BIOHAZARD CABINET MANUAL

Model 10448 - EBC 47, 4-Foot Type A/B3
Model 10276, 6-Foot Type A
Model 10451, 6-Foot Type B3

Operation Manual

ENVIRCO CORPORATION
A Fedders Engineered Products Company

CAUTIONS AND WARNINGS

READ AND SAVE THESE INSTRUCTIONS

WARNING!

TO REDUCE THE RISK OF FIRE, ELECTRICAL SHOCK, OR INJURY TO PERSONS, OBSERVE THE FOLLOWING:

A. Read this manual completely before installing or operating the ENVIRCO Biohazard Cabinet.

B. Use this unit only in the manner intended by the manufacturer. If you have any questions, contact the manufacturer:

ENVIRCO CORPORATION
5601 Balloon Fiesta Parkway N.E.
Albuquerque, New Mexico 87113, U.S.A.
Tel : (800) 545-6598
Fax : (505) 345-8875
Email: envirco@envirco.com

ENVIRCO CORPORATION
Eastern Regional Office
18238 Showalter Rd.
Hagerstown, Maryland 21742, U.S.A.
Tel : (800) 645-1610
Fax : (301) 714-4784
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TRION-ENVIRCO
European Operations
Reith Way, West Portway Industrial Estate
Andover, Hampshire, SP10 3TY, England
Tel : +44 (0) 1264 364622
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Email: robflaherty@onetel.net.uk

C. Before servicing or cleaning unit, switch power off at facility service panel and lock service panel to prevent power from being switched on accidentally and follow proper procedures as necessary.

D. The ENVIRCO Biohazard Cabinet is equipped with a three-wire grounding plug for your protection against shock. Insert the plug into a properly grounded three-wire outlet. If only a two-wire outlet is available, it must be replaced with a properly grounded three-wire outlet in accordance with the National Electric Code, and local codes and ordinances. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction. Only a qualified electrician should do this work.

E. Caution: Do not, under any circumstances, cut or remove the grounding prong from the plug.

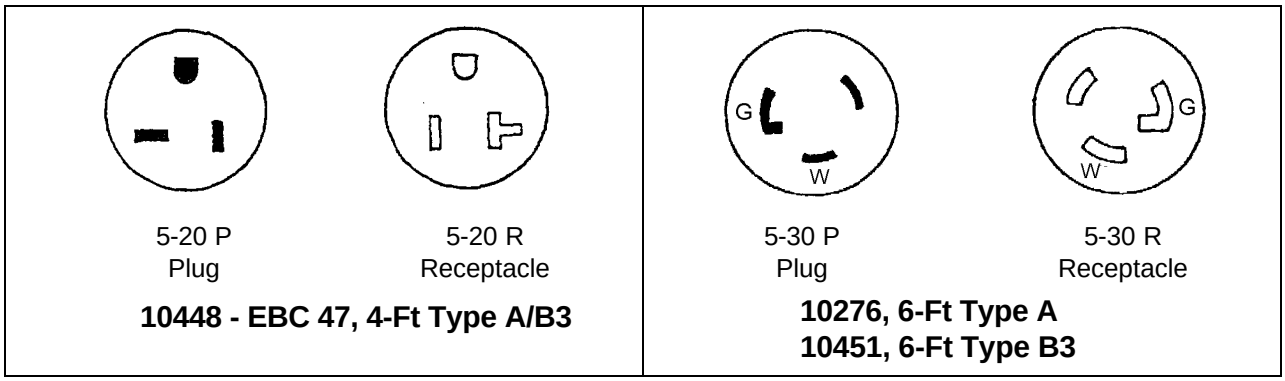

Figure 1: Plug and Receptacle Requirements

F. Unplug the power cord and decontaminate before servicing the cabinet or changing the filters. Do not use extension cords. If the power cord or plug becomes frayed, cracked, broken or otherwise damaged, replace it immediately.

G. Only an Authorized ENVIRCO Service Contractor should service the cabinet; however, the owner can perform certain operations outlined in the manual. Do not attempt to perform any procedures that are not specifically outlined in this manual.

H. Do not remove the caution labels from the equipment or the associated work area except for the instruction label on the viewscreen.

I. Do not remove the front panel or HEPA filters from the ENVIRCO Biohazard Cabinet until the cabinet has been decontaminated.

J. Keep this manual for future reference and for training new operators

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I. INTRODUCTION

Investigators and technicians concerned with microbiological safety have for many years utilized specialized containment enclosures to limit their exposure to harmful pathogens. In addition, it is recognized that exacting research, as well as routine pathology, is often compromised by environmental contamination. The ENVIRCO Class II Biohazard Cabinet is designed to limit the contamination exposure of both the worker and the work when handling biohazard material.

The Class II enclosure is an open face cabinet with a high volume of air recirculated through internal HEPA filters. Air is drawn into the open front of the cabinet and exhausted through a HEPA filter. The controlled airflow direction and volume balance provides protection for the worker, the work (sample) and against cross contamination within the cabinet.

II. DEFINITIONS

Class II, Type A Cabinets (formerly designated Type 1):

1. Maintain a minimum calculated average inflow velocity of 75 fpm through the work area access opening.
2. Have HEPA filtered downflow air from a common plenum (i.e. a plenum from which a portion of the air is exhausted from the cabinet and the remainder supplied to the work area).
3. May exhaust HEPA filtered air back into the laboratory.
4. May have positive pressure contaminated ducts and plenums.

Type A cabinets are suitable for work with low to moderate risk biological agents in the absence of volatile toxic chemicals and volatile radionuclides.

Class II, Type B3 Cabinets:

1. Maintain a minimum (calculated or measured) average inflow velocity of 100 fpm through the work access opening.
2. Have HEPA filtered downflow air that is a portion of the mixed downflow and inflow air from a common exhaust plenum.
3. Discharge all exhaust air to the outdoor atmosphere after HEPA filtration.
4. Have all biologically contaminated ducts and plenums under negative pressure, or surrounded by negative pressure ducts or plenums.

Type B3 cabinets are suitable for work with low to moderate risk biological agents treated with minute quantities of toxic chemicals and trace quantities of radionuclides that will not interfere with the work if recirculated back with the downflow air.

Class II, Type A/B3 Cabinets:

1. Meets the requirements of Class II, Type A cabinets when the HEPA filtered exhaust air is recirculated back to the laboratory.
2. Meets the requirements of Class II, Type B3 cabinets when the exhaust air is vented to the outside atmosphere after HEPA filtration.
3. Confirms to the requirements for either the Type A or Type B3 cabinet outlined above.

III. DESCRIPTION

The ENVIRCO Biohazard Cabinet is a Class II, Type A/B3 unit with HEPA filtered air recirculation, front air barrier and self-contained exhaust. It provides a work area for safe handling of low to moderate risk biohazard materials. It is designed primarily for work in microbiology, virology, tissue culture, and sterility testing.

The Biohazard Cabinet

The cabinet protects the worker from airborne contaminants generated within the work area. It protects the work from airborne contaminants generated in the ambient air and protects against cross-contamination within the work area. The cabinet is designed to comply with NSF[1] Standard 49, Class II, Type A and/or B3 Biohazard Cabinetry and bears NSF seal of compliance.

NOTE**:** The Type A cabinet is suitable for work with low to moderate risk agents.

The Type B3 cabinet is suitable for use with chemical carcinogens and low toxicity fumes or vapors.

[1] NSF International, Ann Arbor, Michigan 48105

IV. FEATURES

1. The hinged viewscreen is constructed with safety glass and has a seven-degree angle for comfortable viewing. The hinge enables easy loading and unloading of work and allows maximum accessibility when cleaning the interior work area.
2. The all stainless steel work area has a lift-out work tray and support for easy cleaning.
3. The self-contained drain pan with external drain valve simplifies flushing and cleanup of major spills.
4. The electrical and air, gas or vacuum outlets within the work area include all internal plumbing.
5. The exhaust flow buzzer warns the operator in the event of loss of containment function.
6. All of the controls, light tubes, and serviceable components are located outside the contaminated area within a convenient, hinged front panel.
7. The heavy duty and stable work deck support provides extremely low vibration transmission.
8. The leak-tight cabinet is designed to provide negative pressure. None of the contaminated air plenums are at positive pressure with respect to the laboratory.
9. The price of the cabinet includes initial on-site testing and certification of proper performance by an Authorized Service Contractor.

V. CABINET DIMENSIONS

Model	A	B	C	D	E	F
10448 – EBC 47, 4-Ft Type A/B3	47.0”	32.5”	62.0”	58.0”	4.0”	28.5”
10276, 6-Ft Type A 10451, 6-Ft Type B3	70.0”	32.5”	62.0”	58.0”	4.0”	28.5”

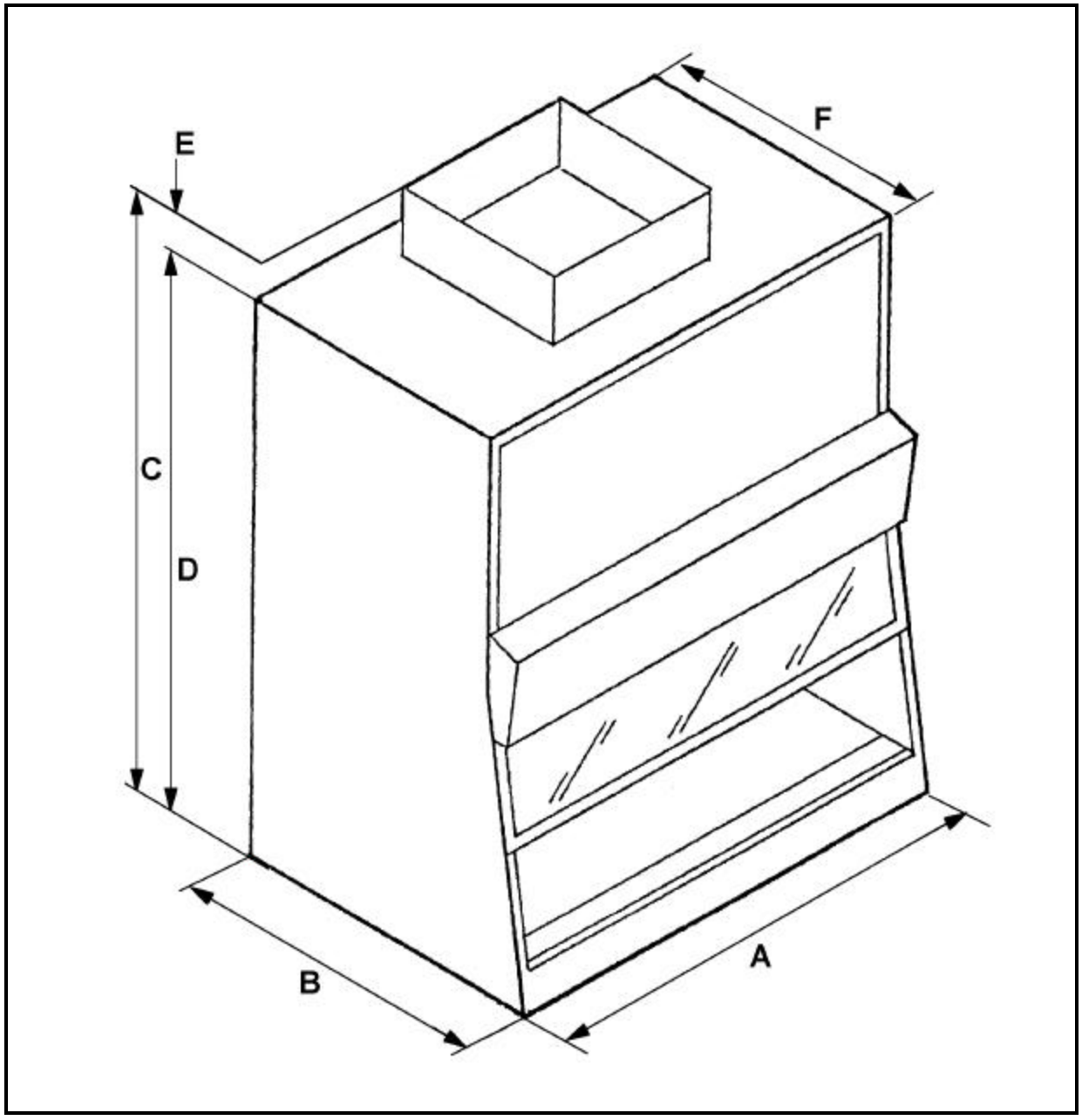


Figure 2: Biohazard Cabinet Dimensions

VI. SPECIFICATIONS

Electrical:

10448 - EBC 47, 4-Ft Type A/B3:	115v, 60 Hz, 20 amp
10276, 6-Ft Type A:	115v, 60 Hz, 30 amp
10451, 6-Ft Type B3:	115v, 60 Hz, 30 amp

10448 - EBC 47, 4-Ft Type A/B3:	Single power cord with a NEC 5-20p cap plug
10276, 6-Ft Type A:	Single power cord with a NEC 5-30p cap plug
10451, 6-Ft Type B3:	Single power cord with a NEC 5-30p cap plug

10448 - EBC 47, 4-Ft Type A/B3:	One (1) 3/4 h.p. motor, thermally protected, automatic reset, SCR speed control
10276, 6-Ft Type A:	Two (2) 1/3 h.p. motors, thermally protected, automatic reset, SCR speed control
10451, 6-Ft Type B3:	Two (2) 1/3 h.p. motors, thermally protected, automatic reset, SCR speed control

All models have separate combination circuit breaker/switches for the motor(s), lights and duplex electrical outlet.

High Efficiency Particulate Air (HEPA) Filters:

Both the recirculating supply air and exhaust air filters remove all particles 0.3 µm and larger in size with an efficiency of 99.99%. The HEPA filters are mounted with a compression spring clamping system.

Physical:

Dimension	**10448 – EBC 47, 4-Ft Type A/B3**	**10276, 6-Ft Type A 10451, 6 Ft Type B3**
Overall Height	62.0 in. (157.5 cm.)	62.0 in. (157.5 cm.)
Overall Depth	32.5 in. (82.6 cm.)	32.5 in. (82.6 cm.)
Overall Width	47.0 in. (119.4 cm.)	70.0 in. (177.8 cm.)
Work Area Height	26.0 in. (66.0 cm.)	26.0 in. (66.0 cm.)
Work Area Depth	21.0 in. (53.3 cm.)	21.0 in. (53.3 cm.)
Work Area Width	45.5 in. (115.6 cm.)	68.5 in. (174.0 cm.)
Face Opening Height	8.0 in. (20.3 cm.)	8.0 in. (20.3 cm.)
Shipping Weight – Cabinet	550 lbs. (249.5 kg.)	750 lbs. (340.2 kg.)

Lighting:

The light intensity at the work surface is between 80-150 foot-candles provided by two (2) fluorescent light tubes controlled by a separate breaker switch.

Airflow

10448 - EBC 47, 4-Ft Type A/B3:

Direct Inflow Method	Type A/B3
-Velocity	100 – 110 fpm
-Airflow	253 – 278 cfm
Calculated Face Velocity	115 – 125 fpm
Exhaust Volume	290 – 316 cfm
Exhaust Filter Area	1.07 sq. ft.
Front Access Area	2.53 sq. ft

Downflow	Velocity
Uniform	72 – 82 fpm
or	
Zoned	
Zone 1 (Back)	67 – 77 fpm
Zone 2 (Center)	67 – 77 fpm
Zone 3 (Center)	80 – 90 fpm
Zone 4 (Front)	74 – 84 fpm

10276, 6-Ft Type A:

Calculated Face Velocity	Type A
-Velocity	85 – 95 fpm
-Airflow	324 – 362 cfm
Exhaust Filter Area	2.33sq. ft.
Front Access Area	3.81 sq. ft.

Downflow	Velocity
Zone 1 (Back)	54 – 64 fpm
Zone 2 (Center)	53 – 63 fpm
Zone 3 (Front)	67 – 77 fpm

10451, 6-Ft Type B3:

Calculated Face Velocity	Type B3
-Velocity	100 – 110 fpm
-Airflow	381 – 419 cfm
Exhaust Filter Area	2.33sq. ft.
Front Access Area	3.81 sq. ft.

Downflow	Velocity
Zone 1 (Back)	75 – 85 fpm
Zone 2 (Center)	75 – 85 fpm
Zone 3 (Front)	68 –78 fpm

NOTES:

1. In performing the velocity profile test, the front row of velocity readings (behind the window) must be taken with the thermoanemometer probe positioned **perpendicular** to the window with the probe head facing the window.
2. Velocity readings for the middle row(s) and rear row must be taken with the probe positioned **parallel** to the window.
3. In performing the calculated face velocity test, the exhaust transition collar must be removed when taking air velocity readings with a thermal anemometer probe. This is the manufacturer's recommended method for balancing the 10276 and 10451.
4. Direct Inflow Method is the manufacturer's recommended method for balancing the 10448-EBC 47.

Construction:

The all-steel, welded unitized construction is leak tight at 2.0-in. water gauge (500 Pa) positive pressure. The exterior is finished with chemically resistant polyurethane enamel. The work area is constructed of 304, 16 gauge stainless steel.

Color:

Blue and White.

VII. INSTALLATION

Cabinet Location

The cabinet should be placed in an area of the laboratory free from strong air currents, heavy traffic and particulate microbial or chemical contamination. This will reduce any disruption of the airflow patterns at the face opening and will prolong the life of the HEPA filters.

The ceiling height above the cabinet should allow four (4) inches of clearance above the exhaust area to allow free air passage.

Installation and Leveling

Caution: Do not remove the front panel. Removal will void the Factory Leak Tight Air Seal Test.

Bench Top Installation

Set the cabinet on the bench top with five (5) inches overhanging in the front. Thread the drain valve in place and tighten. Put the work deck support and pan in place. Level the work deck by placing metal shims under the bottom of the cabinet. Silicone caulking can also be applied to seal the area between the bench top and the cabinet.

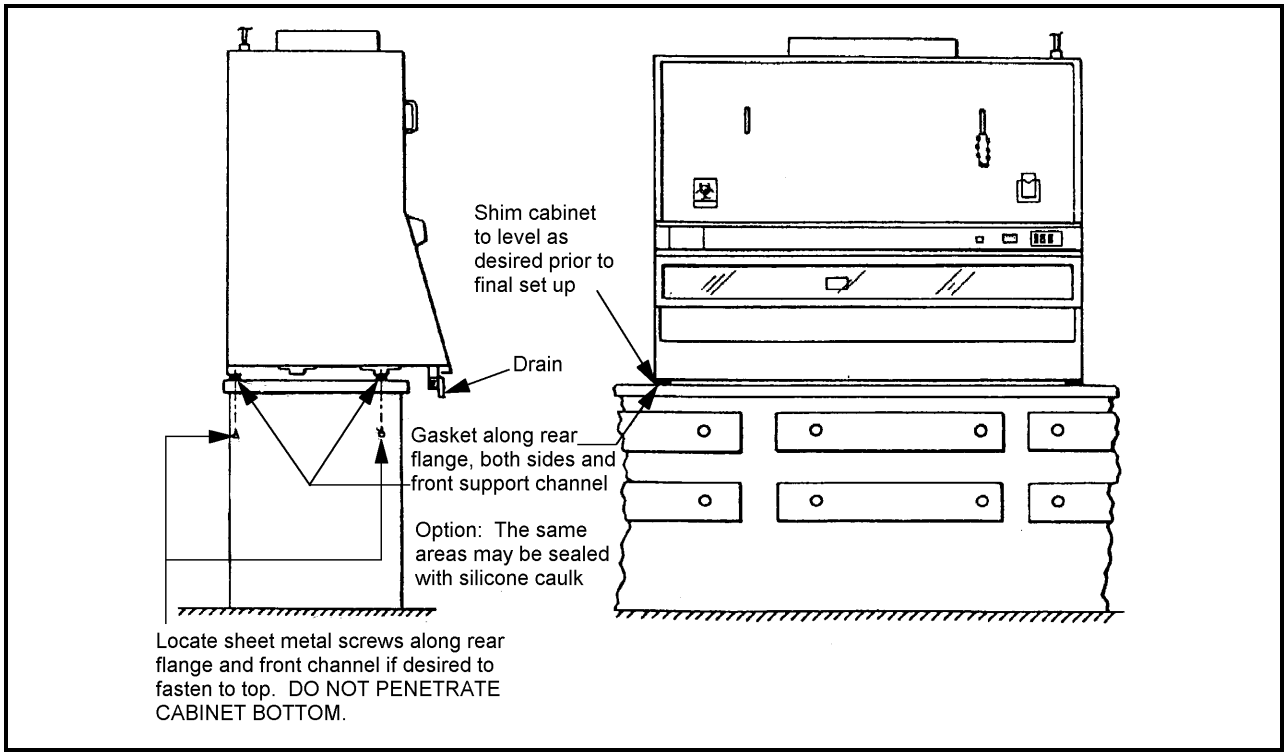


Figure 3: Bench Top Installation

Service Connection

Make sure that a 20 amp, 115 V outlet with the proper receptacle is available for the 10448 - EBC 47, 4-Ft Type A/B3. Both the 10276, 6-Ft Type A and the 10451, 6-Ft Type B3 units require a 30 amp, 115 V outlet with the proper receptacle.

Connect the air, gas or vacuum service line to the external connection point located on the top of the cabinet. The connections should be field tested for leak tightness.

Warnings and Other Identification Label Locations

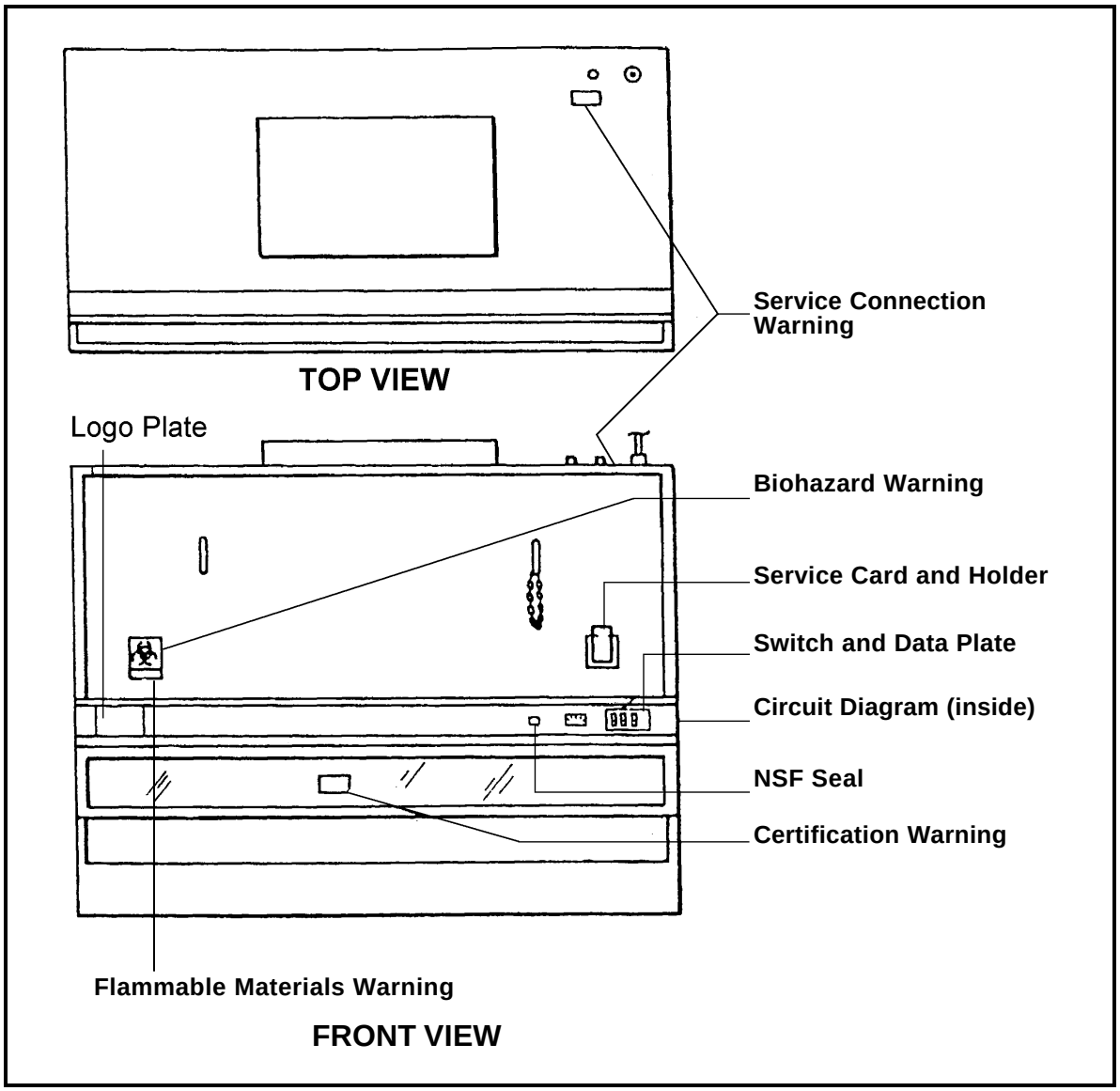


Figure 4: Top and Front Cabinet Views with Label Locations

External Exhaust Connection (Optional)

Under normal conditions, the Class II Type A Cabinet does not require external exhaust from the laboratory. However, when used in the Type B3 configuration, the cabinet must be connected to an external laboratory exhaust system with the use of a thimble connection. This ensures that the exhaust air balance of the Biohazard Cabinet is not disturbed by fluctuation in the external exhaust system.

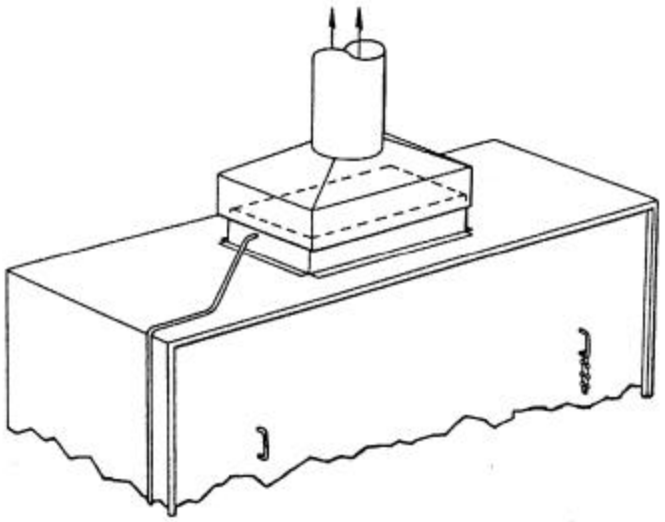
In order to assure a negative pressure exhaust system, the external exhaust capacity should be sized as follows:

10448 - EBC 47, 4-Ft Type A/B3:	305-cfm minimum
10451, 6-Ft Type B3:	460-cfm minimum

Since the exhaust transition is a thimble connection, the exhaust motor/blower need only be sized to overcome the resistance of the facility exhaust system.

NOTE: The customer must install the thimble connector suspension and provide the external exhaust system fan and damper.

External Exhaust Through Ceiling



Transition Dimensions

10448 - EBC 47 Thimble
14-¼" W x 22-¼" D
to 10" round

10451 Thimble
26-½W x 20-¼" D
to 10" round

Figure 5: External Exhaust Through Ceiling

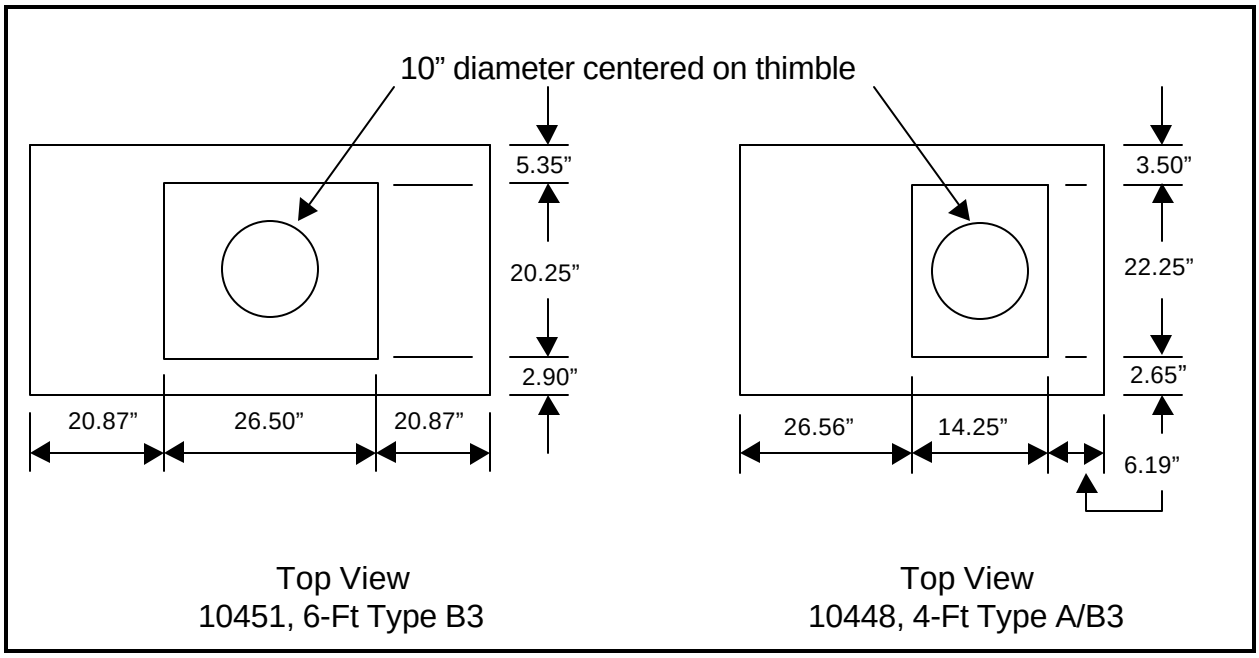


Figure 6: Thimble Exhaust as Viewed from Front of Unit

VIII. TESTING AND CERTIFICATION

The ENVIRCO Biohazard Cabinet has been fully tested by the manufacturer prior to shipment, however, shipping and handling during installation may result in leaks in the HEPA filter or other cabinet seals. The cabinet should be adjusted for proper airflow balance after it has been installed in the final location.

Recommended Tests

The following tests are recommended at initial installation:

1. Aerosol Leak Test of the recirculating air HEPA filters.
2. Aerosol Leak Test of the exhaust air HEPA filter.
3. Adjustment of the airflow within the cabinet to an average velocity per values on page 10 of this manual.
4. Adjustment of the exhaust air volume to provide a minimum inward airflow per values on page 10.
5. Visually verify that an inward airflow exists around the entire periphery of the face opening using an acceptable smoke challenge.
6. Check electrical continuity between cap plug ground pin and exposed metal cabinet surfaces to verify that electrical resistance does not exceed 0.15 ohms. Initial on-site testing and certification of the ENVIRCO Biohazard Cabinet is included with the purchase of the unit. Contact an Authorized Service Contractor to arrange for certification date. Testing and certification service includes operation and maintenance training for the unit and validation of the manufacturer's warranty. Operation of the cabinet prior to authorized certification may void the warranty and service contract or result in additional service contractor charges.

Authorized Service Contractor

ENV Services, Inc.
(800) 345-6094

Service Record

A service record card is permanently attached to the front of the cabinet. An Authorized Service Contractor will record service functions and validate the card upon completion of certification.

Re-certification

It is recommended that the ENVIRCO Biohazard Cabinet be re-certified every six (6) months and the HEPA filters are replaced if necessary. An Authorized Service Contractor can provide this service upon request and should be contacted directly.

On-Site Testing Procedure

HEPA Filter Leak Testing

The approved method of testing is to challenge the integrity of the HEPA filters by introducing a cold polydispersed aerosol[2] upstream from the HEPA filters while using a light scattering photometer to detect any aerosol penetration at the downstream surface of the filter.

Test Equipment Required

1. Air operated “Laskin Nozzel” type aerosol generator to produce an aerosol with a mean particle size of 0.7 micron
2. Light Scattering Aerosol Photometer
3. Silicone RTV
4. Rubber-base solvent cement
5. Silicone stopcock grease

Preparation

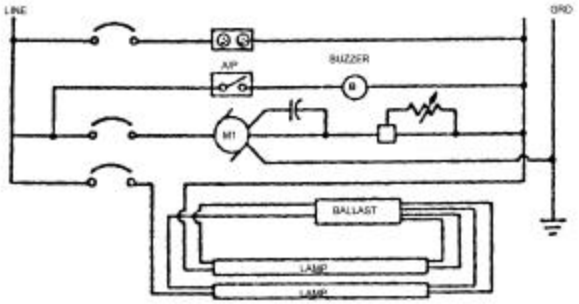
1. Remove perforated aluminum diffuser screen at top of work area to expose the recirculating supply HEPA filter.
2. Open the electrical control panel by removing two bolts at each end. Pull the rubber tubing off the magnehelic gauge.
3. Disconnect warning buzzer at left-hand side of harness.
4. Remove the work tray.
5. Turn cabinet blower "ON."
6. Locate aerosol generator output hose so that aerosol is fed into the return air plenum at the back of the work area.

[2] NSF 49 (1992 edition)

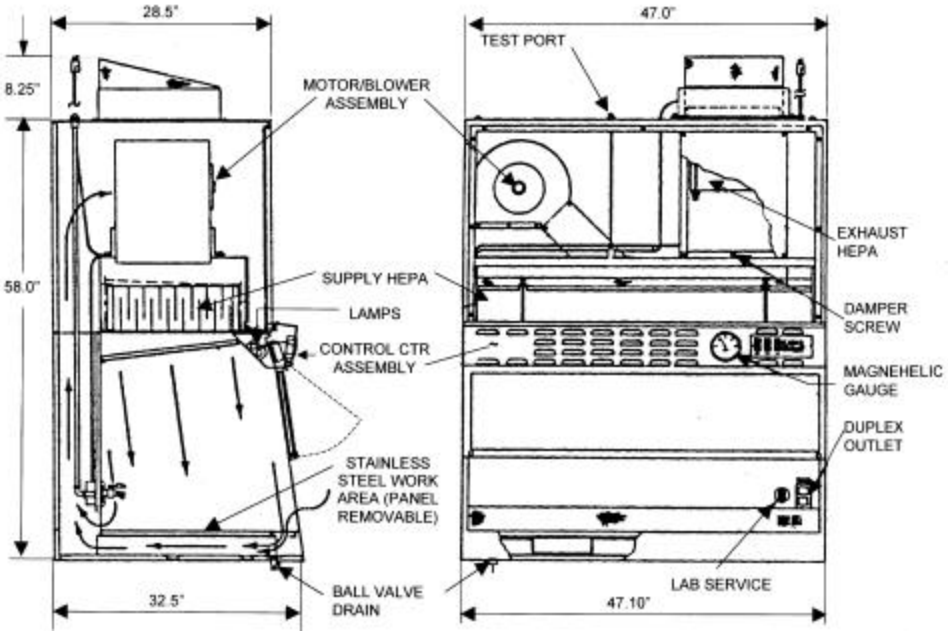
Testing

1. Calibrate the photometer with the aerosol generator so that the upstream concentration is 100 percent. The upstream concentration for all HEPA filters may be sampled by removing the pipe plug from the penetration provided on the top front of the cabinet and inserting the photometer probe in the penetration fitting. Set the photometer to ZERO and verify the 100 percent upstream and zero downstream readings are achieved. Set the range switch to read a minimum of 0.01 percent.
2. Carefully scan the faces of the recirculating supply and exhaust filters, particularly around the edges of the sealing gaskets and adhesive seal. Hold photometer probe about one inch from the filter surface and scan at about two inches per second.
3. Identify and repair any leaks greater than 0.01%.

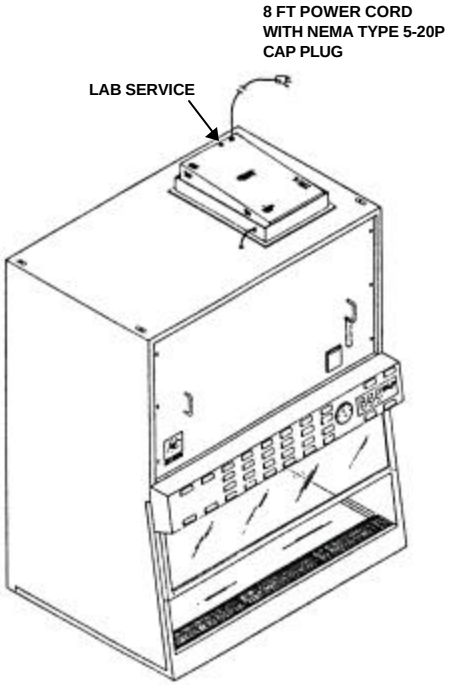
Drawing Number
PD – 10448-EBC 47



WIRING DIAGRAM



SIDE SECTION FRONT ELEVATION
(Access Panels Removed for Clarity)



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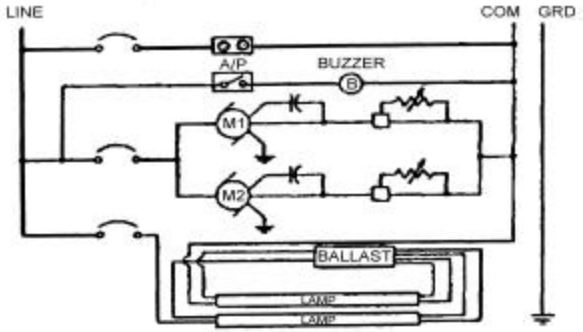
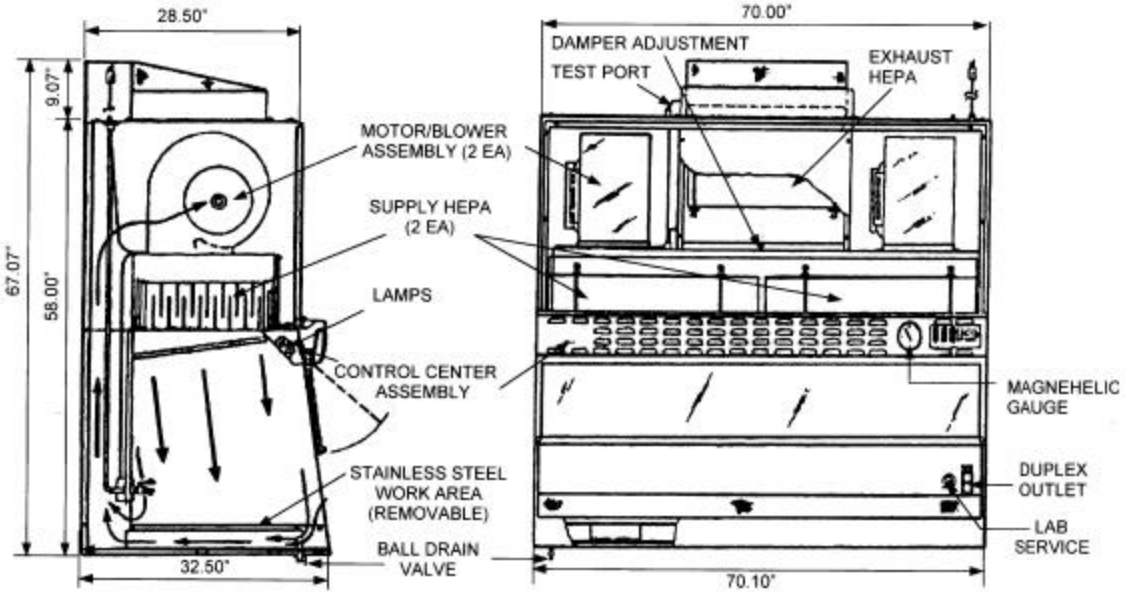
IX. 10448 - EBC 47, 4-Ft Type A/B3 CABINET DRAWING

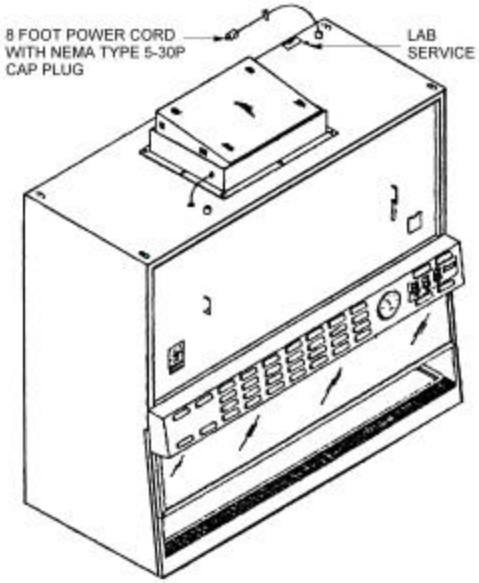
Drawing Number
PD – 10276 / 10451



WIRING DIAGRAM



SIDE SECTION FRONT ELEVATION
(Access Panels Removed for Clarity)



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X. 10276, 6-Ft Type A and 10451, 6-Ft Type B3 CABINET DRAWING

XI. FILTER REPAIRS

Caution: If the cabinet has been used with infectious agents, decontamination is necessary before removing access panels.

Shipping movement and handling may cause filter leaks. These leaks can normally be repaired as follows:

1. Caulking with silicone RTV can usually repair small leaks in the filter media or at an adhesive joint from the downstream side of the HEPA filter.
2. Leaks at gasket seal may also be stopped with the RTV sealant on the downstream side. If leaks cannot be stopped from the downstream side, the cabinet access panels must be removed.
3. To seal major leaks in gasket or filter media, first remove main access panel then the inner filter access panel to expose upstream side of filter. Remove filter and seal leaks by pouring rubber base cement down into leaking area. Check for separation at gasket corners and repair with silicone RTV. Put silicone grease on gasket surface before re-installing filter to improve gasket seal.
4. Re-install filter access panels, and retest. Put silicone grease on exterior door gasket before re-installing on the cabinet. Do not over-tighten access panel screws. Replace the tubing on the magnehelic gauge and reconnect the warning buzzer. Replace the filter screen and exhaust damper housing. Set the damper with blades about 3/8 inch open to begin airflow adjustment.

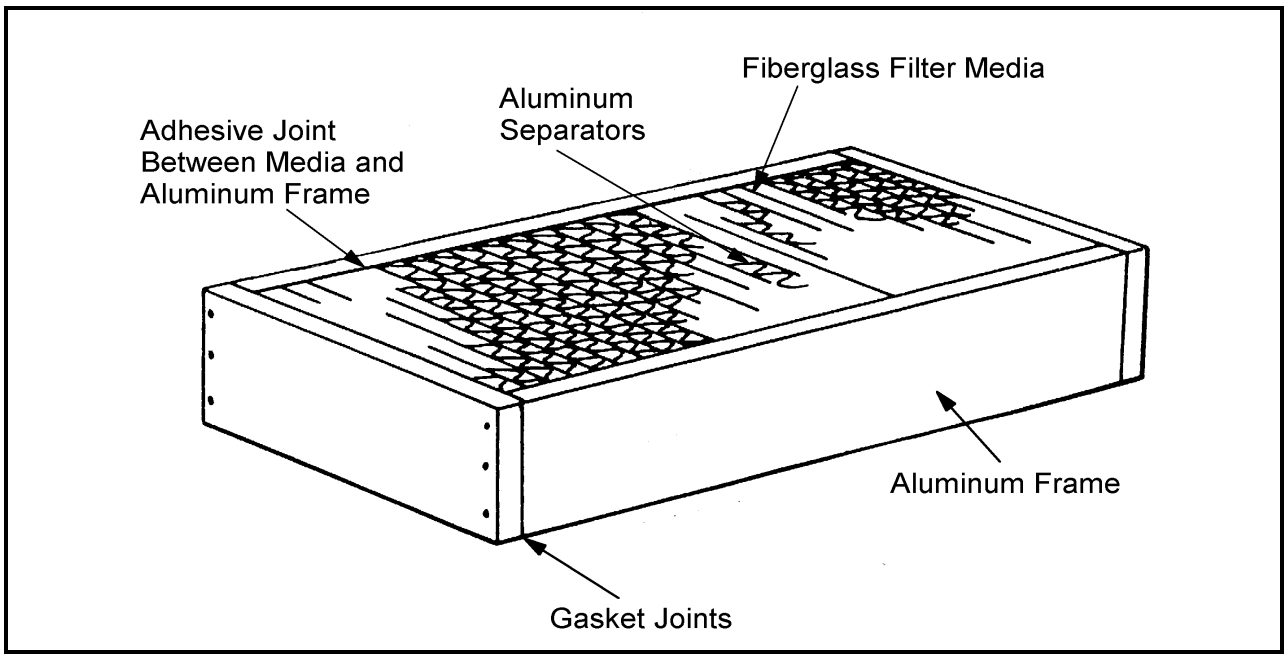

Figure 7: Supply HEPA Filter

XII. AIRFLOW ADJUSTMENT

Airflow adjustments can be made with either the solid state speed control inside the electrical control panel and/or with the exhaust damper. Access to the damper adjusting rod is gained through the plugged access hole in the front access panel of the cabinet. The recirculating supply airflow and the exhaust airflow velocities must be set per values on page 10 of this manual. The recirculating supply and exhaust airflows are interactive; therefore some re-adjustments may be required if either is changed significantly.

Equipment

1. An airflow thermal anemometer with sensing probe at least eight inches long and less than ¼inch in diameter.
2. A Shortridge Airdata Multimeter ADM-870 with 8" x 24" hood. This recommended, but not required.

Downflow - Recirculating Supply Airflow Measurement

The recirculation supply air velocity is measured within the work area enclosed by perimeter walls and viewscreen in the horizontal plane defined by the bottom edge of the viewscreen. Measurement points are shown in Figures 8-9. Measure and record all points and calculate the average zone velocities. Adjust the solid state speed control and/or exhaust damper as required to achieve averages within the above stated limits.

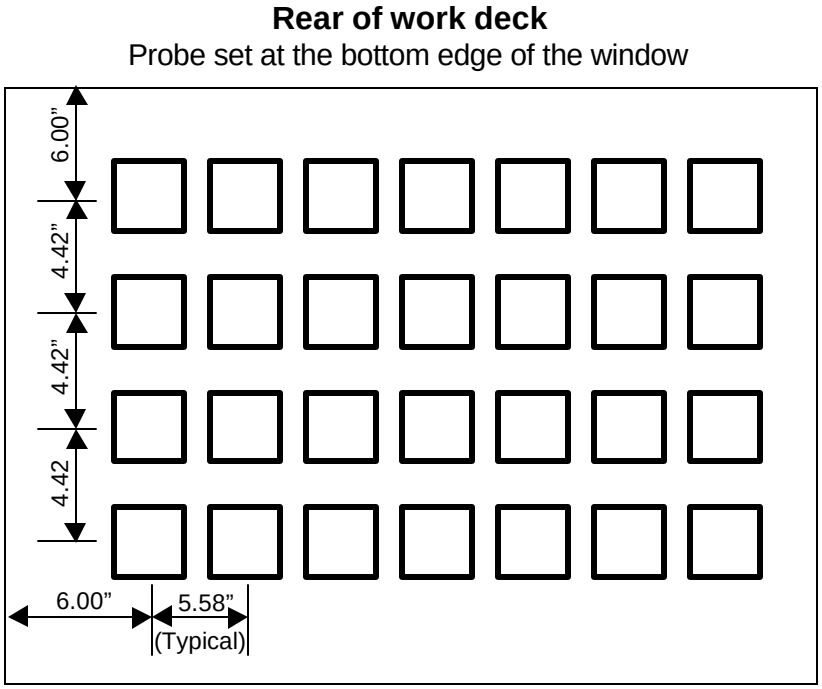

Figure 8: Downflow Velocity Grid, 10448 - EBC 47, 4-Ft Type A/B3

Rear of work deck

Probe set at the bottom edge of the window

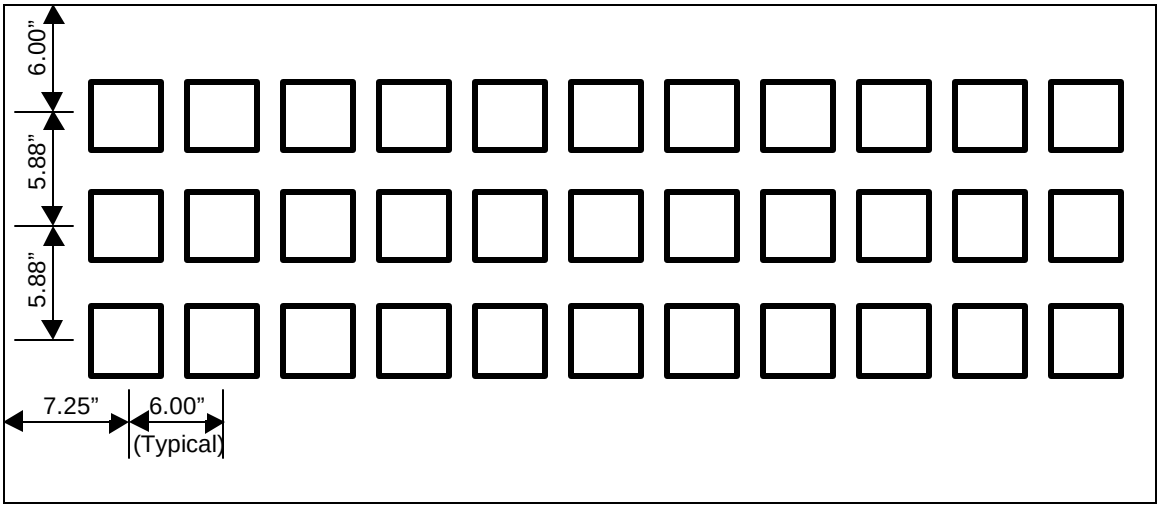

Figure 9: Downflow Velocity Grid, Models 10276, 6-Ft Type A and 10451, 6-Ft Type B3

Inflow Airflow Measurement (Type A & Type B3 Units)

Direct Inflow Method

The inflow airflow is measured by placing the 8” x 24” hood directly in front of the window and blocking off the entire remaining opening. Take measurements with the Shortridge device and adjust the exhaust airflow by adjustment of the interior damper and the solid state speed control, as required.

Calculated Method

The exhaust airflow is measured approximately four inches above the face of the exhaust filter even with the top plane of the exhaust housing. Take measurements at approximate locations as depicted by the exhaust velocity grids shown below. Adjust the exhaust airflow by adjustment of the interior damper and/or the solid state speed control.

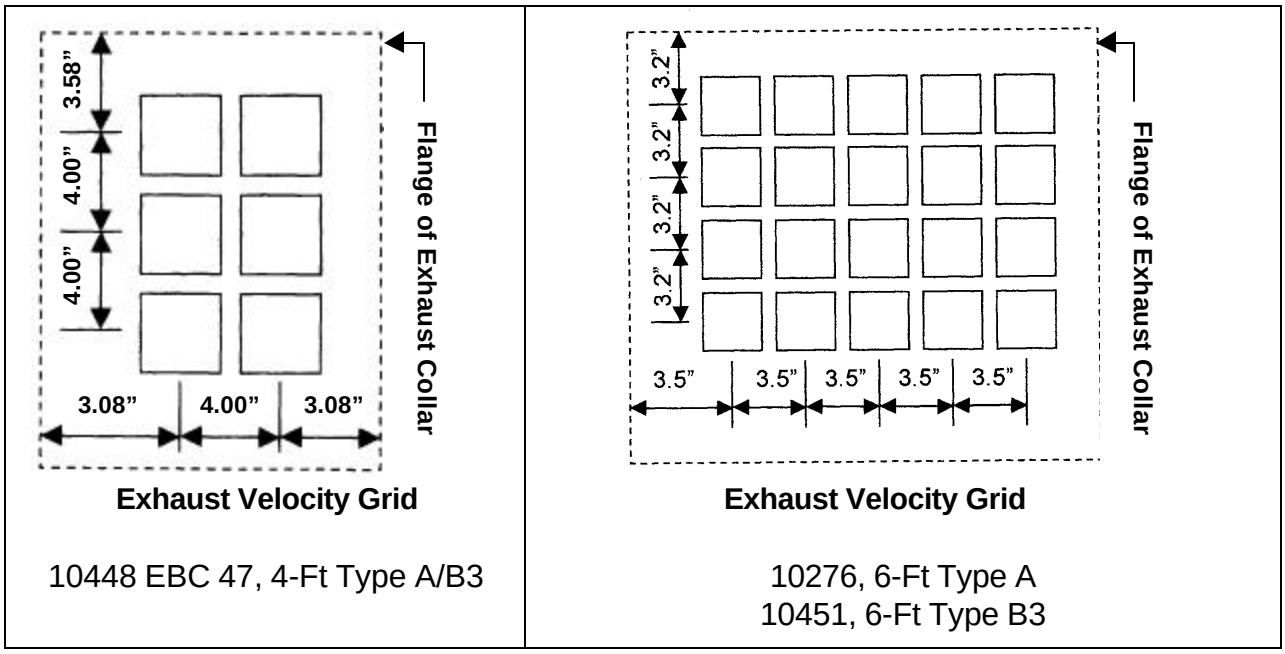

Figure 10: Exhaust Velocity Grid

XIII. POST-INSTALLATION TESTING

Visual Containment Test

After the cabinet has been balanced for proper air velocity readings, it should be checked with a simple visual smoke test.

1. Hold the smoke source outside the cabinet face opening and make sure that smoke is pulled into the opening around all four (4) sides. Hold source three (3) to four (4) inches away from cabinet and scan around the entire opening.
2. Hold the smoke source inside the work area behind the glass viewscreen and make sure that no smoke escapes the front opening. Hold source four (4) inches behind the viewscreen and about 12 inches above the work deck. Scan cabinet from side-to-side.
3. Hold the smoke source inside the work area along the front to back centerline of the work deck and about 12 inches above the work deck. Check the front to back split of the airflow across the work deck near the center of the cabinet.

Electrical Tests

Electrical grounding tests should be made to assure that all exposed metal surfaces of the cabinet are grounded.

Equipment

0-1 ohm full scale ohmmeter

Testing

1. Disconnect the cabinet from the power source.
2. Connect one lead of the ohmmeter to the ground pin on the power cord plug.
3. Touch the other lead to the ground pin on the convenience outlet, stainless steel work deck, viewscreen frame, and several of the exposed screw fasteners on the front of the cabinet.
4. The ground resistance should be less than 0.15 ohms at any test location.

XIV. SUGGESTED WORKING PROCEDURES

Cabinet Operation

After the cabinet has been properly installed and certified, it is ready for use. The three switches on the control panel operate the cabinet blower system, fluorescent lights, and convenience outlet separately.

Surface Decontamination

To disinfect the work area before use, turn the blower system "ON," raise the viewscreen and secure it with the bead chain holder, wipe the stainless steel and all work area components, including the inside of the viewscreen, with a fast-drying, non-corrosive disinfectant. Remove the two screws located at the two front corners of the perforated diffuser grille above the work area. Carefully remove the grille and clean it on both sides. Do not attempt to clean the bottom of the HEPA filter since any contact with the filter surface may cause damage and contamination leakage.

After the cabinet is turned “OFF,” the work surfaces should be cleaned with a disinfectant. The work tray, front air grille, and work tray support/rear air grille can be removed to facilitate the clean up of any spillage.

An optional UV light accessory (#22557) can be used for interior work surface decontamination. The UV light accessory fits into the face opening and the power and switching function is supplied from the convenience outlet within the cabinet.

Surface Maintenance

Painted surfaces and the outside of the safety viewscreen may be cleaned with soap and water. A light abrasive soap can be used on the stainless steel areas to help remove scratches and stains. Rub in the direction of the grain only.

Use Of Ancillary Equipment

Do not use equipment requiring more than three (3) amperes maximum.

Bunsen Burner

Caution: Bunsen Burners should never be operated unless the cabinet blowers are turned “ON.” The use of flammable materials within the cabinet is not recommended. Bunsen Burners must be operated so as to prevent unburned gas mixture collection in the cabinet.

If a flame is required within the work area, a small "touch-light" type should be used to minimize heat build-up and subsequent operator discomfort that a continually burning flame may create. To avoid exposing an open flame within the work area, an incinerator-type sterilizer is recommended for sterilizing inoculating loops.

Blender

Caution: Be sure that the unit is operating before starting either a centrifuge or blender. The cabinet must continue to operate for a minimum of five (5) minutes after the appliance is turned “OFF.”

A blender may be operated in the unit. Because of the severity of the aerosol generated, however, it is suggested that the operator keep his or her arms, other equipment and containers out of the work area during this procedure.

Working in the Biohazard Cabinet

Caution: Because of the highly specialized nature of the ENVIRCO Biohazard Cabinet, it is recommended that an Authorized Service Contractor perform all service and maintenance. A maintenance and service decontamination procedure is available upon request.

1. The cabinet is ready to use only after an Authorized ENVIRCO Service Contractor has completed on-site testing and certification procedures.
2. All equipment should be clean before being placed inside the cabinet work area.
3. Close the viewscreen and secure it in the working position.
4. Turn on the lights and blowers with the switches located on the control panel and wait until the airflow reaches an acceptable speed.
5. Test for airflow containment by holding a smoke source in front of the cabinet opening. This simple visual smoke test is described on page 24 in the "Visual Containment Test" section of this manual. This procedure may be repeated daily, however, routine re-certification of the cabinet is always recommended.
6. Allow the cabinet to run for five (5) minutes in order to remove any airborne particulate material from the system before beginning work.
7. Equipment should not obstruct the front and rear return grilles in order to maintain proper airflow and avoid air turbulence. Work procedures should be conducted only on the non-perforated work surface.
8. All equipment and containers should be placed in the cabinet before work is begun. The front viewscreen should never be lifted during a procedure, as this disrupts the airflow characteristics of the cabinet and may allow contaminated air to leave the cabinet and room air to enter the cabinet.
9. Unnecessary items should not be stored in the work area.
10. The cabinet does not have the ability to remove contaminants from its surfaces. To prevent surface-to-surface contamination, clean all equipment using proper safety and clean handling techniques.
11. The operator's hands and arms should be placed into and withdrawn from the work area slowly, thus preventing "dragging" of air from one environment to the other. Laboratory coat sleeves and cuffs should fit snugly on the operator's arms in order to avoid trapping the contaminated air that is entering front return grille. Surgical gloves are recommended while working in the cabinet.
12. After the working procedure is completed and the containers of biohazardous material are closed and sealed, the cabinet should be allowed to run for five (5) minutes to remove airborne contamination within the cabinet before the equipment and containers are removed. If the normal daily working routine in the cabinet includes the constant exposure of low to moderate risk level agents, it is suggested that the cabinet be operated continuously, 24-hours a day, seven (7) days a week.

XV. CABINET PRESSURE TESTING

The ENVIRCO Biohazard Cabinet is designed so that there are no contaminated plenums under positive pressure when the cabinet is operating. The entire outer shell of the cabinet and the work area are at negative pressure with respect to the laboratory. Therefore, any leakage at the cabinet penetrations or at the access panels is "inward" and thus not a contamination hazard.

The outside access panel is sealed and the cabinet is designed to be airtight at two (2) inch water gauge over-pressure when the open face and the exhaust openings are sealed off.

A test of the cabinet seals after removal of the access panel can be accomplished using the following procedure:

Suggested Equipment

1. Heavy vinyl sheeting and two-inch plastic or rubberized tape to seal off the cabinet openings.
2. A small compressor or the building's compressed air source.
3. A detergent solution or other liquid leak detector solution in a hand-held spray bottle.

Test Procedure

1. Seal off the front opening of the cabinet and the exhaust opening. When taping the plastic in place, ensure that a complete pressure-tight seal is formed.
2. Connect the pressure source to the drain valve fitting located on the bottom of the cabinet. The valve can be used to control the air pressure feed into the cabinet.
3. Using the magnehelic gauge mounted on the front of the unit to monitor the pressure, pressurize the cabinet to two-inch water gauge.
4. Using the soap solution, spray around the access panel opening and other cabinet penetrations. The formation of soap bubbles indicates an air leak that may be sealed off by tightening the fasteners or by using a silicone rubber construction joint adhesive.

NOTE: The Electrical Control Compartment may be completely removed by unplugging the wiring spade connectors from the terminal block on the right side and removing the hinge screws. Unplug the power cord before attempting to remove the compartment.

XVI. LABELING USED ON THE CABINET

Review all labeling on the ENVIRCO Biohazard Cabinet as it provides both the installer and the worker with important information regarding cabinet function and safety.

WARNING

Service Connection(s)

If not used, leave cap plugs in place to maintain sealed cabinet integrity

SERVICE CONNECT WARNING

NSF SEAL

IMPORTANT

Do Not Plug in Cabinet.

Do Not Use Cabinet Until Certification Has Been Completed.

Verify That 115V Electrical Receptacle, NEMA Type 5-20R is Available and Located Within Reach of Cabinet Power Cord.

CALL FOR CERTIFICATION
Contact: ENV Services, Inc.
1016 W. Eighth Avenue
King of Prussia, PA 19406
(800) 345-6094

CERTIFICATION WARNING

SERVICE RECORD
(Form SM 30-008)

Ser. No._____
Installed_____
By _____

Record service other than recertification on opposite side of card.

SIX MONTH RECERTIFICATION as per Fed. Std. 209b

Date	Signature

SERVICE CARD

WARNING: To avoid possible contact with infectious agents, DO NOT REMOVE FRONT PANEL until the cabinet has been decontaminated.

See Operator's Manual for instructions

BIOHAZARD WARNING

DO NOT USE OR STORE FLAMMABLE MATERIALS IN THIS CABINET

FLAMMABLE WARNING

XVII. WIRING DIAGRAMS

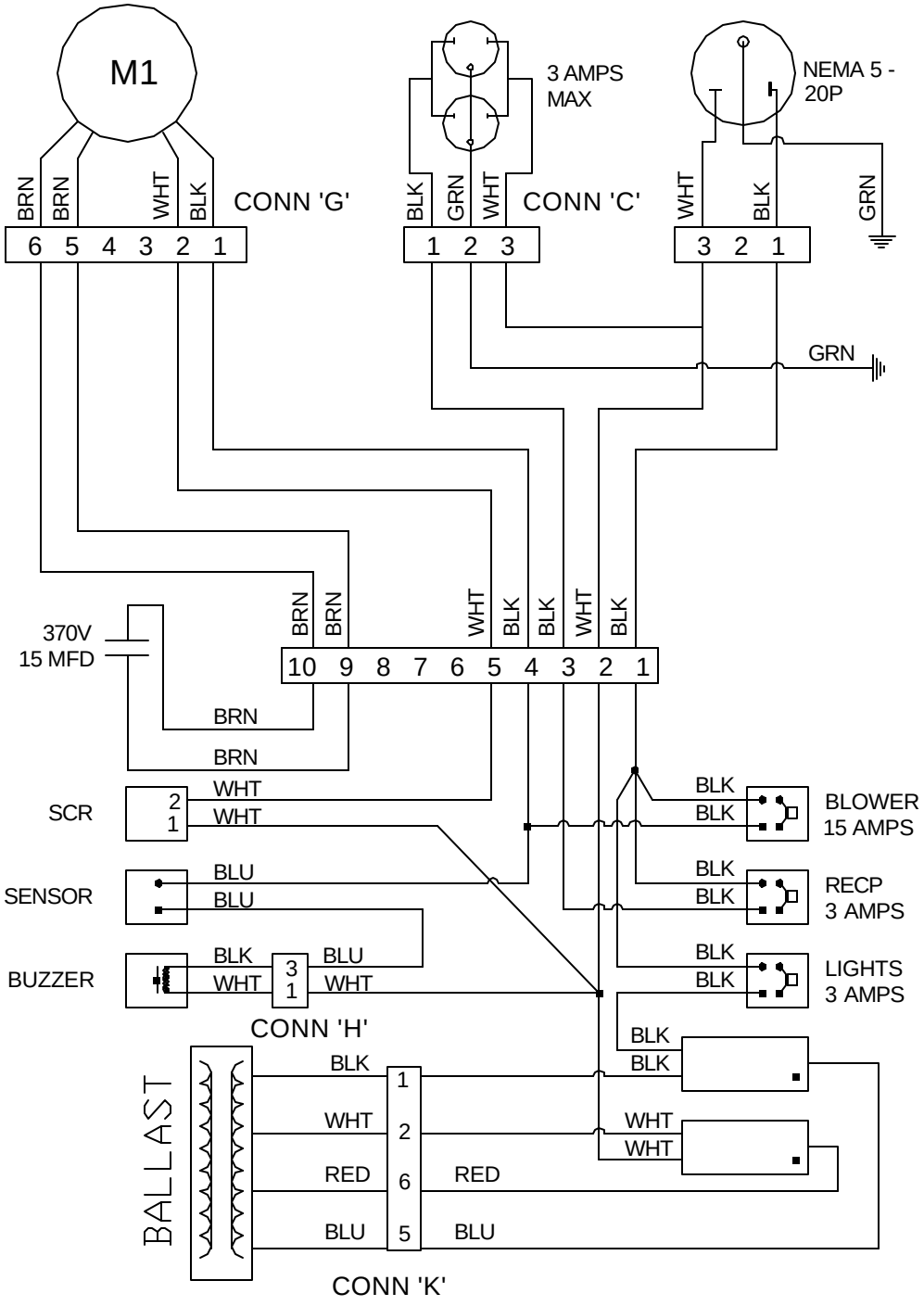

Figure 11: 10448 - EBC 47 (4-Ft Type A/B3) Wiring Diagram

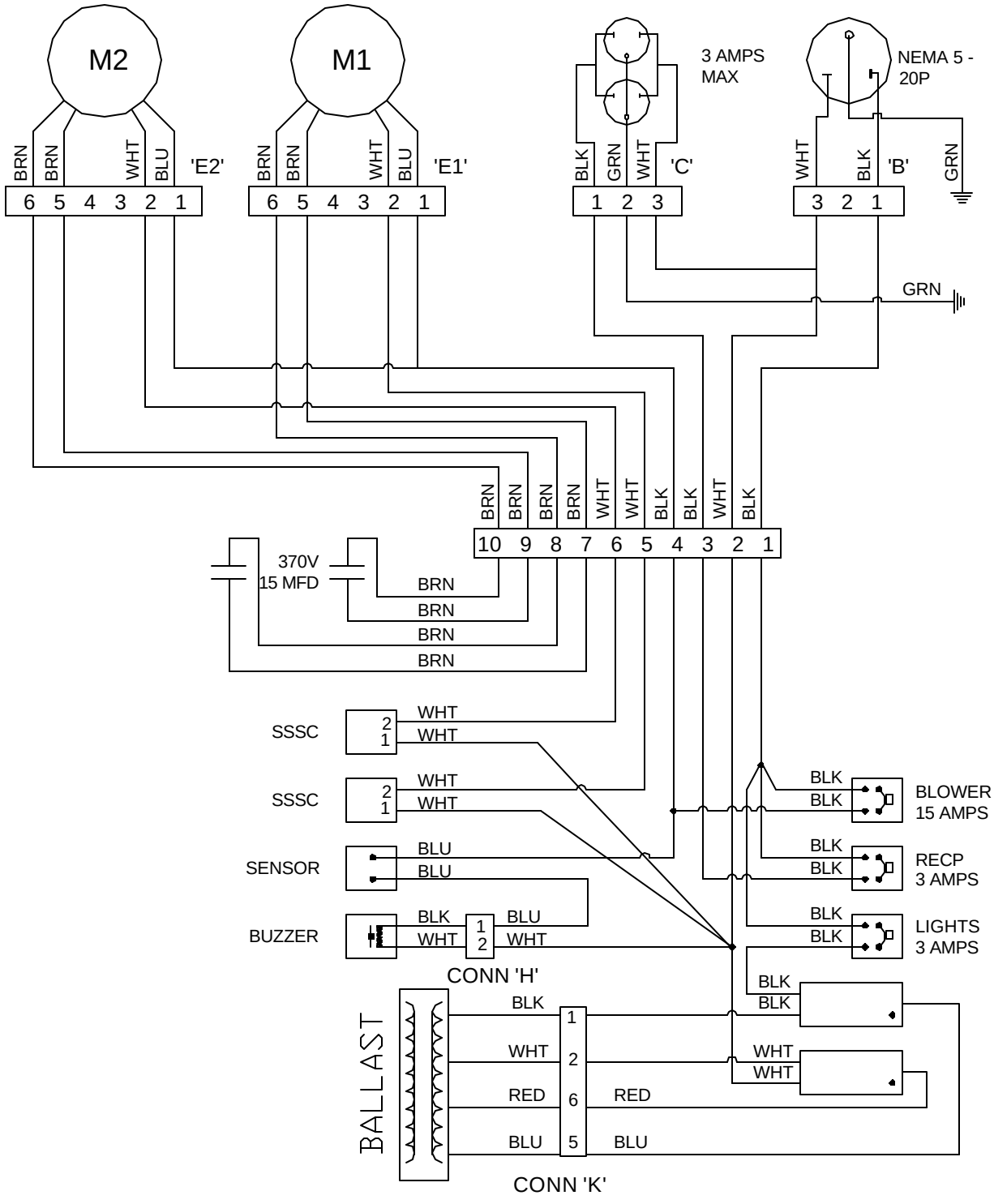

Figure 12: 10276 (6-Ft Type A) and 10451 (6-Ft Type B3) Wiring Diagram

XVIII. HEPA FILTER REPLACEMENT

The HEPA filters require replacement when the air resistance is such that the specified air velocities cannot be achieved. Replacement should also be made when the HEPA filter is damaged beyond repair or if five percent or more of the filter surface has been patched. Only an Authorized Service Contractor should replace the HEPA filters.

Filter Removal

Caution: Do not remove the front panel until the cabinet has been decontaminated.

Remove the front access panel by removing the holding screws. Next, remove the lower, inner access panel(s) to gain access to the supply air HEPA filter. Finally, remove the upper, inner access panel to gain access to exhaust HEPA filter.

Loosen the four (4) bolts holding the spring clamp on each filter. The 10448 - EBC 47, 4-Ft Type A/B3 cabinet has a baffle above the supply HEPA filter that must be removed first. Remove the bolts, springs and bars. The exhaust filter should drop down for easy removal. The supply air filter may be lifted out of the cabinet. All used filters should be disposed of by incineration.

Filter Installation

Install the new filters in the same way as the old filters were removed. The filter media is very fragile and even slight finger pressure on the filter pack itself may cause damage. Handle the filters by the aluminum frame edges only. Be sure to replace the baffle on the 10448 - EBC 47, 4-Ft Type A/B3 cabinet.

Tighten the spring clamps until the spring is not quite fully compressed. Do not over-tighten.

Replace all access panels. A light coat of silicone grease should be placed on the front access panel gasket before replacing. If the gasket was damaged upon removal, install a new gasket before reinstalling the panel.

After the HEPA filters have been replaced, a filter leak test procedure should be performed to verify the filter seals, and a cabinet pressure leak test should be performed to verify the access panel seal. The airflow velocity should also be checked and adjusted as necessary.

XIX. REPLACEMENT AND OPTIONAL PARTS

DESCRIPTION	PART NUMBER 10448 – EBC 47	10276 / 10451
Assembly, Motor/Blower	23002	22425 (2 ea.)
Motor, 3/4 H.P. O.D.P., 1625 rpm	62367 (1 ea.)	
Motor, 1/2 H.P. O.D.P., 1625 rpm		61806 (2 ea.)
Breaker Switch, 3 amp	61865 (2 ea.)	61865 (2 ea.)
Breaker Switch, 15 amp	62364	
Assembly, Speed Control	23371	23371 (2 ea.)
Lamp, F42T12CW	64650	
Lamp, F65T12CW		61660
Breaker Switch, 20 amp		62372
Viewscreen	22879	22880
Filter, 12" x 18" x 12"	69015	
Filter, 18" x 24" x 12"		61702
Filter, 18" x 44" x 6"	69011	
Filter, 18" x 34" x 6"		61701 (2 ea.)
Magnehelic Gauge, 0-2"	60899	60899
Diffusion Screen	22468	22546
3/8" Ball Valve Drain	62560	62560
Service Record Card	61246	61246
Gasket, Closed, 1/4" x 3/4"	60105	60105
Assembly, Ballast	20077	32151
Bead Chain with hook	22471	22471
Exhaust Thimble	10666	10667
UV Light Accessory	22557	22557

Parts can be ordered from:

ENVIRCO CORPORATION
5601 Balloon Fiesta Parkway N.E.
Albuquerque, New Mexico 87113, U.S.A.
Tel : (800) 545-6598
Fax : (505) 345-8875

XX. BIBLIOGRAPHY

1. Effective Use of the Laminar Flow Biological Safety Cabinet. U.S. Department of Health, Education and Welfare, Office of Biohazard and Environmental Control, Bethesda, MD.
2. Federal Standard No. 209B, U.S. Government Printing Office, 1973, Superseding Federal Standard No. 209A, 1966.
3. National Cancer Institute Safety Standards for Research Involving Chemical Carcinogens, DHEW Publication No.(NIH) 76-900, 1975.
4. NSF International Standard No. 49 for Class II (Laminar Flow) Biohazard Cabinetry, 1992.
5. U.S. Department of Health, Education and Welfare, Public Health Service Center for Disease Control, Classification of Etiologic Agents on the Basis of Hazard, 4th Edition, July 1974.
6. U.S. Department of Health, Education and Welfare, Public Health Service, National Institutes of Health, Certification of Class II (Laminar Flow) Biological Safety Cabinets.
7. National Cancer Institute Safety Standards for Research Involving Oncogenic Viruses, DHEW Publication No.(NIH) 75-790.
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XXI. GLOSSARY

Aerosol: A colloid of liquid or solid particles suspended in a gas, usually air.

Ambient: Surrounding on all sides.

Biohazard: A contraction of the words biological and hazard. Infectious agents presenting a risk or potential risk to the well being of man, or other animals, either directly through infection of indirectly through disruption of the environment.

Carcinogen: A substance or agent producing or inciting cancer.

Etiologic: Relating to all of the causes of a disease of abnormal condition.

HEPA Filters: High efficiency particulate air filters. These have a nominal efficiency of 99.99% removal of 0.3 micron particles from air.

Laminar Air Flow: Air flow in which the entire body of air within a designated space moves with uniform velocity in a single direction along parallel flow lines.

Plenum: A chamber for conveying or containing air.

Linear Feet Per Minute (lf/m): A unit of measurement for air velocity.

NSF Standard 49: National Sanitation Foundation standard for Class II (Laminar Flow) Biohazard Cabinetry. This standard covers cabinetry design to minimize biohazards inherent in work with low and moderate risk biological agents. It does not cover equipment included for use with high risk biohazards. It includes the basic requirements of design, construction, and performance necessary for reliability of function and safety, and adequate personnel and product protection.

NCI: National Cancer Institute.

NIH: National Institutes of Health.

Oncogenic: Tending to cause the formation of tumors.

OSHA: Occupational Safety and Health Administration or Act.

XXII. RISK LEVELS, CLASSIFICATION

Low Risk

The risk level of the agents and/or the operation has minimal effect on personnel, animals, or plants under ordinary conditions. This classification is restricted to all etiological agents designated Class I by the U.S. Department of HEW, Center for Disease Control.

Moderate Risk

The risk level of the agents and/or the operations requires special conditions for control or containment because of:

1. Known pathogenicity to personnel, animals, or plants.
2. Concentration.
3. Genetic alterations and synergistic effects with other materials.

This classification includes all etiologic agents designated Class II or Class III by the U.S. Department of HEW, Center for Disease Control and oncogenic viruses specified as moderate risk by the National Cancer Institute.

High Risk

The risk level of the agents and/or the operations requires additional control measures beyond those for moderate risk. These are agents or operations with any of the following characteristics:

1. Infections can be produced by low doses.
2. Pose a high mortality risk.
3. May potentially spread outside the laboratory.
4. Dangerous concentrations.
5. May release microbial aerosols.
6. May result in genetic alteration or genetic recombination that significantly increase the potential for pathogenicity or spread.

This classification includes all etiological agents designated Classes IV and V by the U.S. Department of HEW, Center for Disease Control, and oncogenic viruses classified as high risk by the National Cancer Institute.

XXIII. MANUFACTURER'S LIMITED WARRANTY

The Biohazard Cabinet is manufactured by ENVIRCO, of Albuquerque, New Mexico and is warranted to be free from defects in material and workmanship under normal use. This warranty is subject to the following qualifications, conditions and limitations set forth below to provide information concerning the duration and extent of this warranty, the procedure to be taken to obtain performance, and other information concerning the warranty policy.

This warranty is valid only in the 48-contiguous United States covering parts and labor only, and extends for a period of two (2) years from the date of on-site certification by the manufacturer of his Authorized Service Contractor. This warranty applies only to the original purchaser of the ENVIRCO Biohazard Cabinet. The fluorescent light tubes (and optional ultraviolet lamp) are not covered by this warranty. Defects, malfunctions, failure or damage of the ENVIRCO Biohazard Cabinet caused by improper, unreasonable, or negligent use or abuse by the consumer are excluded from this warranty. This warranty is also void if the serial number has been removed or the cabinet has been damaged.

To secure performance of this warranty and repair of the ENVIRCO Biohazard Cabinet, the following procedures should be taken:

1. To put this warranty into effect the ENVIRCO Biohazard Cabinet must be tested and certified, on-site, by the manufacturer or his Authorized Service Contractor.
2. To make repairs or replacements within the terms of this warranty, contact:

   ENV SERVICES, INC.
   (800) 345-6094

Upon compliance with the above procedure, all warranted defects will be repaired (at no additional charge to the consumer) as long as the Biohazard Cabinet has not been damaged, tampered with or negligently used as described above.

ENVIRCO makes no warranty expressed or implied except as stated above. For ENVIRCO Biohazard Cabinets sold or located outside the 48-contiguous United States, ENVIRCO assumes liability only for the replacement of defective part(s), excluding labor.

NOTE: On-Site Test and Certification of the ENVIRCO Biohazard Cabinet by the manufacturer or his Authorized Service Contractor is a precondition to warranty service or performance. Under no circumstances should the user operate the ENVIRCO Biohazard Cabinet prior to its On-Site Certification.

THIS CABINET MAY BE RESTRICTED TO USE IN SPECIALLY DESIGNED FACILITIES UNDER STATE, FEDERAL, OR LOCAL CODES.