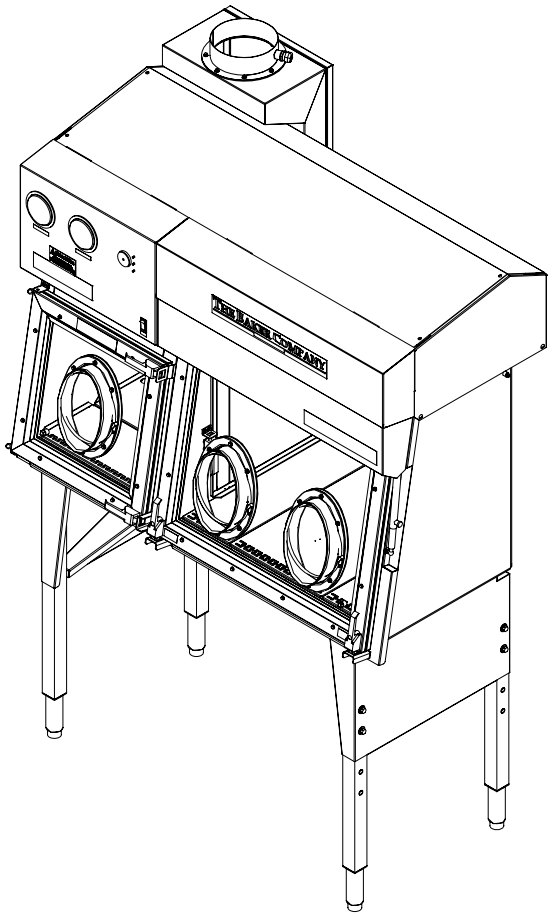
THE BAKER COMPANY

OPERATOR'S MANUAL

ChemoSHIELD®
Negative Pressure Isolator

MODEL
CS500



This manual includes information for installation, operation, maintenance and spare parts. We recommend that it be kept near the cabinet for ready reference.

September 2005

THE BAKER COMPANY

INTRODUCTION AND WELCOME

It is a pleasure to welcome you to the growing number of customers who own and operate Baker cabinets and glove boxes. As the inventors of the laminar flow biological safety cabinet and the leaders in the field, Baker people take special pride in providing a cabinet that is designed for maximum performance.

Your new ChemoSHIELD® cabinet includes many unique features which are included to give you superior performance, simpler maintenance and lower life cycle cost. Your ChemoSHIELD® cabinet operates under negative pressure and is designed for protection of product, personnel and the environment. You will find your ChemoSHIELD® cabinet suitable for sterile compounding of hazardous or potent pharmaceutical compounds, chemotherapy agents and IV admixtures that can be harmful to laboratory personnel.

In addition to the high quality you expect from all Baker equipment, this model has been ergonomically designed to provide the lab user with many exciting design features. The ergonomic design will help prevent repetitive motion injury, reduce fatigue and lab accidents and enhance productivity.

The adequacy of a cabinet for user safety should be determined on-site by an industrial hygienist, safety officer or other qualified person. Remember that you, the owner and user, are ultimately responsible and that you use your cabinet at your own risk.

We recommend that this manual, along with the factory test report, be kept near the cabinet for convenient reference by operators and qualified maintenance personnel. If you have any questions about the use or care of your new ChemoSHIELD® cabinet, please do not hesitate to contact our Customer Service Department at ***800-992-2537*** *for assistance or e-mail us at* ***bakerco@bakerco.com****.*

Sincerely,

Dennis Eagleson
President, CEO
The Baker Company, Inc.

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! WARNING !

The agents used and/or work performed in this cabinet may be hazardous to your health and to the health of others. The cabinet must be used properly. You must read the operator's manual before using.

I - FUNCTION AND DESCRIPTION OF THE ChemoSHIELD®

The ChemoSHIELD® is a negative pressure isolator offering product, personnel & environment protection from hazardous or potent pharmaceutical compounds and chemotherapy agents. It features vertical laminar airflow and a closed front viewscreen. Other uses for the cabinet include formulation, mixing of hazardous non-explosive chemical compounds and other applications that require Class 100 (ISO Class 5) air.

ChemoSHIELD Airflow and Base Features

The ChemoSHIELD® cabinet is designed to provide vertical laminar airflow within the work chamber (See Fig. 1). The stainless steel metal diffuser just below the downflow HEPA filter creates gentle laminar airflow over the work zone and an air curtain at the viewscreen. The air pressure is negative in the work zone to insure maximum personnel protection while the sealed work chamber and HEPA filtered airflow provides product protection.

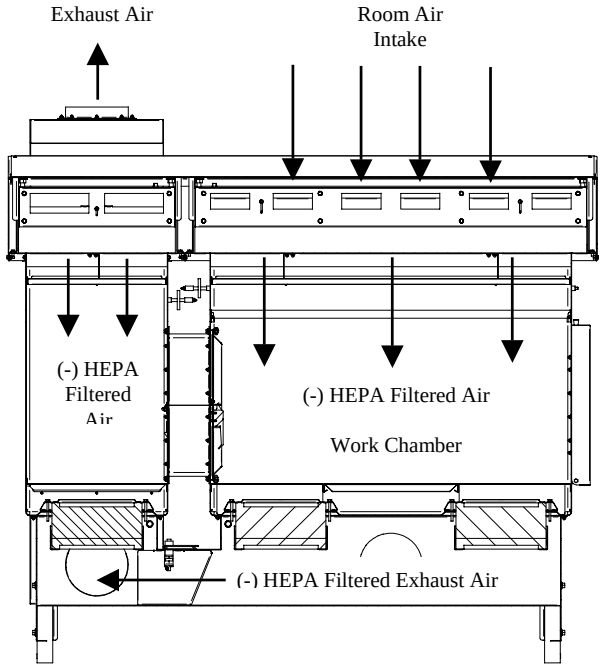


Fig. 1: Airflow Inside Cabinet
(-) = Negative Pressure

The pass-through chamber allows operators to introduce or remove items from the main work chamber while maintaining the internal aseptic conditions. The stainless steel metal diffuser just below the downflow HEPA filter creates laminar airflow in the chamber and air curtains at the viewscreen and tunnel connecting the two chambers. The air pressure is negative to insure maximum personnel protection.

Airflow within the tunnel connecting the two chambers is slightly turbulent due to the pass-through air curtain. This helps purge the tunnel.

Airflow within the work and pass-through chambers is pulled through exhaust HEPA filters located under the work surfaces into a common exhaust plenum. The air is then exhausted out of the cabinet through the building exhaust system.

It is recommended that the pass-through chamber operate at a higher negative pressure than the work

chamber. This will provide the most favorable condition for both product and personnel protection.

The pass-through chamber has an external access door with gloveport. An inter-chamber door is located inside the work chamber. These doors have a mechanical interlock system to keep both doors from being open at the same time.

The work chamber viewscreen has key lock latches and two gloveports equipped with gloves to provide a physical barrier between the technician and the product. The viewscreen is hinged along the top and may be fully opened for loading or unloading.

! CAUTION !

The viewscreen should never be opened until after the work chamber has been properly cleaned and decontaminated. When opening the viewscreen it is important that it be fully opened so that the safety latch on the gas spring engages. Pull on the latch knob before closing the viewscreen.

The Baker Company has included ergonomic enhancements into the design of the ChemoSHIELD® for improved operator comfort and safety. A 10° sloped front feature and adjustable stand have been incorporated into the design to improve ergonomics so the operator can use the cabinet comfortably either standing or sitting without sacrificing safety.

Cabinet Pressure Areas

One of the many features that sets the ChemoSHIELD® unit apart from other cabinets is the interaction of its pressure areas. The whole cabinet is under negative pressure when operating. The pass-through chamber operates at a more negative pressure than the adjacent work chamber. This allows air to flow into the pass-through chamber when the inter-chamber door is open to insure product protection in the work chamber. When the pass-through access door is opened room air is pulled into the chamber thus helping personnel protection.

The ChemoSHIELD® provides better than Class 100 (ISO Class 5) air cleanliness conditions within the enclosure.

Access to the Work Chamber

For easy entry of apparatus into the work chamber, ChemoSHIELD® has a top hinged viewscreen. Its 3/8 -inch shatterproof polycarbonate viewscreen allows excellent visibility, and can be opened fully to permit placement of large items in the work area.

! CAUTION !

The viewscreen should never be opened until after the work chamber has been properly cleaned and decontaminated.

While in operation the pass-through is used to bring items in and out of the cabinet.

Design Details

Performance assurance

Meticulous care in manufacturing is followed by physical and performance tests prior to shipment of your cabinet. In addition, a complete factory test report on your cabinet is included at the rear of this manual.

Building exhaust requirement

Your ChemoSHIELD® cabinet has an 8” exhaust collar and requires the building exhaust connection to handle 1.8” WC at 310 CFM.

Chamber walls and tunnel construction

The chamber walls and tunnel of your ChemoSHIELD® are constructed of 16 gauge, type 316 stainless steel. The easy-to-clean 7/16-inch radiused (rounded) corners prevent buildup of contaminants and resist corrosion. The chambers are designed to be leak tight to 2” WC.

All-metal plenums

The plenums of your ChemoSHIELD® unit have been constructed entirely of metal in order to provide strength, durability, air-tightness and resistance to deterioration.

Stainless steel work surfaces

The work surfaces are constructed of corrosion-resistant 16-gauge, type 316 stainless steel. They have a #4 satin finish that diminishes light reflection.

The work chamber has a three (3) piece flat work surface and the pass-through chamber has a two (2) piece flat work surface. The work surfaces are removable so that you can access the exhaust filters.

Cabinet exterior panels

External panel construction is of 16-gauge cold-rolled steel protected by a smooth white baked enamel finish.

Tested HEPA filters

The filters in the ChemoSHIELD® are scan-tested HEPA filters. They are 99.99% effective on particles of 0.3 micron in size. Each filter is scan-tested after installation to assure that there are no leaks >.01% of upstream concentration.

Viewscreens

Your ChemoSHIELD® has 3/8-inch shatterproof, clear polycarbonate in both the pass-through door and the work chamber viewscreen.

Work chamber and pass-through lighting

The lighting system produces at the work surface of the work chamber an average of 50 foot-candles of illumination and 45 foot-candles at the work surface of the pass-through chamber. Two fluorescent lamps are externally mounted to minimize heat buildup. The cabinet uses one F36T12-CW-HO fluorescent lamp for the work chamber and one FT36W-2G11-41 fluorescent lamp for the pass-through chamber.

Chamber base pan construction and cleanability

The base pan is constructed of 16-gauge, type 316 stainless steel with 7/16” radius in all corners to facilitate cleaning. The work surfaces can be repositioned for cleaning of the chamber pans.

Cabinet air balance adjustments

Only a technician with proper training and equipment should perform air balancing. (See Section IV, "On-Site Checks and Maintenance Procedures.")

- Each chamber has an inlet plenum with manual damper to control airflow and static pressure within the chamber.
- A single damper located in the base of the cabinet is used to adjust the pressure balance between the two chambers.

Easy filter access

For convenience and ease of service, the downflow HEPA filters are installed and removed through the top front of the cabinet. The exhaust HEPA filters are designed for bagging inside of the cabinet and removal through the pass through. Only a qualified technician should service the filters.

Telescoping stand

The cabinet stand provides the following range of heights:

	Knee Space Height	Work Surface Height	Overall Height
Minimum Setting	32″	36″	84″
Maximum Setting	41″	45″	93″

Mechanical interlock between pass-through door & inter-chamber door

A mechanical interlock is provided that prevents both doors being open at the same time.

Pressure monitoring of chambers

Two pressure gauges are provided to monitor the negative pressure levels inside the pass-through and work chambers. The gauges are comparing chamber pressure to the room pressure.

Airflow monitor – AFM

An exhaust alarm is provided that monitors the mass airflow out of the cabinet exhaust duct. Mass airflow is a volumetric measurement usually expressed as cubic feet per minute (cfm). The AFM provides both an audible and visual alarm. A switch is provided to mute the audible alarm.

! CAUTION !

Alarm conditions may not be as obvious when the audible alarm is muted. Make sure to restore the audible alarm to normal operation once the alarm condition has been corrected.

The warning light and remote signal will remain on until the exhaust condition is corrected and reset. The AFM is located on the electrical panel.

Auxiliary switch (Optional)

An auxiliary switch located on the electrical panel rated at 125-277 VAC, 15A is available for wiring to a fan/blower for the building exhaust system so that it can be turned on/off from the cabinet, if required. Refer to pages 32 and 33 for the junction box location and wiring schematic.

Electrical duplex (Optional)

Two GFI protected duplex outlets with weather-proof covers can be located in the rear wall of the work chamber. These outlets will be protected by a self-resetting circuit breaker to allow 10A maximum total to all outlets. A rocker switch rated at 125VAC, 15A is located on the electrical panel for turning the outlets on/off.

Lift system (Optional)

An electric motor driven hydraulic lift system is available for adjusting the height of the cabinet. It is rated at 115VAC, 2A (Intermittent Duty, Max 1.2 min. on/12 min off). The lift has a travel range of approximately 11 3/8".

Specifications for ChemoSHIELD® - Model CS500

Weight

Cabinet on Standard Tube Leg Stand: 570 pounds

Cabinet on Hydraulic Stand: 600 pounds

Shipping weight: Add 90 pounds to weights above

Electrical Specifications

All electrical wiring should comply with the National Electrical Code and any applicable Local Electrical Code at the site of installation.

The cabinet is to be powered by a 115 V AC, 15A, 60 Hertz, Single Phase dedicated circuit. This circuit should be protected by a 15A circuit breaker or fuse.

Typical Current for the Standard unit:	1.4A
Optional duplex receptacles:	10A
Optional Hydraulic Lift:	2A (Intermittent Duty, Max 1.2 min. on/12 min off)

The cabinet is furnished with one 9 FT power cord with 15A, NEMA 5-15P type plug.

The power cord is the Main Disconnect device for the cabinet. The cabinet should be positioned in a manner that allows easy access to the power cord connection to the electrical utility.

The cabinet is internally protected with a 250 VAC, 15A time delay fuse, Buss MDA-15 or equivalent.

The cabinet may be provided with 1 or 2 optional GFCI protected, 115V AC, Duplex outlets. The outlets are controlled using a rocker switch mounted in the front panel. When supplied, the outlet(s) on this circuit are protected by a 10A self-resetting circuit breaker.

The cabinet may be provided with an optional Auxiliary Switch that can be wired to control an external building exhaust fan/blower or other device. The switch rating is 125V- 277V AC, 15A.

The optional Auxiliary Switch circuit introduces a second power source to the cabinet. All power sources must be disconnected before the cabinet is electrically safe. Use proper Lockout/Tagout procedures.

The cabinet may be provided with an optional lift system rated at 115 VAC, 2A.
(Intermittent Duty, Max 1.2 min. on/12 min off).

Environmental Conditions

The cabinet is designed for use under the following conditions:

- Indoor use
- Altitudes up to 2000 meters
- Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.
- Main supply voltage 105 to 125Volts AC
- Transient overvoltages according to Installation Categories (OVERVOLTAGE CATAGORIES) II per UL 61010-1, Annex J.
- Pollution Degree 2

Symbols and Terminology

Protective Earth: Any terminal intended for connection to external protective conductor for protection against electric shock in case of a fault.

General Caution: Refer to instruction manual for information regarding personnel and environment protection.

II - PREPARING THE ChemoSHIELD® FOR USE

Checking the Cabinet Upon Arrival

Upon receipt of your new ChemoSHIELD® cabinet, first inspect the exterior of the crate, box and/or skid. If there is any visible damage, that fact should be noted on the receiving slip and immediately reported to the delivering carrier.

Next, remove the packing material and inspect the cabinet itself. Remove the cabinet from the skid with a forklift or other available equipment. If any concealed damage is found it should be reported to the delivering carrier. A claim for restitution should be filed within 15 days.

The Uses of a ChemoSHIELD® Cabinet

The ChemoSHIELD® is a negative pressure isolator offering product, personnel & environment protection from hazardous or potent pharmaceutical compounds and chemotherapy agents. It features vertical laminar airflow and a closed front viewscreen. Other uses for the cabinet include formulation, mixing of hazardous non-explosive chemical compounds and other applications that require Class 100 air (ISO Class 5).

! CAUTION !

Explosive or flammable substances should never be used in this cabinet.

Location Within the Laboratory

Position the ChemoSHIELD® so the pass- through chamber end is 15” away from any wall or obstruction. This clearance is needed for the pass-through access door to swing open freely. The work chamber end and rear of the cabinet requires minimal space. The front of the cabinet requires 28” of clearance for the work chamber viewscreen to swing open freely.

The ChemoSHIELD® is a negative pressure isolator and requires a room exhaust system capable of handling 1.8” WC at 310 CFM.

Installing the Cabinet

Installation of this cabinet should be carried out in accordance with appropriate OSHA regulations and those of other regulatory agencies having jurisdiction.

1. Remove the protective container from around the cabinet.
2. Remove the strapping that holds the cabinet to the pallet. Lift the cabinet off the pallet, place it on a dolly and move it to the intended location.
3. Lift the cabinet off the dolly and extend the legs to the desired position.
4. Slide the cabinet into its desired position within the room. Level the cabinet using the leg levelers.
5. Remove all tape used to secure cabinet components during shipping.

Final Connections and Tests

1. A 15-amp power cord with a NEMA 5-15P plug is furnished with the ChemoSHIELD®. It should be plugged into an appropriate 115 Volt AC, 15 Amp, 60 Hz utility outlet.
2. Turn on the fluorescent light and make sure the bulbs are lighted.
3. Check to see if the AFM is being powered.
4. Turn on the optional duplex power switch and confirm that power is going to each duplex.
5. Push the optional cabinet lift system control switch and run the lift up, then down.

   NOTE: Make sure you have enough clearance between the top of the cabinet and the ceiling before conducting the test.
6. Thoroughly clean the interior of the cabinet.
7. If required by the user, the cabinet can be given a pressure decay test per the American Glovebox Society guidelines. (*Reference the cabinet factory test report for information on the test criteria used*)

   NOTE: This test should be performed before the cabinet is connected to the building exhaust system (See Fig. 4 in the appendix).
8. Connect the cabinet to the building exhaust system.
9. Although all cabinets are carefully tested at the factory, it is advisable that certain other checks are made on-site by a qualified technician after installation. These include testing the filters for leaks, checking the air balance of the cabinet and using a particle counter to verify air cleanliness inside the chambers. A description of these tests can be found in Section IV, "On-site Checks and Maintenance."
10. It is recommended that all personnel who will be using the cabinet study this Operator's Manual to learn how to use the cabinet most effectively. For additional start up and use procedures, please turn to Section III, "Proper Cabinet Use."

Airflow Mointor (AFM) Operation & Calibration

The AFM is an audible and visual alarm system consisting of solid state flow measuring and alarm circuitry in a small enclosure. The AFM has a Hot wire anemometer probe that is installed in the cabinet exhaust duct. The measuring circuit and probe are calibrated as a system so both must be replaced if problems occur. The AFM is equipped with an Alarm Relay that can be used to connect to building/room monitoring system.

The relay contact is Single Pole Double Throw (SPDT) rated at 60V DC/30W or 120V AC/60VA.

The AFM visual indicators are Green, Yellow, and Red LEDs. The Green indicator is ON when the exhaust airflow is adequate. The Yellow indicator is ON when the airflow drops below the required minimum. If the airflow remains below the required minimum for more than six (6) seconds the Red indicator is ON (flashing) and the audible alarm is ON. There is an Audio ON-OFF switch to disable the audible alarm. If an alarm condition exists the Red indicator will continue to flash when the audible alarm is OFF.

When the Audio ON-OFF switch is in the OFF position alarm conditions may not be obvious to the operator. The Operator should return the switch to the ON position as soon as the current alarm condition is corrected.

The AFM alarm setpoint is calibrated at our factory after it is installed in the cabinet.

Recalibration of the AFM should only be performed by a qualified certification company or biosafety professional.

Calibration Procedure:

1. Set the cabinet exhaust airflow within the set point of the factory test report.
   - Verify that the AFM green indicator is ON.
2. Reduce the airflow to the specified lower range point on the test report.
3. Turn the AFM calibration screw counter clockwise until the yellow light starts flickering ON and OFF.
4. Increase the exhaust airflow back to the set point value. Verify that the green indicator is ON.

III - PROPER CABINET USE

Your ChemoSHIELD® is a valuable supplement to good aseptic technique, but is not a replacement for it.

If the cabinet is not understood and operated correctly as defined in this manual it will not provide an adequate protective barrier for personnel or product.

All activities that are to be performed in your cabinet should first be approved by a competent professional, such as an industrial hygienist or safety officer, to make sure that the cabinet is appropriate for the work it will be required to do. This person should monitor the cabinet and its operating personnel at regular intervals to see that it is being used correctly.

In order to keep the interior workspace clean and free of particulates, Your ChemoSHIELD® is designed for continuous operation. Therefore it is recommended that the exhaust system be left on at all times.

Operator Controls

The operator controls and indicators are arranged on the front electrical panel of the cabinet.

1 - Light On/Off Switch

This switch controls operation of the fluorescent lights. The indicator light on the switch will illuminate when the fluorescent lights are turned on.

2 - Auxiliary ("AUX") Switch (Optional)

This switch is available for wiring to a building exhaust system fan/blower so that it can be turned on/off from the cabinet, if required. The indicator light on the switch will illuminate when the fluorescent lights are turned on.

3 - Duplex Outlet Switch (Optional)

This switch is used for turning on/off the duplex outlets. The indicator light on the switch will illuminate when the fluorescent lights are turned on.

4 - Hydraulic Lift (Optional)

The Hydraulic Lift has a momentary rocker switch to control the UP and DOWN motion of the lift. The maximum and minimum limits of travel are controlled by limit switches on the lift system.

Start-up Procedure

1. If the cabinet has not been left running continuously turn on the building exhaust fan. Check the readings on the mag gauges. They should be consistent with the last time the cabinet was on.
2. Turn on the fluorescent lights.
3. Verify that work area and pass through grills are free from any obstructions.
4. Inspect gloves & sleeves for holes.
5. Latch the work chamber viewscreen and pass-through access door in the closed position.

This cabinet should never be operated with the work chamber viewscreen open or unlatched

Note: The latches have key locks

6. Allow the cabinet to run at least 3 minutes so that the chambers can purge with HEPA filtered air.
7. Wipe down the interior area of the cabinet with a surface disinfectant.

   Note: Some disinfectants, such as bleach or iodine, may corrode or stain the steel surfaces. If this happens, thoroughly clean the surfaces afterward with a detergent and rinse with sterile water to prevent corrosion.

Loading Materials and Equipment

1. Place all materials and equipment needed in the cabinet via the pass-through door. After closing the door **wait 1 minute** before opening the inter-chamber door. This will allow the pass-through chamber and tunnel enough time to purge with HEPA filtered air. **Important: Make sure to disinfect items before moving them from the pass-through chamber to the work chamber.**
2. Avoid blocking front and rear grills.
3. Arrange materials to minimize movement within the cabinet.
4. Leave the inter-chamber door closed while working in the work chamber.

Recommended Work Techniques

1. Perform all work on or over the solid work surface. Avoid working on the grills.
2. Keep the viewscreen closed and latches locked.
3. Limit opening of pass-through and inter-chamber doors when moving materials or equipment.
4. Make sure to **wait 1 minute** anytime the pass-through door has been open and closed to allow the chamber and tunnel to purge with HEPA filtered air.

Unloading and Wipe down

1. Close the inter-chamber door before opening the pass-through door when unloading materials and equipment.
2. Wipe down the work and pass-through chambers with disinfectant before opening the pass-through door. **Never use the cabinet to store supplies or laboratory equipment.**
3. We recommend that the cabinet be left running continuously to ensure cleanliness. If the user elects to turn the building exhaust fan off at the end of a work session, the work chamber viewscreen and pass-through door should be closed completely and latched.

Reacting to Spills

Spills should be cleaned immediately to prevent cross contamination to the work and to avoid any damage to the stainless steel surfaces.

It is recommended that the researcher, in coordination with their consulting safety professional, have a written plan available in case of an accidental exposure or spill. The safety plan should include all of the emergency procedures to be followed in the event of an accident. All employees who use the cabinet should be familiar with the safety plan.

Decontamination

It is recommended that the researcher, in coordination with their consulting safety professional, have a written decontamination plan available based on what the cabinet is being used for. All employees who use the cabinet should be trained on how to perform the decontamination procedure.

Cleaning and Disinfecting Stainless Steel

Simple Cleaning

IMPORTANT

Do not use steel wool or steel pads when cleaning stainless steel.

Dirt deposits on stainless steel (dust, dirt and finger marks) can easily be removed. Usually, warm water, with or without detergent, is sufficient. If this does not remove the deposits, mild, non-abrasive household cleaners can be used with warm water and bristle brushes, sponges or clean cloths.

Iron rust discoloration can be treated by rubbing the surface with a solution of 15% to 20% by volume of Nitric Acid and water and letting it stand for one to two minutes to loosen the rust.

Disinfection

The purpose of disinfection is to destroy particular organisms that could pose a potential hazard to humans or compromise the integrity of the experiment. It is important to use a suitable disinfectant in the concentration appropriate to the organism being killed. Standard disinfectants include: Hypochloride (chlorine bleach), Iodophor-Detergent, Ethanol, Phenol and Alcohol.

IMPORTANT

Disinfection and cleaning should always be followed by rinsing in sterile hot water and wiping the surface completely dry.

Disinfect the work surface before and after every procedure.

1. Disinfect surfaces of all equipment used.
2. Remove all items from the inside of the cabinet.
3. Place all items that may have come in contact with the agent(s), such as used pipettes, in a plastic bag or other suitable container.
4. Disinfect the entire inside surface of the cabinet.

For additional information on cleaning and disinfecting stainless steel, please refer to: “Decontamination, Sterilization, Disinfection, and Antisepsis”, Vesley, Donald and Lauer, James L., Laboratory *Safety Principles and Practices, Second Edition*, 1995, Fleming, D.O., Richardson, J.H., Tulis, J.J. and Vesley, D., editors, ASM Press, Washington, D.C., pp. 219-237; and Biosafety Reference Manual, Second Edition, 1995, Heinsohn, P.A., Jacobs, R.R. and Concoby, B.A., editors, AIHA Publications, pp.101-110.

About the HEPA Filters

The High Efficiency Particulate Air (HEPA) filter is one of the essential components of a clean air cabinet. It is the shield, which stands between the product and the environment.

The HEPA filter consists of a continuous sheet of glass fibers pleated and mounted in a rigid frame. It is very delicate and the filter media should *never* be touched.

Proven efficiency in all HEPA filters used in Baker cabinets are 99.99% for particles 0.3 microns in diameter. The 0.3 micron particle is used as the basis for filter definition because theoretical studies have shown that filtration efficiency should be at a minimum for particles of this diameter, with efficiency increasing for particles either larger or smaller. Experiments with various viruses and microbial agents have proven the effectiveness of HEPA filters. (Contact The Baker Company for more information).

It must be pointed out that the HEPA filter is **not** intended to filter gasses or vapors, nor are they 100% efficient on particulates.

The room and cabinet particulate levels along with the capacity of the building exhaust fan determines the life of a filter. Under most laboratory conditions, you should expect a long filter life. However, misuse or a heavy particulate load within the cabinet will shorten any filter's life.

Reminders

After many years of seeing our equipment used and misused, we have made up this list of suggestions:

- Store equipment and supplies outside of the cabinet.
- Always leave the building exhaust fan on.
- Keep the work chamber viewscreen closed and latches locked.
- Avoid using an open flame within the cabinet unless it has been specifically approved by a safety professional.
- Always keep the air grilles clear and unobstructed.
- Toxic, explosive or flammable substances should not be used in the ChemoSHIELD®.
- Don’t operate the cabinet above the recommended manufacturer exhaust flow rate.

IV - ON-SITE CHECKS AND MAINTENANCE PROCEDURES

We recommend that the following checks be performed before initial use, after relocation, and after each filter change. They should also be carried out at regular intervals, usually six months or one year, as specified by an industrial hygienist, safety officer or other qualified person. The tests described below meet recommended minimum requirements and only experienced technicians using proper procedures and instruments must perform them. Our representatives can tell you about other tests, which you may consider desirable.

As reported earlier in this manual, each individual cabinet made by The Baker Company is carefully tested before it leaves the factory. Your copy of the test report, which you will find at the back of this manual, gives the factory test results for your own ChemoSHIELD® cabinet. Use it as your record of the original testing, and as your guide to testing in the future. To gain many years of satisfactory service, please be sure that your maintenance personnel come as close as possible to duplicating these original test figures.

Your test procedures should be identical to ours so that achieving similar test results and comparison of data will be possible. Refer to your copy of the test report or correspond directly with us to request detailed procedures for your particular cabinet model.

Pressure Decay Test

All penetrations and openings in the cabinet are sealed prior to performing the pressure decay test. The cabinet is pressurized with air to 2" WC while monitoring cabinet pressure and temperature over a 30 minute period.

The leak rate is calculated as outlined by the American Glovebox Society, with a leak rate not to exceed 0.5% of the cabinet volume escaping the cabinet per hour. (See Fig. 4 in appendix)

Filter Leak Testing

The filters in your cabinet were tested at our factory before shipment to ensure that the media, gasket, and frame were not exceeding IEST-RP-CC034.1 for HEPA and ULPA filter leak tests. Since filters may become damaged in transport, we recommend that the filters be re-tested by qualified technicians before the cabinet is used. The filters should also be leak tested at prescribed intervals as specified by an industrial hygienist, safety officer or other qualified person.

Filter leak test procedures
Downflow filter:

1. Remove the top hinged electrical panel.
2. Remove the front and top dress panels.
3. Open the work chamber viewscreen.
4. Remove the IV bar and work chamber downflow diffuser.
5. Attach an auxillary blower (FASCO Model# B45267 or equal) to the inlet plenum and seal all remaining openings in the plenum with tape.
6. Perform the filter leak test per IEST-RP-CC034.1. The upstream DOP sampling port is on the top of the inlet plenum.
7. Repair leaks as required per IEST-RP-CC034.1.

8. Reinstall diffuser and IV bar and close the viewscreen.
9. Open the pass-through access door and remove the downflow diffuser.
10. Attach an auxillary blower (FASCO Model# B45267 or equal) to the inlet plenum and seal all remaining openings in the plenum with tape.
11. Perform the filter leak test per IEST-RP-CC034.1. The upstream DOP sampling port is on the top of the inlet plenum.
12. Repair leaks as required per IEST-RP-CC034.1.
13. Reinstall diffuser and close door.

Exhaust filters:

There are two exhaust filters in the base of the work chamber and one exhaust filter in the base of the pass-through chamber.

! WARNING !
This procedure should only be performed by qualified technicians.

Make sure to decontaminate both chambers of the cabinet including the area below the worksurfaces before changing the filters. The cabinet exhaust should be left running.

Locate the two exhaust probe ports (See Fig.2: Section A-A in appendix) The ports will be used to perform a duct traverse using a thermal anemometer to determine exhaust flow. The same ports will be used for probing the exhaust flow with a photometer to check for exhaust filter leaks.

1. Remove one of the probe port pipe plugs.
2. Take four velocity readings per the grid pattern provided in Fig.2: Section A-A of the appendix.
3. Calculate the exhaust flow (Q) using the formula Q = V x A [where V= Avg. velocity (fpm) and A= Duct area (sqft)]
4. Use the exhaust flow rate (cfm) to calculate the number of nozzles required for the aerosol generator.

Checking the pass-through exhaust filter:

1. Open the inter-chamber door and slide the pass-through worksurfaces into the work chamber.
2. Close the inter-chamber door then open the pass-through access door. This will provide direct access to the exhaust filter.
3. Establish the aerosol challenge using the number of nozzles required. Follow the photometer manufacturers instructions to set the photometer.
4. Insert the tip of the photometer probe into the exhaust probe port until it is midway into the duct.
5. Scan the face of the exhaust filter with the aerosol generator hose held 6 to 8 inchs away. Look for leaks no greater than 0.002%.
6. Repair or replace a leaking filter.
7. Close the pass-through access door and open the inter-chamber door. Install the pass-through worksurfaces and close inter-chamber door.

8. Plug the exhaust probe port.

Checking the work chamber exhaust filters:

1. With both the pass-through access door and the inter-chamber door closed, open the work chamber viewscreen. Lift the center worksurface and place it on top of the right hand worksurface. Lift the left hand worksurface and stack it on top of the other two worksurfaces. This provides access to the left hand exhaust filter. To access the right hand exhaust filter simply slide the stack of worksurfaces to the left side of the chamber.
2. Establish the aerosol challenge using the number of nozzles required. Follow the photometer manufacturers instructions to set the photometer.
3. Insert the tip of the photometer probe into the exhaust probe port until it is midway into the duct.
4. Scan the face of each exhaust filter with the aerosol generator hose held 6 to 8 inchs away. Look for leaks no greater than 0.002%.
5. Repair or replace any leaking filter.
6. Replace the worksurfaces and close the work chamber viewscreen.
7. Plug the exhaust probe port.

Balancing Airflow / Pressure

! WARNING !
This procedure should only be performed by qualified technicians.

The airflow/pressure balance dampers, which are set at the factory, provide your cabinet with the proper air volume, velocity and chamber pressures, as long as the building exhaust is set correctly.

In order to duplicate as closely as possible the airflow/pressure characteristics described in the original factory test report, please follow these steps:

1. Set building exhaust to match factory test report.
2. Perform downflow velocity test per manufacturer instructions. Specific details are in the factory test report located in the back of this manual.

   NOTE: The IV bar needs to be removed while performing downflow readings.
3. Record the negative pressure readings for each chamber.
4. Compare your results with those originally recorded at the factory.
5. Make adjustments to the building exhaust fan speed and the dampers as necessary. The inlet dampers are located in the top front of the cabinet behind a dress panel (See Fig.1). There is one damper for the pass-through chamber and one for the work chamber. Opening the damper will increase the downflow and reduce the negative pressure in that chamber. Closing the damper will decrease the downflow and increase the negative pressure in that chamber. A third damper is located after the exhaust filters and controls airflow/pressure balance between both chambers.

NOTE: As the HEPA filters load up with particulates airflow will decrease. When exhaust airflow diminishes to the point that the building exhaust fan can't compensate for it, then it will be necessary to replace the HEPA filters. (See "Procedure for HEPA Filter Replacement" later in this section).

Air Cleanliness Test

Following the ISO 14644-2 standard, a single particle counter is used to determine the air cleanliness class in each chamber. The cabinet is designed to provide Class 100 (ISO Class 5) HEPA filtered air in both chambers.

A 3/8" NPT port is provided in the work chamber viewscreen and pass-through door so that the sampling hose from the particle counter can be passed through while the cabinet is closed up.

The sampling nozzle needs to be positioned 6" above the worksurface facing up. The grid patterns for the chambers are 6" off the walls and front viewscreen (See your test report for more details).

Maintenance Notes

! WARNING !

Always perform cleaning with exhaust system running and outer cabinet doors closed and latched.

Avoid contacting the filter media. It can be easily damaged.

Cleaning the pass-through chamber base pan

To clean the base pan under the worksurface, lift up the rear worksurface and pass it through the tunnel into the work chamber. Lift and remove the front worksurface and pass it through the tunnel into the work chamber. This provides unobstructed access to the base pan.

Cleaning the work chamber base pan

To clean the base pan under the worksurface, lift up the center worksurface and stack it on top of the right hand worksurface. This provides unobstructed access to the center of the base pan for easy cleaning. Slide either the left or right worksurfaces to expose the sides of the base pan.

Replacing the work chamber light

Lift and remove the upper right dress panel (it hangs in place by two tabs). Reach down inside the light canopy and unscrew two wing nuts that hold it in place. Remove the canopy. Remove the worn-out fluorescent lamp and install a new one. Reinstall the light canopy using the wing nuts. Hang the upper right dress panel by sliding its tabs into the slots located on top of the cabinet.

Replacing the pass through chamber light

Remove the security screw on the lower left side of the electrical panel / light canopy. Hinge the panel up until it stops. A panel support bracket will swing out to hold the panel open. Remove the worn-out fluorescent lamp and install a new one. Using your left hand to hinge up the panel slightly. At the same time push in on the top of the support bracket with your right hand and slowly lower the panel. Install the security screw.

Replacing gloves in the armports

This procedure describes how to change the hand piece on a 2-piece sleeve-and-glove system. This is the standard glove combination supplied by The Baker Company.

Hand pieces are available in small, medium, large, and extra large. Choose a hand piece that is right for

you. You must decontaminate the outside of the old gloves first. Use an appropriate decontaminant for the hazard on the gloves (see your safety professional or industrial hygienist).

Start by inserting your hand into the sleeve and glove assembly. Then, pull the sleeve and glove inside out. This exposes the silicone O-ring that holds the hand piece to the sleeve. Roll the O-ring out of its groove with your thumbs and discard the old glove.

Take a new hand piece and turn it inside out. Make sure the thumb is pointing up (for an ambidextrous glove – for a left/right glove, the thumb will point either left or right but should be at or near the top). Stretch the glove over the plastic grooved flange.

Replacing the stainless O-ring: Start with the O-ring at 6 o'clock and place it in the groove. With your left thumb, roll the O-ring into the groove to about the 11 o'clock position while holding your right thumb at the 4 o'clock position. Next, while holding the O-ring at 11 o'clock, roll the O-ring into the groove with your right thumb finally stretching the reminder (from 11 to 1 o'clock) of the O-ring into the groove with both thumbs. This will take some practice but after a few tries it should become much easier.

Finally, push the glove into the glovebox isolator. Please remember that this glove needs to be sanitized. Working through the gloves, sanitize the glove using one hand to wash the other.

Replacing the HEPA filter

If your periodic checks of total airflow show a drop of ten percent or more from the original settings, the filters may be loading with particulates. When the building exhaust system can no longer maintain the airflow or when the filters are damaged, they need to be replaced.

HEPA filters are very easily damaged, and you will want to use great care in handling them. Avoid contact with the filter media. Inspect the filter's frame, media, and gasket carefully before and after installation. A broken or damaged filter is worthless.

Downflow filter change steps

! WARNING !
Decontaminate cabinet interior as required before replacing filters.

1. Close and latch the work chamber viewscreen and pass through door.
2. Unplug the cabinet.
3. Remove the top hinged electrical panel.
4. Lift and remove the upper front work chamber dress panel. Remove the hardware holding the top dress panel and remove the panel. Now you have access to both downflow filters. (See Fig.3 in the appendix)
5. Loosen the ½ - 13-plenum clamp bolts, located on each side of the inlet plenums. Start with the lower ½-13 hex nuts. Back them off the bracket as far as they can go. Next rotate the upper ½-13 hex nuts so they move towards the inlet plenum. This will raise the plenums off the filters. (See Fig.3, Detail C in the appendix)
6. Loosen the filter gasket seal from the metal plenum. A putty knife works fine to break the gasket seal if necessary. Remove both filters by sliding them towards you.
7. Take the new filters and align them with the inlet plenums and sliding them back against the stops in rear. Check that the gasket remains attached on both sides of the filters.

8. The inlet plenums can now be lowered and tightened by reversing step number 5 until the gaskets are compressed approximately 50%**.**
9. Leak test filters (Reference “Filter leak test procedures” in this section).

Work chamber exhaust filter change steps
(NOTE: There are two exhaust filters in the chamber)

! WARNING !
Decontaminate the interior and base pan area of the work chamber while the cabinet is operating. Keep the cabinet operating during the exhaust filter changing process.

1. Lift the center work surface and place it on top of the work surface opposite the pass through. Slide the other work surface (one closest to the pass through) over to the middle to expose one of the filters underneath.
2. Open the outer pass through door and place a 3/8” spin wrench, one (1) disposal bag, one (1) filter media cap and tape inside the chamber. Close the outer pass through door.
3. Open the inter-chamber door to bring in the items. Close the inter-chamber door.
4. Remove the filter frame hardware using the spin wrench and lift the filter frame off the filter.
5. Cover the exposed filter media with the cap and tape it in place. Lift the filter out of its well and slide it into the disposal bag. Tape the bag closed. CAUTION: Be careful not to let the disposal bag or tape get pulled into the filter well.
6. Remove the bagged filter from the work chamber into the pass through chamber. Close the inter-chamber door. Wipe down the exterior of the disposal bag.
7. Remove the bagged filter from the pass through and place it in a hazardous-material drum for disposal.
8. Open the outer pass through door and place a new filter inside the chamber. Close the outer pass through door.
9. Open the inter-chamber door and bring in the new filter. Close the inter-chamber door.
10. Place the new filter in the well (Filter gasket facing up) and center it. Make sure to avoid touching the media.
11. Place the filter frame over the filter and tighten down the hardware using the spin wrench. Compress the gasket approximately 50%
12. Slide the work surfaces to the pass through side of the work chamber. This will expose the other filter.
13. Repeat steps 2 thru 11 (Note: You will need to move the center work surface to open and close the inter-chamber door)
14. Replace work surfaces in the work chamber.

Pass through chamber exhaust filter change steps

1. Open the outer pass through door and place a 3/8” spin wrench, one (1) disposal bag, one (1) filter media cap, tape and a new filter inside the chamber. Close the outer pass through door.
2. Open the inter-chamber door and transfer all items into the work chamber.
3. Lift and remove the rear work surface and place it into the work chamber. Remove the front work surface and place it into the work chamber. The pass-through filter is now exposed.
4. Remove the filter frame hardware using the spin wrench. Lift the filter frame off the filter and place it in the work chamber.
5. Cover the exposed filter media with the cap and tape it in place. Lift the filter out of its well and place it in the work chamber. Slide the used filter into the disposal bag and tape the bag closed. **CAUTION: Be careful not to let the disposal bag or tape get pulled into the filter well.**
6. Place the new filter in the well (Filter gasket facing up) and center it. Make sure to avoid touching the media.
7. Place the filter frame over the filter and tighten down the hardware using the spin wrench.
8. Slide the work surfaces back into the pass through in reverse order from how they were removed in step #3.
9. Place the bagged filter and all other items in the pass through chamber. Close the inter-chamber door. Wipe down all articles in the chamber.
10. Open the outer pass through door. Place the bagged filter in a hazardous-material drum for disposal. Close the outer pass through door.
11. Decontaminate the pass through chamber and work chamber.

Troubleshooting

Here are some suggestions based on our experience with the use and misuse of safety cabinets.

If there is no airflow within the cabinet -

1. Check to make sure the building exhaust system is on and the cabinet is hard ducted to it.
2. Check to see if the seal covers on the inlet plenum openings have been removed after the pressure decay test.
3. Verify that nothing is covering the face of the exhaust filters.

If there is low airflow within the cabinet –

1. Verify that the building exhaust flow is within the specified range required.
2. Check the inlet damper position.
3. Check the filters for particulate loading.

If a fluorescent light does not work –

1. Check to see if the cabinet is plugged in and verify that the red indicator on the light switch is lit when the switch is on.
2. Verify that the lamp is not blown and that it is engaged properly in the lamp sockets.

FOR MORE INFORMATION

For a complete listing of articles, papers and reports related to containment, clean air products and safety, contact The Baker Company for our complete Bibliography or visit our website at www.bakerco.com.

Appendix

Warranty

The Baker Company, Inc. expressly represents and warrants all goods (a) to be a specified (and described) in The Baker Company catalogues and literature, and (b) to be free under normal use, service and testing (all as described in The Baker Company, Inc. catalogues and literature) from defects in material and workmanship from a period of twelve months from the invoice date.

The exclusive remedy for any breach or violation of this warranty is as follows: The Baker Company, Inc. will F.O.B. Sanford, Maine furnish without charge repairs to or replacement parts or equipment which proved defective in material or workmanship. No claim may be made for any incidental or consequential damages. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTIBILITY OR FITNESS FOR A PARTICULAR PURPOSE UNLESS OTHERWISE AGREED IN WRITING SIGNED BY THE BAKER COMPANY. (THE BAKER COMPANY SHALL NOT BE RESPONSIBLE FOR ANY IMPROPER USE, INSTALLATION, SERVICE OR TESTING OF GOODS.)

Replacement Parts List

Electrical Items	Baker Part Number
Fluorescent Lamp – Work Chamber	17988
Lamp Holder – Plunger End	35614
Lamp Holder – Fixed End	35615
Ballast – Work Chamber	18140
Fluorescent Lamp – Pass through	38682
Lamp Holder – Pass through	35072
Ballast – Pass through	39346
Rocker Switch - Lights	15826
Rocker Switch - Aux	15826
Rocker Switch – Duplex outlets	15826
Terminal Block	39195

Mechanical Items	Baker Part Number
Mag. Guage	20773
Electrical panel assembly	338A505
Gas Cylinder	41041
Gas Cylinder w/ Locking Feature	40075
Inter-Chamber Door	338A604
Pass-Through Door Assembly	338A306
Work Chamber Viewscreen Assembly	338A305
Connector, Gloveport Sleeve	39608
Filter, HEPA, 18” x 35” x 3”	40815
Filter, HEPA, 18” x 20” x 3”	39853
Filter, HEPA, 9” x 13” x 6”	40817
Latch, Inter-Chamber Door	40114
Latch, Pass-Through Door	40114
Latch, Work Chamber Viewscreen	40881
Nitrile Glove, SM/MED/L/EXL	40699 / 40700 / 40701 / 40703

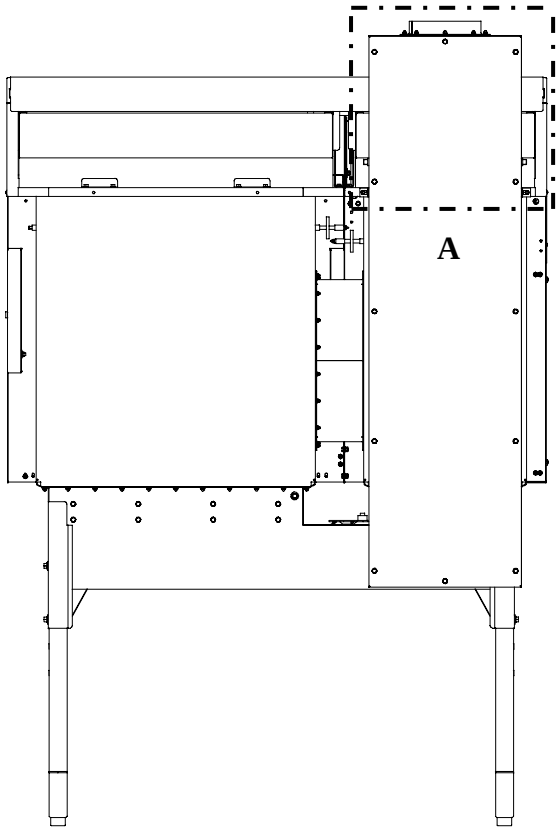
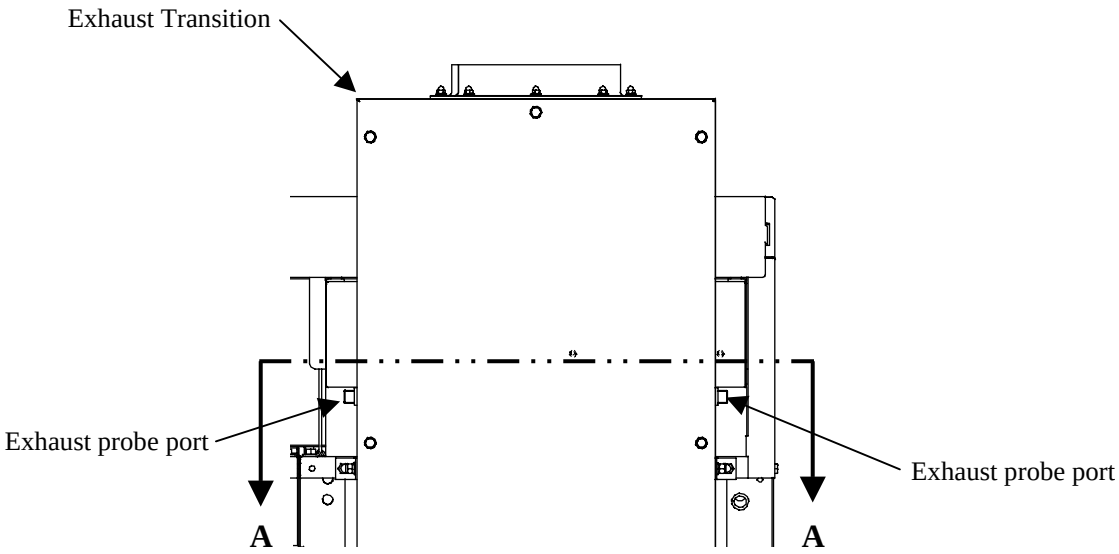
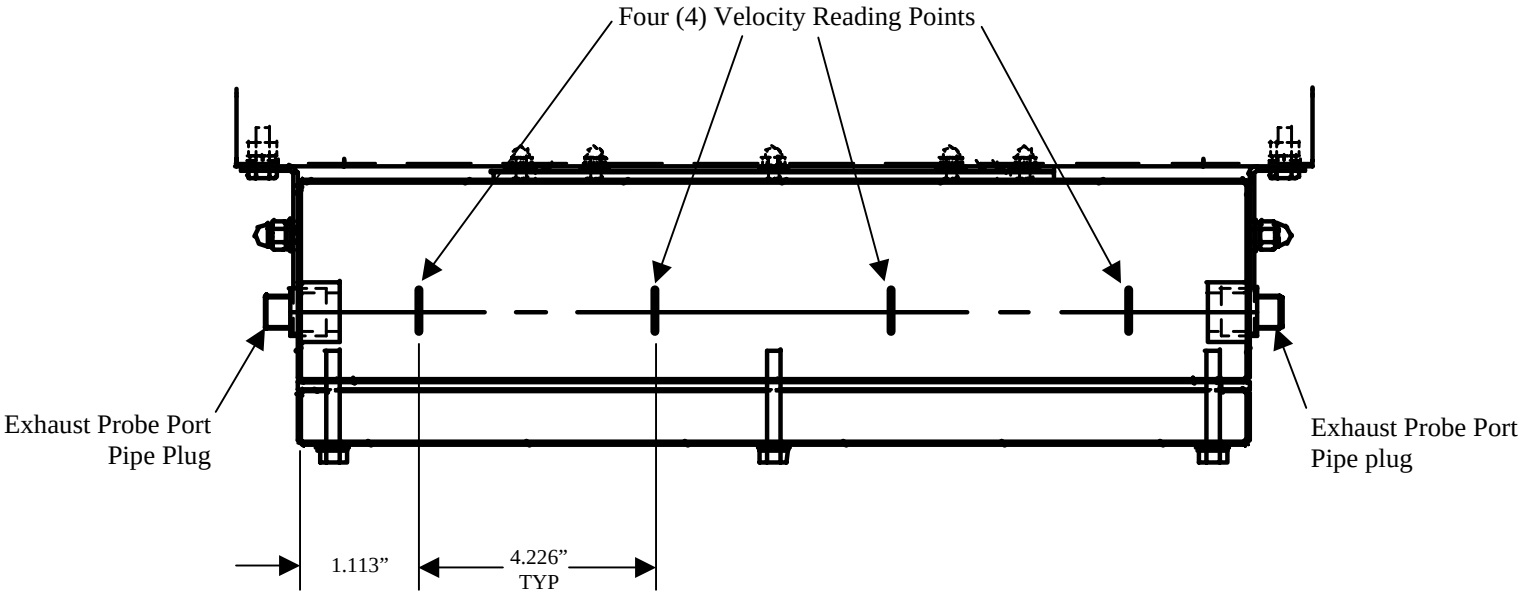


Fig.2: Rear view of cabinet



Detail A: Probe ports in exhaust transition



Duct area = 0.546 sqft

Section A-A: Cabinet exhaust transition

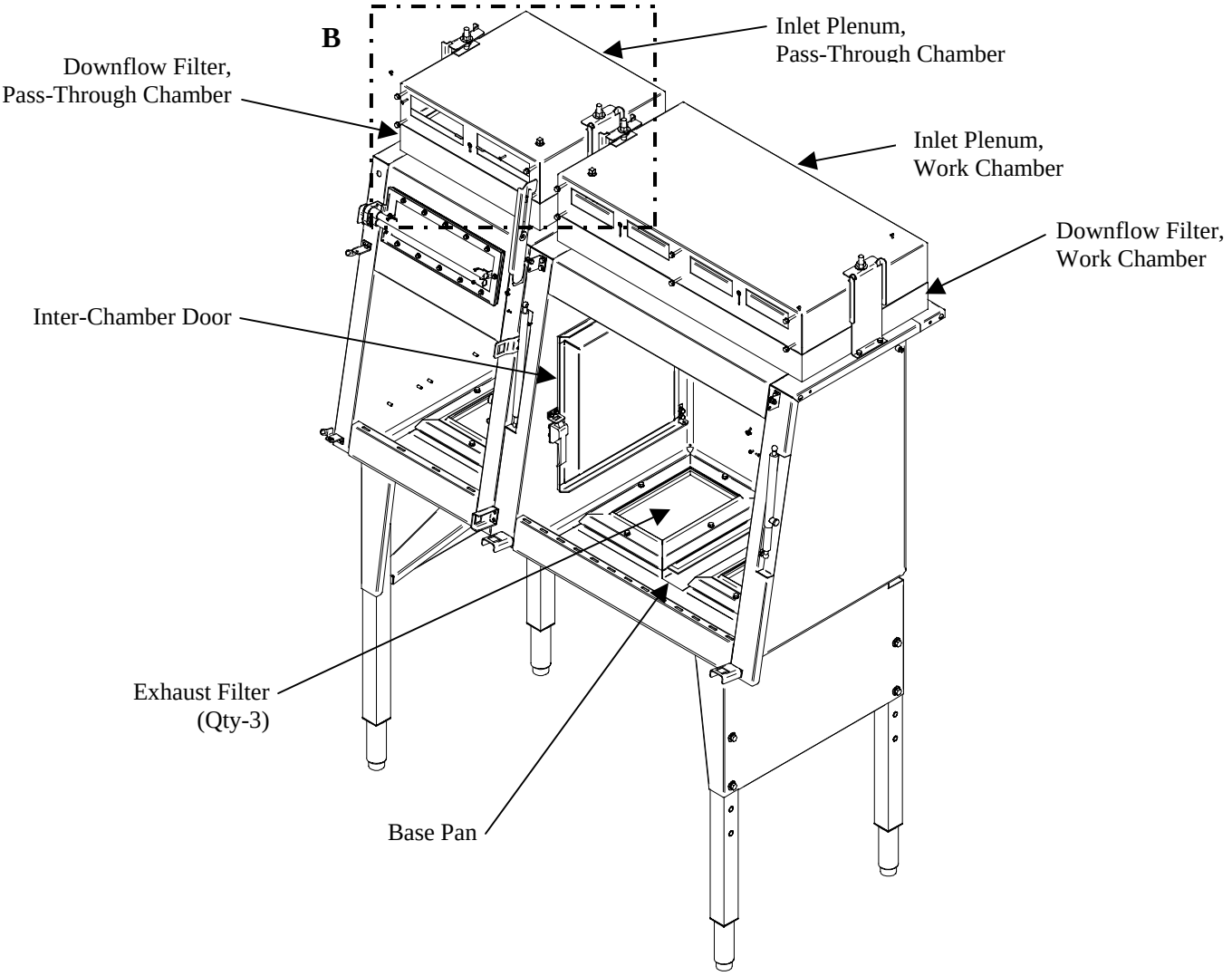
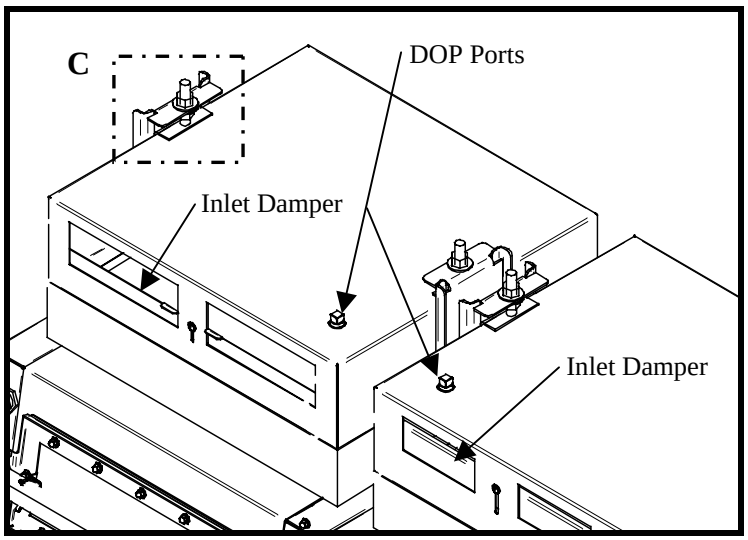
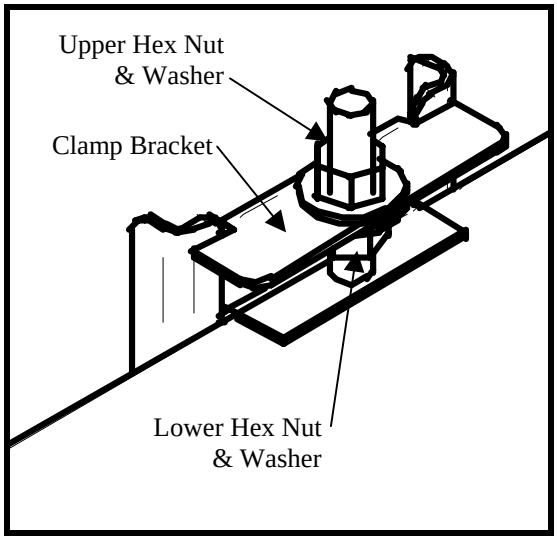


Fig.3: Cabinet interior (Worksurfaces removed)



Detail B: Inlet plenums



Detail C: Inlet plenum / filter clamp

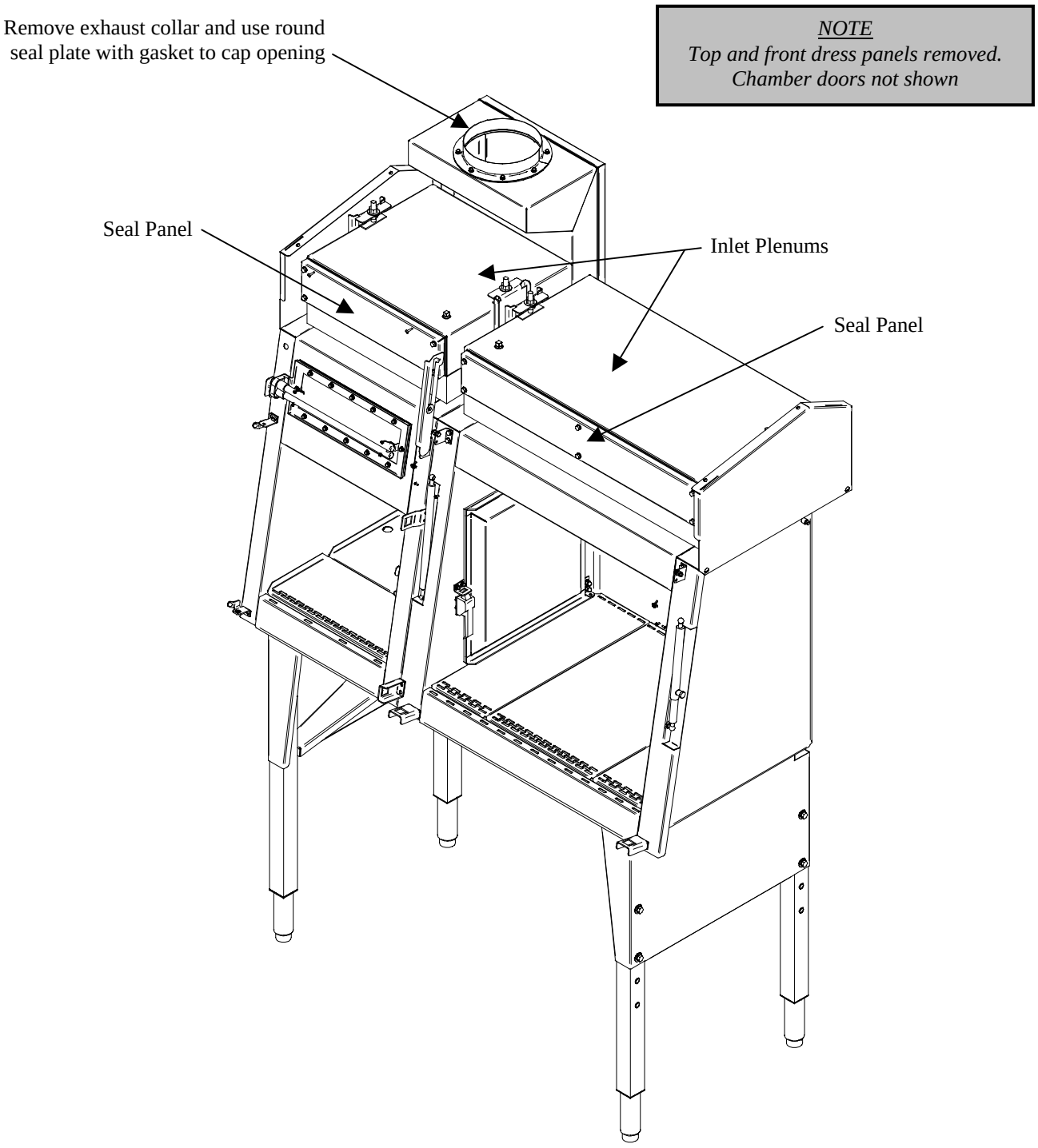
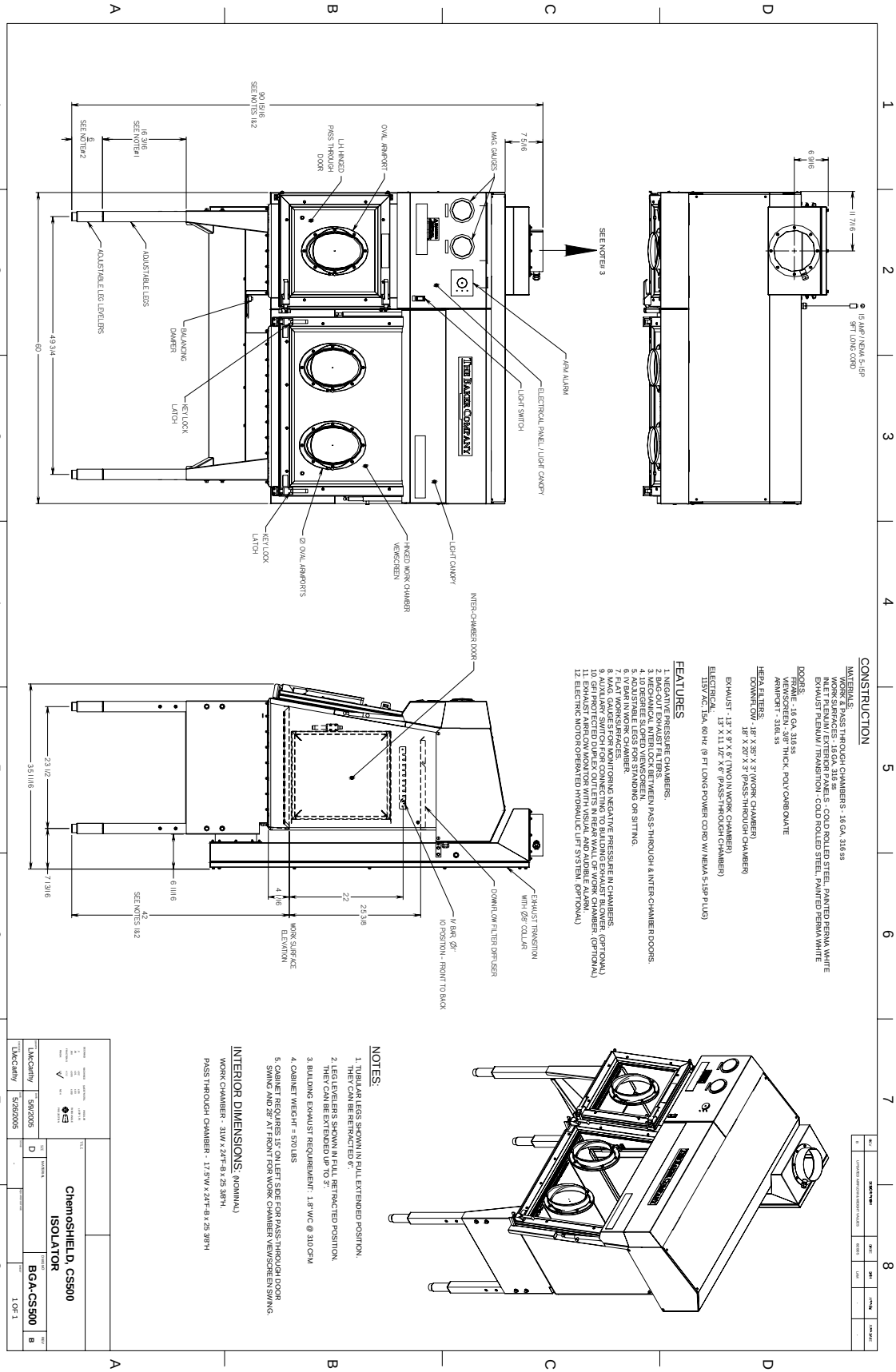
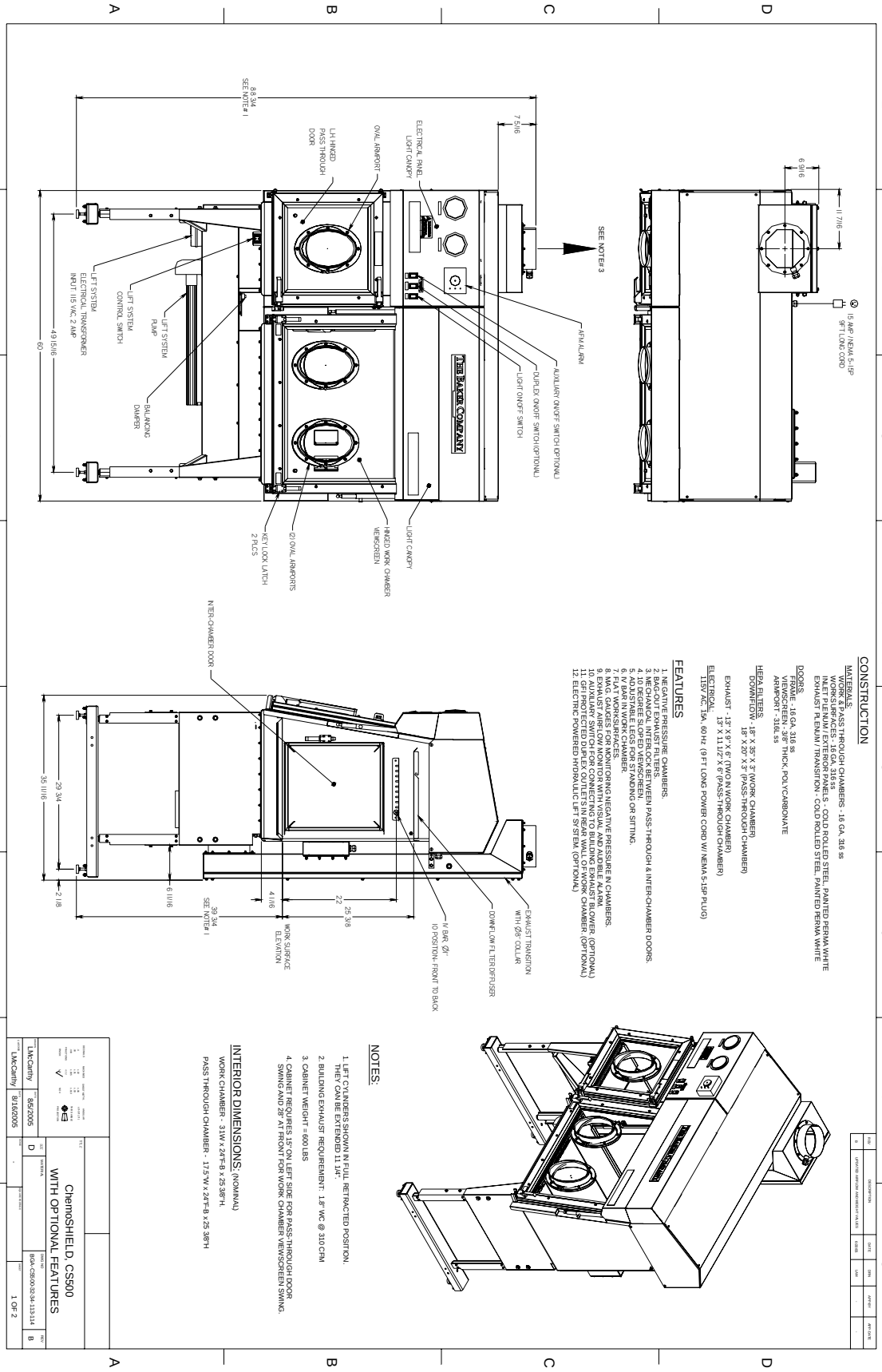


Fig. 4: Inlet plenums with seal panels for pressure decay test
(NOTE: Make sure to remove seal panels after test)

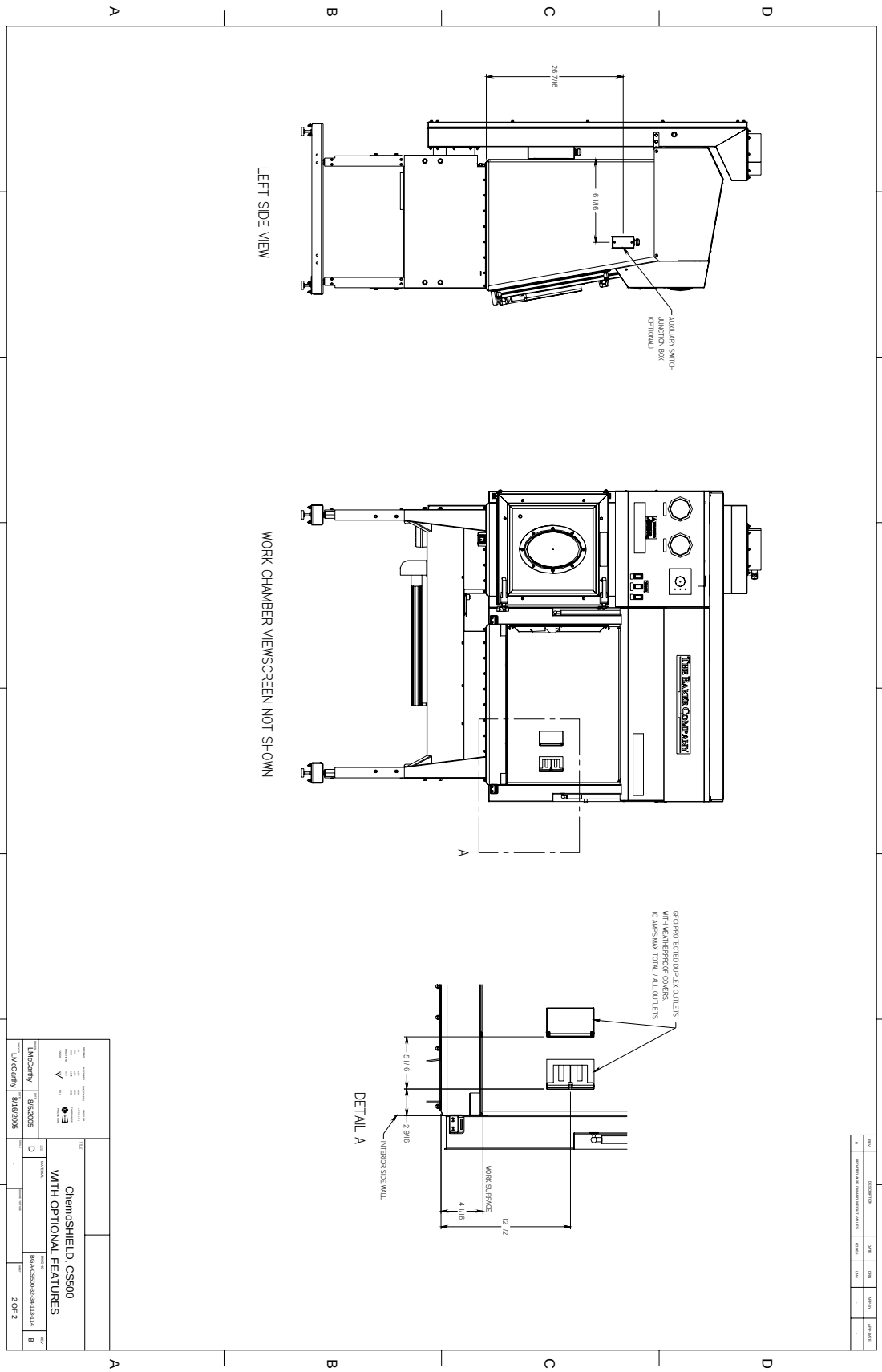
Dimensional Drawing – Standard Configuration



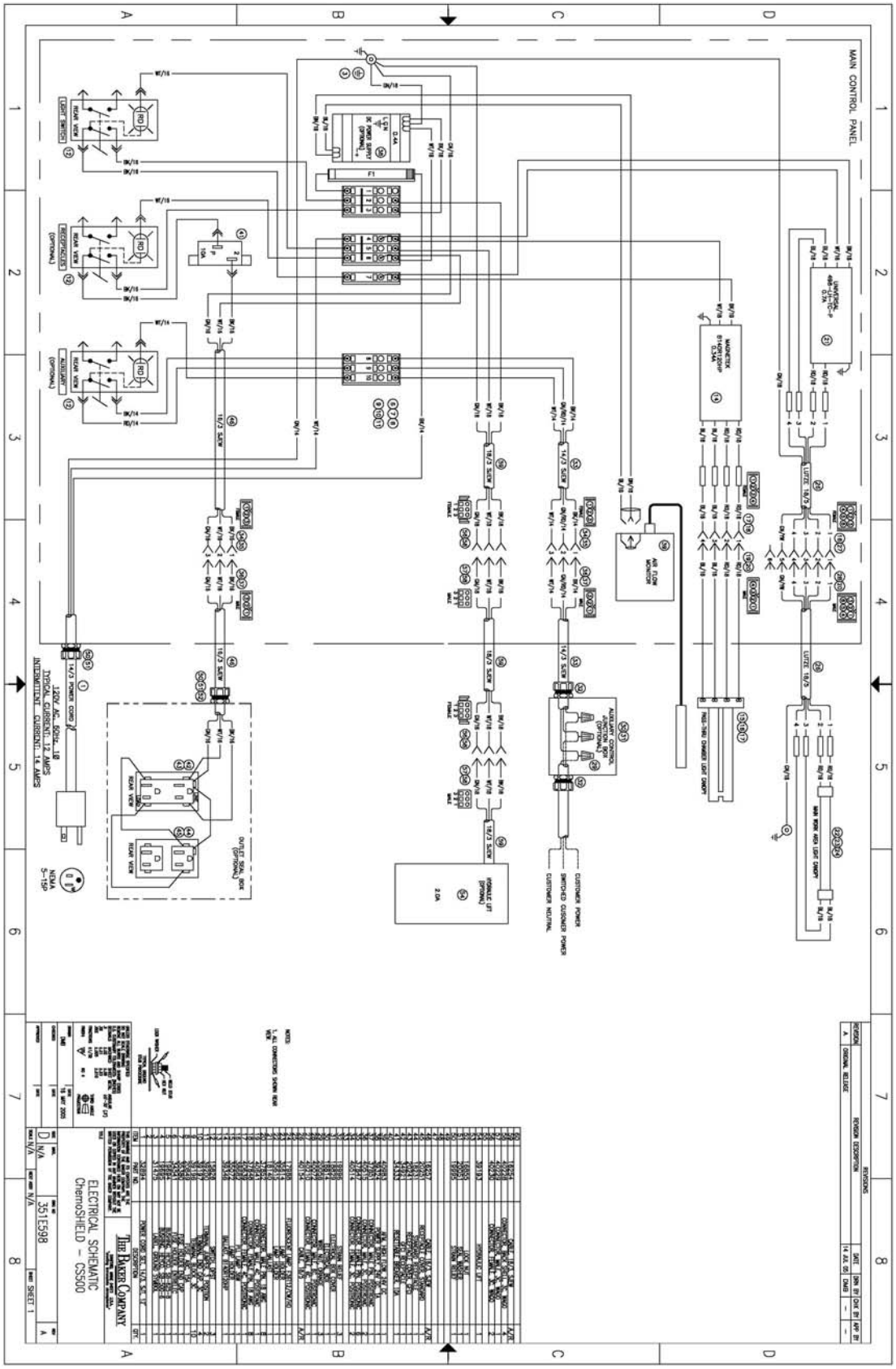
Dimensional Drawing – Optional Features [Page 1 of 2]



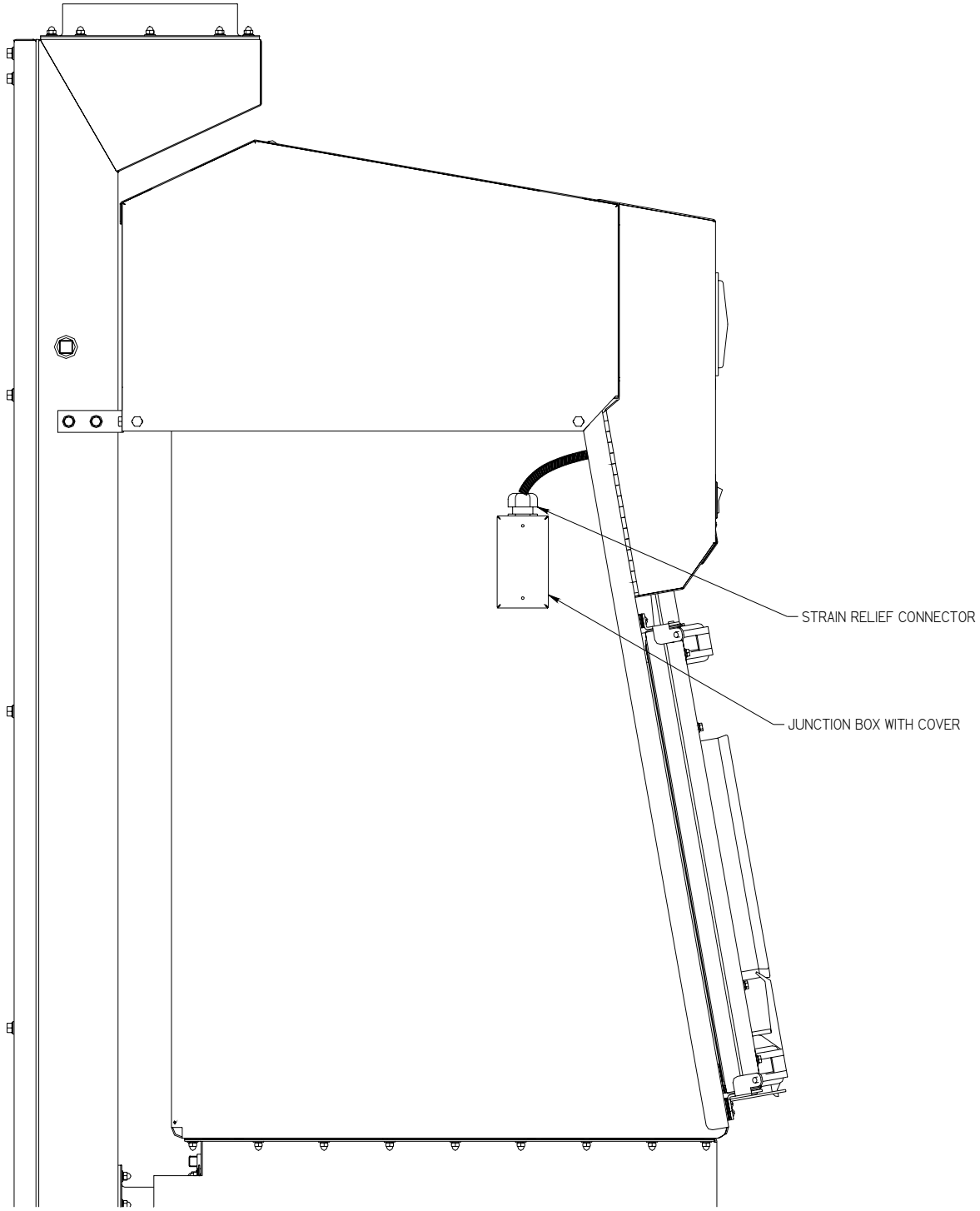
Dimensional Drawing – Optional Features [Page 2 of 2]



Wiring Diagram



Auxiliary Switch Junction Box Location (Optional)



LEFT SIDE VIEW OF CHEMOSHIELD

Junction Box Wiring Schematic