accessory work surfaces, airflow monitors; exhaust transition kits, remote blowers, exhaust dampers, filters, storage cabinets and utility shelf kit.

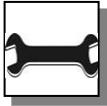
1. Work Surfaces



An optional dished work surface is available to attach to the filtered enclosure.

Dished work surfaces are contoured to fit the dimensions of the filtered enclosures to contain spills. Epoxy is chemical resistant. See Figure 3-1 for installation.

Catalog #	Description	Dimensions (W x D x H)
3909900	Black, 2-foot wide	24" x 29" x 1"
3909901	Black, 3-foot wide	36" x 29" x 1"
3909902	Black, 4-foot wide	48" x 29" x 1"
3909903	Gray, 2-foot wide	24" x 29" x 1"
3909904	Gray, 3-foot wide	36" x 29" x 1"
3909905	Gray, 4-foot wide	48" x 29" x 1"



2. Guardian™ LED Airflow Monitor

The Guardian LED Airflow Monitor allows you to continuously monitor airflow through the enclosure. The Guardian LED monitor can be placed on any Purifier enclosure.

Description	Order Part #'s	Individual Parts Required
Guardian Airflow Monitor 115V or 230V		
1 ea.	3811500	Airflow Monitor Printed Circuit Board
1 ea.	3910700	Airflow Sensor w/ Connector
2 ea.	1885405	#6-32 x .31" Phillips machine screw to mount Airflow Monitor Circuit Board
2 ea.	1891808	#6-32 x .50" Phillips thread cutting screw to mount Airflow Sensor

3. Thimble Exhaust Connections for Ducting to Outside

Thimble Exhaust connects to the enclosures with integral motorized impellers from the top so the duct can be routed up and outside the building. The transition is available for 6" nominal duct. The Thimble Exhaust Connection should be sealed to the top of the enclosure with silicone sealant to prevent leaks. See figure 3-2 and figure B-2.

Order the following:

Part	Description
3924400	2' Thimble Exhaust Connection
3924401	3' Thimble Exhaust Connection
3924402	4' Thimble Exhaust Connection
3924405	2' Canopy Exhaust Connection (5") – to FilterMate
3924406	3' Canopy Exhaust Connection (5") – to FilterMate
3924407	4' Canopy Exhaust Connection (5") – to FilterMate

4. Remote Blowers

For Purifier Class I Enclosure

The remote blower has 1/4 hp direct drive motor and corrosion-resistant epoxy-coated steel housing and wheel with blower inlet of 5.94" OD. sized to accept 6" nominal PVC duct. Includes a blower transition adapter outlet for 6" PVC duct with integral back draft damper.

CFM @ Static Pressure-Inches of H ₂ O						
S.P.	0.0"	0.125"	0.25"	0.50"	0.75"	0.87"
CFM	595	560	515	420	300	167

Chapter 7: Accessorizing and Modifying Your Filtered Enclosure

Used With	Catalog #	Description	Shipping Wt. (lbs./kg.)
Purifier Class I	3716000	Remote Blower, 115V, 60 Hz. 4.4 amps	35/16
	3716001	Remote Blower, 115/230V, 50 Hz, 5.6/2.8 amps	35/15

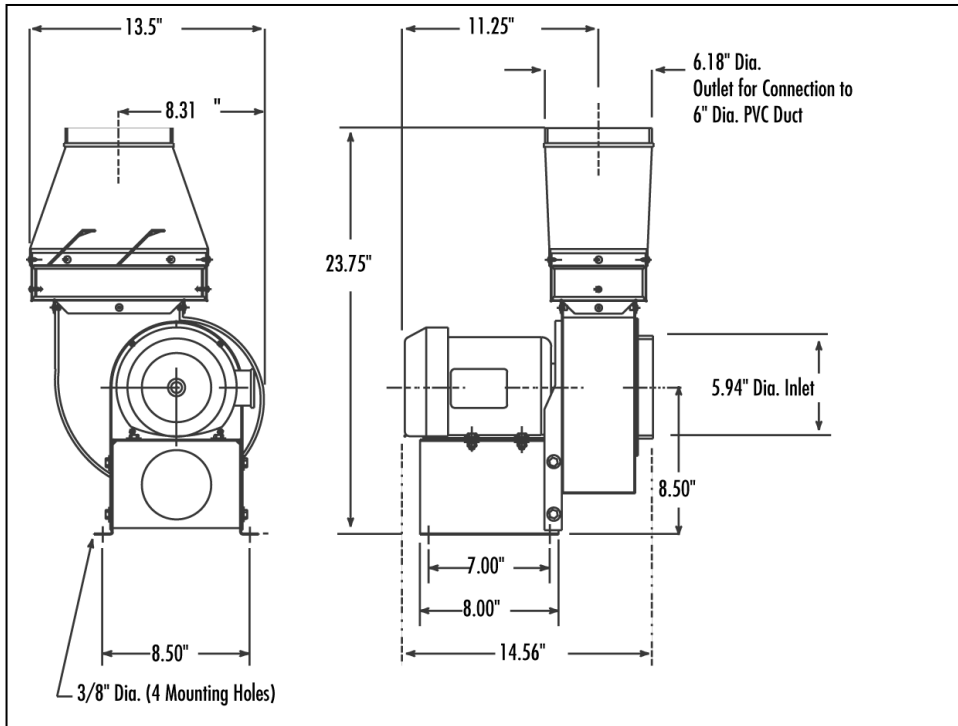


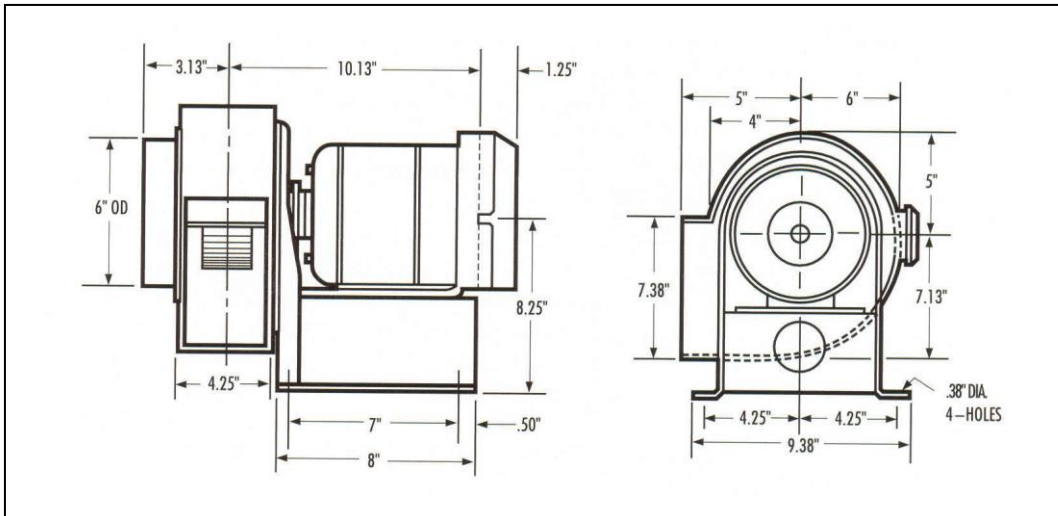
Figure 7-1

For Purifier HEPA Filtered Enclosure

Has a 1/4 hp direct drive motor and corrosion-resistant epoxy-coated steel housing and wheel with blower inlet of 6.00" ID. Outlet dimensions are 4.25" x 7.38" OD.

CFM @ Static Pressure-Inches of H ₂ O						
S.P.	0.0"	0.125"	0.25"	0.50"	0.75"	0.87"
CFM	595	560	515	420	300	167

	Catalog #	Description	Shipping Wt. (lbs./kg.)
Used with Purifier HEPA Filtered Enclosure	4863500	Remote Blower, 115 V, 60 Hz. 4.4 amps	35/16
	4863501	Remote Blower, 115/230 V, 50 Hz, 5.6/2.8 amps	35/16
	7053501	Explosion-Proof Remote Blower, 115 V, 60 Hz, 4.4 amps	40/18



5. Exhaust Dampers

Exhaust dampers allow adjustments required to maintain proper airflow for roof-mounted blowers or house exhaust systems.

Catalog #	Description
3924000	6" Epoxy Coated Steel In-Line adjustable damper
4724200	6" PVC In-line adjustable damper

6. Accessory Filters

HEPA Filter & ULPA Filter (optional)

HEPA Filter is 99.99% efficient on particles 0.3 micron. ULPA is 99.999% efficient on 0.12 micron.

Width	HEPA Catalog #	Size	ULPA Catalog #
2'	3707900	18" x 18" x 3.31"	3885700
3'	3707901	30" x 18" x 3.31"	3885701
4'	3707902	42" x 18" x 3.31"	3885702

Odor Control Carbon Filter

Provides granular activated carbon or impregnated carbon used for Odor Control applications on integral motorized impeller models exhausted back into the room.

Filter Classification and Size	Catalog #	X Pounds
2' Organic 18 x 18 x 1	3937200	5.5 lbs. activated
3' Organic 30 x 18 x 1	3937300	9.2 lbs. activated
4' Organic 42 x 18 x 1	3937400	12.9 lbs. activated
2' Formaldehyde 18 x 18 x 1	3937201	7.0 lbs impregnated
3' Formaldehyde 30 x 18 x 1	3937301	12.0 lbs. impregnated
4' Formaldehyde 42 x 18 x 1	3937401	16.8 lbs. impregnated
2' Ammonia & Amines 18 x 18 x 1	3937202	8.0 lbs. impregnated
3' Ammonia & Amines 30 x 18 x 1	3937302	13.5 lbs. impregnated
4' Ammonia & Amines 42 x 18 x 1	3937402	18.9 lbs. impregnated
2' Acid-Sulfur 18 x 18 x 1	3937203	7.0 lbs. impregnated
3' Acid-Sulfur 30 x 18 x 1	3937303	12.0 lbs. impregnated
4' Acid-Sulfur 42 x 18 x 1	3937403	16.8 lbs. impregnated

7. Storage Cabinets

SOLVENT

ACID

Size/Description	Dual Doors	Right Hinge	Left Hinge	Dual Doors	Right Hinge	Left Hinge
48"	9902000	-	-	9901000	-	-
36"	9902100	-	-	9901100	-	-
30"	9902200	-	-	9901200	-	-
24"	-	9902300	9902400	-	9901300	9901500
18"	-	-	-	-	9901400	9901600
12"	-	-	-	-	-	-
48" w/Self-Closing Doors	9903000	-	-	-	-	-
36" w/Self-Closing Doors	9903100	-	-	-	-	-
30" w/Self-Closing Doors	9903200	-	-	-	-	-
24" w/Self-Closing Doors	-	9903300	9903400	-	-	-
24" ADA	-	9906000	9906100	-	9905000	9905200
24" ADA w/Self-Closing Doors	-	9906200	9906300	-	-	-
18" ADA	-	-	-	-	9905100	9905300
12" ADA	-	-	-	-	-	-

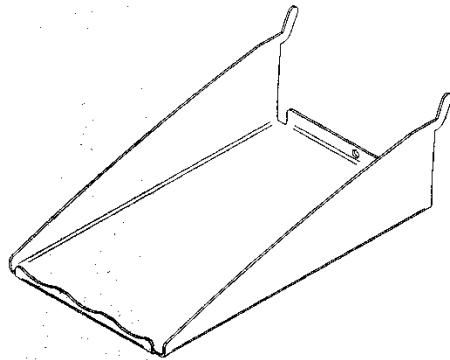
STANDARD BASE

VACUUM PUMP

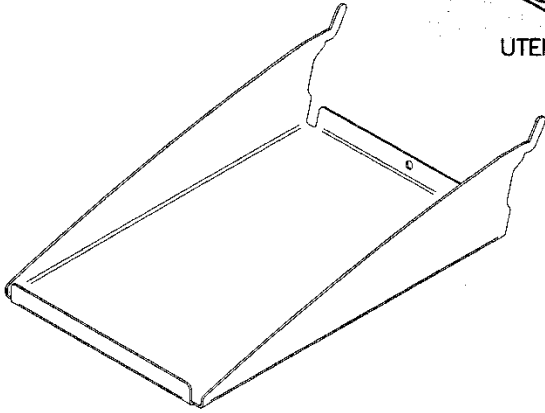
Size/Description	Dual Doors	Right Hinge	Left Hinge	Dual Doors	Right Hinge	Left Hinge
48"	9900000	-	-	-	-	-
36"	9900100	-	-	-	-	-
30"	9900200	-	-	-	-	-
24"	-	9900300	9900600	-	-	-
18"	-	9900400	9900700	-	9907000	9907100
12"	-	9900500	9900800	-	-	-
48" w/Self-Closing Doors	-	-	-	-	-	-
36" w/Self-Closing Doors	-	-	-	-	-	-
30" w/Self-Closing Doors	-	-	-	-	-	-
24" w/Self-Closing Doors	-	-	-	-	-	-
24" ADA	-	9904000	9904300	-	-	-
24" ADA w/Self-Closing Doors	-	-	-	-	-	-
18" ADA	-	9904100	9904400	-	-	-
12" ADA	-	9904200	9904500	-	-	-

8. Utility Shelf Kit

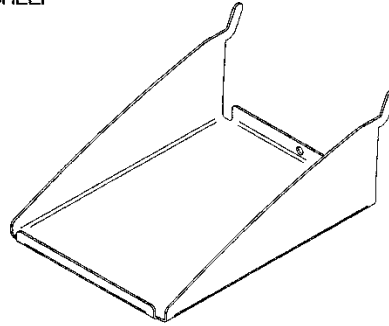
Labconco offers a utility shelf kit part number 3925000 consisting of three shelves to hold items inside the enclosure. One shelf may be used for the printer, one shelf for spatulas and weigh brushes, and one miscellaneous shelf. The shelves hang from slots in the rear baffle.



UTENSIL SHELF



PRINTER SHELF



MISCELLANEOUS SHELF

CHAPTER 8

TROUBLESHOOTING AND SERVICER OPERATING LOG

Refer to the following table if your filtered enclosure fails to operate properly. If the suggested corrective actions do not solve your problem, contact Labconco for additional assistance.

PROBLEM	CAUSE	CORRECTIVE ACTION
Contaminants outside of enclosure.	Improper user techniques for the enclosure.	See “Certifying the Enclosure” Chapter 3 and “Safety Precautions” Chapter 4 sections in the manual. (Ref. Appendix D).
	Restriction of the baffle air slots or blockage of the exhaust outlet.	Remove obstruction to ensure that all air slots and the exhaust outlet are unobstructed.
	External factors are disrupting the enclosure airflow patterns or acting as a source of contamination.	See “Location Requirements” Chapter 2, “Certifying the Enclosure” Chapter 3, and “Safety Precautions” Chapter 4 sections of this manual. (Ref. Appendix D).
	Enclosure has improper face velocity.	Have enclosure certified and check exhaust system. Check HEPA filters for loading. Adjust enclosure speed control. Enclosure should have an average face velocity of 60-100 fpm for weighing procedures and 75-105 fpm for biohazardous procedures.

PROBLEM	CAUSE	CORRECTIVE ACTION
Blower won't operate.	Unit not plugged into outlet.	Plug the enclosure into appropriate electrical service.
	Circuit breaker(s) or Ground Fault Interrupter.	Reset circuit breaker.
	Blower wiring is disconnected.	Inspect blower wiring.
	Blower switch is defective.	Replace switch.
	Motorized impeller or blower is defective.	Replace motorized impeller or blower. See Chapter 6.
Low face velocity or poor containment of contaminants.	Enclosure sash not closed.	Close sash to the lowest position.
	HEPA filter clogged.	Replace HEPA filter or increase speed.
	Carbon filter loaded with chemicals.	Replace carbon filter.
Blower and lights won't operate.	Unit not plugged into outlet.	Plug enclosure into appropriate electrical service.
Light does not work.	Circuit breaker(s) tripped.	Reset or replace circuit breaker.
	Lamp not installed properly.	Inspect lamp installation.
	Lamp wiring disconnected.	Inspect lamp wiring.
	Defective lamp.	Replace lamp.
	Light switch is defective.	Replace light switch.
	Defective electronic ballast.	Replace ballast.
	UV closure panel not installed .	Install UV closure panel (UV lights only).
	Magnetic switch for UV closure panel defective.	Replace switch (UV lights only).
	UV timer circuit board defective.	Replace circuit board (UV lights only).

PROBLEM	CAUSE	CORRECTIVE ACTION
Airflow Monitor Malfunction	No power. No lights. No display.	Power cable to circuit board is disconnected and needs to be connected. Sensor cable needs to be connected. Verify that all airflow monitor interface cables are connected. Check fuses on enclosure.
	No audible alarm.	Alarm has been temporarily silenced using "SILENCE ALARM".
	Wrong alarm set point.	Airflow monitor was not properly adjusted. Repeat calibration steps outlined in this manual in Chapter 6.
	Constant audible alarm.	Check airflow and calibration of airflow monitor. See Chapter 6.
	Continuous alarm.	Check the face velocity of the enclosure as the airflow of the system may have changed. If incorrect, adjust the speed control to increase face velocity. The HEPA filter may have become loaded. If face velocity is correct, calibrate the airflow monitor outlined in this manual in Chapter 6.
	Monitor alarms; air way to airflow monitor sensor is blocked by insects, dust or debris.	Lightly clean the airway with clean air. Be careful not to touch sensitive electrical components.
	Audible disable will not stay operational.	An alarm condition must be continuously present before the audible alarm can be silenced. If flow conditions fluctuate near the alarm set point, the airflow monitor will automatically reset it. Action should be taken to bring the enclosure airflow into proper operating parameters or adjust the alarm set point lower.

APPENDIX A

FILTERED ENCLOSURE

COMPONENTS AND

REPLACEMENT PARTS

The components that are available for your filtered enclosure are listed. The parts shown are the most commonly requested. If other parts are required, please contact Product Service.

Appendix A: Filtered Enclosure Components and Replacement Parts

Item	Qty.	Part Number	Description
1	1	3911000	Glass, Side
2A	1	3911900	Glass, Sash 2'
2B	1	3911901	Glass, Sash 3'
2C	1	3911902	Glass, Sash 4'
3A	1	3991500	Sash Assembly, 2'
3B	1	3991501	Sash Assembly, 3'
3C	1	3991502	Sash Assembly, 4'
4A	1	3905600	Lower Air Foil, 2'
4B	1	3905601	Lower Air Foil, 3'
4C	1	3905602	Lower Air Foil, 4'
5A	1	3907400	Bracket, Air Foil R.H.
5B	1	3907401	Bracket, Air Foil L.H.
6A	1	3907500	Stop, Sash R.H.
6B	1	3907501	Stop, Sash L.H.
7A	1	6916500	Latch, Sash
7B	1	3906700	Bracket, Latch
7C	1	1927403	Spring, Compression Latch
7D	2	1893206	Screw, 8-32 x .38" Lg. Phillips Pan S.S. Type F
9A	2	1889316	Screw, 10-24 x 1.00 PH Phil S.S.
9B	2	1912108	Washer, Plastic .194 ID. x .380 OD
9C	2	7868402	Bushing, Spacer .31 x .63
10	1.9 Ft	6913700	Wiper, Sash Seal
11A	2	1936800	Bushing, Heyco closed 1.50 Dia.
11B	2	1934601	Bushing, Heyco w/ Flex Shutter 1.50 Dia.
12A	1	3915401	Side Air Foil
12B	2	1889912	Screw, #6-32 x .75" Oval Hd. Type F (S.S.)
13A	1	3907700	Reflector, Light 2'
13B	1	3907701	Reflector, Light 3'
13C	1	3907702	Reflector, Light 4'
13D	2	1889308	Screw, Mach. 10-24 x .50 PH Phillips
14A	1	3708300	Lamp, Fluorescent 2' Enclosure (F15T8-SP35)
14B	1	9721902	Lamp, Fluorescent 3' Enclosure (F17T8)
14C	1	9721901	Lamp, Fluorescent 4' Enclosure (F25T8)
14D	1	9721912	LED, 3' Enclosure, 24" nominal width LED
14E	1	9721911	LED, 4' Enclosure, 36" nominal width LED
15A	1	1270100	Lamp, UV 2' or 3' Enclosure (G15T8)
15B	1	1271300	Lamp, UV 4' enclosure (G30T8)
16A	1	3911700	Bracket, Right Reflector Support
16B	1	3911701	Bracket, Left Reflector Support
16C	4	1893108	Screw, #8 x 1/2 AB Hex Washer Head

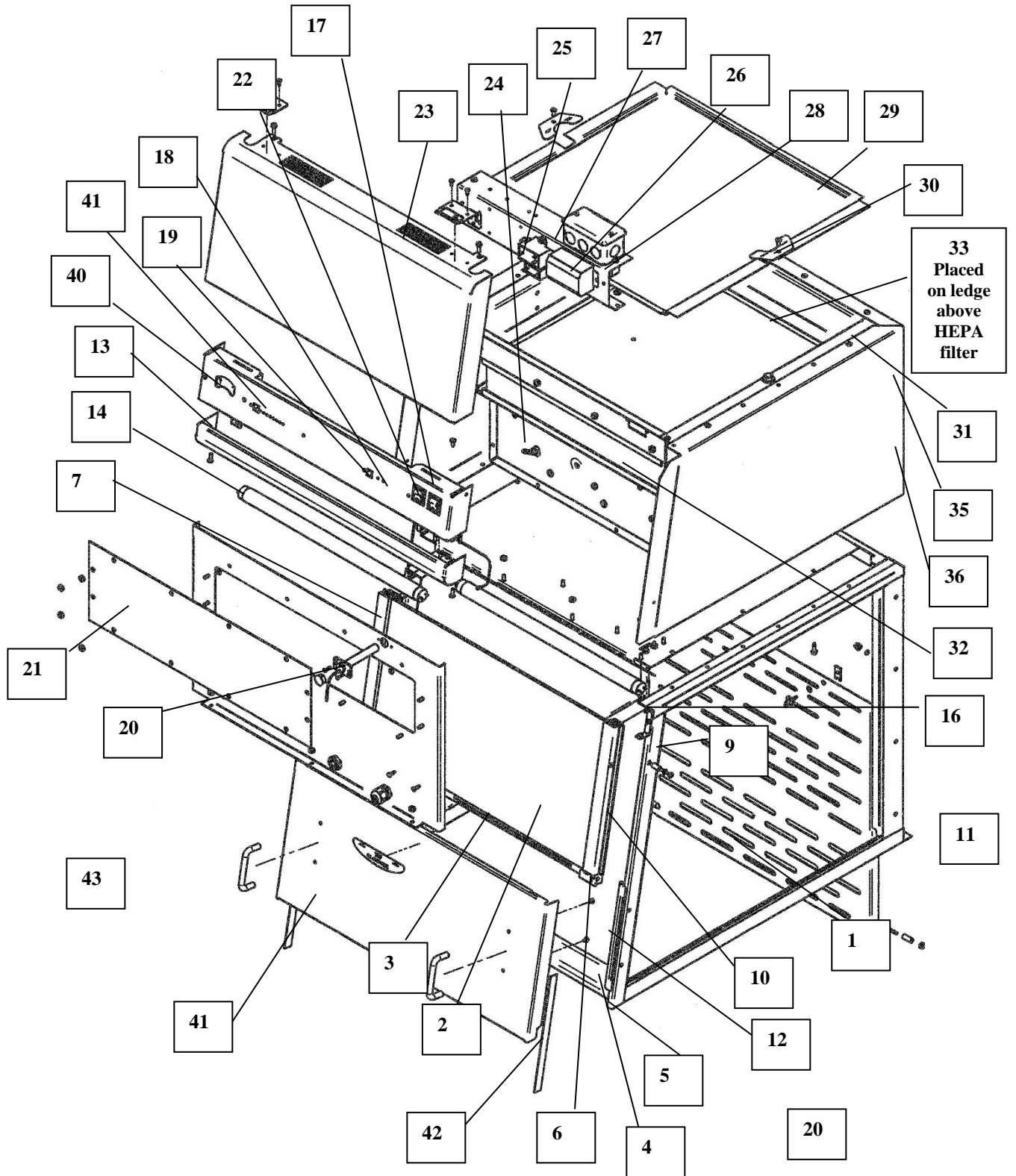
Appendix A: Filtered Enclosure Components and Replacement Parts

Item	Qty.	Part Number	Description
17A	1	3918510	Wiring Harness Main, 115V
17B	1	3918610	Wiring Harness Main, 230V
18A	1	3811500	Guardian Airflow Monitor Printed Circuit Board
18B	2	1885405	Screw Mach #6-32 x .31 PH Phil. S.S.
19A	1	3926600	Label, Front Class I
19B	1	3926700	Label, Front HEPA
20A	1	3910700	Airflow Switch
20B	2	1891808	Screw, Thread Cutting #6-32 x .50 PH
21A	1	3906200	Cover Plate for HEPA 2'
21B	1	3906201	Cover Plate for HEPA 3'
21C	1	3906202	Cover Plate for HEPA 4'
21D	Multiple	1905617	Nut, KEPS 10-24
22A	1 or 2	1307000	Switch, Rocker (2 position)
22B	1	1306300	Switch, Rocker (3 position) – UV Light Only
23A	1 or 2	3904800	Front Panel, 2'
23B	1	3904801	Front Panel, 3'
23C	1	3904802	Front Panel, 4'
23D	1	4472400	Screw, Thread cut 10-24 x .50 Type F PH Phillips
24A	1	3916500	Impeller, Motorized 2' or 3' Enclosure, 115V
24B	1	3916501	Impeller, Motorized 2' or 3' Enclosure, 230V
24C	1	3903300	Impeller, Motorized 4', 115V
24D	1	3903301	Impeller, Motorized 4', 230V
24E	4	1601800	Vibration Isolator Mount
25A	1	1306900	Capacitor, 2', 115V 10 MFD
25B	1	1306900	Capacitor, 3', 115V 10 MFD
25C	1	1306600	Capacitor, 4', 115V 15 MFD
25D	2	1306800	Capacitor, 2', 230V 4 MFD (effective 2MFD)
25E	2	1306800	Capacitor, 3', 230V 4 MFD (effective 2MFD)
25F	1	1306800	Capacitor, 4', 230V 4 MFD
26A	1	1295510	Ballast, Fluorescent 2', 115V
26B	1	1295510	Ballast, Fluorescent 2', 230V
26C	1	1294000	Ballast, Fluorescent 3' or 4', 115V or 230V
27A	1	1295510	Ballast, UV 2' or 3', 115V
27B	1	1295510	Ballast, UV 2' or 3', 230V
27C	1	1295510	Ballast, UV 4', 115V
27D	1	1295510	Ballast, UV 4', 230V
28A	1	1325500	Speed Control, 115V
28B	1	1325501	Speed Control, 230V
29A	1	3910800	Upper Diffuser Screen 2'
29B	1	3910801	Upper Diffuser Screen 3'
29C	1	3910802	Upper Diffuser Screen 4'
30A	2	3916700	Clip, Upper Diffuser

Appendix A: Filtered Enclosure Components and Replacement Parts

Item	Qty.	Part Number	Description
30B	2	1893708	Screw, #10 x .50 PH Phil. Thd. Forming
31A	2	1881196	Capscrew, 3/8 –16 x 6.0 Lg. Hx. Hd.
31B	2	1924403	Sealing Washer 3/8
32A	1	3707900	HEPA Filter (2') 18 x 18 x 3.32 w/Gasket
32B	1	3707901	HEPA Filter (3') 30 x 18 x 3.32 w/Gasket
32C	1	3707902	HEPA Filter (4') 42 x 18 x 3.32 w/Gasket
32D	1	3885700	ULPA Filter (2') 18 x 18 x 3.32 w/Gasket
32E	1	3885701	ULPA Filter (3') 30 x 18 x 3.32 w/Gasket
32F	1	3885702	ULPA Filter (4') 42 x 18 x 3.32 w/Gasket
33A	1	3937200	2' Odor Control Organic Vapor Carbon Filter
33B	1	3937201	2' Odor Control Formaldehyde Carbon Filter
33C	1	3937202	2' Odor Control Ammonia Carbon Filter
33D	1	3937300	3' Odor Control Organic Vapor Carbon Filter
33E	1	3937301	3' Odor Control Formaldehyde Carbon Filter
33F	1	3937302	3' Odor Control Ammonia Carbon Filter
33G	1	3937400	4' Odor Control Organic Vapor Carbon Filter
33H	1	3937401	4' Odor Control Formaldehyde Carbon Filter
33I	1	3937402	4' Odor Control Ammonia Carbon Filter
33J	1	3937203	2' Odor Control Acid-Sulfur
33K	1	3937303	3' Odor Control Acid-Sulfur
33L	1	3937403	4' Odor Control Acid-Sulfur
34	1	7907802	Digital Monitor Outlet, 115V only, 230V connected at laboratory outlet location.
35A	1	1333800	IEC Power Inlet
35B	1	1305800	Power Cord, 115V, Right Angle
35C	1	1334200	Power Cord, 230V, Right Angle
36A	1 - (115V)	1327200	Circuit Breaker, 3 AMP
36B	2 - (230V)	1327205	Circuit Breaker, 2 AMP
40A	1	1952500	Gauge, Pressure Mini Helic II
40B	1	3667400	Bracket, Gauge
40C	2	1905617	Nut, #10-24 KEPS
40D	2	1551700	Tubing, 3/16" ID x 5/16" OD, PBC 7.00" Lg.
40E	2, 1" Long	3788200	Snubber, Filter Pressure Gauge
41A	1	3560510	Panel, UV Closure 2 Ft.
41B	1	3560511	Panel, UV Closure 3 Ft.
41C	1	3560512	Panel, UV Closure 4 Ft.
42	2	1907002	Tape, hook and latch, fastening
43	1	1322800	Switch assembly, magnetic
44	1	3945302	Circuit board, UV Timer

Use for Purifier Class I and Purifier HEPA Filtered Enclosures



APPENDIX B

DIMENSIONS AND EXHAUST

OPTIONS

See the following dimensions and exhaust options for all the Purifier Filtered Enclosures.

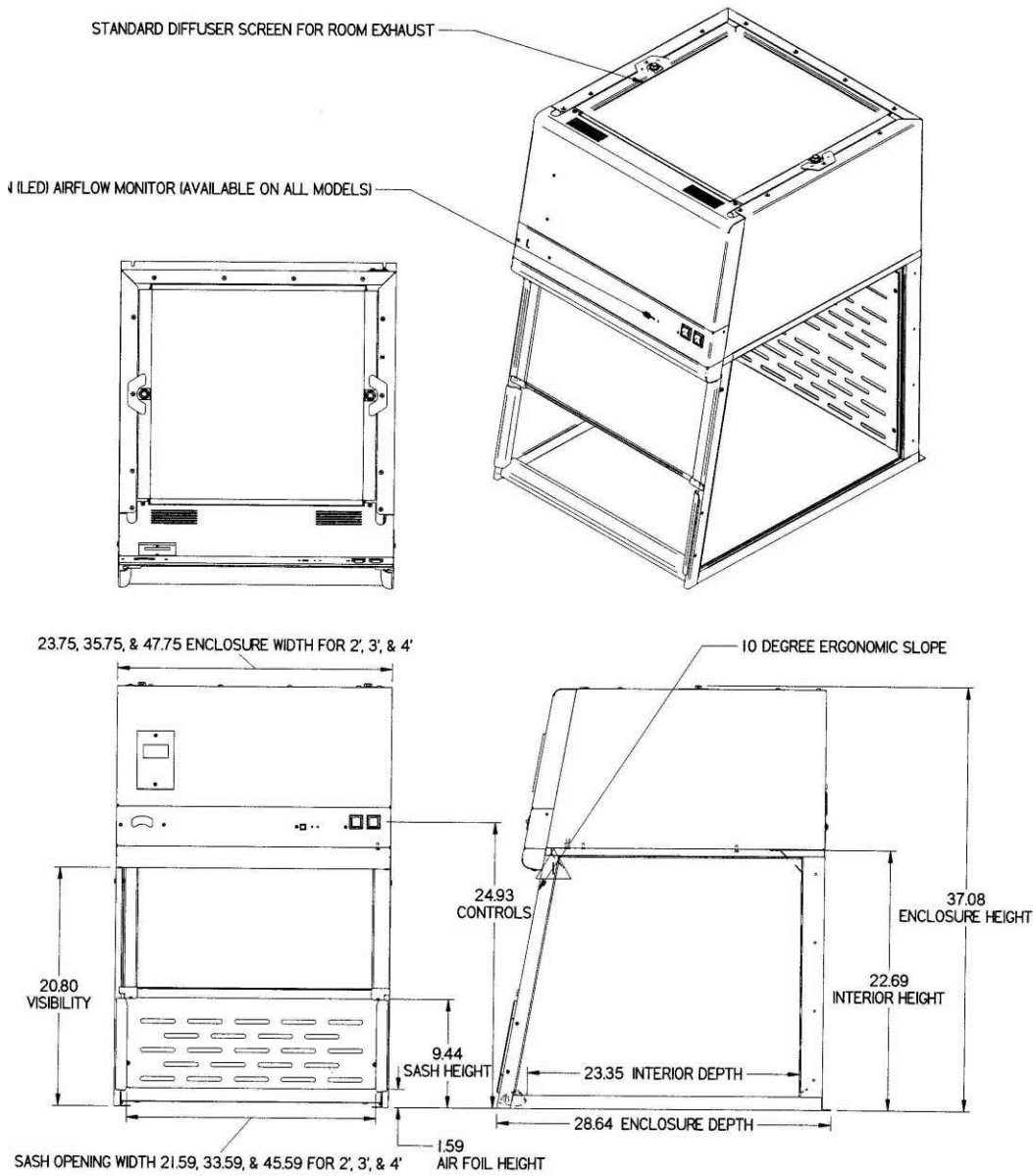


Figure B-1
Purifier Class I and Purifier HEPA Filtered Enclosure

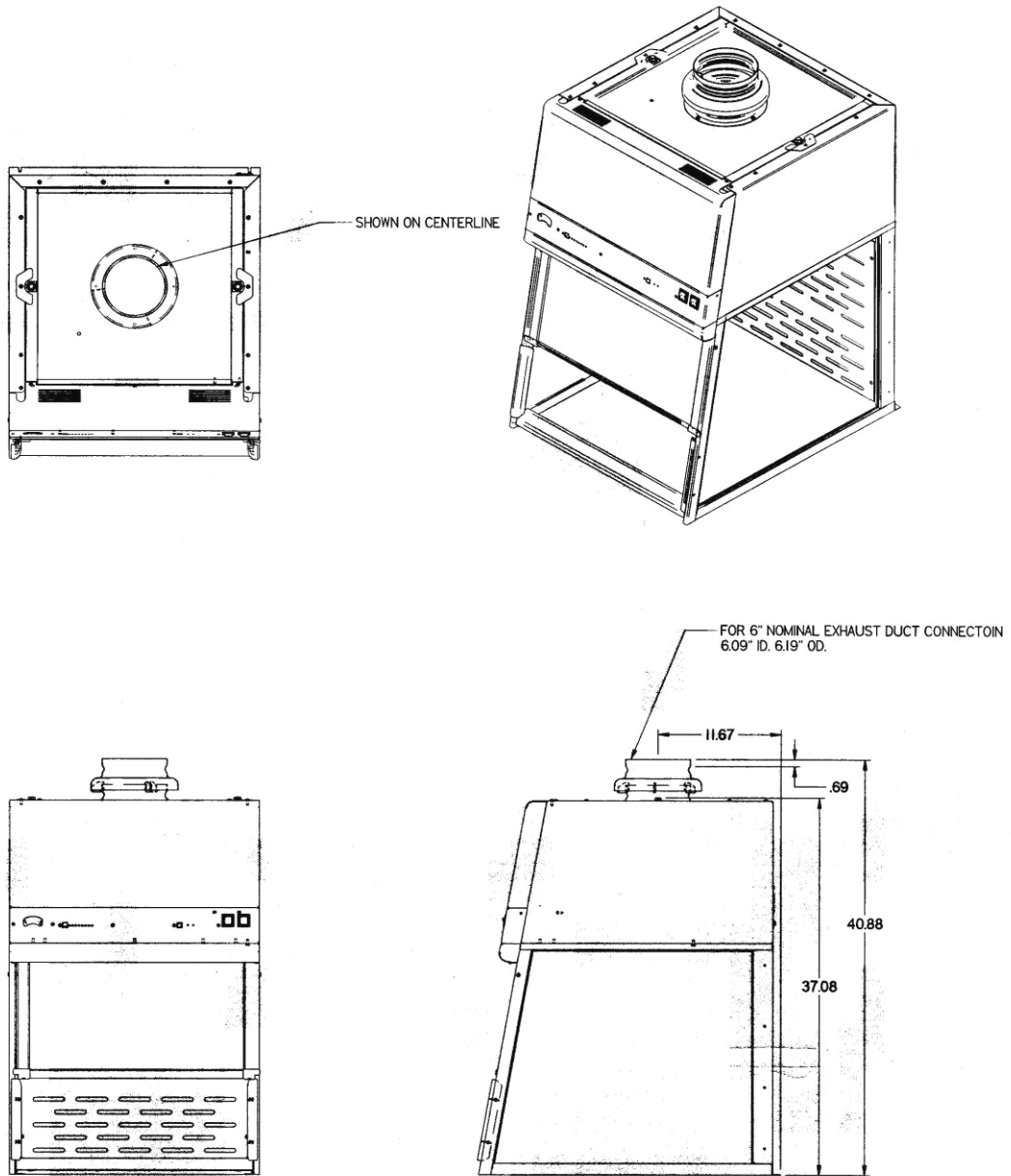


Figure B-2
Thimble Exhaust Connection
(Optional installation for outside ducting)

APPENDIX C

FILTERED ENCLOSURE

SPECIFICATIONS

This Appendix contains technical information about all the Purifier HEPA Filtered Enclosures including electrical specifications and environmental operating conditions.

Electrical Specifications

- 3 Amps, 115V, 50/60 Hz
- 2 Amps, 230V, 50/60 Hz

Environmental Conditions

- Indoor use only.
- Maximum altitude: 6562 feet (2000 meters).
- Ambient temperature range: 41° to 104°F (5° to 40°C).
- Maximum relative humidity: 80% for temperatures up to 88°F (31°C), decreasing linearly to 50% relative humidity at 104°F (40°C).
- Main supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage.
- Transient over-voltages according to Installation Categories II (Over-voltage Categories per IEC 1010). Temporary voltage spikes on the AC input line that may be as high as 1500V for 115V models and 2500V for 230V models are allowed.
- Used in an environment of Pollution degrees 2 (i.e., where normally only non-conductive atmospheres are present). Occasionally, however, a temporary conductivity caused by condensation must be expected, in accordance with IEC 664.

APPENDIX D

QUICK CHART FOR THE FILTERED ENCLOSURES

Model Size	2'	3'	4'
Sash Height from Work Surface (inches)	9.44	9.44	9.44
Total Open Area with Bypass (sq. ft.)	1.45	2.20	2.95
Exhaust Airflow Volume at 90fpm (CFM)	130	200	265
Alarm Airflow Volume at 60 fpm (CFM)	85	130	175
Initial Mag. Gauge Pressure Reading (inches H ₂ O)	0.20 to .045	0.15 to 0.40	0.10 to 0.35
Number of Laskin Nozzles needed at 10 psig	1	1	1
Exhaust HEPA Filter w/ Gasket Dimensions (inches)	18x18x3.31	30x18x3.31	42x18x3.31
*Motor Horsepower (HP)	0.13	0.13	0.30
*Capacitor (MFD, Volts)	10MFD, 115V (2) 4MFD, 230V	10MFD, 115V (2) 4MFD, 230V	15MFD, 115V 4MFD, 230V
Fluorescent Lights	F15T8-SP35	F17T8	F25T8
UV Light on Class I only	G15T8	G15T8	G30T8
Power Usage (watts)			
Blower	76	78	124
Lights	22	24	32
Total	98	102	156

To determine the actual face velocity at the sash opening, airflow velocity readings will need to be taken. This should be done across the sash opening of the enclosure in accordance with the *Industrial Ventilation Manual*. (See Appendix E) The “average face velocity” is achieved by taking readings in two rows across the enclosure with the readings 6" from the ends and evenly spaced every 12"; the first row is 3" down from the upper sash foil and the second row is 3" up from the work surface. A total of four readings will be taken for the 2' enclosure, six readings taken for the 3' enclosure and eight readings taken for the 4' enclosure and then averaged.

APPENDIX E

REFERENCES ON

VENTILATION, SAFETY,

OCCUPATIONAL HAZARDS,

BIOSAFETY AND

DECONTAMINATION

Many excellent reference texts and booklets are currently available. The following is a brief listing:

Laboratory Ventilation Standards

Federal Register 29 CFR Part 1910

Non-mandatory recommendations from "Prudent Practices."

- Fume hoods should have a continuous monitoring device
- Face velocities should be between 60-100 linear feet per minute (lfpm)
- Average 2.5 linear feet of hood space per person

Occupational Health and Safety

U.S. Department of Labor

200 Constitution Avenue N.W.

Washington, DC 20210

(202) 523-1452

www.osha.gov

Industrial Ventilation-ACGIH

- Fume hood face velocities between 60-100 lfpm
- Maximum of 125 lfpm for radioisotope hoods
- Duct velocities of 1000-2000 fpm for vapors, gasses and smoke
- Stack discharge height 1.3-2.0 x building height
- Well designed fume hood containment loss, <0.10 ppm

Industrial Ventilation, A Manual of Recommended Practice.

24th Edition, 2001

American Conference of Governmental Industrial Hygienists

1330 Kemper Meadow drive

Cincinnati, OH 45240-1634

(513) 742-2020

www.acgih.org

ASHRAE 110-1995 Method of Testing Performance of Fume Hoods

Evaluates fume hood's containment characteristics

- Three part test: Smoke generation, Face velocity profile, Tracer gas release @ 4 liters per minute
- Rated As Manufactured (AM), As Installed (AI) and As Used (AU)

American Society of Heating, Refrigerating, and Air Conditioning Engineers

1791 Tullie Circle N.E.

Atlanta, GA 30329

(404) 636-8400

www.ashrae.org

ANSI Z9.5-1993 Laboratory Standard

Covers entire laboratory ventilation system.

- Vertical stack discharge @ 2000-3000 fpm
- New and remodeled hoods shall have a monitoring device
- Ductless hoods should only be used with non-hazardous materials
- Fume hood face velocities between 80 – 120 fpm

American Industrial Hygiene Association

2700 Prosperity Avenue, Suite 250

Fairfax, VA 22031

(703) 849-8888

www.aiha.org

SEFA 1-2002

- Fume hood face velocities based on toxicity levels of chemicals
 - Class A – 125 to 150 fpm
 - Class B – 80 to 100 fpm
 - Class C – 75 to 80 fpm
- Test method – face velocity profile and smoke generation

Scientific Equipment & Furniture Association

1028 Duchess Drive

McLean, VA 22102

(703) 538-6007

www.sefalabs.com

NFPA 45 – 2002 Fire Protection for Laboratories Using Chemicals

- Laboratory hoods should not be relied on for explosion protection
- Exhaust air from fume hoods should not be recirculated
- Services should be external to the hood
- Canopy hoods only for non-hazardous applications
- Materials of construction should have flame spread of 25 or less
- 80 to 120 fpm to prevent escape

NFPA 30 – 2000 Flammable and Combustible Liquids Code

- Approved cabinets may be metal or wood
- Vent location on cabinets are required
- Venting of cabinets not a requirement

National Fire Protection Association

1 Batterymarch Park

P.O. Box 9101

Quincy, MA 02269-9101

(800) 344-3555

www.nfpa.org

General References

American Conference of Governmental Industrial Hygienists. *Industrial Ventilation, A Manual of Recommended Practice*, Cincinnati, OH

ASHRAE Standard Committee. *ASHRAE Standard* Atlanta: ASHRAE Publications Sales Department, 1995

British Standards Institution, *Laboratory Fume Cupboards*. Parts 1, 2 and 3, London: 1990

Department of Labor, Occupational Safety and Health Administration, *29 CFR Part 1910, Occupational Exposures to Hazardous Chemicals in Laboratories, Final Rule*. Vol. 55, No. 21. Washington D.C.:1990

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Rayburn, Stephen R. *The Foundation of Laboratory Safety, A Guide for the Biomedical Laboratory*. Springer-Verlag, New York: 1990

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