Division 12300
Laboratory Casework and Equipment/ Fumehoods

Gibson Associates
325 Boston Post Rd.
Sudbury, MA 01776

Frank Nykiel

Tel: 978-443-8160 Fax: 978-443-0928

Information Includes:

Fumehoods- Factory Certification
Warranty

Epoxyn Products L.L.C.
500 E 16th Street
Mountain Home, AR 72653

Customer Service
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Receiving, Installation & Care Instructions

Epoxyn Products L.L.C.

500 E 16th Street
Mountain Home, AR 72653
(870) 425-4321 • (800) 424-5254 • (870) 425-0820 Fax

RECEIVING, INSTALLATION & CARE INSTRUCTIONS

Thank-You for purchasing our epoxy resin products. In order to insure you receive many years of service from your investment, we are providing these Receiving, Installation and Care Instructions. It is important that you read and familiarize yourself with the steps and procedures outlined in these instructions to avoid damage while receiving/handling the products, properly installing the products, and caring for the products in the coming years.

Should you have any questions concerning the receiving, installation, and/or care of your resin products, feel free to call our Customer Service Department at (870) 425-4321.

RECEIVING PRODUCTS

Products are typically shipped via common carrier. All products are packaged for protection during transit. Upon receipt of a shipment, the following steps should be followed:

1. Inspect all pieces for damage caused during shipment. If packaging material is damaged, be sure to immediately inspect the products inside the carton and/or crate. Any damage must be noted on the carrier's shipping paperwork and initialed by the driver before departure.

2. Compare the number of pieces received with the packing list provided. Any discrepancies must be noted on the carrier's shipping paperwork and initialed by the driver prior to departure.

3. Resin products are awkward and cumbersome to handle due to their weight and size. They are susceptible to breakage if dropped. Leaning resin counter tops against a sheet rock wall, finished or otherwise, can leave permanent indentations and should be avoided.

   WARNING: Resin products are very heavy! Weights for typical pieces can easily exceed 50 lbs. *Adequate manpower is required to unload and handle resin products to avoid personal injury and property damage.*

4. Once the products are unloaded, care should be used in distributing materials to the rooms/areas installation will take place. Damage to the products or

damage to the interior finishes of the building can occur if care during distribution is not exercised.

5. After distribution, products should be checked for conformance with your order using paperwork provided with the shipment. ***Any discrepancy involving products as compared to your original order must be reported within 7 calendar days after receipt of shipment.*** Discrepancies should be reported via fax (870-425-0820) to Epoxyn on the enclosed "Shortage & Breakage Form." Please be sure to completely fill out the form so as to expedite the replacement of any product.

6. If concealed shipping damage is discovered during the unpacking process, contact the carrier immediately to report the damage and request an inspection. Concealed damage must be reported to the carrier within 14 calendar days after receipt of shipment if the carrier is to be held responsible for replacement product. Do not dispose of any packing material until after the carrier performs an inspection and authorizes its disposal.

7. If products are to be stored for an extended period of time (longer than 30 days), special care must be taken to prevent damage. Counter tops should be stored flat, fully supported along the entire length and width of the counter top. Epoxy resin products should not be stored outside without cover. This will prevent warpage or twisting from occurring. Resin products should be stored in a conditioned facility.

INSTALLATION OF PRODUCTS

Installing epoxy resin products does not require any special tools or skills beyond what is normally expected of experienced maintenance personnel. Tools and supplies (not included) typically require:

- Tape Measure
- 4' Level
- Putty Knife
- Assorted Sizes of C-Clamps
- Metal Shims
- Masking Tape
- Scott's Liquid Gold Household Cleaner or Similar Product
- Clean Cloth Rags
- Rubbing Alcohol

Installation of sinks and counter tops requires the use of adhesives. Some installers prefer to use silicon adhesive, others prefer to use two-part epoxy cement. Silicon provides flexibility for removal and replacement of sinks and counter tops at a later date, but is not as resistant as epoxy cement to reagents and chemicals typically found in the laboratory environment. Silicon can also require additional time to install

counter tops since it does not have the adhesive properties of epoxy cement and extra care must be taken when finishing joints to obtain an acceptable result. Also, silicon does not visually match the resin counter tops, sometimes resulting in a less than acceptable installation.

For this reason, Epoxyn Products L.L.C. recommends the use of, and only provides, epoxy cement for use when installing counter tops and sinks, except in those instances where the end-user requires flexibility and movement on a frequent basis. Use of epoxy cement will provide for the best possible appearance and longevity, resulting in a quality installation.

Installation should <u>not</u> occur if the building temperature does not remain above 60° F. during the entire period of installation and cement curing.

I. Cupsink Installation

(Oval and Rectangular Cupsinks are installed in the same fashion)

Cupsinks are installed from the top of the counter top, cemented in place in a permanent location.

1. Place the cupsink in the hole cut at the factory to insure a proper fit.

2. Remove the cupsink. Using clean cloth and alcohol, wipe cut-out in counter top and lip of cupsink to remove any excess fabrication dust/oil.

3. Mix two-part epoxy cement carefully following instructions on container.

4. Carefully apply cement on bottom edges of cupsink and in counter top cut-out. Press cupsink into cut-out until lip of sink is flush with counter top surface. Shim cupsink to prevent movement prior to cement fully curing. Wipe off any excess cement immediately using a clean cloth dampened with clean water. ***Excess cement and residue must be removed prior to curing.***

   WARNING: The cement is a permanent adhesive. Avoid getting excess cement on adjacent counter tops and building surfaces since it cannot be removed once cured.

5. Leave cement cure overnight before attaching any plumbing to avoid misalignment of the cupsink.

6. If cement around cupsink shrinks after curing for 24-hours, grout seam until smooth, being sure to remove any excess cement as noted in Step 4 above.

II. Tub Sink Installation:

Tub sinks are installed from below the counter top, usually within a cabinet or under an apron of some type.

1. Following cabinet manufacturer's instructions, install tub sink "cradle" in cabinet or apron, making sure cradle is extended to the lowest possible position.

2. Using a clean cloth rag and alcohol, wipe the top rim of the tub sink and bottom surface of the counter top at the cut-out to remove any excess fabrication dust/oil.

3. Mix the two-part epoxy cement carefully following the instructions on the container. Apply a bead of cement along the entire top rim of the tub sink.

4. Slide the tub sink onto the sink cradle in the cabinet or under the apron.

5. Adjust the cradle until the tub sink is pressed tightly against the underneath of the counter top.

   NOTE: Avoid over tightening the sink cradle since excessive pressure will cause the counter top to push up and possibly cause damage to the cabinet, counter top and/or tub sink.

6. Looking through the sink cut-out in the counter top, wipe any excess cement from the interior walls of the tub sink using a clean cloth rag dampened with clean water. ***Excess cement must be removed prior to it curing.***

   WARNING: The cement is a permanent adhesive. Avoid getting excess cement on adjacent surfaces or allowing to dry on tub sink since it cannot be removed once cured.

7. Sink plugs (sometimes referred to as "strainers") are installed in the same fashion as a cupsink. Refer to instructions for Cupsink Installation to complete this task.

III. Counter Top Installation:

Proper installation of counter tops is dependent on the quality installation of cabinetry which support the resin products. Prior to installing counter tops, an inspection of the cabinetry is required. In order to insure a quality installation of counter tops, the following should be reviewed:

- Be sure the cabinetry is installed plumb and level. If it is not, cabinetry must be corrected.

- Inspect the top rails of the cabinetry to be sure the alignment between

units are smooth. If misalignment is detected, cabinetry must be corrected.

- Inspect the top rails of the cabinetry to be sure there are no fasteners extending above the top surface of the cabinets. If fasteners are too high, rework cabinets to eliminate the problem.

- Clean top of cabinetry to remove any dust/dirt to allow for proper adhesion of adhesives during counter top installation.

- If plumbing or electrical service runs have been roughed-in prior to the installation of counter tops, check to be sure piping and/or conduit does not interfere with the bottom side of counter tops and/or sinks. If interference is detected, have piping and/or conduit moved.

Once this inspection is complete, counter tops should be set on the cabinetry in their correct locations to check for proper fit **prior to cementing anything in place.**

1. Starting with the corner pieces of counter top (if applicable), begin laying complete assemblies of counter tops on top of the cabinetry as shown on drawings (provided by others).

- Arrange counter tops to allow for a joint approximately 1/16"-1/8" wide.

- Counter tops should overhang the cabinets in front and at the end of an assembly in accordance with installation drawing provided by others.

- Check to be sure fixture holes and sink cut-outs match the requirements of the assembly.

- Integral backsplash tops should be set by aligning the backsplash to be even.

  NOTE: It is important that the proper pieces of counter tops be placed in their correct location to insure adequate joint width and acceptable installation.

2. After dry-fitting an assembly, remove pieces of counter tops and carefully place to the side.

3. Starting with the corner of a counter top assembly, wipe the edges to be joined to adjacent pieces of counter top with a clean cloth rag dampened with alcohol to remove any excess fabrication dust/oil.

4. Wipe the bottom of the pieces of counter top with a clean cloth rag dampened with clean water to remove any dust or dirt that would prevent proper adhesion of cement.

5. Apply masking tape to the top surface of the counter top immediately adjacent to the joint.

6. Mix the two-part epoxy cement following the instruction label on the container.

7. Tip the counter top piece up from the front. Using a putty knife, apply a small dab of cement every 12"-24" on the top rail of the cabinet, then set the piece back down aligned in its proper location.

8. Apply a liberal amount of cement to both edges of counter top pieces to be joined prior to pressing them together. Cement should be applied evenly and consistently along the entire joint.

9. Press the two pieces of counter top together. Work the pieces back and forth to the desired joint width and to insure proper adhesion of cement to both pieces. Make sure the two edges of the joint are aligned with each other, shim and clamp as necessary to obtain a smooth, level working surface upon completion.

   HINT: If conditions permit, carefully use bar clamps to draw two pieces together.

10. Once the proper joint width is achieved, clamp the counter top pieces in place using C-Clamps.

11. Using a putty knife, remove excess amounts of cement by running the knife along the entire length of the joint.

12. Cement residue must be removed from the counter top by wiping the surface of the counter top with a cloth rag dampened with clean water. ***Excess cement and residue must be removed before it cures.***

    WARNING: Cement is a permanent adhesive. Avoid getting cement on any other surfaces or materials since it will be impossible to remove once cured.

NOTE: Water used to wipe off cement residue must remain clean. After wiping several joints, fresh water must be used to avoid smearing cement on surface of counter tops and causing permanent stains.

13. Allow 10-15 minutes for the cement to initially set-up, wipe joints with clean water, and remove masking tape. Lightly wipe joint again to insure all excess cement and residue have been removed.

Installation of remaining counter top pieces should follow in accordance with the steps listed above.

NOTE: Curing time for epoxy cement is approximately 24-hours. Counter top pieces should remain clamped and undisturbed during this period of time to insure proper adhesion.

If your order included applied backsplashes (curbs) the following process should be followed:

- Dry-Fit backsplash to insure proper fit.
- Wipe bottom edge of backsplash and surface of counter top with a cloth rag dampened with alcohol to remove any excess fabrication dust/oil.
- Mix two-part epoxy cement following instructions on container.
- Apply cement to bottom edge of backsplash using a putty knife making sure cement is evenly applied along the entire length.
- Press backsplash into place, making sure it is straight and level.
- Using a putty knife, remove excess cement.
- Allow cement to initially set for 10-15 minutes, then lightly wipe joint with cloth rag dampened with clean water. ***Excess cement and residue must be removed prior to curing.***

If additional fixture holes or sinks need to be added after receiving shipment of Epoxyn products, the following steps should be followed.

IV. Fixture Holes:

1. Determine the proper size hole for the fixture by referring to the manufacturer's literature or contacting a local distributor.

2. Mark the center of the hole on the counter top in pencil. If the counter top is already installed, be sure to check underneath and confirm clear space for piping and fixture installation.

   WARNING: Drilling resin counter tops will cause a very fine black dust to become airborne. Be sure to utilize adequate personal protective equipment as well as being sure to cover any other equipment or finished surfaces in the room. Whenever possible, drill resin materials outside the building in a well ventilated area.

3. Using a diamond or carbide tipped drill bit or hole saw, drill the required hole.

4. Lightly sand or file any rough or sharp edges after drilling to complete process.

V. Sink Cut-Outs:

Cupsink cut-outs and drop-in sink cut-outs are very difficult to do in the field. *Only trained, experienced resin installers should attempt to field cut a cupsink cut-out.*

Undermount tub sink cut-outs are performed as follows:

1. Measure the inside dimensions of the sink to be installed.

2. Subtract one inch from the inside dimensions of the sink, mark the hole on the counter top in pencil.

3. Using a diamond tipped or carbide hole saw 1/2" less than the radius of the tub sink, drill the four corners of the sink cut-out.

   WARNING: Drilling/Cutting resin counter tops will cause a very fine black dust to become airborne. Be sure to utilize adequate personal protective equipment as well as being sure to cover any other equipment or finished surfaces in the room. Whenever possible, drill/cut resin materials outside the building in a well ventilated area.

4. Using a diamond tipped or carborundum circular saw blade, cut along the straight sections of the sink cut-out. Make 3-4 shallow cuts with each pass.

5. Lightly sand or file any rough or sharp edges to complete process.

6. Freshly cut edges must be lightly sanded and Epoxyn Edge Dressing must be applied. The edge dressing comes prepackaged in a kit.

VI. Field Fabrication:

If you need to cut counter tops to fit a specific field condition, the following process should be followed:

1. Transfer the necessary measurements to the counter top to be cut.

2. Always use a straight edge when cutting a counter top to insure a proper joint during installation.

3. Always cut the side of the counter top that will be joined with another piece of counter top, or that will abut with a wall whenever possible.

4. Using a diamond tipped or carborundum circular saw blade, make 3-4 passes using a shallow cut.

5. Once cut, be sure to wipe off the edge with a clean cloth rag dampened with alcohol to remove dust/oil.

VII. Installation Completion:

Once installation of all counter tops is complete, and cement is allowed to cure for 24 hours, the following should be performed:

- Remove all clamps, shims, etc.

- Using clean water and a clean cloth rag, wipe off any construction dust/dirt.

- Inspect joints to see if the cement shrank and/or if voids in cement are detectable. If so, apply masking tape to counter top surface and grout joint using epoxy cement. Be sure to clean counter tops after using cement as noted throughout these instructions.

- If additional construction activity is still taking place around the counter tops, it is recommended that they be covered with corrugated cardboard. Cardboard should then be covered with 3-5mil plastic and taped in place to prevent any damage to counter tops.

  NOTE: Be sure to warn other contractors/trades of the potential damage that can be caused if they use counter tops as work-benches or scaffolding to perform their work.

- Just prior to occupancy, after all construction activity has been completed, wipe the counter tops with a clean cloth rag dampened with Scott's Liquid Gold, Old English Lemon Oil, or similar commercially available product. This will provide a dark, consistent sheen to the resin counter tops.

  NOTE: Do not over apply these cleaners since they will leave an oily build up. If too much is applied, immediately wipe off excess.

VIII. CARE OF EPOXYN PRODUCTS RESIN COUNTER TOPS AND SINKS:

Epoxy resin products are nearly chemically inert, thus resisting stains and damage from a wide variety of reagents and chemicals if properly installed and cared for.

However, an end-user must be aware that there are certain reagents and/or chemicals that will stain or otherwise damage resin. ***Caution should be used when using any type of acid such as nitric acid, sulfuric acid, chromic acid, hydrofluoric acid, etc.*** Concentrated amounts of these acids, if spilled on resin counter tops or in resin sinks, will cause stains or permanent etching of the resin surface. Any spills must be immediately cleaned to avoid damage to your resin products, as well as avoid any danger to your workers.

Epoxyn Products L.L.C. recommends the following process/intervals for basic care and housekeeping of counter tops and sinks:

1. In normal laboratory applications, counter tops and sinks should be wiped clean at the end of every day if possible. At a minimum, a weekly cleaning regiment must be implemented to insure the lasting beauty and durability of your resin products.

- To clean counter tops and sinks to remove dirt, dust and chemical residues, simply use a sponge, clean water and a sudsing cleanser (ie: Soft Scrub). Lightly wipe the surfaces until the dirt and residue is removed.

WARNING: Do not use an abrasive cleaner or abrasive sponge/brush so that the surface of the resin is not damaged.

2. Sinks should be inspected on a monthly basis to insure the seal between the sink and counter top, and the seal between tub sink and sink plug (sink strainer), is still good. Specifically, look for voids or cracks in the cement at seams. If cracks or voids are detected, repair should occur immediately.

3. Counter tops should be inspected every six months. Review of current house-keeping practices should be conducted, especially in any area that staining occurs on a frequent basis. Inspection of the counter tops must include a review of the joints to insure they are still sealed and solid. Look specifically for any cracks or voids in the cement at joints. If cracks or voids are detected, repair should occur immediately.

Repairing Resin Counter Tops

Although the resin materials used to form counter tops is very hard and durable, they can be damaged if care is not taken. Should damage be identified during normal daily operations or through routine inspections as recommended, the following processes should be used to make repairs.

Scratches

Counter tops can be scratched if heavy items/equipment are slid across their surface,

sharp objects are run along the surface such as cutting, or something is dropped on the counter top. Scratches can be categorized in two types: 1) Surface Scratches and 2) Deep Scratches.

Surface scratches can be easily repaired by following these steps:

1. Many light surface abrasions can be handled by simply wiping the counter tops with a clean cloth dampened with Scott's Liquid Gold, Old English Lemon Oil, or other similar commercially available product.

2. If surface abrasions are not removed using this process, the deeper scratches will need to be addressed individually as follows:

- Using 660 grit or finer wet/dry sand paper, hand sand the area of the scratch parallel to the scratch using light, uniform passes until the depth of the scratch is reached.

- Using a 50/50 mixture of Soft Scrub and commercial cleanser on a clean cloth rag, use a circular motion and clean/buff the sanded area.

- Wipe the area with clean water to remove all grit and cleaners.

- Using Epoxyn Edge Dressing Kit, apply a light coating to refurbish the color and luster of the resin counter top.

- Wipe the entire counter top with a light coating of Scott's Liquid Gold, Old English Lemon Oil, or other similar commercially available product.

Should the counter top sustain minor chips at the edges or corners, the following steps should be followed:

1. Using a clean cloth rag dampened with alcohol, clean the area of the chip and surrounding counter top.

2. Mix two-part epoxy cement in accordance with instructions on container.

3. Using a putty knife, apply cement to chip working into the crevice and shaping to match contour of edge/corner.

4. Remove excess cement using a putty knife, but allow cement to remain slightly raised above surface of counter top.

WARNING: Cement is a permanent adhesive. Avoid getting cement on any other surfaces or materials since it will be impossible to remove once cured.

5. Allow cement to cure for a 24-hour period.

6. Using an orbital sander with 660 grit or finer wet/dry sand paper, sand the repair area until the patch is flush with the surface of the counter top.

7. Using a 50/50 mixture of Soft Scrub and a commercial cleanser on a clean cloth rag, apply the mixture in a circular fashion to clean/buff the repaired area.

8. Wipe the area with a clean cloth rag and clean water.

9. Using Epoxyn Dressing Kit, wipe the area to refurbish the color and luster of the repaired area.

10. Apply a light coating of Scott's Liquid Gold, Old English Lemon Oil, or other similar commercially available product to the entire counter top.

IX. USE AND CARE GUIDELINES FOR PHENOLIC WORK SURFACES:

Surface Protection

Scratches and Impact: Do not chop, slice or pound directly on a phenolic work surface. Use a chopping block or other protective surface. Heavy impact, such as a hammer can cause gouges in the surface. Knives can leave slices or scratches. Ceramics and abrasive materials can scratch phenolic work surfaces.

Hot Objects: Do not place extremely hot items on phenolic work surfaces. Phenolic work surfaces can withstand heat up to 350 degrees F. However, prolonged high temperature exposure can cause surface damage. Use an insulated hot pad or other protective device beneath hot items. Do not place hot irons or crucibles directly onto phenolic work surfaces.

Ordinary Cleaning

To keep phenolic work surfaces looking beautiful, clean with a damp cloth using mild nonabrasive cleaners, e.g., 409, Fantastic, etc. Some commercial self-cleaning waxes and polishes can be used on phenolic work surfaces, but caution must be taken since others contain abrasives that will eventually damage the surface or make it susceptible to stains.

Stronger acid or alkaline-based cleaners may permanently damage or stain phenolic work surfaces. Never allow these cleaners, containers, rags or other items contaminated with these cleaners to remain in contact with phenolic work surfaces. Examples of such cleaners include:

drain cleaners	some countertop cleaners	ceramic top cleaners
chlorine bleach	oven cleaners	rust removers
toilet bowl cleaners	metal cleaners	

If you spill such cleaners on a phenolic work surface, wipe up the spill immediately and rinse the effected area thoroughly with water. Chemical testing, performed to SEFA 8-1998 test specifications, has shown that phenolic work surfaces resist most chemicals for a period of time, but there is no substitute for good housekeeping. Check your phenolic work surface specifications for chemical resistance prior to long-term exposure.

Disinfecting

Phenolic work surfaces may be disinfected with common alcohol based disinfectants or with mild solutions of hydrogen peroxide.

Special Cleansing Recommendations

Residual adhesive: Phenolic work surfaces will occasionally have a protective cover sheet used during shipping that may leave residual adhesive. Clean this adhesive with a nonabrasive cotton cloth and adhesive solvent such as lacquer thinner, MEK, or acetone. Read and follow all instructions and warnings on the labels of all solvent products.

Paint and varnish: Remove most oil based paints, varnishes and lacquers with a suitable solvent or paint remover. Read and follow all instructions and warnings on the labels and remember that most solvents are extremely flammable. Remove most water based paints with an ammonia based household cleaner or paint remover, For stubborn paint spots, use a plastic, nonabrasive scouring pad. Never use steel wool or other metal scouring pads.

Stains: Phenolic work surfaces are resistant to most common stains. However, some materials and liquids such as certain dyes and pharmaceutical products may permanently stain phenolic if not removed quickly. Examples include:

some hair dyes	laundry bluing	tannic acid
Mercurochrome	dermatological tar	povidone-iodine

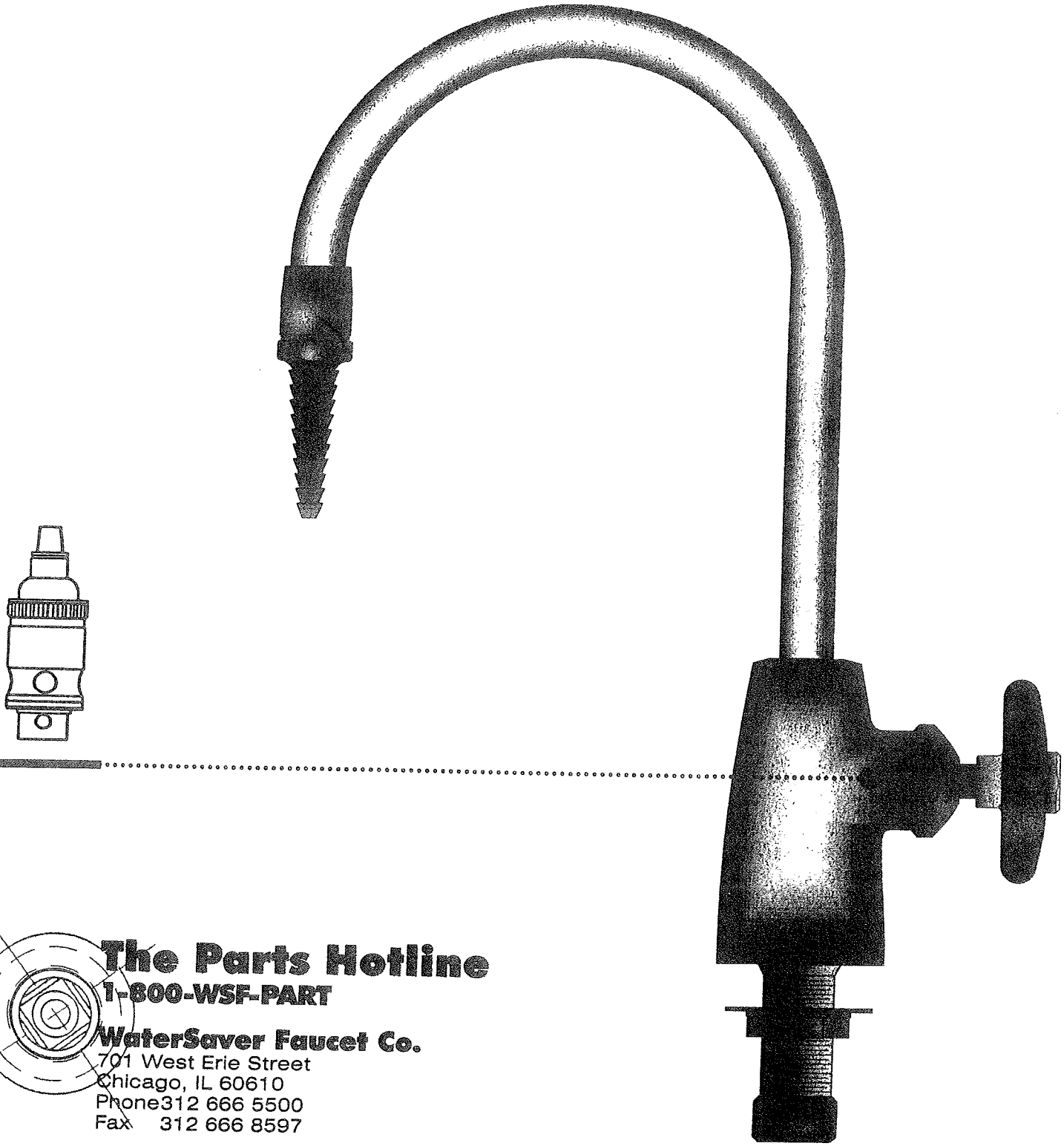
To remove or minimize such stains, use full strength Pine-Sol® liquid cleaner or another mild household spray cleaner on the effected area, and allow it to draw out the stain. Blot with a damp, nonabrasive cloth, then rinse. You can also use solvents such as denatured alcohol. Follow all directions and warnings on the solvent label because many are extremely flammable.

Avoidance of Abrasive Cleaners/Materials

DO NOT use abrasive cleaners, powders, scouring pads, steel wool, sandpaper, etc. to clean phenolic work surfaces. These can damage the surface finish and make it susceptible to staining.

WaterSaver Faucet Co.
O & M Guide

Operation & Maintenance Guide for Laboratory Service Fixtures



The Parts Hotline
1-800-WSF-PART

WaterSaver Faucet Co.
701 West Erie Street
Chicago, IL 60610
Phone312 666 5500
Fax 312 666 8597

WaterSaver Faucet Co.
701 West Erie Street
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Phone 312 666 5500
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For fifty years, WaterSaver Faucet Co. has set the standard for quality in laboratory faucets and valves. Our products are carefully designed and manufactured to provide exceptional durability and performance.

To assist in the installation, operation and maintenance of WaterSaver products, we have developed this "O&M Guide." This Guide provides information on installation procedures, repair and replacement parts and trouble-shooting techniques for our products.

Repair and replacement parts are available on a 24-hour basis through the WaterSaver Parts Hotline. Our product specialists are available to answer questions and provide technical support. Call 1-800-WSF-PART to take advantage of this service.

WaterSaver Faucet Co. is dedicated to providing quality products and service. We trust that you will let us know if we can be of assistance in any way.

Table of Contents

Installation Guidelines

Installing WaterSaver laboratory faucets and valves requires the use of common plumbing installation techniques. Observing the following guidelines will help to assure troublefree installation:

1. Thoroughly clean and flush supply lines prior to installing faucets and valves. Pipe shavings, scale, tape and other debris can be carried through a pipe and into a faucet or valve when the system is activated. This debris can damage valve components and interfere with the proper operation of the faucet or valve.

2. When placing a faucet or valve on a laboratory countertop or wall, secure the fixture using the lockwasher and locknut. Tighten the locknut sufficiently to secure the fixture to the counter or wall. Do not overtighten.

3. Except for several faucet styles, WaterSaver fixtures are furnished with American National standard taper pipe threads (NPT) on the fixture inlet. Use Teflon tape or other pipe sealant to seal these threads. Do not apply the sealant in a way that will permit it to enter into the faucet or valve. The faucets which do not have NPT threads (such as our L400 series and L600 series) are furnished with 1/2" OD slip joint connections.

4. Observe the maximum test and working pressures for faucets and valves. Testing or using a valve at pressures for which it is not designed can result in leakage or failure. Refer to the Water Saver "Valve Selection Guide" for information on maximum test and working pressures.

5. Do not use valves for services and applications for which they are not intended. For example:

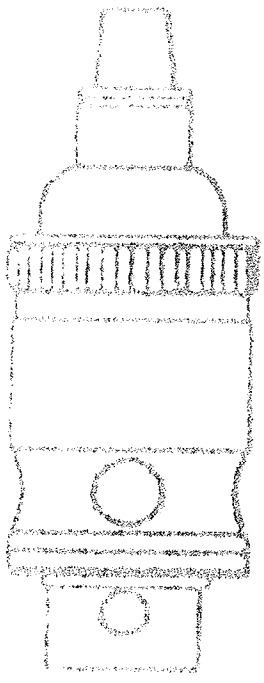
   - Ground key cock valves are intended for gas, air and vacuum service only and at pressures of less than 40 PSI.
   - Valves for oxygen service must be specially cleaned, lubricated and packed. Ground key cock valves or needle valves which have not been specially cleaned are not acceptable.
   - Needle valves should be used for gas services only. They are generally not suitable for water or steam services.

6. Use caution when applying a wrench or other tool to the exterior of a faucet or valve. Failure to do so can result in damage to the chrome plating or epoxy finish on the outer surfaces of the faucet or valve.

7. Every WaterSaver faucet is fully assembled (i.e. the gooseneck is installed into the faucet body, the outlet fitting is installed into the gooseneck, etc.). This enables us to inspect and test the faucet as a complete assembly. Faucets are tagged when testing is complete. If a faucet is received without an inspection tag, please contact the factory.

   Every WaterSaver valve (such as a needle valve or ground key cock valve) is assembled, inspected and tested. When ordering valve assemblies (for example, a ground key cock valve with a turret and a mounting shank), we recommend ordering the assembly *fully assembled*. This permits us to test the entire assembly, including the connections between the valve, the mounting fitting (turret or flange) and the mounting shank. Factory assembly also minimizes the field labor required to install the fixture and minimizes the possibility of damaging the fixture's finish during installation.

9. Clean faucets and valves using only a soft cloth and soapy water. Do not use abrasives, detergents or other cleaners which can damage the finish on the fixture. In particular, do not use any solvent in or near a faucet or valve. Solvents can remove the lubricants used in the valve mechanism.



WaterSaver Faucet Co.
Innovative Products for Research

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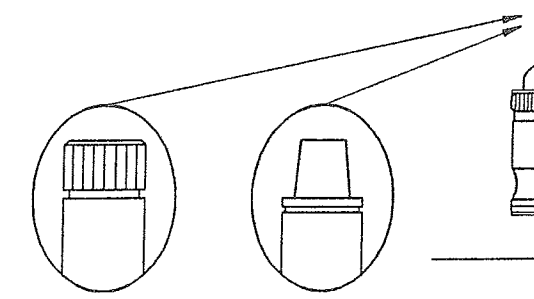
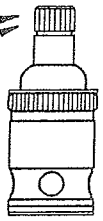
BNV100 Compression Control Renewable Unit (Round Serrated Stem)

Effective July 1, 1991, this unit was replaced by the BNV200 unit with tapered square stem. See page 6.

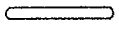


ROUND SERRATED STEM (BNV100 SERIES)

TAPERED SQUARE STEM (BNV200 SERIES)



BNV100
COMPRESSION CONTROL RENEWABLE UNIT
(SPECIFY RH OR LH)



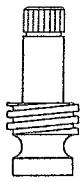
BNV060 PACKING NUT O-RING

BNV065 VALVE STEM PACKING

SNV055 RETAINER WASHER

SNV050 STEM FRICTION RING

SNV035-045
VALVE STEM WITH DISC AND SCREW (ASSEMBLED)
(SPECIFY RH OR LH)

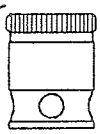


BNV045 VALVE STEM WITH ROUND SERRATED END
(SPECIFY RH OR LH)

BNV040 VALVE DISC
BNV040HD VALVE DISC (HARD)

SNV035 VALVE DISC SCREW

BNV030-130A
BARREL WITH SEAT (ASSEMBLED)
(SPECIFY RH OR LH)



BNV030 BARREL
(SPECIFY RH OR LH)

SNV130A STAINLESS STEEL RENEWABLE SEAT WITH BNV025 UNIT WASHER ASSEMBLED

NOTES:
1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. IF FIXTURE HAS WRIST BLADE OR LEVER HANDLES, COLD WATER SERVICE REQUIRES UNIT WITH LEFT HAND THREAD. ORDER "LH" UNIT.
3. BNV040HD VALVE DISC (HARD) IS USED WITH BA036 AND BA039 WRIST BLADE HANDLES. ORDER BNV100HD.

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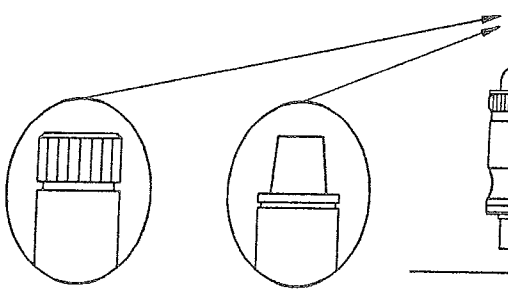
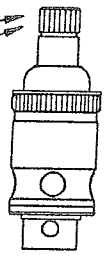
BNV100AVC Compression Control Renewable Unit with Adjustable Volume Control (Round Serrated Stem)

Effective July 1, 1991, this unit was replaced by the BNV200AVC unit with tapered square stem. See page 7.

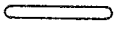


ROUND SERRATED STEM (BNV100 SERIES)

TAPERED SQUARE STEM (BNV200 SERIES)



BNV100AVC
COMPRESSION CONTROL RENEWABLE UNIT WITH ADJUSTABLE VOLUME CONTROL (SPECIFY RH OR LH)



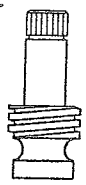
BNV060 PACKING NUT O-RING

BNV065 VALVE STEM PACKING

SNV055 RETAINER WASHER

SNV050 STEM FRICTION RING

SNV035-045
VALVE STEM WITH DISC AND SCREW (ASSEMBLED) (SPECIFY RH OR LH)

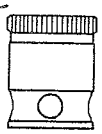


BNV045 VALVE STEM WITH ROUND SERRATED END (SPECIFY RH OR LH)

BNV040 VALVE DISC
BNV040HD VALVE DISC (HARD)

SNV035 VALVE DISC SCREW

SNV005-030
BARREL WITH SEAT AND VOLUME CONTROL (ASSEMBLED) (SPECIFY RH OR LH)



BNV030 BARREL (SPECIFY RH OR LH)

SNV015 STAINLESS STEEL RENEWABLE SEAT FOR ADJUSTABLE VOLUME CONTROL

BNV025 UNIT WASHER

BNV010 WATER SAVER VOLUME CONTROL

SNV005 SET SCREW

NOTES:

1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. IF FIXTURE HAS WRIST BLADE OR LEVER HANDLES, COLD WATER SERVICE REQUIRES UNIT WITH LEFT HAND THREAD. ORDER "LH" UNIT.
3. BNV040HD VALVE DISC (HARD) IS USED WITH BA036 AND BA039 WRIST BLADE HANDLES. ORDER BNV100AVC-HD.

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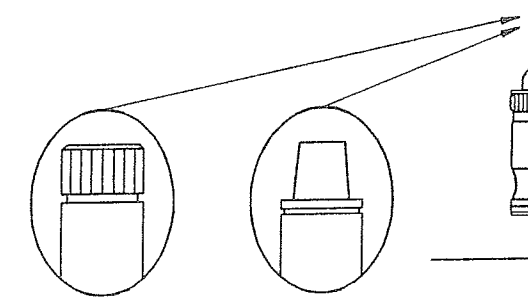
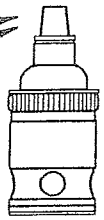
BNV200 Compression Control Renewable Unit (Tapered Square Stem)

Effective July 1, 1991, this unit replaced the BNV100 unit with round serrated stem.

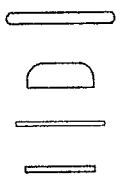


ROUND SERRATED STEM (BNV100 SERIES)

TAPERED SQUARE STEM (BNV200 SERIES)



BNV200
COMPRESSION CONTROL
RENEWABLE UNIT
(SPECIFY RH OR LH)



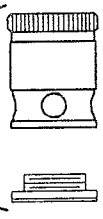
BNV060 PACKING NUT O-RING
BNV065 VALVE STEM PACKING
SNV055 RETAINER WASHER
SNV050 STEM FRICTION RING

SNV035-045TS
VALVE STEM WITH DISC AND SCREW (ASSEMBLED)
(SPECIFY RH OR LH)

BNV045TS VALVE STEM WITH TAPERED SQUARE END
(SPECIFY RH OR LH)

BNV040 VALVE DISC
BNV040HD VALVE DISC (HARD)
SNV035 VALVE DISC SCREW

BNV030-130A
BARREL WITH SEAT (ASSEMBLED)
(SPECIFY RH OR LH)



BNV030 BARREL
(SPECIFY RH OR LH)

SNV130A STAINLESS STEEL RENEWABLE SEAT WITH BNV025 UNIT WASHER ASSEMBLED

NOTES:
1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. IF FIXTURE HAS WRIST BLADE OR LEVER HANDLES, COLD WATER SERVICE REQUIRES UNIT WITH LEFT HAND THREAD. ORDER "LH" UNIT.
3. BNV040HD VALVE DISC (HARD) IS USED WITH BA036 AND BA039 WRIST BLADE HANDLES. ORDER BNV200HD.

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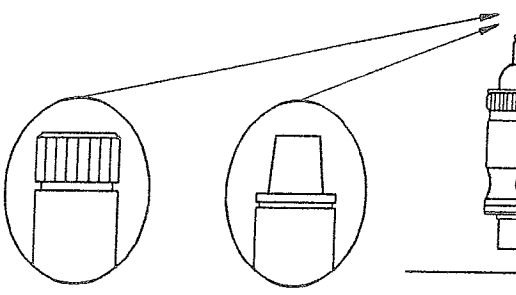
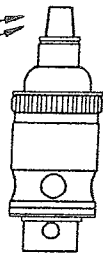
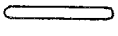
BNV200AVC Compression Control Renewable Unit with Adjustable Volume Control (Tapered Square Stem)

Effective July 1, 1991, this unit replaced the BNV100AVC unit with round serrated stem.





BNV200AVC
COMPRESSION CONTROL RENEWABLE UNIT WITH ADJUSTABLE VOLUME CONTROL (SPECIFY RH OR LH)



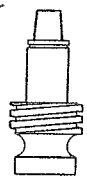
BNV060 PACKING NUT O-RING

BNV065 VALVE STEM PACKING

SNV055 RETAINER WASHER

SNV050 STEM FRICTION RING

SNV035-045TS
VALVE STEM WITH DISC AND SCREW (ASSEMBLED) (SPECIFY RH OR LH)

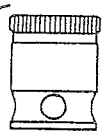


BNV045TS VALVE STEM WITH TAPERED SQUARE END (SPECIFY RH OR LH)

BNV040 VALVE DISC
BNV040HD VALVE DISC (HARD)

SNV035 VALVE DISC SCREW

SNV005-030
BARREL WITH SEAT AND VOLUME CONTROL (ASSEMBLED) (SPECIFY RH OR LH)



BNV030 BARREL (SPECIFY RH OR LH)

SNV015 STAINLESS STEEL RENEWABLE SEAT FOR ADJUSTABLE VOLUME CONTROL

BNV025 UNIT WASHER

BNV010 WATER SAVER VOLUME CONTROL

SNV005 SET SCREW

NOTES:
1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. IF FIXTURE HAS WRIST BLADE OR LEVER HANDLES, COLD WATER SERVICE REQUIRES UNIT WITH LEFT HAND THREAD. ORDER "LH" UNIT.
3. BNV040HD VALVE DISC (HARD) IS USED WITH BA036 AND BA039 WRIST BLADE HANDLES. ORDER BNV200AVC-HD.

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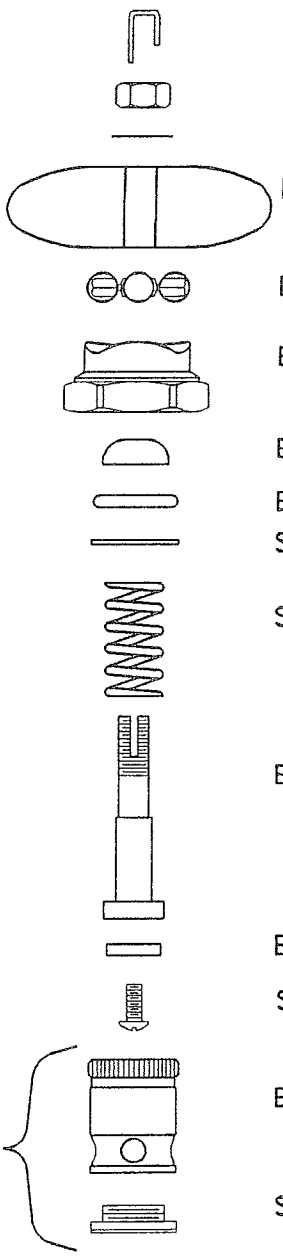
BSC135 Self-Closing Control Renewable Unit



SSC080	LOCKING CLIP
SSC085	HEX ADJUSTMENT NUT
PSC052	FRICTION WASHER
PA035	WHITE NYLON SELF-CLOSING HANDLE
BSC091	ROLLER BEARING ASSEMBLY
BSC071A	PACKING NUT
BSC066	STEM PACKING
BNV060	BODY WASHER
SSC056	RETAINER WASHER
SSC095	LIFTING SPRING
BSC046	VALVE STEM
BSC041	VALVE DISC
SNV035	VALVE DISC SCREW
BSC032	BARREL
SNV130A	STAINLESS STEEL RENEWABLE SEAT WITH BNV025 UNIT WASHER ASSEMBLED

BSC032-130A
BARREL WITH SEAT (ASSEMBLED)

NOTES:
1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. USE PA031 INDEX BUTTON WITH PA035 SELF-CLOSING HANDLE. SPECIFY SERVICE WHEN ORDERING.

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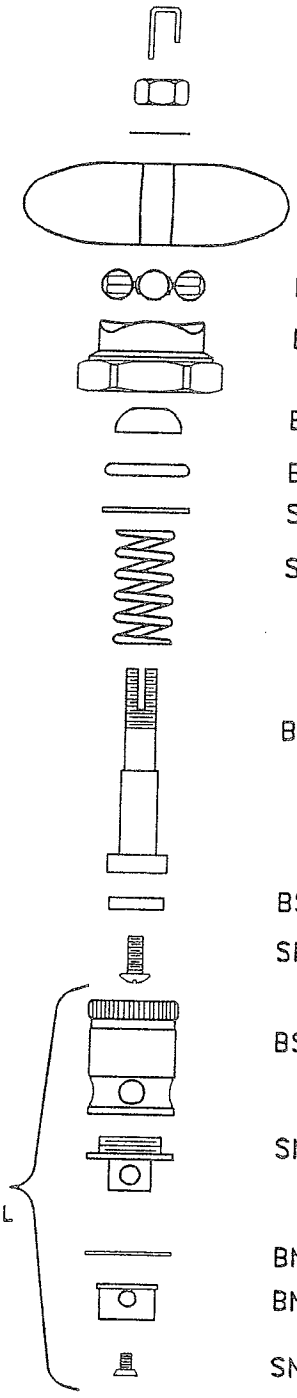
BSC135AVC Self-Closing Control Renewable Unit with Adjustable Volume Control



SSC080 LOCKING CLIP

SSC085 HEX ADJUSTMENT NUT

PSC052 FRICTION WASHER

PA035 WHITE NYLON SELF-CLOSING HANDLE

BSC091 ROLLER BEARING ASSEMBLY

BSC071A PACKING NUT

BSC066 STEM PACKING

BNV060 BODY WASHER

SSC056 RETAINER WASHER

SSC095 LIFTING SPRING

BSC046 VALVE STEM

BSC041 VALVE DISC

SNV035 VALVE DISC SCREW

BSC032 BARREL

SNV015 STAINLESS STEEL RENEWABLE SEAT FOR ADJUSTABLE VOLUME CONTROL

BNV025 UNIT WASHER

BNV010 WATER SAVER VOLUME CONTROL

SNV005 SET SCREW

BSC005-032
BARREL WITH SEAT AND VOLUME CONTROL (ASSEMBLED)

NOTES:

1. IF TIN-LINED RENEWABLE UNIT FOR DISTILLED OR DEIONIZED WATER IS REQUIRED, ADD SUFFIX "-TL".
2. USE PA031 INDEX BUTTON WITH PA035 SELF-CLOSING HANDLE. SPECIFY SERVICE WHEN ORDERING.

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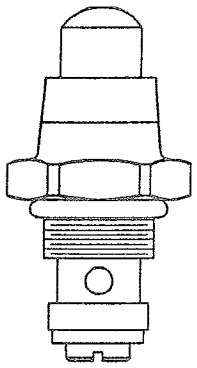
BSC011/016/021 Renewable Unit for Pedal Valves

WaterSaver pedal valves were redesigned as of April 1, 1995. Some of the new individual valve components (such as the valve stem and bonnet) are not interchangeable with the old components. Therefore, when ordering components for pedal valves built prior to April 1, 1995, please order the complete renewable unit (BSC011, 016 or 021).

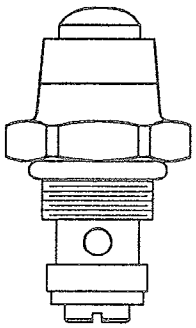
BSC011

RENEWABLE UNIT FOR L3001/3050/3050LP



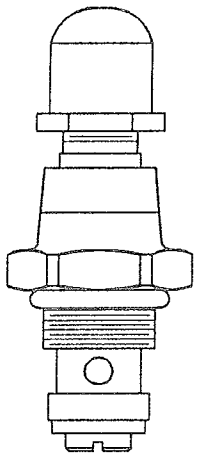
BSC016

RENEWABLE UNIT FOR L3010 AND 3060 (SAME AS BSC011 EXCEPT WITH BSC136A PUSH BUTTON)



BSC021

RENEWABLE UNIT FOR L3001LP (SAME AS BSC011 EXCEPT WITH BSC139A/160/140A PUSH BUTTON ASSEMBLY)



NOTES:

1. IF TIN-LINED RENEWABLE UNIT REQUIRED, ADD SUFFIX "-TL".

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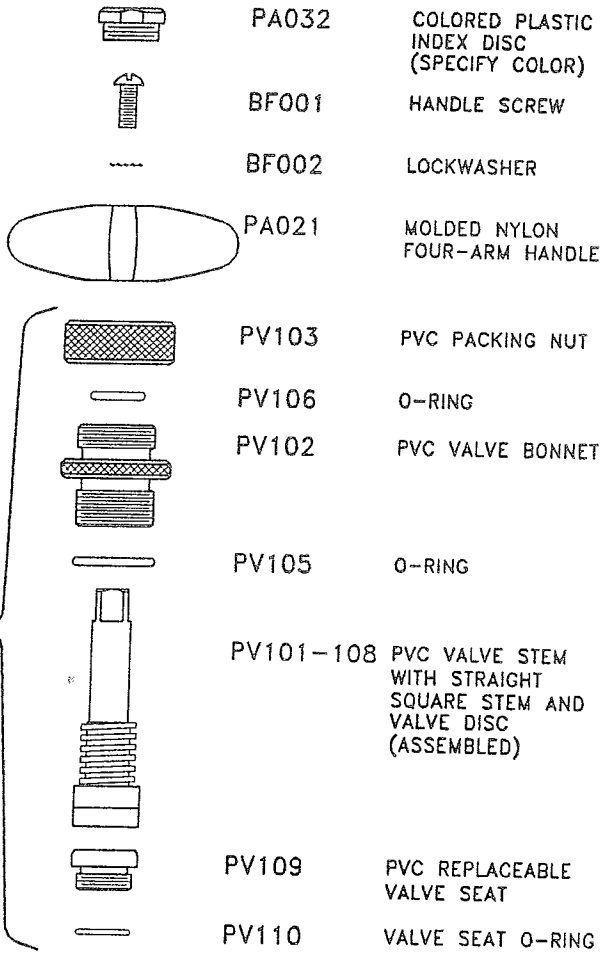
Compression Control PVC Valve Components

(Used on L7331 and L7332)

Self-Closing Control PVC Valve Components

(Used on L7318, L7319, L7320, L7322)

COMPRESSION CONTROL PVC VALVE COMPONENTS (USED ON L7331 AND L7332)



PA032 COLORED PLASTIC INDEX DISC (SPECIFY COLOR)

BF001 HANDLE SCREW

BF002 LOCKWASHER

PA021 MOLDED NYLON FOUR-ARM HANDLE

PV103 PVC PACKING NUT

PV106 O-RING

PV102 PVC VALVE BONNET

PV105 O-RING

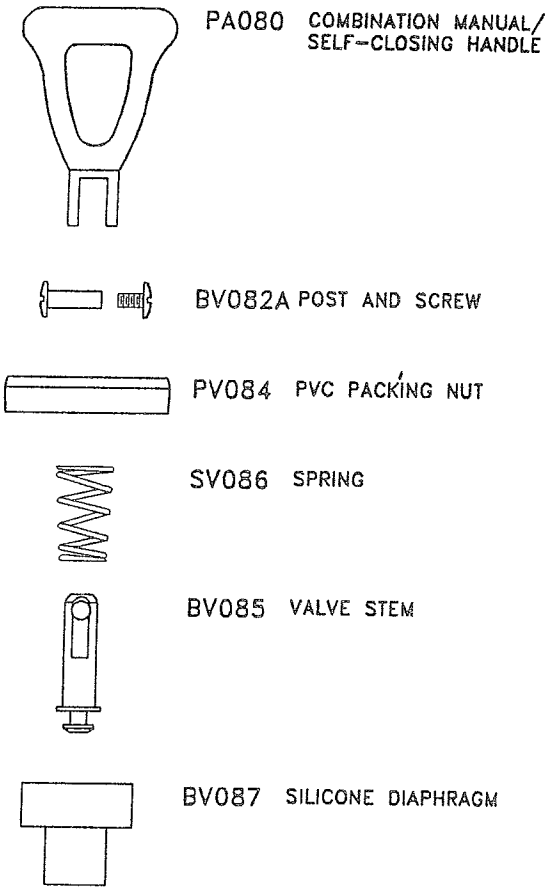
PV101-108 PVC VALVE STEM WITH STRAIGHT SQUARE STEM AND VALVE DISC (ASSEMBLED)

PV109 PVC REPLACEABLE VALVE SEAT

PV110 VALVE SEAT O-RING

PV100 RENEWABLE UNIT FOR PVC COMPRESSION CONTROL FAUCETS

SELF-CLOSING CONTROL PVC VALVE COMPONENTS (USED ON L7318, L7319, L7320, L7322)



PA080 COMBINATION MANUAL/ SELF-CLOSING HANDLE

BV082A POST AND SCREW

PV084 PVC PACKING NUT

SV086 SPRING

BV085 VALVE STEM

BV087 SILICONE DIAPHRAGM

NOTES:

1. MAXIMUM WORKING PRESSURE OF DIAPHRAGM VALVE IS 30 PSI.

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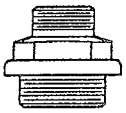
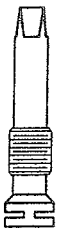
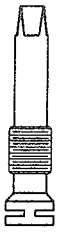
BV200N Needle Valve Components

(Maximum working pressure 125 PSI; Used on L2880, L3180, etc.)

	BV006	PACKING NUT
	BV005	VALVE PACKING
	BV004	VALVE BONNET
	PV004-1	BODY GASKET
	BV003TS	VALVE STEM WITH TAPERED SQUARE STEM
	SV002-1	STAINLESS STEEL LOCKING CLIP
	SV002	STAINLESS STEEL FLOATING CONE
	SV001	STAINLESS STEEL VALVE SEAT

BV200FCN Fine Control Needle Valve Components

(Maximum working pressure 200 PSI; Used on L751, L752, etc.)

	BV006	PACKING NUT
	BV005	VALVE PACKING
	BV054	VALVE BONNET
	PV004-1	BODY GASKET
	BV053TS	VALVE STEM WITH TAPERED SQUARE STEM
	SV002-1	STAINLESS STEEL LOCKING CLIP
	SV002FC	FINE TAPER STAINLESS STEEL FLOATING CONE
	SV001FC	SMALL ORIFICE STAINLESS STEEL VALVE SEAT

NOTES:
1. IF VALVE SEAT REMOVAL TOOL IS REQUIRED, ORDER BV076 TOOL.
2. IF VALVE IS TO BE USED FOR OXYGEN OR OR OTHER PURE GAS SERVICE, COMPONENTS MUST BE SPECIALLY CLEANED AND PACKED.
3. WHEN ORDERING COMPONENTS FOR REMOTE CONTROL VALVES, BV003 AND BV053 VALVE STEMS WITH STRAIGHT SQUARE ENDS MAY BE REQUIRED.

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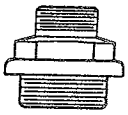
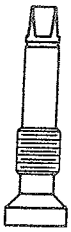
BV200W Water Valve Components (for Remote Control Fume Hood Valves)

(Maximum working pressure 80 PSI)

	BV006	PACKING NUT
	BV005	VALVE PACKING
	BV004	VALVE BONNET
	PV004-1	BODY GASKET
	BV030TS	VALVE STEM WITH TAPERED SQUARE STEM
	BNV040HD	NEOPRENE VALVE DISC
	SNV035	VALVE DISC SCREW
	SV029	STAINLESS STEEL VALVE SEAT

BV200S Steam Valve Components

(Maximum working pressure 20 PSI; Used on L2890, L3190, etc.)

	BV006	PACKING NUT
	BV005	VALVE PACKING
	BV004	VALVE BONNET
	BV004-1	BODY GASKET
	BV030TS	VALVE STEM WITH TAPERED SQUARE STEM
	BV031	TEFLON VALVE DISC
	SNV035	VALVE DISC SCREW
	SV029	STAINLESS STEEL VALVE SEAT

NOTES:

1. IF TIN-LINED COMPONENTS FOR DISTILLED OR DEIONIZED WATER ARE REQUIRED, ADD SUFFIX "TL" TO PART NUMBER.
2. WHEN ORDERING COMPONENTS FOR REMOTE CONTROL VALVES, BV030 VALVE STEM WITH STRAIGHT SQUARE END MAY BE REQUIRED.

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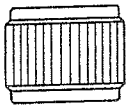
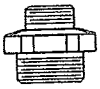
Components for Needle Point Cock

	PA032	COLORED PLASTIC INDEX DISC (SPECIFY SERVICE)
	BF011	HANDLE SCREW
	BF012	LOCKWASHER
	PA019	MOLDED NYLON VALVE HANDLE WITH TAPERED SQUARE BROACH
	BV028	PACKING NUT
	BV027	VALVE PACKING
	BV040	VALVE BONNET
	PV040-1	BODY GASKET
	BV041TS-43BN	VALVE STEM WITH FLOATING BRASS CONE (ASSEMBLED)
	BV041TS-43SN	VALVE STEM WITH FLOATING STAINLESS STEEL CONE (ASSEMBLED)

NOTES:
1. THE MAXIMUM WORKING PRESSURE FOR WATER SAVER NEEDLE POINT COCK IS 60 PSI.
2. IF VALVE IS TO BE USED FOR OXYGEN OR OTHER PURE GAS SERVICE, COMPONENTS MUST BE SPECIALLY CLEANED AND PACKED.

WaterSaver Faucet Co.
Innovative Products for Research

701 West Erie Street
Chicago, Illinois 60610

Phone 312 666 5500
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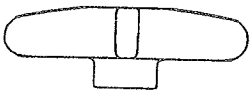
Handles and Handle Accessories

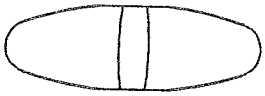
PA032 COLORED PLASTIC INDEX DISC (SPECIFY SERVICE)

BF001 HANDLE SCREW FOR ROUND SERRATED STEM
BF011 HANDLE SCREW FOR TAPERED SQUARE STEM

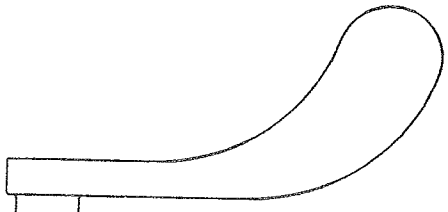
BF002 LOCKWASHER FOR ROUND SERRATED STEM
BF012 LOCKWASHER FOR TAPERED SQUARE STEM



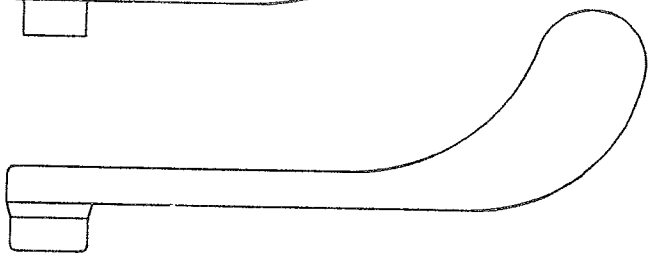
BA013 FORGED BRASS FOUR-ARM HANDLE WITH ROUND SERRATED BROACH
BA013TS FORGED BRASS FOUR-ARM HANDLE WITH TAPERED SQUARE BROACH



PA021TS MOLDED NYLON FOUR-ARM HANDLE WITH TAPERED SQUARE BROACH (SPECIFY COLOR)

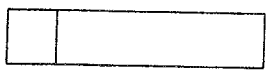


BA039 4" WRIST BLADE HANDLE WITH ROUND SERRATED BROACH
BA039TS 4" WRIST BLADE HANDLE WITH TAPERED SQUARE BROACH



BA036 6" WRIST BLADE HANDLE WITH ROUND SERRATED BROACH
BA036TS 6" WRIST BLADE HANDLE WITH TAPERED SQUARE BROACH

BF003 HANDLE SCREW FOR ROUND SERRATED STEM
BF019 HANDLE SCREW FOR TAPERED SQUARE STEM



BA006 LEVER HANDLE WITH ROUND SERRATED BROACH
BA006TS LEVER HANDLE WITH TAPERED SQUARE BROACH

NOTES:
IF FIXTURE HAS WRIST BLADE OR LEVER HANDLES, COLD WATER SERVICE REQUIRES RENEWABLE UNIT WITH LEFT HAND THREAD.

701 West Erie Street
Chicago, Illinois 60610

Phone 312 666 5500
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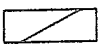
Swing and Rigid/Swing Gooseneck Components

SWING GOOSENECK COMPONENTS

SWING GOOSENECK

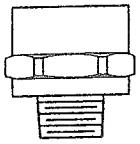
B0070 PACKING NUT WITH 1"–22 MALE THREAD



B0071 FRICTION RING

B0075 SWING GOOSENECK PACKING

B0081 SPLIT RETAINING RING



B0226 SWING ADAPTOR (FOR USE WITH FAUCET BODY WITH 3/8" FNPT OUTLET)

NOTE:
TO CONVERT FAUCET WITH RIGID GOOSENECK TO SWING USING SWING CONSTRUCTION, ORDER B0226 AND EITHER (SG) SWING GOOSENECK OR B035COMP CONVERSION ADAPTOR.

RIGID/SWING GOOSENECK COMPONENTS

RIGID GOOSENECK

B0352 RETAINER NUT

P0349 NYLON WASHER

B0351 DOUBLE O–RING GUIDE

B0353 O–RINGS (2 REQUIRED)

P0355 NYLON CONVERSION SPACER (SWING)
B0355 BRASS CONVERSION SPACER (RIGID)

B0350 RIGID/SWING ADAPTOR (FOR USE WITH FAUCET BODY WITH 1"–22 OUTLET)

A0354 LOCKING BODY GASKET

B0356 RIGID/SWING ADAPTOR (FOR USE WITH FAUCET BODY WITH 3/8" FNPT OUTLET)

NOTE:
TO CONVERT FAUCET WITH RIGID GOOSENECK TO SWING USING RIGID/SWING CONSTRUCTION, ORDER B0356COMP (B0356 AND PARTS B0352 THROUGH B0353).

WaterSaver Faucet Co.
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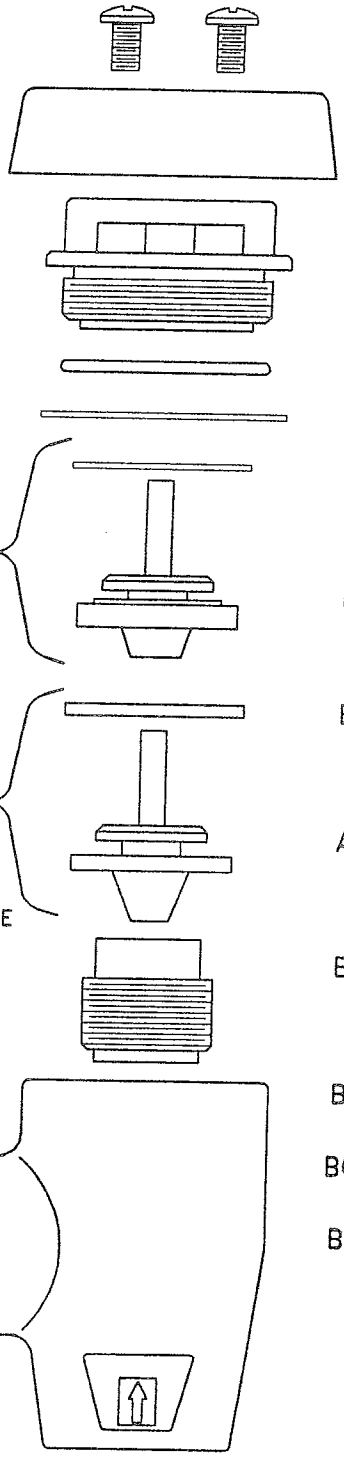
Vacuum Breaker Components

(L100/101/102/103)



SF022	COVER SCREW
B0317	VACUUM BREAKER COVER
B0314	VACUUM BREAKER BONNET
B0322	BONNET O-RING
P0318	BODY GASKET (FOR USE WITH OLD STYLE BONNETS)
B0319	ULTRA-LIGHT SILICONE GASKET
P0316	ULTRA-LIGHT POLYETHYLENE FLOAT CUP
B0319HP	NEOPRENE GASKET FOR HIGH PRESSURE USE (SEE NOTE 1 BELOW)
A0316	ALUMINUM FLOAT CUP FOR HIGH PRESSURE USE (SEE NOTE 1 BELOW)
B0324	RENEWABLE SEAT
B0313	3/8" IPS ANGLE VACUUM BREAKER BODY (USED ON L100 AND L102)
B0313-1/2	1/2" IPS ANGLE VACUUM BREAKER BODY (USED ON L101)
B0315	3/8" IPS STRAIGHT VACUUM BREAKER BODY (USED ON L103)

P0316-319
POLYETHYLENE FLOAT CUP WITH GASKET (ASSEMBLED)

A0316-319HP
ALUMINUM FLOAT CUP WITH GASKET (ASSEMBLED) FOR HIGH PRESSURE USE

NOTES:

1. FOR WORKING PRESSURES OVER 70 PSI AND FOR L102, ORDER HIGH PRESSURE (HP) COMPONENTS.
2. IF TIN-LINED VACUUM BREAKER COMPONENTS FOR DISTILLED OR DEIONIZED WATER ARE REQUIRED, ADD SUFFIX "-TL".
3. RK100 VACUUM BREAKER REPAIR KIT CONSISTS OF (6) EACH OF P0316, B0322 AND B0319.

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L100/101/102/103 Atmospheric Vacuum Breakers

Guidelines for Installation, Operation and Maintenance

Maximum Pressure: 125 PSI
Maximum Temperature: 180°F
ASSE Certified under ASSE Standard 1001 (L100 only)

Atmospheric vacuum breakers (VBs) are used to prevent backsiphonage of contaminated water into a potable water system. They are not designed to protect against backpressure conditions; protection against backpressure may require installation of a backflow preventer in the water supply line.

WaterSaver VBs are specifically designed for use on laboratory faucets and valves. They are typically installed as an integral part of a laboratory faucet gooseneck. In addition, they are used in water supply systems installed in fume hoods, mounted between a remote control water valve and an outlet fitting.

As such, WaterSaver VBs are designed and constructed specifically for the requirements of laboratory applications. They are designed to seal properly and prevent spillage at as low a flow as possible, thus facilitating many common laboratory procedures. However, under certain circumstances, spillage of water from under the VB cover can occur.

The purpose of these guidelines is to assist in the correct installation, operation and maintenance of WaterSaver VBs. In addition, these guidelines will assist in troubleshooting in the event that spillage does occur.

IMPORTANT: Be sure to review applicable local plumbing codes prior to selecting or installing a VB. Many codes have specific provisions regarding the type of VB which may be used and the design of the system in which it is used.

Installation

The water supply line must be thoroughly flushed prior to installation. The presence of any scale, debris, chips, thread sealant, etc. in the water line may cause fouling of the VB, prevent proper sealing of the float cup and damage internal components.

The VB must be installed with the supply connected to the bottom inlet of the VB (L100/101/102) or to the indicated side inlet (L103).

An atmospheric VB must be installed downstream of the last valve in the water supply line.

The Uniform Plumbing Code requires that "potable water outlets with hose attachments . . . shall be protected by . . . a listed atmospheric vacuum breaker installed *at least six inches above the highest point of usage* and located on the discharge side of the last valve." [Uniform Plumbing Code, Section 1003(n) (1991)] Consequently, when the VB is installed, the bottom of the VB body must be at least 6" above the flood level rim of the sink or fixture into which water is discharged. [See Figure 1.] Where a hose is to be attached to a serrated hose end, the VB must be installed at least 6" above the highest point to which the hose can be raised. [See Figure 2.]

Figure 1

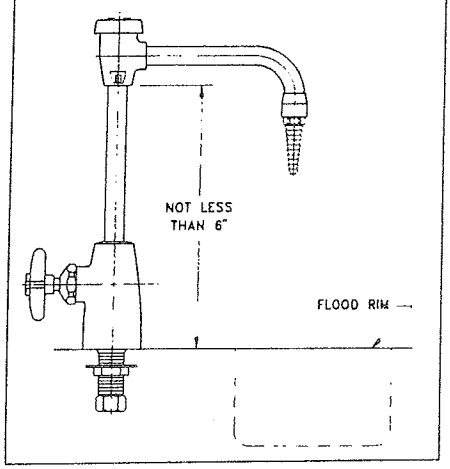
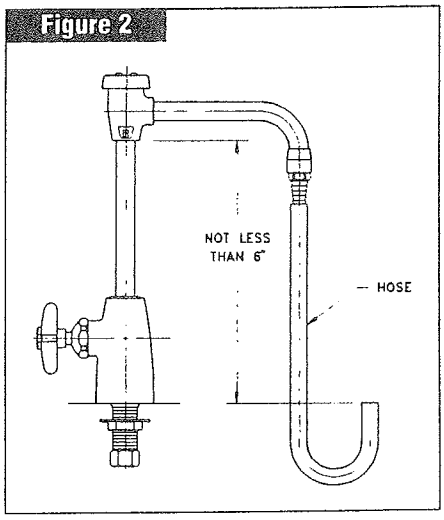


Figure 2



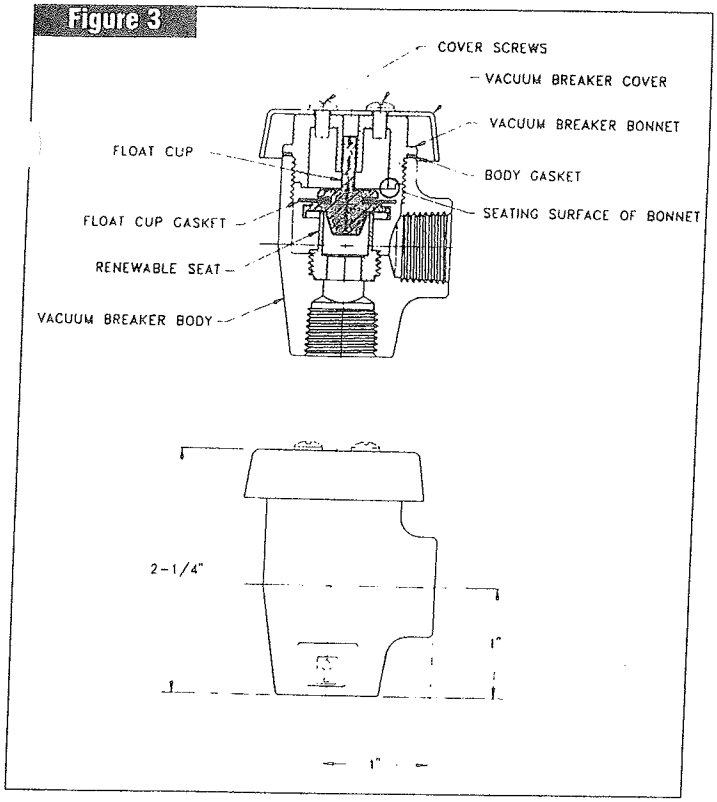
Since atmospheric VBs require routine inspection and maintenance (primarily cleaning and/or replacement of internal components), they should be installed in locations in which they are readily accessible. In addition, the Uniform Plumbing Code prohibits installing a backflow preventer in any area containing toxic, poisonous or corrosive fumes. [Uniform Plumbing Code, Section 1003 (t) (1991)] VBs should thus not be installed within the work space of a laboratory fume hood.

Operation

When the water control valve is closed, the VB float cup rests on the VB seat. [See Figure 3.] In this position, the atmospheric vent is open and the waterway through the seat is closed.

When the water valve is opened, the water flow pushes the

Figure 3



float cup up off the seat and against the VB bonnet. The float cup gasket seals against the bottom face of the bonnet. This seal prevents water from passing through the atmospheric vent and spilling out from underneath the VB cover.

In the event of a loss of pressure on the upstream side of the VB and the resulting creation of a negative pressure in the supply line, the float cup drops back down onto the seat. This opens the atmospheric vent and closes the waterway. This action admits air into the discharge line downstream of the VB, thereby preventing the creation of a vacuum and stopping any back-siphonage.

An atmospheric VB cannot be used in applications where it is subject to continuous water pressure. In addition, the water control valve should not be left open for extended periods of time.

Maintenance

Contamination of the internal components of the VB (e.g. mineral deposits on the float cup gasket or bonnet) may cause a loss of the seal between the float cup gasket and bonnet. Therefore, VBs should be inspected periodically (at least monthly) for contamination and/or deterioration of the internal working components. Components should be cleaned or replaced as required.

Troubleshooting

The most common problem associated with atmospheric VBs is the occurrence of spillage of water from underneath the VB cover. There are many possible causes of this. Set forth below is a list of the potential causes of spillage, together with the appropriate solution for the problem:

1. *Contamination of Float Cup Gasket.* If the water contains a level of calcium or other minerals, deposits and scale can accumulate on the float cup gasket. If this occurs, the gasket will not seal completely against the bonnet. The gasket should be cleaned or replaced.

2. *Contamination of Bonnet.* Build-up of deposits can occur on the seating surface of the bonnet as well. The bonnet must then be cleaned or replaced.

3. *High Water Pressure.* As noted above, WaterSaver VBs are designed specifically for laboratory applications. The float cup and gasket are extremely light to permit sealing at as low a flow as possible (since many laboratory procedures require low flow over an extended period of time). When used in water systems with high water pressure (greater than 70 PSI), these components can wear out more quickly than at low pressure. If that occurs, the VB may not seal properly at low flow. In higher pressure applications, the ultra-light float cup and gasket should be replaced with the following WaterSaver heavy duty VB components:

A0316HP	Heavy Duty Aluminum Float Cup
B0319HP	Heavy Duty Neoprene Gasket

4. *Deterioration of Bonnet Gasket.* The VB bonnet is sealed into the VB body using a nylon gasket (P0318) or O-ring. Over time, this gasket or O-ring can deteriorate and leakage can occur. In that event, the gasket or O-ring should be replaced.

5. *Connection to Elevated Equipment.* As noted above, the VB must be installed at least 6" above the flood level rim of the sink or the highest point which can be reached by a hose attached to the outlet. Thus, if a hose is attached to the serrated end of a laboratory faucet, the free end of the hose should not be capable of reaching a height which is 6" *below* the VB.

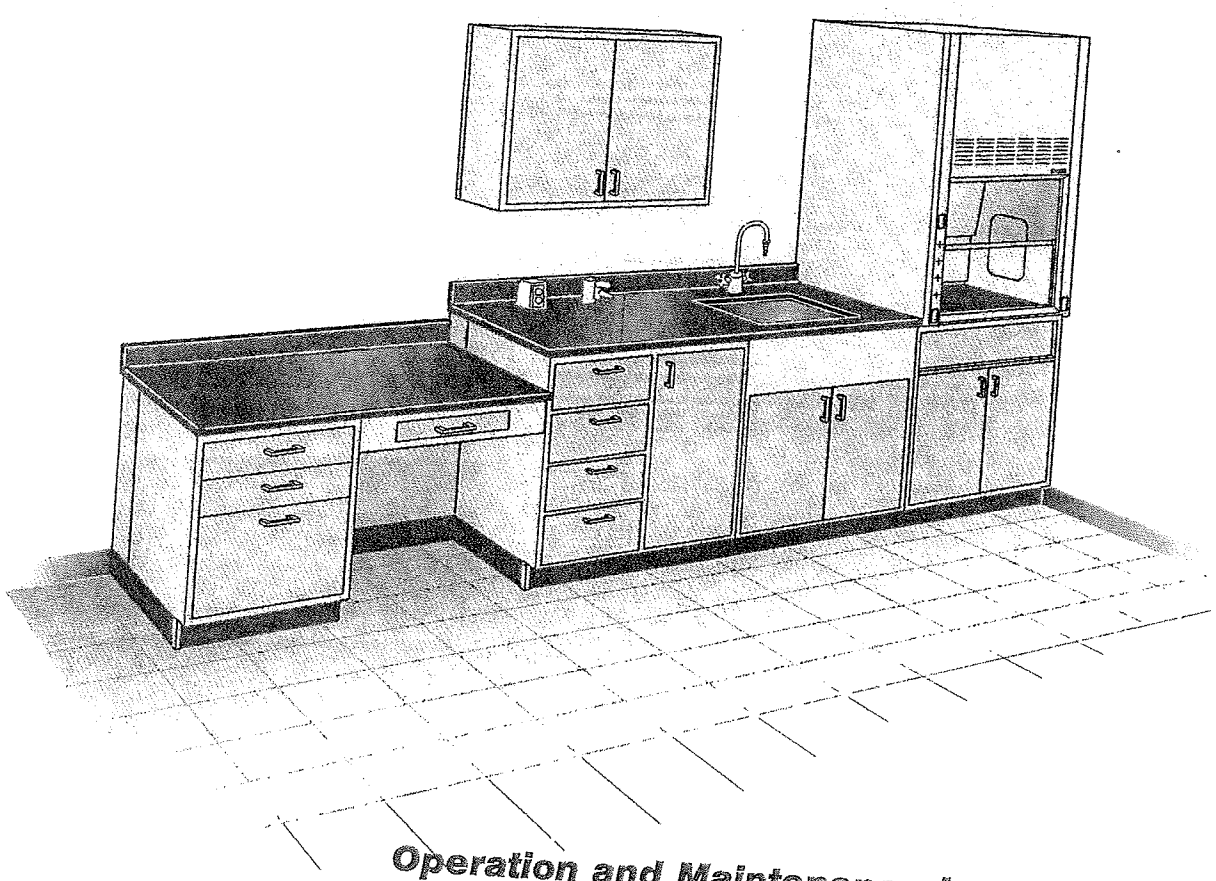
Spillage can occur in the event that a hose is attached to a faucet and extended above the level of the VB. In this situation, when the valve is opened and water is flowing through the system, there can be an accumulation of water in the hose downstream of the VB. The pressure created by the weight of the downstream water may exceed the water pressure upstream of the VB, causing a negative pressure situation. This will cause a reversal of flow, the VB will close, and spillage will occur. In this situation, the VB is acting exactly as it is designed in preventing backflow.

The situation described above is most likely to occur when the water control valve is opened a slight amount and left in this position for a long period of time. Fluctuations in supply line pressure and flow may cause the float cup to "flutter" rather than seal continuously against the bonnet. This will accentuate the tendency for a negative pressure situation to develop.

One possible solution for spillage of this type is to install a non-positive closing volume control device (such as the WaterSaver B0358) on the faucet outlet. The control valve can then be fully opened, permitting the VB float cup to seal. Water flow is metered using the volume control on the outlet. As noted above, the Uniform Plumbing Code requires that vacuum breakers be located on the discharge side of the last valve in the water line. Therefore, the volume control device must not be capable of fully closing.

Fisher Scientific

Laboratory Furniture & Equipment



Operation and Maintenance Instructions

Fisher Hamilton

Fisher Hamilton is pleased to have had the privilege of furnishing your laboratory equipment. This is a major investment, and your equipment is built to withstand extremes of temperature, stress and corrosion provided you give it reasonable care and use.

This manual gives you full information for the operation and care of working surfaces, finishes, hardware, fixtures, fume hoods and other Fisher Hamilton equipment items.

Utility and fine appearance can be assured for many years by following simple procedures. A regular schedule of maintenance will be most effective.

If you have a special problem or would like extra copies of this manual, contact Fisher Hamilton.

Table of contents

Manuals covering the operation and maintenance of purchased equipment provided on Fisher Hamilton projects will be supplied with the product. A single copy is normally furnished and additional copies may be ordered from Fisher Hamilton at nominal cost. When ordering, please provide complete information as to model number, serial number, manufacturer, etc.

Good care ... begins with reasonable use. For best service and longest life ... use, but don't abuse your equipment.

Fisher Hamilton working surfaces have been thoroughly researched and tested. With proper use and maintenance they will provide many years of fine appearance, function and trouble free service.

Here are a few helpful hints that you can use in maintaining your Fisher Hamilton working surfaces:

Place superheated glassware, tubing, crucibles and hot plates on asbestos squares or heat dispersion pads not directly on the working surface. Likewise, when working with extremely cold temperatures use insulating or dispersion pads. When using hot plates in fume hoods, place insulation under unit and avoid blocking baffle slots to insure proper air flow around and under the unit.

Do not allow concentrated reagents to remain in contact with the working surface longer than necessary. Clean up spills as soon as possible.

In the event that any part of the working surface is damaged through temperature extremes, chemical spills or unusual physical abuse, such areas should be repaired promptly to prevent further damage and provide maximum service.

Stainless Steel Surfaces

Stainless steels have a proven reputation for performance and corrosion resistance, but they must he kept clean and allowed access to air.

Regular cleaning with mild soap or detergent is usually sufficient to remove dirt and grease. Inks and paints can be removed by using a suitable organic solvent. A non gritty abrasive such as Bon-Ami will remove particles that adhere more tightly, or it may be necessary to rub with more abrasive materials. Never use ordinary steel wool or steel brushes. Not only is their scouring action too severe, but they will leave deposits of steel on the surface which will rust. In all cases the surface should be flushed with water and dried following cleaning. Any scouring should be done with the grain of the metal.

A stainless steel surface should be cleaned within four hours of being exposed to the following chemicals:

Aluminum Chloride	Lysol
Barium Chloride	Mercuric Chloride
Bichloride of Mercury	Mercury Salts
Calcium Chloride	Phenol
Carbolic Acid	Potassium Permanganate
Chlorinated Lime	Potassium Thiocyanate
Citric Acid (Boiling)	Sodium Hypochlorite
Dakin's Solution	Stannous Chloride
Ferrous Chloride	Tartaric Acid

Stainless steel surfaces are particularly susceptible to chloride compounds. Even a weak solution of sodium chloride (NaCl) or hydrochloric acid (HCl) will corrode the surface.

A stainless steel surface should be cleaned immediately after being exposed to the following chemicals:

Aqua Regia	Sulfuric Acid
Ferric Chloride	Hydrochloric Acid
Iodine	

The following list of recommended polishing materials arranged in ascending order of abrasiveness:

Finely Bolted Whiting or Grade FFF Italian Pumice	Rub with damp cloth
Liquid Nu-Steel	Rub with small amount on dry cloth
Bon-Ami	Rub with damp cloth
Old Dutch Cleanser Bab-O and Sapolio	Rub with damp cloth
Stainless Steel Wool	Use only for severe conditions

A light coating of mineral oil applied to stainless steel will bring back the original brightness and luster, protect the surface and help to conceal fingerprints.

Never allow iron or steel objects to rest on the surface for any length of time in the presence of water or chemicals. These objects may leave iron deposits on the stainless steel surface which will rust, causing unsightly spots.

To Remove Rust from Work Surface

Ventilate the room properly. User should take care to properly protect himself from the cleaning materials and residue. Cover the rusted surface area with a 15% to 20% solution of Nitric Acid. Within a few minutes the rust will be loosened and the surface can be flushed with clean water and dried.

OR

Cover the rusted area with a 2% to 5% solution of warm Oxalic Acid. When all rust is loosened, flush the area with warm clean water and dry.

Work Surfaces

General Use and Maintenance

Recommended Maintenance Materials

Top Material	Cleaner Color	Finish and Wax	Surface Touch-Up	Repair
High-Pressure Laminate	All Patterns	1, 3, & 4	Filler & Paint	A & B
Galvanized Iron	Natural	1 & 4	Solder	Solder
Epoxy Resin	All	1, & 3	c	D
Solid Maple	Natural	1, 2, & 3	Clear Lacquer	C
Edge Grain Maple	Natural	1, 2, & 3	Sand, b	Sand, C & b
Stainless Steel		See Page 3		
Cabinet Finish				
Wood Cabinet Bodies	All Colors	1, 2, 4 & 8	a	C & b
Steel Cabinet Bodies	All Colors	1, 2, 4 & 8	a	a

1. Cleaner - reconditioner (DuPont, Johnson's or other automobile cleaner, wax, or polish).
2. SOS, Brillo or other steel wool soap pads to remove soil.
3. Household soaps and detergent.
4. Organic solvents - alcohol, lacquer thinner or paint solvent to remove stubborn stains. (Caution: do not allow solvents to contact adhesive glue joint around edges).

a. Matching color touch-up.
b. Boiled linseed oil.
c. Sand with 320 fine sandpaper and finish with Carnuba Wax.

A. Matching color burn-in stick.
B. Auto body repair plastic.
C. Plastic wood.
D. Black pigmented adhesive.

Epoxy Resin Tops

Epoxy Resin tops are nearly chemically inert, thus resisting stains and damage from a wide variety of reagents and chemicals if properly installed and cared for. However, the end user must be aware that there are certain reagents and/or chemicals that will stain or damage resin. ***Caution should be used when using any type of acid such as nitric acid, sulfuric acid, chromic acid, hydrofluoric acid, etc.*** Concentrated amounts of these acids, if spilled on resin counter tops or in resin sinks, will cause stains or permanent etching of the resin surface. Any spills must be immediately cleaned to avoid damage to the resin surface, as well as avoid any danger to any users.

Basic care and housekeeping of resin counter tops and sinks:

1. In normal laboratory applications,m counter tops and sinks should be wiped clean at the end of every day. At a minimum, a weekly cleaning regiment must be implemented to insure the lasting beauty and durability of the resin product.
   - To remove dirt, dust and chemical residues, simply use a sponge, clean water and a sudsing cleanser (such as Soft Scrub). Lightly wipe the surfaces until the dirt and residue is removed.

   Warning: Do not use an abrasive cleaner or abrasive sponge/brush so that the surface is not damaged.
2. Sinks should be inspected on a monthly basis to insure the seal between the sink and the counter top, and the seal between the tub sink and sink plug (sink strainer), is still good. Specifically, look for voids or cracks in the cement at seams. If cracks or voids are detected, repair should occur immediately.
3. Counter tops should be inspected every six months. Review of current housekeeping practices should be conducted, especially in any area that staining occurs on a frequent basis. Inspection of the counter tops must include a review of the joints to insure they are still sealed and solid. Look specifically for voids or cracks in the cement at joints. If cracks or voids are detected, repair should occur immediately.

Repairing Resin Counter Tops

Although the resin materials used to form counter tops are very hard and durable, they can be damaged if care is not taken. Should damage be identified during normal daily operations or routine inspections as recommended, the following processes should be used to make repairs.

Scratches – Counter tops can be scratched if heavy items are slid across the surface, sharp objects are run along the surface or if something is dropped onto the surface. Scratches are categorized in two types: 1) Surface Scratches and 2) Deep Scratches.

Surface Scratches can be easily repaired by the following steps:

1. Many light surface abrasions can be handled by simply wiping the counter top with a clean cloth dampened with Scott's Liquid Gold, Old English Lemon Oil, or similar available product.
2. If surface abrasions are not removed using this process, the deeper scratches will need to be addressed individually as follows:
   - Using 660 grit or finer wet/dry sand paper, hand sand the area of the scratch parallel to the scratch using light, uniform passes until the depth of the scratch is reached.
   - Using a 50/50 mixture of Soft Scrub and commercial cleanser on a clean cloth rag, use a circular motion and clean/buff the sanded area.
   - Wipe the area with clean water to remove all grit and cleaners.
   - Using Epoxyn Edge Dressing Kit, apply a light coating to refurbish the color and luster of the counter top.
   - Wipe the entire counter top with a light coating of Scott's Liquid Gold, Old English Lemon Oil, or similar available product.

Should the counter top sustain minor chips at the edges or corners, the following steps should be followed:

1. Using a clean cloth rag dampened with alcohol, clean the area of the chip and surrounding counter top.

2. Mix two-part epoxy cement in accordance with instructions on the container.
3. Remove excess cement using a putty knife but allow cement to remain slightly raised above the surface of the top.
4. Using a putty knife, apply cement to the chip working into the crevice and shaping to match contour of edge/corner.

   Warning: Cement is a permanent adhesive. Avoid getting cement on any other surfaces or materials since it will be impossible to remove once cured.

   Caution: Avoid contact with epoxy material as severe skin irritation may result! Should accidental skin contact be made, wash thoroughly with soap and water.
5. Allow cement to cure for a 24-hour period.
6. Using an orbital sander with 660 grit or finer wet/dry sand paper, sand the repair area until the patch is flush with the surface of the top.
7. Using a 50/50 mixture of Soft Scrub and a commercial cleanser on a clean cloth rag, apply the mixture in a circular motion to clean/buff the repaired area.
8. Wipe the area with a clean cloth rag and clean water.
9. Using Epoxyn Dressing Kit, wipe the area to refurbish the color and luster of the repaired area.
10. Apply a light coating of Scott's Liquid Gold, Old English Lemon Oil, or similar available product to the entire counter top.

High Pressure Plastic Laminate Tops

These plastic surfaces should be cleaned with detergent and warm water followed by car finish cleaner to remove all the soil. Light scratches can be removed by light sanding with 220 sandpaper. Eight to ten double strokes should be sufficient.

Sand out the marks of the 220 paper with a 400 grit paper, working a slightly larger area than before.

Buff the entire top by using an electric drill with a cotton buffing wheel. Use a good grade of buffing compound such as Jeweler's Rouge or Tripoli Brown to achieve a semi-gloss finish. Finally, apply a heavy paste wax and polish or One-Step car cleaner/wax.

High pressure plastic laminate surfaces are difficult to repair if they are punctured. If this occurs, it is recommended that the hole be repaired with a burn-in lacquer material or epoxy using a shade that most closely approximates the surface being repaired.

Edge Grain Maple Tops - Oil Finish

First remove surface soil with solvent cleaner as recommended for de-waxing. After top is clean and dry apply two coats of boiled linseed oil allowing 24 hours for drying between coats. Scrub off the excess with detergent and water.

Chemsurf® Tops

Chemsurf tops offer remarkable reagent resistance, easy cleaning characteristics and various color options in a moderate use laboratory surface. The top may be kept clean with soap and water or organic solvents. A persistent spot may be removed with a bleach such as sodium hypochlorite. Abrasive cleaners of steel wool pads should be avoided.

Repair Procedures
How to Burn-In Surface Defects

Burning-in is a method of patching deep mars, scratches and gouges on work tops and wood cabinet surfaces.

Equipment needed is:

1. A clean putty knife with flat edge
2. Colored stick shellac or "lacquer-sticks" available from most paint stores or from Fisher Hamilton. Be sure to specify colors to be matched.
3. Bunsen burner, propane torch or alcohol flame. Technique is very easy to learn.

   Basic rule: don't overheat the blade - test on the stick material until it just melts. Excessive blade temperature will scorch surrounding surfaces. When blade is just hot enough, wipe on clean rag to remove carbon, melt the colored stick into the groove or gouge, and level lightly with the hot knife. Carefully remove excess material with the hot knife; re-heat knife and smooth patch. Further sanding should not be necessary. Selection of the proper color eliminates need for further touch-up with paint. Reduce sheen of the repair with stiff bristle brush compressed in hand and stipple patch to match surrounding surface.

Paint Touch-Up

Surfaces must be clean, wax free and dry. Sand the marred area with No. 320 wet-or-dry paper and make necessary physical repairs with proper patching materials if surface is not flush and level with surrounding area. It is good practice to wipe off the sanded area with lacquer thinner to remove any wax or oil residue. Wipe with a clean cloth.

All air dry materials should be allowed to dry overnight and then inspected. If an additional coat is required, sand with No 320 wet-or-dry paper, wipe off dust with clean cloth and re-coat.

All brushes and equipment must be thoroughly washed with lacquer thinner immediately after use.

Laboratory fixtures and fittings furnished in chrome plate can be maintained by washing with detergent and water followed by buffing with a dry cloth. When heavier accumulations of soil are present, Cleaning with a non-abrasive cleanser or a chrome polish will restore the appearance.

When chrome finished fixtures are exposed to chemical fumes and signs of corrosion appear, cleaning as described above should be followed by an application of paste wax.

Laboratory Fixtures

Maintenance

Sinks, Traps and Accessories

Water baths and steam baths require a minimum of care. Twice yearly the reservoirs should be drained and flushed to eliminate accumulated water minerals. Thicker mineral deposits can be removed by filling bath with a weak acid solution (5-10%) and allowing to stand overnight. Stainless steel components should be maintained with regular cleaning procedures using some recommended cleaners such as Old Dutch, Bon-Ami, etc.

Sinks and drainlines are preserved by water. Always flush concentrated acids and alkalis down the drain with copious amounts of water.

Stone sink materials should be maintained the same as stone working tops.

Epoxy Resin sinks require a minimum amount of maintenance. They may be washed, cleaned, and waxed the same as stone sinks. Heavy stains and deposits can be removed by scouring with Bon-Ami or its equivalent.

Stainless steel sinks are maintained the same as stainless steel tops. Be sure to flush freely and avoid prolonged exposure to undiluted reagents.

Lead, glass, plastic and Epoxy Resin cupsinks are often supplied in working surfaces and inside fume hoods. These should be flushed freely and washed with detergent and water to prevent accumulation of deposits.

Traps also benefit from large amounts of water. When disposing of large volumes of corrosive chemicals, it is suggested that the sink overflow be used along with large volumes of cold water for immediate dilution.

Glass traps can be inspected for debris and other traps should be cleaned when signs of clogging appear. Wax, plaster and other traps designed to collect solid materials should be emptied on a regular schedule determined by use. Each trap (and drainline) material exhibits inherent strengths and weaknesses. In general, users should avoid dumping concentrated, molten, or very cold materials directly into the drain. Cool, warm or dilute are good practices to follow.

CAUTION: Mercury will perforate lead traps and lines

Handle Mercury as directed by your Laboratory Director or Health Safety Officer.

Fixtures

Epoxy finished fixtures, supplied in fume hoods and chemical laboratory areas can he cleaned with detergent and water, dried and burnished with a soft cloth. Heavy deposits of chemical salts should be flushed away with water or soaked off by application of a saturated sponge. Do not use abrasive cleansers.

Epoxy coated fixtures subject to extremely high temperatures may show signs of browning. This color change cannot be scrubbed away as it is the result of chemical change in the finish material. Fume and splash resistance of the chemical finish remains unchanged.

In the event of physical damage to the fixture surface finish, by way of a direct blow or scratch, touch up with matching paint or lacquer will protect the fixture. Immediate repair of physical damage to the surface will prevent potential corrosion and further destruction of the fixture.

Laboratory service fixtures are subject to heavy use, and, after an extended period of time, may show signs of wear. Parts and kits of replacement parts are available from Fisher Hamilton.

Ground Key Gas Cocks

Each ground key cock is a hand fitted assembly, and when wear occurs, the entire cock must be replaced. Index buttons and stop rings are replaceable, however. Loose or hard working cocks can be improved by adjustment of the compression spring. After long service, cocks may be disassembled and lubricated with vacuum wax.

CAUTION: Do not intermix parts or leaks will occur.

Needle Point Cocks

Loose handles can be tightened by removing the index button and tightening the handle retaining screw. Replace index button. An application of vacuum wax to the threads will ease operation.

CAUTION: Do not use lubricants of any kind on oxygen outlets.

Leaks can usually be eliminated by tightening bonnet nut. Should corrosion, wear or damage occur at needle point or seat, replace complete assembly

Remote Control Needle Point Valves Used in Fume Hoods

Fume hood valves used for water and standard gases are identical. Stainless steel seats and needles are replaceable when worn or damaged. Order parts and necessary tool from Fisher Hamilton.

Water Fixtures

New Style (1976 -)

Current Watersaver fixture mechanism has replaceable glass reinforced Noryl/Ceramic cartridge. The handle requires only a quarter turn for precise flow control. Replacement O-ring seals are available locally or may be ordered from Fisher Hamilton.

Conversion of Water Fixture from Fixed to Swing Operation

Fisher Hamilton water fixtures are field convertible from fixed to swinging by following a simple procedure. Using a padded wrench to avoid damage to the fixture finish, loosen gooseneck retaining nut and carefully lift gooseneck from valve body socket. Remove and discard the fiber washer. Carefully insert gooseneck into socket taking care not to damage the "O" rings. Tighten down gooseneck retaining nut. Procedure may be reversed to convert from swinging to fixed gooseneck.

Manual Close to Self-Closing Operation

All single service water fixtures may be converted from manual to self closing operation, or vice versa. Order kit from Fisher Hamilton specifying fixture type. Complete instructions are included.

Vacuum Breakers

Integral vacuum breaker function is impaired by dirt or deposits of mineral materials. Take unit apart and flush to remove dirt and particles. Examine seats and parts for damage and replace as necessary. Mineral deposits can be removed by soaking in a weak acid solution.

Broen® Fixtures

Please contact Fisher Hamilton for additional information.

Wood Cabinet Finish

The finish provided on Fisher Hamilton wood cabinets parallels that furnished on fine furniture, but is specially formulated to resist chemical fumes, spills and splashes.

Exposed surfaces will maintain there good appearance with regular care. Spills and splashes should be wiped off immediately. An occasional wash down with mild detergent and warm water will remove accumulated soil and provide a clean surface for the application of wax or furniture polish. Careful use of fine steel wool and a solvent will remove more stubborn dirt and stains.

Scratches and gouges should be repaired and touched up promptly to prevent damage to base materials. Finish repair kits are available from Fisher Hamilton; be sure to specify your finish color. See page 4. On older installations finish colors may have changed due to actinic effects; we recommend that you send a door or drawer for preparation of a perfect match.

Steel Cabinet Finish

Fisher Hamilton steel finishes are roughly comparable to fine automobile finish, but with some modifications to resist chemical fumes, spills and splashes.

Accidental spills should be wiped off immediately and a twice a year cleaning with a dishwasher detergent in warm water or household cleaner will insure good appearance and long life.

Nicks and scratches should be touched up immediately to prevent corrosion of the exposed metal. Standard colors are available in spray can/air dry formulation. Touch up for non-standard colors can be obtained locally or on special order.

General Care - Wood and Steel Cabinets

Avoid storing open or leaking reagent containers in tightly closed cabinets as concentrated fumes will eventually damage any material and are particularly harmful to metal hardware items. For long term storage, ventilated reagent storage cabinets are recommended. Open or leaking containers may be placed in an operating fume hood for short storage periods.

Wood cabinet parts reflect changes in the relative humidity and may swell or warp. This condition ordinarily is self correcting as all cabinet parts reach the same moisture content. Installation schedules often require setting of wood cabinets in wet or unheated buildings, causing swelling or warping problems. These problems usually disappear with time or after the building and equipment have been through a complete four season cycle.

Temporary correction of minor warping of doors can be accomplished by the use of an additional door catch. More serious conditions can be corrected by hinge adjustment or clamping in a reverse twist overnight or over a weekend.

When wood furniture is installed under wet conditions as described above, then subject to extremely dry conditions; hinge and hardware, screws, bolts and nuts may require retightening. Annual examination of all mechanical attaching devices is a part of good maintenance procedures.

Occasional lubrication of wood drawers and sliding doors will ease operation. Paraffin or soap rubbed on all surfaces subjected to friction will resolve sticking problems. Hinges benefit from a drop of fine oil - wipe away excess.

Steel drawer suspension roller bearings on both the drawer and cabinet runs should be lubricated with light bearing grease or petroleum jelly (Vaseline). Clean dirt and debris from roller surfaces and raceways.

Locks should never be oiled. Use lubricants such as graphite or silicon spray. After many years of severe use, keys may become worn and not function well in the barrels of the lock. Replacements are available from Fisher Hamilton. If lock service is required, be sure to send us all of the numbers for the series of locks involved.

Loosened base molding can be re-cemented with ordinary contact cements. A thorough cleaning and a coat of automotive wax or polish is recommended twice a year.

Broken glass in wood cabinet doors can be replaced as follows: remove plastic molding holding broken glass in frame. The end can be pried up with a screwdriver, and a steady pull will remove the entire strip. Dispose of broken glass and replace with a new piece of same size, type and thickness. Insert end of plastic molding and force into place. Continue until molding is replaced.

Replacement of glass in steel cabinets is accomplished by removing interior retaining members and gasket material. Replace broken pane with a new piece of same size, type and thickness. Replace gasket and retaining frames.

Replacement Hardware

See Fisher Hamilton *Fixtures and Accessories* catalog for replacement hardware.

General Maintenance of Fume Hoods

Fume hood maintenance procedures consist primarily of clean-up, adjustment, lubrication, and replacement of worn, damaged or non-functioning parts. Lubrication of sash guides, cables, pulley wheels, and other working parts should be accomplished as required and replacement of broken, worn, or non-functioning parts as needed. The following items should be **inspected and serviced at least semi-annually:**

- Liner and baffles for condition and cleanliness.
- Low air flow detectors.
- Service fixtures and lights.
- Pulleys and belts.
- Sash operation and counterbalance cables including a complete visual check of the entire system.
- Make sure there is a 1/16" clearance between cable keepers and pulley sheaves.
- Velocity and pressure sensing detectors.
- Low or no flow alarms, both visible (lights) and audible (horns or bells).
- Signal transmission for alarms designed to activate signals at more than one location.
- Instrument verification of fume hood face velocity and determination of usage by observation and interview.
- Ductwork and blower.

WARNING
Use only fluorocarbon grease on blower since any other type is to be considered potentially dangerous.

WARNING
Frayed or broken cables should be replaced to avoid personal injury or damage to fume hood. Not all cable manufacturer's cables are the same quality and cycle life. We can only warranty cables furnished by Fisher hamilton.

Clean-up should be accomplished by, or under the supervision of, a knowledgeable technician and should include removal of all baffles for clean-up of all interior surfaces.

Flush all spills immediately using neutralizing compounds as required and clean thoroughly. Use good housekeeping in laboratory fume hoods at all times.

Fume Hood Testing

ANSI/ASHRAE 110-1995

The performance of a laboratory fume hood in providing protection for the worker at the face of the hood is strongly influenced by the laboratory room ventilation, and by other features of the laboratory in which it is installed. Therefore, there arises a need for a performance test which can be used to establish an "as manufactured" and an "as used" performance rating, including the influences of the laboratory arrangement and it's ventilating system.

The test presumes a conditioned environment. No test can be devised which would, conducted once or infrequently, (viz., annually), reflect the results which would be obtained in a non-conditioned laboratory with various conditions of windows, wind velocity, etc.

This procedure is a performance test method.

It remains for the user, the hygienist, or the applications engineer to specify what level of hood performance is desired or required. It should be noted that the performance test does not give a direct correlation between testing with a tracer gas and operator exposures. Many factors, such as the physical properties of the material, the rate and mode of evolution, the amount of time the worker spends at the face of the hood, and several other factors must be integrated, by a trained observer, into a complete evaluation of worker exposure. The performance test does, however, give a relative and quantitative determination of the efficiency of hood capture under a set of strict, although arbitrary, conditions. The same test can be used to evaluate hoods in the manufacturer's facilities under (presumable) ideal conditions, or under some specified condition of room air supply.

The test may be used as part of a specification once the appropriate release rate and required control level are determines. If so used, an "AM" (as manufactured) specification places a responsibility on the hood manufacturer, and an "AU" (as used) specification places responsibilities on others, viz., the designer of the room air supply, the designer of the room layout, etc.

The test sheet attached to the hood reflects hood performance parameters. This sheet represents "AM" testing.

Fisher Hamilton strongly recommends that the ASHRAE 110-1995 test procedure be subjected to this hood under "AU" (as used) conditions.

Refer to the ASHRAE Standard 110-1995 or contact Fisher Hamilton for further information.

If, for some reason, the above test cannot be performed at the job site, Fisher Hamilton strongly suggests use of the SEFA-1.2 1996 test procedure as minimal proof of proper hood performance.

This test consists of a face velocity grid test and a smoke test procedure.

Information and copies of this procedure are available from Fisher Hamilton.

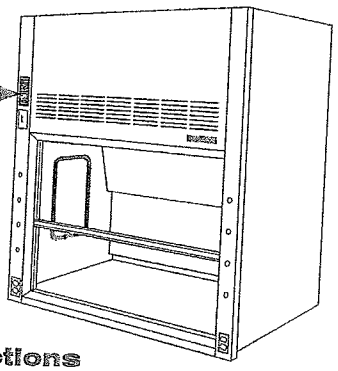
Fisher Hamilton also recommends at least semi-annual verification that this above criteria is subjected to and met by all hoods at your particular facility.

Warning

This product is intended for use with certain chemicals that can cause serious injury or illness through inhalation or physical contact. While this product is intended to minimize exposure to certain hazardous chemicals when selected, installed and operated properly, its performance and the safety of the user is affected by a number of factors. These include the HVAC system, the specific chemicals and processes being used, proper operation and the condition of the room.

Before using this fume hood, consult the owner's industrial hygienist or safety representative to make sure: 1) the specific fume hood alarms, controls and the HVAC system have been properly selected and are operating correctly, 2) the hood has been tested after installation and routinely thereafter to ensure the fume hood is providing the proper containment for the specific chemicals and processes being used, 3) there has been appropriate training on the correct use of the fume hood and handling of the specific chemicals and the fume hood operating instructions have been reviewed, 4) any personal protective devices that are required are properly selected and provided, and 5) the fume hood is being operated at the appropriate face velocity. The fume hood should never be operated with the sash in the full open position.

Refer to the Operating Instructions label on left front post. Data from the "as manufactured" test should be logged in this area along with any further field test results.



Operating Instructions

Failure to follow these instructions could result in physical injury or illness.

Caution: Do not use hood for perchloric acid procedures.

1. Do not use this fume hood unless you have received proper training from the owner's industrial hygienist or safety representative.
2. This fume hood is not intended to be used with all chemicals or all chemical processes. Consult the owner's industrial hygienist or safety representative to determine whether the hood is appropriate for the chemicals and processes to be used.
3. Verify that the fume hood exhaust system and controls are operating properly and providing the necessary air flow. If in doubt, the owner's industrial hygienist or safety representative should be consulted. It is recommended that the hood be equipped with an air flow monitoring device. Before using the fume hood, verify that the monitor is operating properly by testing the monitor.
4. The hood should not be operated with the sash in the full open (set-up) position. When the hood is in use, the opening of the sash glass should be kept at a minimum. On a vertical rising sash, the sash glass should be no higher than 18". Horizontal sliding panels on combination sashes must be closed when sash is raised vertically. The sash should remain closed when the hood is not in use.
5. Place chemicals and other work materials at least six (6) inches inside the sash.
6. Do not restrict air flow inside the hood. Do not put large items in front of the baffles. Large apparatus should be elevated on blocks. Remove all materials not needed for the immediate work. The hood must not be used for storage purposes.
7. Never place your head inside the hood.
8. External air movement can affect the performance of the hood. Do not operate near open doors, open windows or fans. Avoid rapid body movements. Do not open the hood if there are cross-drafts or turbulence in front of the hood. Do not open the sash rapidly.
9. If this hood is equipped with adjustable baffles, do not adjust the baffles without consulting the owner's industrial hygienist or safety representative.
10. Wear gloves and other protective clothing if contact with contaminants is a hazard.
11. Clean spills immediately.
12. If fumes or odors are present, stop operating the hood, close the sash and contact the owner's industrial hygienist or safety representative immediately.
13. It is recommended that this fume hood be tested and certified annually by the owner according to applicable industry and government standards.

Perchloric Acid Fume Hoods

The properties of perchloric acid require that a specially designed fume hood be set aside for exclusive use with this material. The hood is equipped with a cold water spray device for washdown of the interior surfaces. A trough is placed across the back of the hood for collection and disposal of washdown waters. Operating personnel should be well trained in the proper handling techniques and be familiar with the characteristics of this material.

Frequency of washdown, both hood interior and exterior system, is determined by the usage and concentration of reagents. This can range from a weekly procedure to one that occurs after every use. Washdown should always be followed by an inspection to verify that all areas are clean and that the wash system is functioning properly.

Some of the hazards of perchloric acid which justify the use of a special hood are:

1. Perchloric acid is a very strong acid, capable of producing severe burns when in contact with skin, eyes or respiratory tract.
2. As an aqueous solution, it can cause violent explosions if improperly handled.
3. It reacts with other substances to form unstable materials which are susceptible to exploding either by impact, friction, or spontaneous combustion.

Persons using perchloric acid should be thoroughly familiar with its hazards. Many reported laboratory accidents have involved less than one gram of reactant. Listed below are some common safety practices that should be followed:

- Spilled perchloric acid should be thoroughly washed away with large amounts of water.
- The use of organic chemicals or materials in the hood should be avoided.
- Goggles or other effective eye protection should be used whenever possible, as well as utilization of the fume hood sash for additional safety.
- Gas flames or oil baths should not be used within the hood.
- Organic chemicals should not be kept in storage areas set aside for perchloric acid storage.
- A schedule should be made for regular washdown and inspection of hood interior, ductwork and blower to guard against a build-up of dangerous perchloric materials.
- Only a fluorocarbon grease should be used as a blower lubricant, since any other type is to be considered potentially hazardous.
- Washdown procedure should be performed after completion of usage with all apparatus removed from hood.

Fume Hood Inspection Procedures

Safety considerations require that a schedule of inspection and documentation be set up for every laboratory fume hood at least annually.

An inspection record should be maintained. This record may be in the form of a label attached to the fume hood, or a log held by the laboratory director or health safety director.

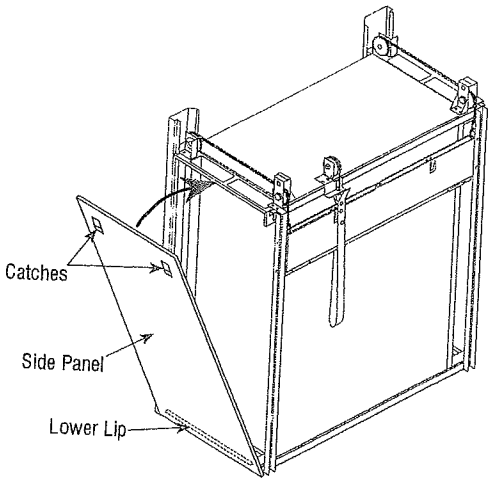
Inspection procedures should include instrument verification of fume hood face velocity and a determination of usage by observation and interview. These procedures should also consist of a physical examination of liner condition and cleanliness, baffle and sash operation and condition, counterbalance cables, light operation and condition, and service fixture function.

Inspection results should be recorded and reported to the proper authority for any required action.

NOTE: Special purpose fume hoods such as those used with radioactive materials or perchloric acid require additional inspection procedures to cover special equipment and requirements.

Options, such as low air flow detectors, when installed, should be inspected at least annually. Where extreme hazardous or corrosive conditions exist or when filters are present in the system, the inspection frequency should be increased appropriately. Velocity and pressure sensing detectors should be tested at each inspection. Low-flow of no-flow alarms of the visible (lights) or audible (horns or bells) type should be tested for correct operation at least at each inspection. Signal transmission for alarms designed to activate signals at more than one location should be verified at each location during each inspection. Frayed or broken belts should be replaced promptly.

Removing Fume Hood End Panels



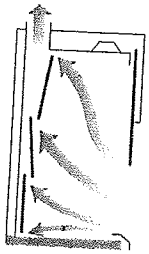
The end panels are held to the hood structural frame with two upper catch fasteners and a lower mounting bracket, that mates to the lower frame angle. Lower the side panel into the side frame of the fume hood superstructure, engaging the frame's lower lip. While pressing down on the two black catches, rotate the side panel and engage the frame's upper lip. Gently apply additional pressure to the panel and release the catches to secure the panel to the hood.

Baffle Adjustment

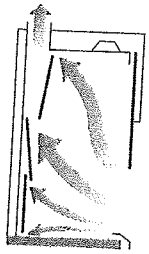
Fisher Hamilton provides two choices of baffle design concepts:

1. Multi-position fixed.
2. Remote exterior control

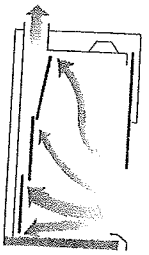
See label located on interior right-hand wall for repositioning instructions for Multi-Position Fixed Baffle. See label located on right front post for Remote Exterior Baffle adjustment instructions.



A – Normal Exhaust Requirements



B – High Heat Loads or Lighter-Than-Air Gases



C – Heavier-Than-Air Gases and Surface Fumes

Fisher Hamilton fume hoods have three baffle settings:

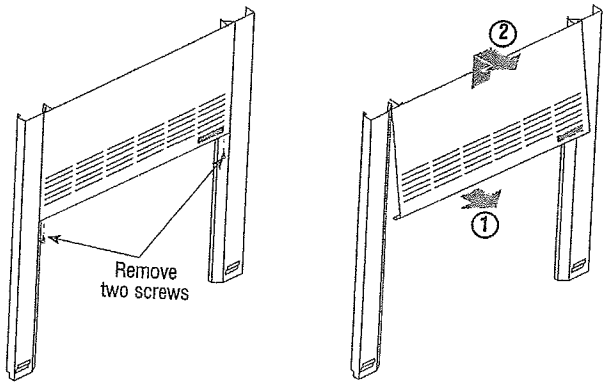
A. Normal or Average.
B. Lighter-than-Air or high thermal loading.
C. Heavier-Than-Air

Position A is for normal exhaust requirements. Locate baffle in center of movement arc. All slots are functional. This baffle position is suitable for most fume generating activities.

Baffle position B is for lighter-than-air gases, or high heat loads. The top slot is open to maximum. The upper portion of perimeter slot is operational. The intermediate horizontal slot is operational and bottom slot is restricted. Fume hood air flow is concentrated in the upper portion of enclosure for efficient capture and exhaust of lighter-than-air fumes and hot gases.

The baffle at position C provides maximum air flow across the work surface for the collection and removal of fumes generated at the work surface and heavier-than-air gases. In this position, perimeter slot and intermediate slot remain open and operational, top slot is closed.

Fluorescent Light Tube Replacement - Bench Top, Hi-Line and Floor-Mounted Fume Hoods



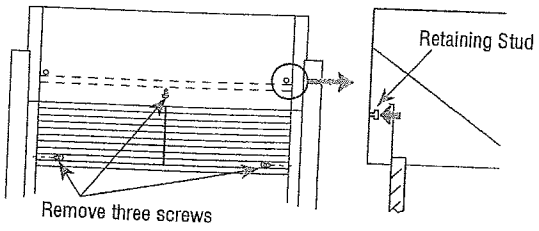
Remove sash enclosure if applicable.

Remove two screws securing bottom of louver panel to front posts. Pull louver panel up to disengage from studs and remove panel.

Squeeze bottom edge of lamp housing to disengage from galvanized channel. Rotate lamp housing up to expose bulbs. Replace bulbs with same type as in unit. Turn on light switch to verify connections.

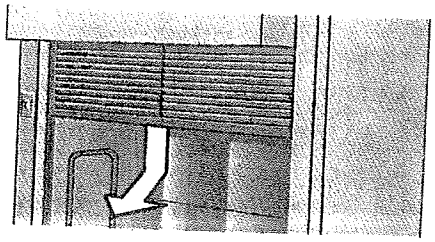
Reverse above procedure to return hood to usable condition.

Fluorescent Light Tube Replacement - Auxiliary Air Fume Hoods



Remove louver panel assembly by removing three (3) screws, as shown above.

NOTE: Two people should perform this operation, one to hold the louver panel, and the other to remove the three screws.

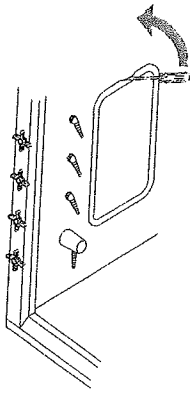


With one person at each end, lift the panel up and push top inward to disengage from two (2) retaining studs, then lower the panel and tilt the bottom outward to remove as shown above.

Lift sash enclosure up one (1) inch and lay back over top of light housing. Grasp and rotate fluorescent tube to remove. Replace with new tube and re-assemble in reverse order.

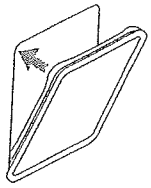
Removal of Gasketed Access Panel

Insert screwdriver and wedge out panel and gasket assembly.



Installation of Gasketed Access Panel

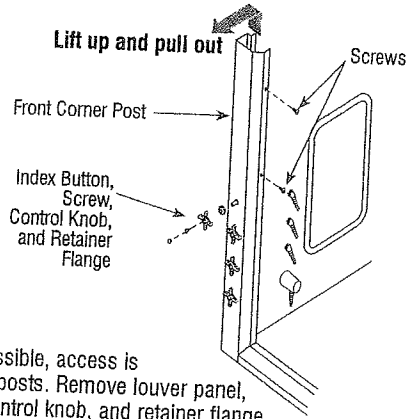
Twist the corners of gasket towards cutout before insertion. Replace the panel and work the entire periphery of the gasket to be sure that the gasket is completely snapped into position. Gasket should be smooth and tight when properly seated.



Fume Hood Service Fixtures

The fixtures used within fume hoods are needle valve type, and if they wear, stainless steel cone and seat replacement kits can be ordered from Fisher Hamilton. It is necessary to remove the handle from the valve and then remove the valve mechanism. This can be done through the access panels (shown above) if fixtures are mounted in the superstructure, or from inside the cupboard if the fixtures are deck mounted. Access to the valves by removal of the exterior end panels permits seat replacement without the need to remove the valve. This approach is recommended when ends are exposed and accessible.

Access to service fixture valves on fume hoods without access panels is obtained by removal of the exterior end panels when hoods are free-standing.



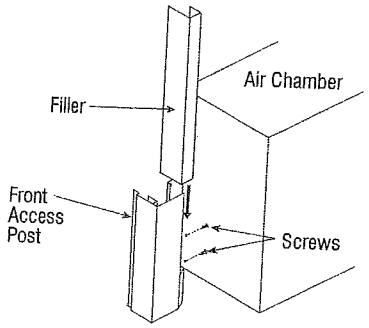
When ends are not accessible, access is gained through the front posts. Remove louver panel, unscrew index button, control knob, and retainer flange from fixture handle rod. Remove two (2) screws from post as shown above, lift up and outward to remove post. Electrical fixtures are connected to post with flexible conduit and can remain attached.

Cleaning Fume Hood Interiors

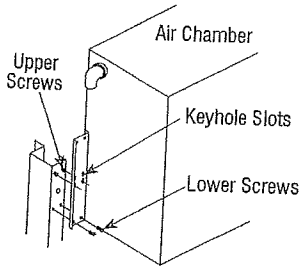
Fume hood liners are maintained by an occasional washdown with detergent and warm water. Stains and salt deposits can be removed with a weak acid solution (5%) or an appropriate solvent – **DO NOT USE ACETONE.** Remove baffles for access to all surfaces. See Page 13 for removal and installation procedures. For deposits of dirt or stubborn stains on stainless steel, follow procedures outlined under Working Surface Section.

The use of organic chemicals or materials in a specialized perchloric acid fume hood with a stainless steel interior should be avoided.

Removing Air Chamber - Auxiliary Air Fume Hoods



Remove the left- and right-hand fillers by removing two (2) screws each side, accessible from inside the air chamber.



Lift up filler to expose four (4) screws each side which secure air chamber. Chamber will be supported by the upper screws after lower screws are removed. Remove lower screws but just loosen upper screws.

Lift air chamber up and off of upper screws. Two people are needed for this procedure, one at each end of air chamber.

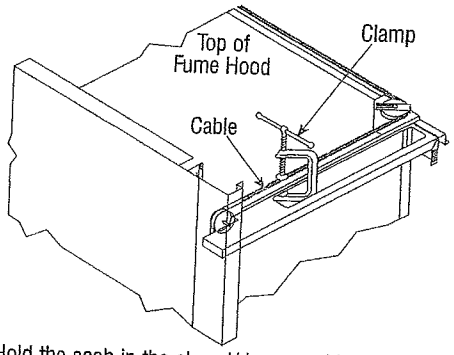
Sash Glass Replacement for Sashes with Steel Frame on Four Sides

NOTE: Special parts, options, and accessories should be maintained as required.

Sashes occasionally require service. The glass may fog due to the condensation of chemical vapors, and such materials should be removed promptly by washing with water and detergent to prevent etching of the glass.

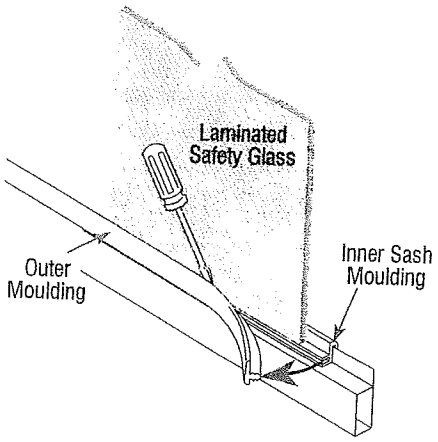
WARNING

If cable is frayed or damaged, it MUST be replaced to avoid personal injury or damage to the fume hood

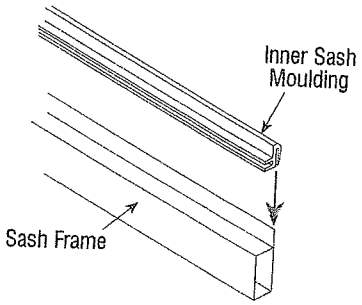


Hold the sash in the closed/down position by clamping the sash counterbalance cable to the top structural frame member. In some situations, access to the top of the fume hood may be gained by:

- Removing end panel if end of hood is clear – See Page 11.
- Removing front louver panel – See Page 12.
- Removing blower enclosure panels – See Page 15–18.

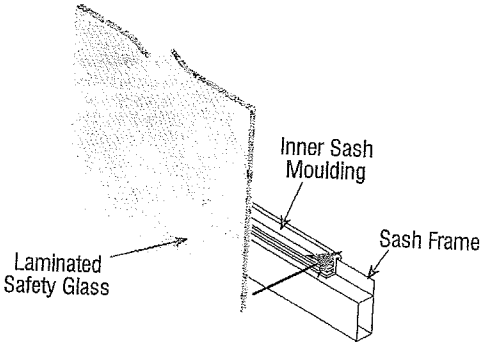


Remove the outer portion of the sash moulding strip on all four sides of the frame. Use a flat blade screwdriver to pry away from inner portion of moulding. Dispose of broken and both portions of the sash moulding strip.

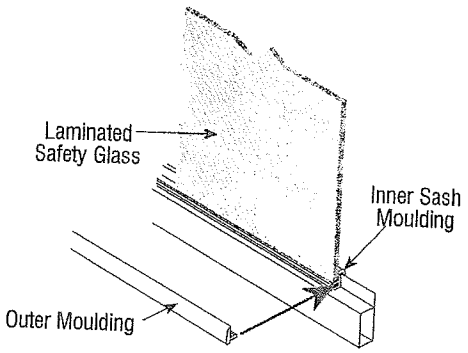


To Re-assemble:

Press the four (4) sections of the inner sash moulding strip over the sash frame edge.



Place the new sash glass onto the inner sash moulding and hold in place.

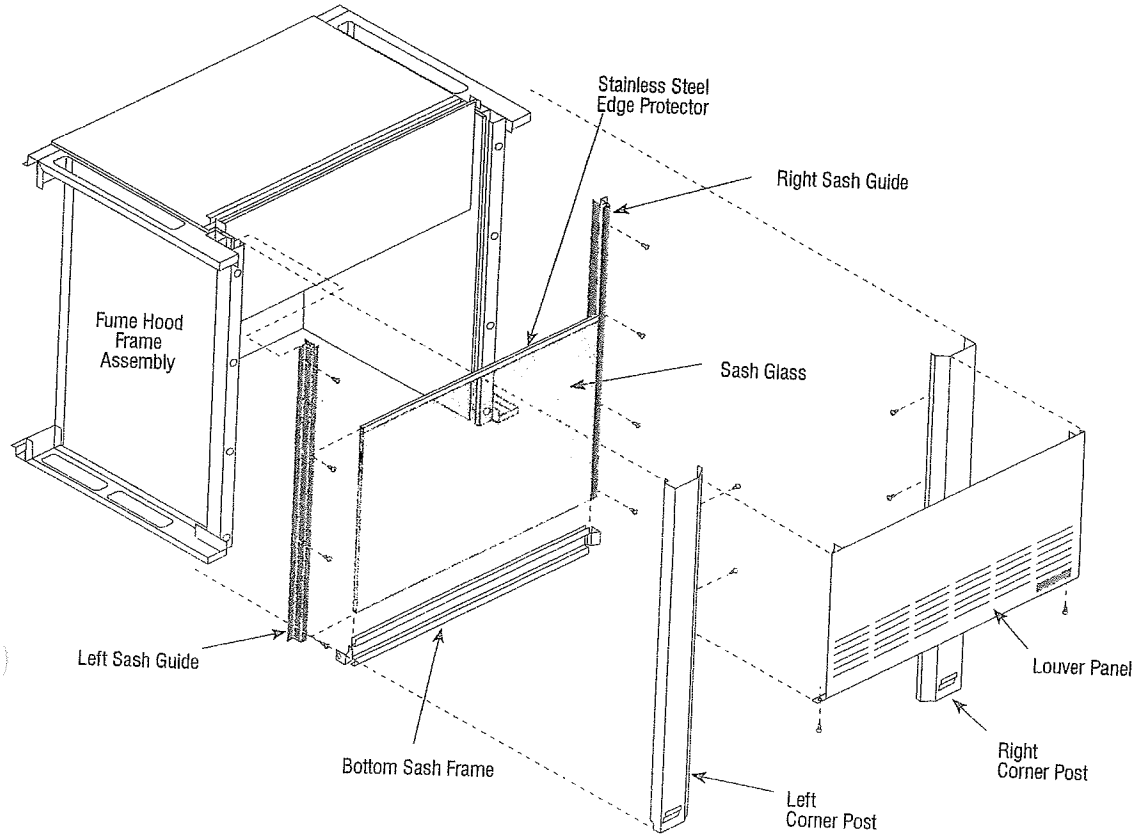


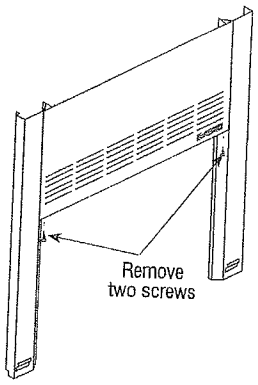
Press the outer moulding strip into the groove of the inner strip.

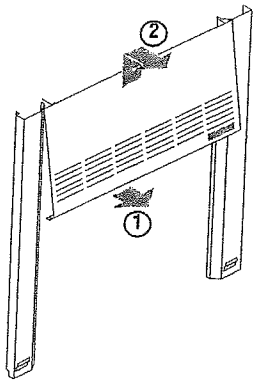
Remove clamps holding the sash cable in place and test for balance.

Sash counterbalance cable is replaced by removing front corner post (See Page 12) for access. Field repairs can be made on existing cable if the problem is an end fastening device or disconnection. If cable is frayed or broken, order replacement cable – describe hood type, size and cable length.

Sash Glass Replacement - Restricted Bypass and Constant Volume Bench Top Fume Hoods That Have Been Installed







Remove louver panel by removing one screw in lower corner at each end.

Pull bottom out and lift entire panel up to remove.

Remove both front corner posts, See Page 12.

WARNING

If cable is frayed or damaged, it MUST be replaced to avoid personal injury or damage to the fume hood

After removal of one of the corner posts, clamp the sash cable to the top of the side frame assembly. See page 14.

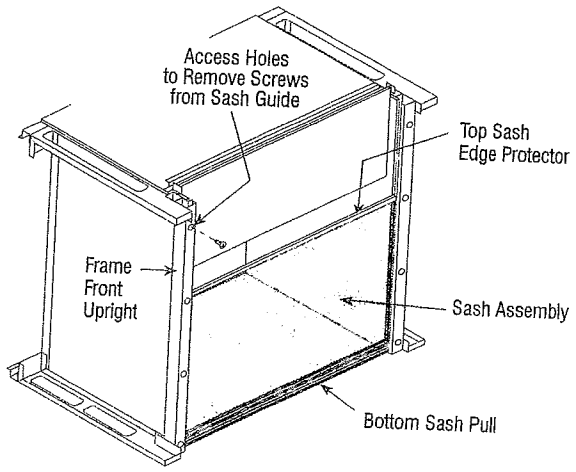
Remove screws that hold the sash guide to the front frame upright and slide the guide up and away from the sash. **Care should be taken when the sash guide is removed so that the glass does not fall from the remaining guide.**

Sash Glass Replacement - Restricted Bypass and Constant Volume Bench Top Fume Hoods That Have Been Installed (Cont..)

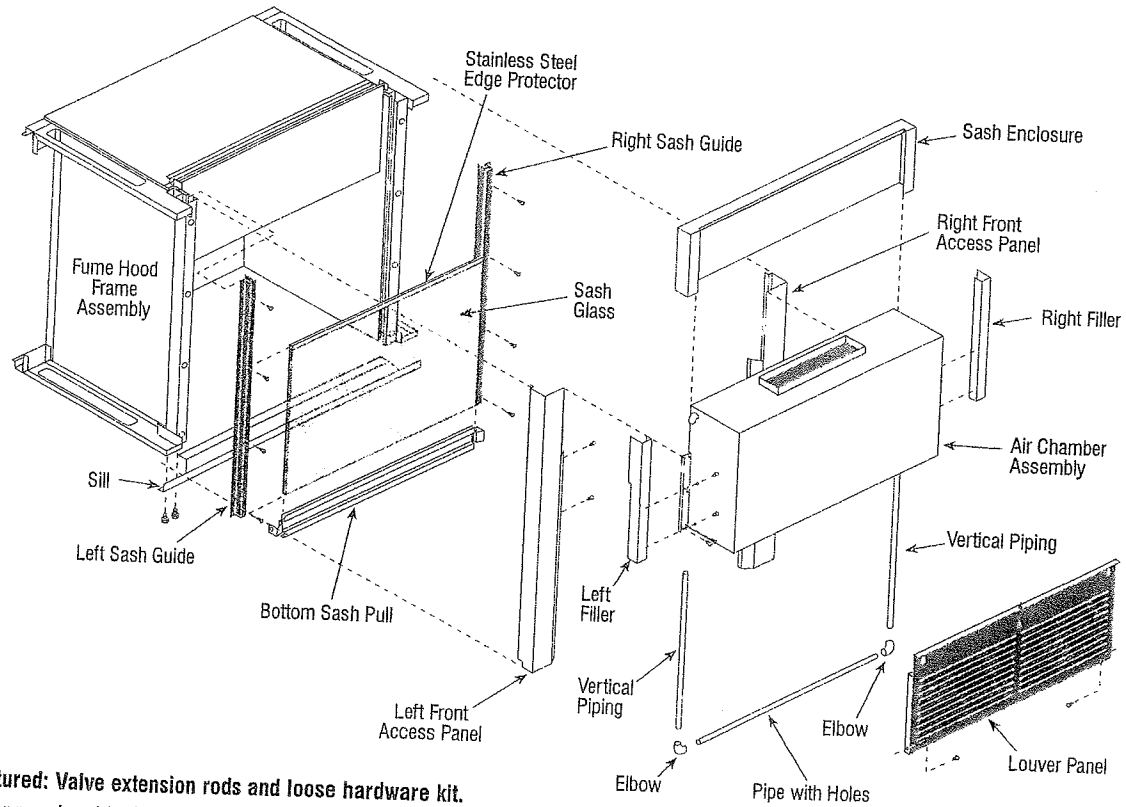
While holding the sash glass, first remove the upper stainless steel edge protector. Then force the glass from the bottom sash pull by pulling upward while holding the sash pull in place. At this point the glass and gasket material should come loose, the bottom sash frame remains attach to the sash cables and one sash guide.

Place gasket material on the bottom of the new sash glass. Align with the bottom frame member and press into place. Replace the stainless steel edge protector on the top horizontal edge of the glass. Replace the sash guide and remove clamps holding the sash cables. Move the sash up and down to test for proper alignment in the sash guides. If at this point you notice the glass is not completely seated into the bottom frame member, tap gently on the bottom with a rubber mallet to seat the glass.

Replace the front corner posts and the louver panel.



Sash Removal and Glass Replacement - Auxiliary Air Bench Top Fume Hoods That Have Been Installed

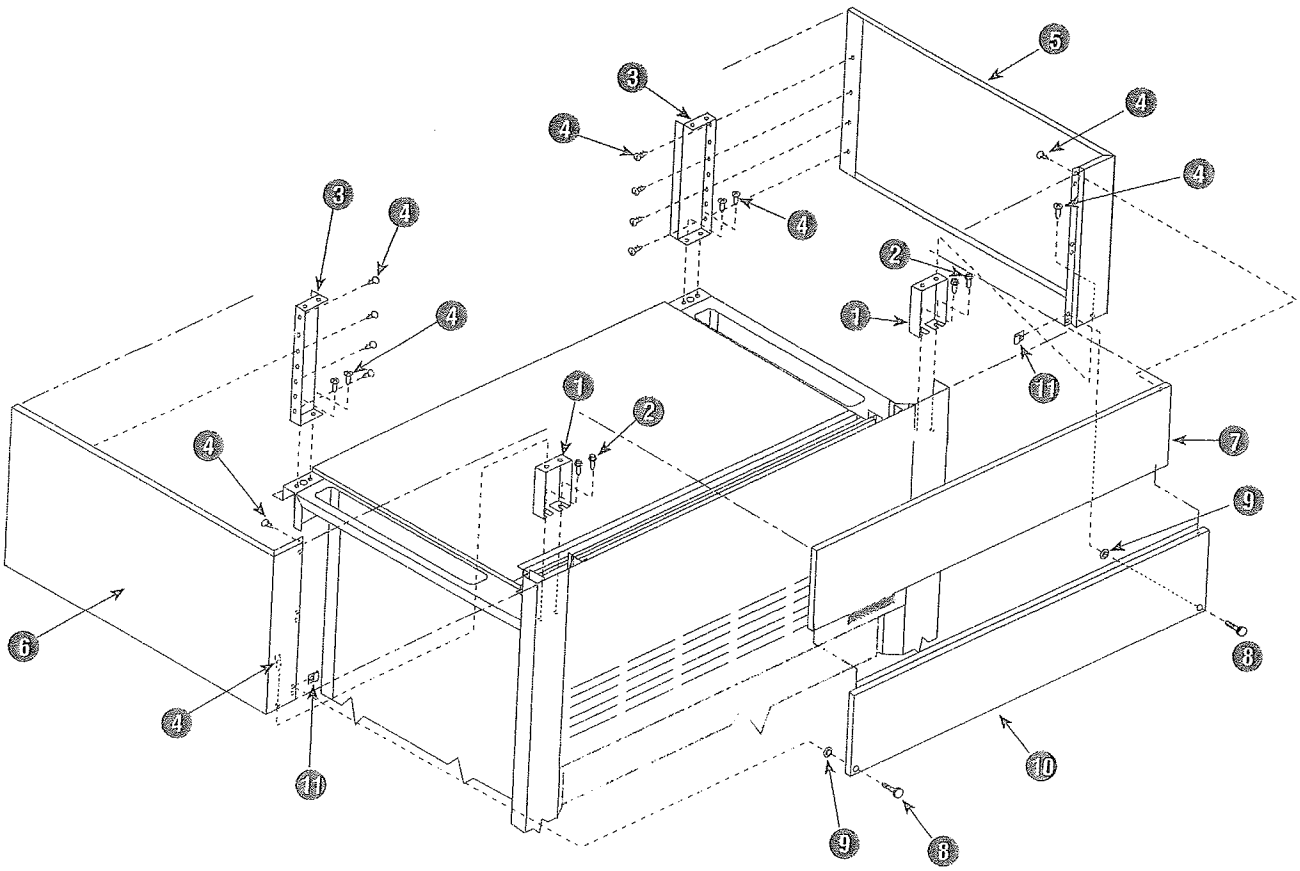


Parts not pictured: Valve extension rods and loose hardware kit.

Remove louver panel and both front corner posts, See Page 12 and 15.

Follow directions from Page 15 and top of this page.

Removing Blower Enclosure Assembly - If Installed - Restricted Bypass, Constant Volume Bypass and Radioisotope Fume Hoods



Remove both side panels from the fume hood, See Page 11.

Remove upper front panel (**7**) from side panels by removing two No. 8 X 5/8" PPHSMS (**4**). Lift up to disengage from flange of lower front panel.

Remove thumb screws (**8**) and push retainers (**9**) to remove lower front panel (**10**).

Remove right-hand (**5**) and left-hand (**6**) side panels from supports (**1**) and (**3**) by removing screws No. 8 X 5/8" PPHSMS (**4**).

Reassemble in reverse order.

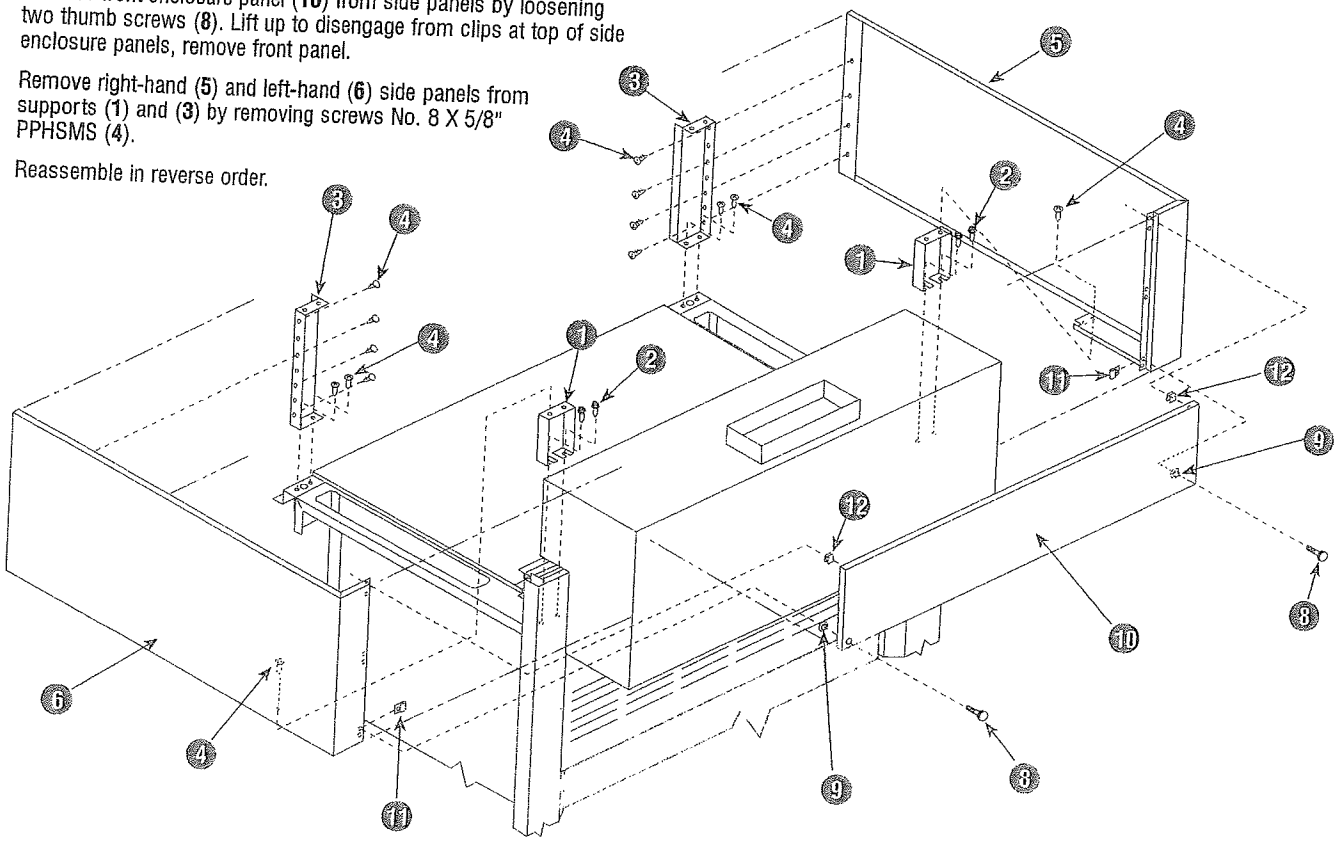
Removing Blower Enclosure Panel Assembly - If Installed - Auxiliary Air Hoods

Remove both side panels from the fume hood, See Page 11.

Remove front enclosure panel (**10**) from side panels by loosening two thumb screws (**8**). Lift up to disengage from clips at top of side enclosure panels, remove front panel.

Remove right-hand (**5**) and left-hand (**6**) side panels from supports (**1**) and (**3**) by removing screws No. 8 X 5/8" PPHSMS (**4**).

Reassemble in reverse order.



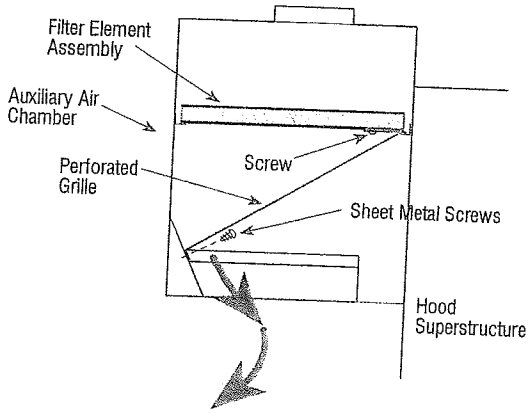
Removing Filter from Supply Air Chamber - Auxiliary Air Fume Hoods

The supply chamber air filter is located in the supply air chamber. The change out of the filter requires the removal of the louver panel. It is the panel consisting of all louvers for bypass air to enter when the sash is closed. Refer to Page 12 for instructions on how to remove the louver panel.

Remove the perforated grille that covers the bottom of the chamber. Remove a series of sheet metal screws that secures the front of the grille in place, tilt this edge down and pull out to release the grille from the angle at the rear of the chamber.

The removal of the perforated grille provides access to the metal enclosure that sandwiches the filter material. This metal enclosure is trapped at the back by two short flanges and rests on top of an angle mounted at the front of the chamber. To allow the front of the metal enclosure to drop down, turn the two screws found on the sandwiched enclosure one-half turn, this releases a metal plate that overlaps the angle on the front of the chamber.

With the removal of the enclosure and separation of the top and bottom perforated panels, the filter material can be cleaned or replaced. The various stages found inside the supply chamber



provides a slow release of air and an even distribution.

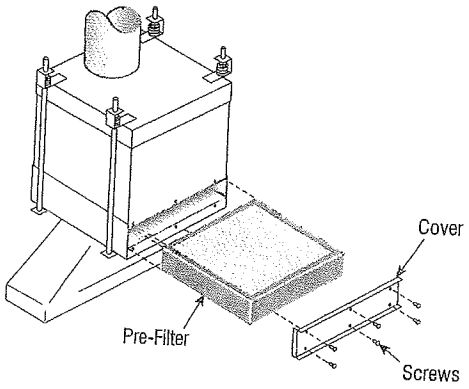
Be careful to re-install the pieces in the chamber in the same manner as removing them. This is to ensure a functional supply air fume hood.

Exhaust Filter Replacement and Blower RPM Adjustment

Exhaust Filter Replacement

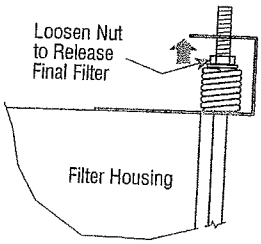
WARNING

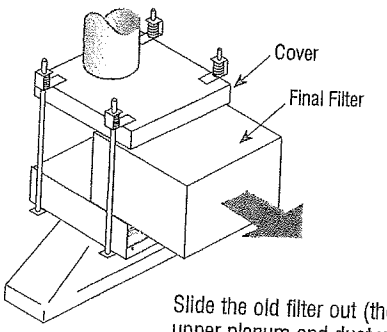
Wear adequate protective devices and use techniques to prevent contamination of the laboratory environment. Filter exchange should be accomplished by knowledgeable personnel who perform sterilization procedures or are trained for the safe handling of radioactive materials. Some users prefer to wet the filter media with a steam or aerosol generator to increase adhesion of particles.



To remove pre-filter – remove six (6) screws that secure the pre-filter cover. Slide the filter out. Slide new filter into the housing and secure cover in place.

To remove final filter – loosen the nuts above the springs to unclamp the filter. Continue turning the nuts until they contact the upperflange of the spring bracketand lifts the plenum away fromthe filter approximately 1/8 inch.





Slide the old filter out (the rods will support the upper plenum and duct work). Insert the new final filter. Turn the four (4) nuts sown to compress the springs. Inspect seal after installation and periodically thereafter.

Blower RPM Adjustments

Remove housing over motor blower assembly.

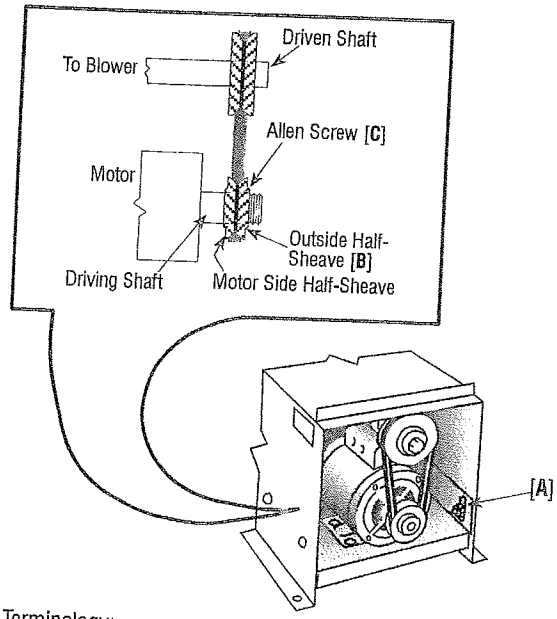
Loosen the four (4) bolts [A] which hold the motor mounting plate stationary so that the plate has a vertical movement, as shown in illustration below. This should be done so that a later adjustment for correcting belt tension can be made.

Make all adjustments ONLY with the outside half sheave [B] on the driving shaft.

To increase the RPM of the blower, increase the diameter of the driving sheave by loosening the Allen screw [C] and turning the outside half-sheave toward the motor. Tightening the Allen screw to the flat portion of the threaded shaft then fixes the diameter of the sheave.

To decrease the RPM of the blower, decrease the diameter of the driving sheave by loosening the Allen screw [C] and turning the outside half-sheave away from the motor. Tightening the Allen screw to the flat portion of the threaded shaft then fixes the diameter of the sheave.

Correct belt tension (side play 1/2" to 3/4") can now be set by adjusting the loosened motor mounting plate and tightening the four (4) bolts.



Terminology:
Sheave = Pulley

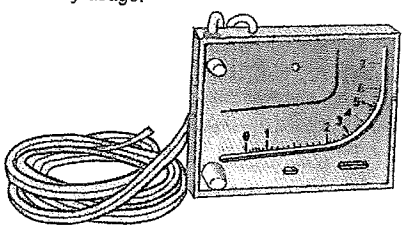
Driven = Attached to blower shaft
Driving = Attached to motor shaft

Monitoring Exhaust Filters Using a Manometer Assembly

When a filter device is installed on a fume hood exhaust system, it is important that the filter performance and condition be monitored to ensure proper performance of the filter and of the fume hood to which it is connected.

By measuring the pressure drop across the filters, the manometer assembly will provide information on filter function and condition.

Manometer reading with clean filters should be recorded and marked with grease pencil on the face of the unit. When the reading changes by one inch, replace filter(s). A maintenance schedule should be set up for periodic reading of the manometer. Frequency can be determined by usage.



Any change in manometer reading should be investigated. It may indicate filter damage, over-pressure, or an unsafe operating condition. If it is subjected to an over-pressure, disassemble and examine for fluid in loops and tubes. Drain and re-install per instructions.

The manometer assembly requires a periodic cleaning of the exterior with water or naphtha and inspection and adjustment of the oil level. Adjust micrometer knob for zero reading as required. Add .826 sp. gr. red gauge oil when needed, to maintain zero reading. Oil can be obtained from Fisher Hamilton.

Proper use of the manometer assembly provides a continuous indication of filter and operation conditions.

NOTE – Be sure to remove manometer when changing filters.

Fume Hood Evaluation in the Field

It is recommended that the user make provisions to have the following tests performed on all laboratory fume hoods. These tests should be performed by qualified personnel to verify proper operation of the fume hoods before they are put to use. The tests of the fume hoods should be performed after the installation is complete, the building ventilation system has been balanced, and all connections made. Any unsafe conditions disclosed by these tests should be corrected before using the hood.

Test Procedures

Test Conditions

Verify that building make-up air system is in operation, the doors and windows are in normal operating position, and that all other hoods and exhaust devices are operating at designed conditions.

Room Conditions

Check room condition in front of the fume hood using a thermal anemometer and a smoke source to verify that the velocity of cross drafts does not exceed 20% of the specified average fume hood face velocity. Any cross drafts that exceed these values shall be eliminated before proceeding with the fume hood test.

Equipment List

(a) A properly calibrated hot-wire thermal anemometer similar or equal to Alnor Model No. 8500.

(b) A supply of 1/2 minute smoke bombs.

(c) A bottle of titanium tetrachloride and a supply of cotton swabs or other recognized device for producing smoke.

CAUTION

Titanium tetrachloride fumes are toxic and corrosive. Use sparingly, avoid inhalation and exposure to body, clothing and equipment.

NOTE: It must be recognized that no fume hood can operate properly if excessive cross drafts are present.

Face Velocity

Determine specified average face velocity for the fume hood being tested. Perform the following tests to determine if fume hood face velocities conform to specifications. With the sash in normal operating position, turn ON the exhaust blower. The face velocity shall be determined by averaging the velocity of six readings taken at the fume hood face. Readings shall be taken at the centers of a grid made up of three sections of equal area across the top half of the fume hood face and three sections of equal area across the bottom half of the fume hood face.

NOTE: If not in accordance with specified face velocity, refer to Troubleshooting section on Page 21, for aid in determining the cause of variation in air flow. If face velocity can not be corrected to that which is specified, reclassify fume hood to conform to actual face velocity. Shut off auxiliary air when testing an Auxiliary Air fume hood.

Sash Operation

Check operation of the sash by moving it through its full travel. Sash operation shall be smooth and easy. Vertical rising sashes shall hold at any height without creeping up or down.

Air Flow

Fume Hoods

Turn fume hood exhaust blower on. With sash in the open position, check air flow into the fume hood using a cotton swab dipped in titanium tetrachloride or other smoke source. A complete traverse of the fume hood face should verify that air flow is into the fume hood over the entire face area. A reverse flow of air indicates unsafe fume hood operation. Consult the Troubleshooting section on Page 21, for possible causes and take corrective action. Move a lighted smoke bomb throughout the fume hood work area directing smoke across the work surface and against the side walls and baffle.Smoke should be contained within the fume hood and be rapidly exhausted.

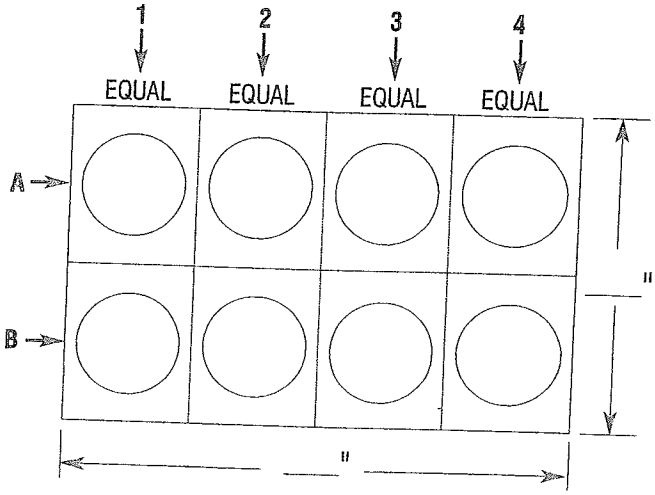
Low Air Flow Monitor

On fume hoods with low flow warning devices, verify that monitor functions properly and indicates unsafe conditions.

Laboratory Fume Hoods

Field Evaluation

Recording Form for Field Evaluation of Laboratory Fume Hoods



Project Name _____

Location _____

Order Number _____

Room _____ Item _____

Fume Hood Identification _____

_____

Sash Operation _____

Light Operation _____

Baffle Operation _____

Services: ☐ A ☐ G ☐ V ☐ W ☐ NIT. ☐ STEAM

☐ OTHER _____

Conclusion & Comments _____

_____

_____

_____

_____

_____

_____

_____

Face Velocity Test

Square footage of hood opening _____

. . and Bypass . . if any _____

TOTAL _____

1A _____ F.P.M.

1B _____ F.P.M.

2A _____ F.P.M.

2B _____ F.P.M.

3A _____ F.P.M.

3B _____ F.P.M.

4A _____ F.P.M.

4B _____ F.P.M.

TOTAL _____ / 8 = _____ avg.

TOTAL C.F.M. = (Avg. X Sq. Ft. of open sash & any bypass)

ALARM CONDITION: FUNCTIONAL _____

NON-FUNCTIONAL _____

SMOKE TEST: POSITIVE _____

NEGATIVE _____

I certify that the above results were obtained on ____ ____ ____ by _____

Evaluation procedures conducted by _____ (Name) _____ (Title)

Troubleshooting

When fume hood test procedures detect an improper function, the cause is normally due to insufficient quantity or air flowing through the hood, or due to room cross drafts blowing into or across the face of the fume hood, or a combination of both. The following suggestions are offered to help pinpoint and correct the problem.

Room Cross Drafts

Air moving through an open door located adjacent to the fume hood can cause cross drafts.

An open window or a room air supply located to one side or across from the fume hood can cause disturbing cross drafts.

High-velocity air from ceiling-mounted diffusers can cause a flow of air down and into the top half of the fume hood face that can cause reverse flows of air out of the bottom half of the face.

Insufficient Air Flow

Insufficient air flow through the fume hood can be caused by one or more of the following conditions. Each condition should be checked, and eliminated if possible, to determine which one or combination of conditions may exist.

One possible explanation for low face velocity readings is inaccurate face velocity readings. Check air flow velocity meter type. Was the recommended model used? When was it calibrated last?

If the recommended model was not used, check to make sure the instrument is recommended for low air velocities in the 50 to 100 feet-per-minute range.

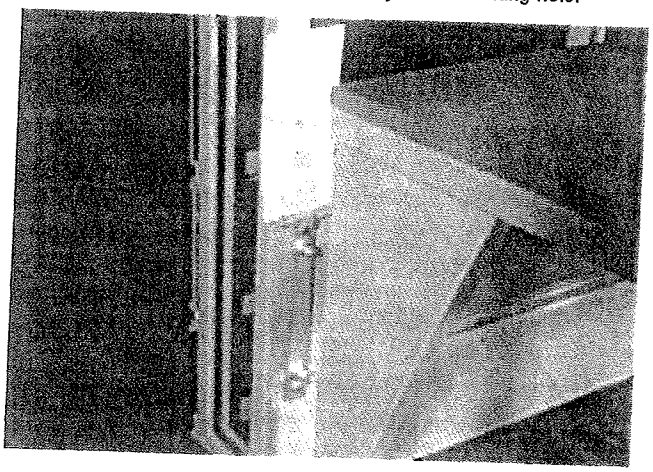
If possible, verify readings with another air velocity meter or by checking air volume using a pitot tube traverse of exhaust duct.

Check List

- Who stated that the unit did not operate properly? Position? Title? Employed by?
- What tests were performed? Instruments used? When calibrated? Results?
- Fume hood type and model number? Size?
- Is hood location correct/acceptable? Cross currents present? Traffic past hood?
- Is adequate free or make-up air available?Always? What is supply source? Can it be altered or cut off?
- Did hood ever function properly? Have authorized modifications been made? Is baffle properly installed? Adjusted?
- Have hoods ever been set? Calibrated? Tested? Balanced? By whom?
- Have recent changes been made in heating/cooling system? Describe.

Height Adjustment - Bracketed Table

1. Release and remove undercounter cabinets and drawer assemblies. Remove molding.
2. Center lift truck under table to be adjusted and raise it 1/2" to align bolt head with enlarged opening of key hole mounting hole.



3. Move lift truck and table 1" away from service support module and bracket.
4. Place template on top rim of strut channel above each stud bar. Raise or lower table to desired position aligning top edge with height marked on template.
5. Then raise table 1/2" above mark on template to align bolt head with enlarged opening of keyhole mounting hole.
6. Move lift truck and table toward service support module. Seat keyhole slots over support bolt heads.
7. Lower table and verify proper attachment. Adjust molding as required for proper seal. Replace molding.
8. Using a level, adjust support bracket bolt for front to back alignment and levelness.
9. Replace undercounter cabinets and drawer assemblies.

Height Adjustment - Four-Leg or Pedestal-Leg Work Units

1. Remove all clamps holding unit to service module or to adjacent assemblies. Take out molding.

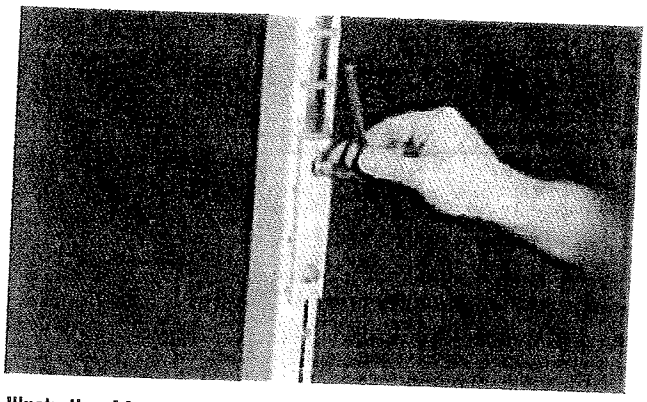


Illustration AA

2. Loosen leg bolts approximately eight (8) turns using allen wrench. See Illustration AA.
3. Using lift, insert lifting tongue under cabinet or frame and raise until contact is established.
4. Raise unit and test for balance. Relocate tongue as required or provide support for unbalanced loads.

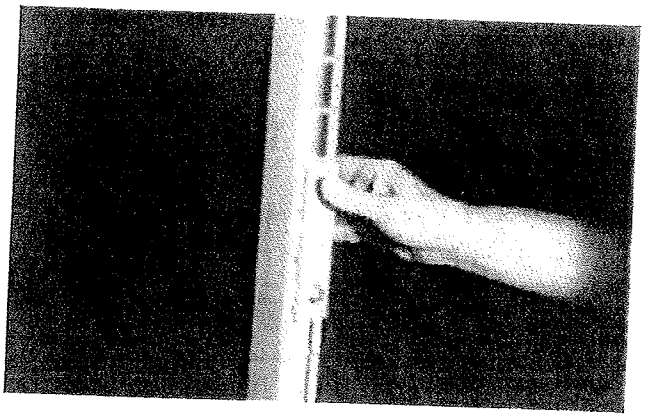
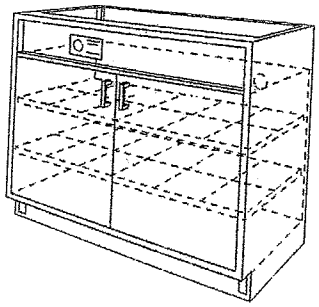


Illustration BB

5. To reduce table height, press in top bolt to release leg lock. See Illustration BB. Telescope leg to desired position and remove pressure on bolt allowing bolt to seat in slot. To adjust the pedestal table legs, both top bolts on legs must be pressed in at the same time to release leg locks. Position the legs and remove pressure on the bolts so locks seat in slots.
6. To increase work surface height, raise table to desired height, press in top bolt(s) and extend leg to new position. Release bolt(s) allowing lock to seat in bolt.
7. Lower unit until legs rest on floor. Tighten bolts.

Electric Drying Cabinet

No. 218S632 and No. 218S832, UL Listed.

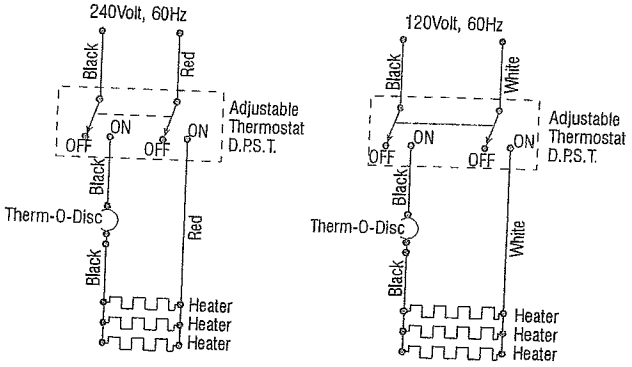


Operating Instructions

Adjust thermostat dial to desired temperature. The range is from room temperature to 180 degrees F. For specific temperature settings, place thermometer on center shelf and adjust thermostat dial until desired temperature is reached and maintained. Mark temperature setting adjacent to dial indicator. This will permit return to desired temperature when dial is reset for rapid warming or other purposes.

To completely turn off Unit, rotate thermostat dial to OFF position.

Note: These units are designed for drying functions only, not for baking.



Wiring Diagram – Electric Drying Cabinet
218S632 – Two Heaters
218S832 – Three Heaters (Shown)

Fisher Hamilton

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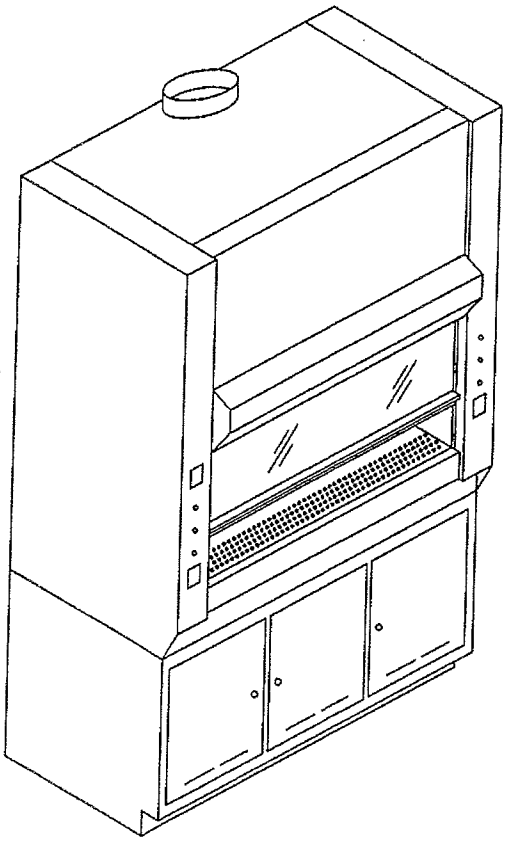
AC-173-10 January 01, 2005

OPERATION AND MAINTENANCE MANUAL

PLASTIC LAMINAR FLOW FUME HOOD

PART # - ID-CB-60-LFH
SERIAL # - ID-331
JOB # - 9498
CUSTOMER - GIBSON
PROJECT - UNIVERSITY OF VERMONT



TFI INLINE DESIGN CORP.

MANUFACTURED BY INLINE DESIGN
5658 E. 58TH
COMMERCE CITY, COLORADO 80022

* A PRODUCT OF TFI / INLINE DESIGN

PLASTIC LAMINAR FLOW FUME HOOD

manufactured by

TFI / INLINE DESIGN

TABLE OF CONTENTS

STANDARD FEATURES

- Solid thermoplastic construction, with base cabinet for storage. The standard material for construction is white s/r polypropylene, however other materials such as PVC, FR polypropylene, PVDF and Halar are available.
- Metal components (such as lights, motor, and counterbalance weights) are completely encapsulated with plastic or encased in gasket tight enclosures.
- The sash is clear plastic with a vertical counterbalance system.
- The front panel is designed to lift off for access to the filters , blower and pulley system. Filters and blower are located behind gasket tight panels.
- (4) - PVC junction boxes are installed on the front of the hood for electrical receptacles.
- Access panels are installed on both and interior and exterior walls.
- The work surface is integrally welded to the interior walls. A sloped sump under the deck will contain any spills and rout them to the drain. The deck perforations also serve as a fume exhaust path, and should never be blocked off . A ½" high drip lip across the front prevents spills from escaping from the work area.
- A dual bulb fluorescent light fixture is located in a sealed chamber with a gasket tight lid. The sealed light panel is clear plastic. The enclosure will tilt down for easy access to change light bulbs.
- (2) minihelic pressure gauges to determine the static pressure drop across the ULPA filters, and SP of the exhaust system.
- On/off switches for the lights and blower, pre-wired to a junction box located on the top back of the hood.
- Main 16a breaker switch mounted in the control panel.
- A variable speed blower controller (located behind the front panel in the upper left corner), controls the airflow thru the hepa filters.
- Refer to general arrangement drawings for additional details and fixture locations.

OPTIONAL FEATURES

- Air flow monitoring system
- 120VAC OR 240 VAC receptacles and/or switches
- Electrical hook up of options (complies to NEC code. Some state and local codes may vary).
- Gas, vacuum, or water fixtures.
- Mounting and supply lines to fixtures
- Cup sinks or utility sinks.

INSTALLATION

1. Choose a location for the hood that will not be subject to constant foot traffic or heavy air currents.
2. Place the hood on a flat level surface.
3. Attach an exhaust duct with adequate CFM requirements to the exhaust outlet. If corrosive chemicals are to be used in the hood, a fume scrubber in the exhaust system is recommended.
4. Have a licensed electrician and plumber hook up all required receptacles and fixtures.
5. After the exhaust system is operating, and the internal blower is on, have a ventilation technician adjust and balance the air flow through the hood to the required specifications.
6. Remove the packing around the counterweight (reattach weight if required) and check the sash cables to insure they are routed correctly and operating smoothly. The sash should glide up and down through the track with fingertip ease.
7. A clearance of 24"min. on the right side the hood is required for access to the pre-filter(s).
8. Remove the packing from the light fixture enclosure. See Maintenance section for removal details.
9. The hood and base cabinet are shipped in two separate sections and will require assembly at the time of installation. The hood section will need to be raised above and be positioned on top of the base cabinet. The hood section is fairly heavy (400 to 650 lbs. Depending on length) and should only be lifted by the base. A sissorlift or hoist is recommended for this procedure. Set the base cabinet in it's final location, and level it by adjusting the leveling legs. It is important to make these adjustments before adding the extra weight of the hood section. The cabinet can then be moved for assembly (if needed) and then slid back into location.

INSTALLATION

(continued)

To set the hood, place spacer bars on top of the base cabinet from front to back (2 x 4's work well) in (2) places aprox. 6" in from each end. Position the hood on top of the spacers. Lift one end of the hood and remove the spacers on that side. and gently lower the hood in place. The guides on the base cabinet will position the hood. Use the same procedure on the other side. Once the hood is set, secure it to the base cabinet by bolting on the attachment plate(s) provided. This is done from inside the cabinet on the mid panel(s). Then, bolt on the front trim panel over the front seam. Protective masking is generally left on the surfaces to prevent scratches during manufacturing and shipping. Peel off all masking as a last step before positioning hood in it's final location.

10. The overall width of the hood is 35 5/8", and is designed to go through a 36" X 80" opening (unassembled). If necessary, the light fixture assembly can be tilted down to make the overall width 34". To accomplish this, do the following steps:
    - Remove the top front panel by lifting off, using the hand holes on top.
    - Remove the bolted on sash stop(s) located on top of the sash track.
    - Remove the bolted on handles on the sash.
    - Lift sash to it's highest position.
    - Remove the top (2) 5/16" bolts that secure the light bracket and swing the light outward and down.

    Repeat steps in reverse order to reassemble. Be careful not to over tighten plastic bolts as they can break. A snug fit is generally sufficient.

INSTALLATION
(continued)

11. If the hood is equipped with the optional air flow monitor, field calibration will be required. Details of this procedure are listed in the manufactures' installation and maintenance instructions. The model used is "TEL" model 1000 fume hood monitor.

12. For reasons due to shipping and handling, stainless steel screws have been used to secure the sash track and plenum baffles. After the hood is in place, these can be replaced with the included polypropylene screws. To avoid breakage, Take care not to over tighten the screws.

OPERATION

1. Insure that the exhaust system is operating at all times when the hood is in use.
2. Do not block off exhaust slots or in deck with equipment or containers.
3. Keep the sash opening at 10" during chemical operations. This will insure optimum exhaust performance.
4. Keep hot plates and heating elements from direct contact with work surface, side walls and clear sash panel. Damage could occur if surfaces get too hot. Insulation and air flow under and around elements are recommended.
5. The use of an air flow monitor to insure proper air flow is desirable. If not, check air flow on a regular basis. 100 fpm face velocity is considered standard for most fume hood operations, however some procedures may vary.
6. The fume hood is not designed to protect personnel from explosions or violent chemical reactions. Take appropriate safety precautions when doing procedures that are associated with these risks.
7. Do not use Perchloric acid in a hood that is not designed for Perchloric acid use only . Only trained personnel that are experienced in the use and system maintenance of Perchloric acid operations should be considered for these procedures. A risk of explosion exists in an improperly maintained system.

MAINTENANCE

1. Insure that a consistent air flow is maintained through the hood. A surface mounted monitor or a hand held meter will accomplish this. If airflow drop is noticed, troubleshoot the entire exhaust system to determine the cause.
2. A routine schedule of cleaning of the hood interior and exterior is suggested to keep the hood in top shape and appearance. The use of abrasive cleaners should be avoided, to prevent scratches from forming. Do not use acetone on polycarbonate sash or light panel, as fogging may occur.
3. Inspect sash cables and pulleys for wear or adjustments on a monthly basis. Replace sash cables immediately if any wear or fraying is noticed.
4. Disconnect electrical power and turn off pressure lines prior to maintenance work in the respective areas.
5. Replace fluorescent lamp bulbs :
   To access the fixture lift up on the front panel. This will disengage the top of the panel from the dowel pins on top of the hood and the lower retainer at the bottom. Hand holes are located on the top of the panel to assist in removal. On longer hoods it may require more than one person to lower the panel. Unscrew the 5/16" bolts from the top front of the light enclosure brackets. Swing the enclosure out and down to expose the clear panel. Unscrew the plastic bolts and remove panel. Change bulbs as needed. Reassemble in the reverse order, taking care not to overtighten the plastic screws.
6. Replace ULPA filters :
   Remove the front panel. Remove the plastic bolts on the lower panel labeled ULPA filters.The ULPA filters are held in place

MAINTENANCE
(continued)

and compressed with polypropylene brackets, held down with ½" fiberglass bolts. Remove the perforated diffuser plate under the Ulpa filters. The plate is held in place by (2) – ¼" slots that run the length of the hood interior, and plastic bolts. Remove the plastic bolts. Pull down on the middle of the perforated plate until it can be wedged out of place. The next step may require (2) people, one to loosen the bolts, and one to position the brackets. Remove the bolts and brackets, then slide the ULPA filters out through the front. Insure that the sealing surface around the perimeter is clean and smooth It is recommended to apply a thin layer of silicone release agent around the sealing surface to insure ease of filter removal at the next changing. Replace the filters in the reverse order. Do not over tighten the plastic bolts. A snug fit will compress the gasket for a sufficient air seal. Take extra precaution when handling ULPA filters, as they are fragile. Even a pinhole leak will reduce the efficiency of the filter.

7. Replacing the pre-filters :
   The pre-filter(s) is located on the side of the hood. Tools are not required to exchange the filters. First, turn off the blower to prevent accidental injury or damage. Rotate the (4) hold down tabs that hold the filter in place. Remove old filter and replace with a new one, close the tabs and the procedure is complete.

8. Replacing the cupsink (where applicable) :
   Disconnect the 1 ½" PVC drain line by loosening the two unions. Two polypropylene bars with fiberglass bolts hold the sink in place. Remove these and the sink will drop out. Apply gasket seal to the top of the new sink and position in place. Replace bars and bolts. Center the sink and tighten the bolts. Replace drain line.

MAINTENANCE
(continued)

9. Servicing the blower fan
   The fan that supplies the incoming air is located in the top of the cabinet between the pre filter(s) and the hepa filter(s). Insure that the fan is turned off and electrical power is disconnected before performing any service work. Remove the top (2) access panels to expose the motor and impeller. The fan housing is an integral part of the hood, and cannot be removed. To remove the impeller, first unbolt the inlet cone and remove. Loosen the set screw on the hub of the impeller. The impeller should then slide of the shaft. In some cases a gear puller may be required to remove the impeller. Inspect, clean, or replace the impeller wheel as necessary. Assembly is the same in the reverse order.

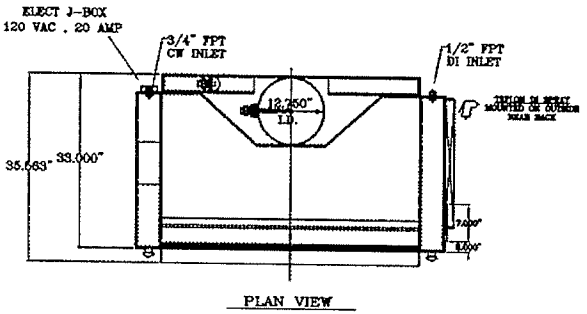
   To remove the motor, the impeller must first be removed. Disconnect electrical supply lines to the motor, noting the proper connections. Unbolt the motor from the vibration isolators and remove. Assembly is the same in the reverse order. Check to insure that the shaft and the impeller are not rubbing on the blower housing. The space between the impeller and the inlet cone should be 1/8". The direction of fan should be clockwise when viewing into the inlet of the blower. Replace access panels being careful not to over tighten the plastic bolts. Reconnect electrical supply and test the blower for air flow, vibration and noise.

MAINTENANCE
(continued)

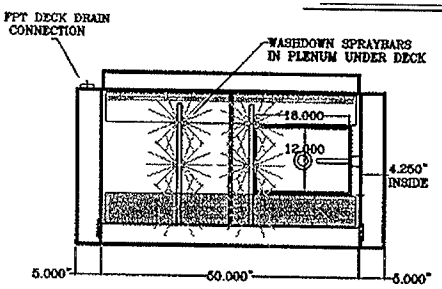
10. This hood is equipped with an optional manual plenum washdown system. There are two manifolds under the work deck, and two spray bars in the exhaust plenum. They should be inspected on a regular basis to insure that clogging does not occur and that they are operating properly. They are all connected with union connections for easy removal. To access the manifolds under the deck, remove the perforated deck panels.

MAIN MATERIAL OF CONSTRUCTION : WHITE S/R POLYPROPYLENE.

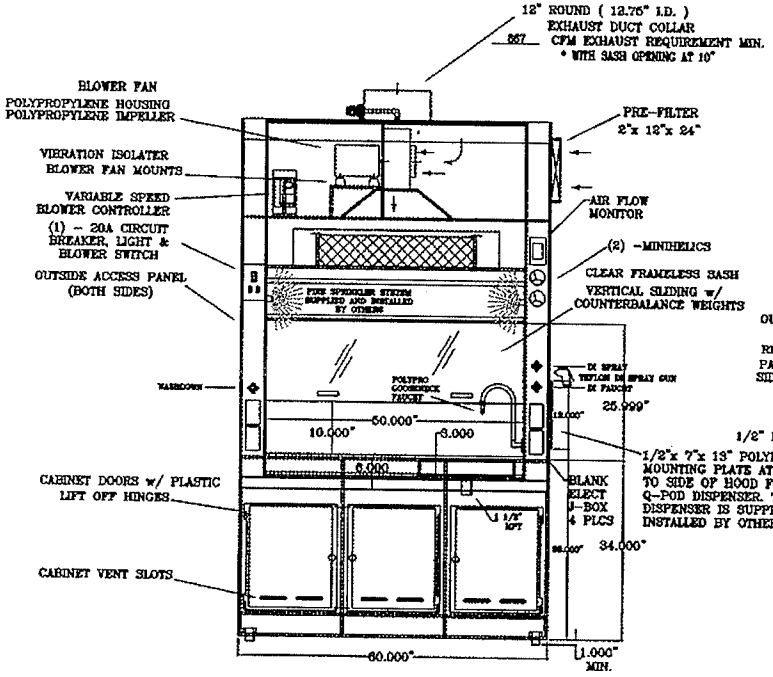
GENERAL ARRANGEMENT

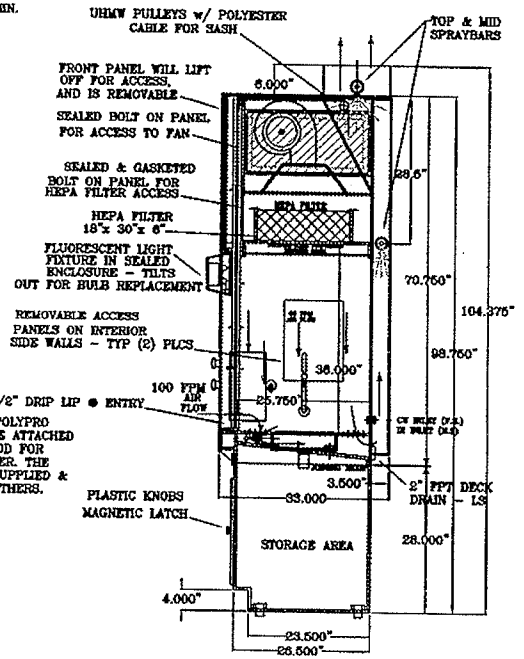


PLAN VIEW



DECK LAYOUT





PROJECT : UNIVERSITY OF VERMONT
HOOD # : VLF-FH-4
ELEVATION : WASH HOOD

EXHAUST CFM REQUIREMENTS - 867 CFM MIN
FACE VELOCITY (average) - 100 FPM
DOWNFLOW VELOCITY (average) - 60 FPM

ADD ON OPTIONS :
1 - 12" x 18" x 8" POLYPRO INTEGRAL SINK
1 - POLYPRO GOOSENECK FAUCET - PRE PLUMBED
1 - DI SERVICE w/ REMOTE POLYPRO MARQUEST VALVE - PREPLUMBED TO FAUCET
1 - TEL 1000 AIR FLOW MONITOR
1 - TEFLON DI SPRAY GUN w/ COILED HOSE.
1 - WASHDOWN SYSTEM w/ REMOTE VALVE(S).
1 - RELOCATE PREFILTER FROM TOP TO RIGHT SIDE.
1 - 20A CIRCUIT BREAKER.
1 - ADD MINIHELIC FOR SP IN EXHAUST SYSTEM.
- ALL PREPLUMBING TO USE POLYTUBE AND POLYPROPYLENE FITTINGS UNLESS NOTED.

SPECIAL INSTRUCTIONS :

QUANTITY : (1)

MODEL # : ID-CB-60-LFH

PROJECT : UNIVERSITY OF VERMONT

-DO NOT SCALE DRAWING -

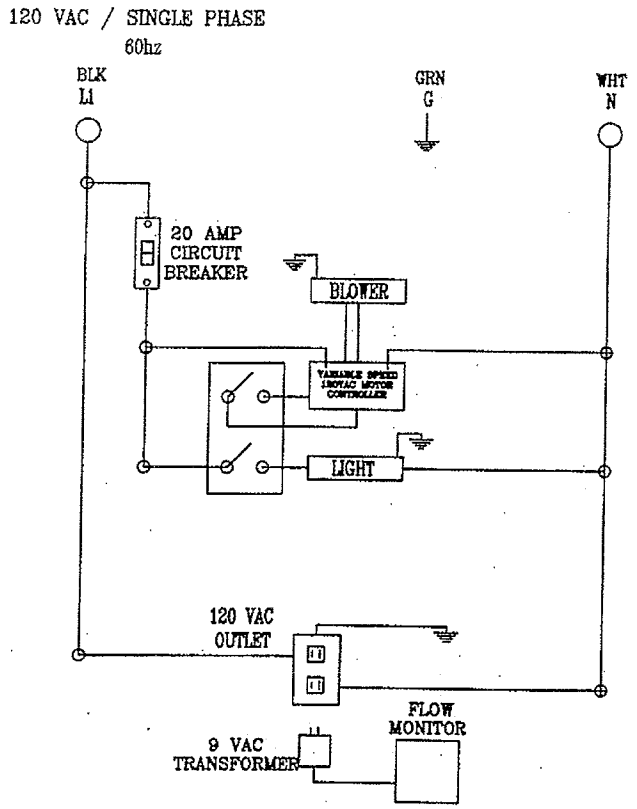
D	MISC REVISIONS AS PER CLIENT LIST	GJ	2-6-08
C	MISC REVISIONS AS PER CLIENT LIST	GJ	1-30-08
B	MISC REVISIONS AS PER CLIENT LIST	GJ	1-25-08
A	CHANGED MATERIAL OF CONSTRUCTION	GJ	1-16-08
	CHANGED PIPING MATERIAL FOR GAS SERVICE		

INLINE DESIGN CORP.
5658 E. 58th COMMERCE CITY . COLORADO

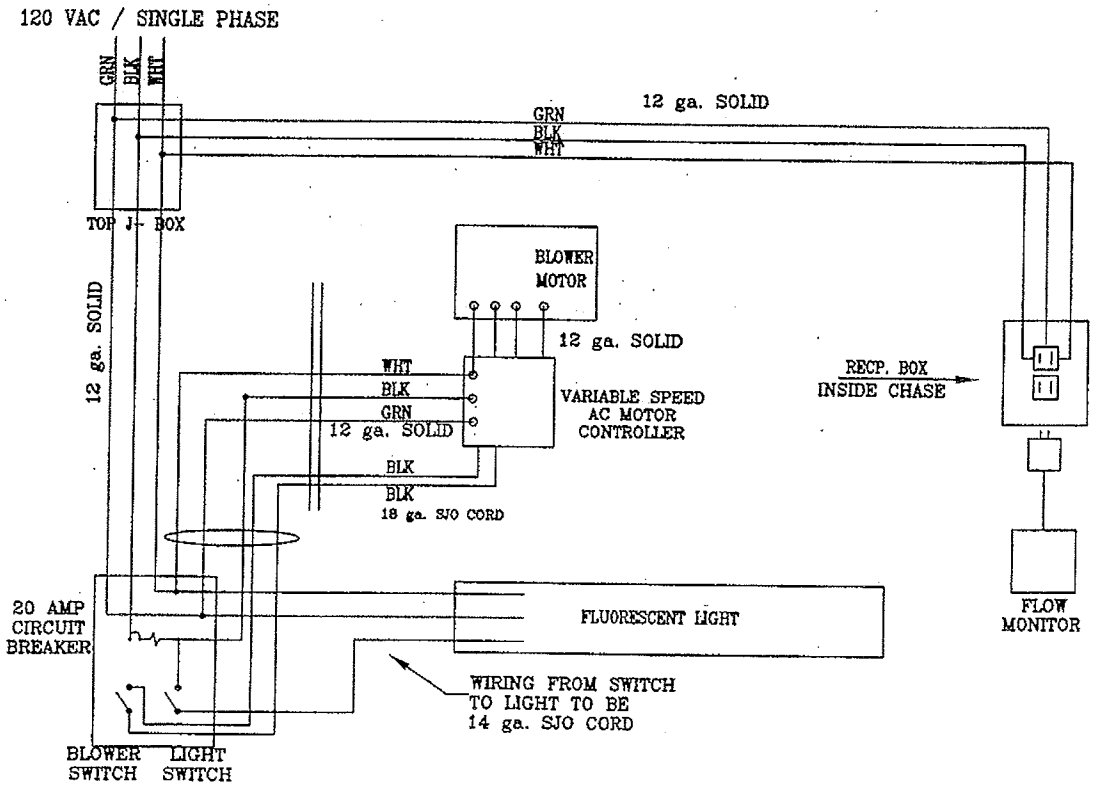
GIBSON ASSOCIATES

5' POLYPROPYLENE LAMINAR FLOW FUME HOOD

DRAWN BY	GJ	SCALE 1/12	DATE 11-17-07
APPD			DRAWING LC-379-01-FH4

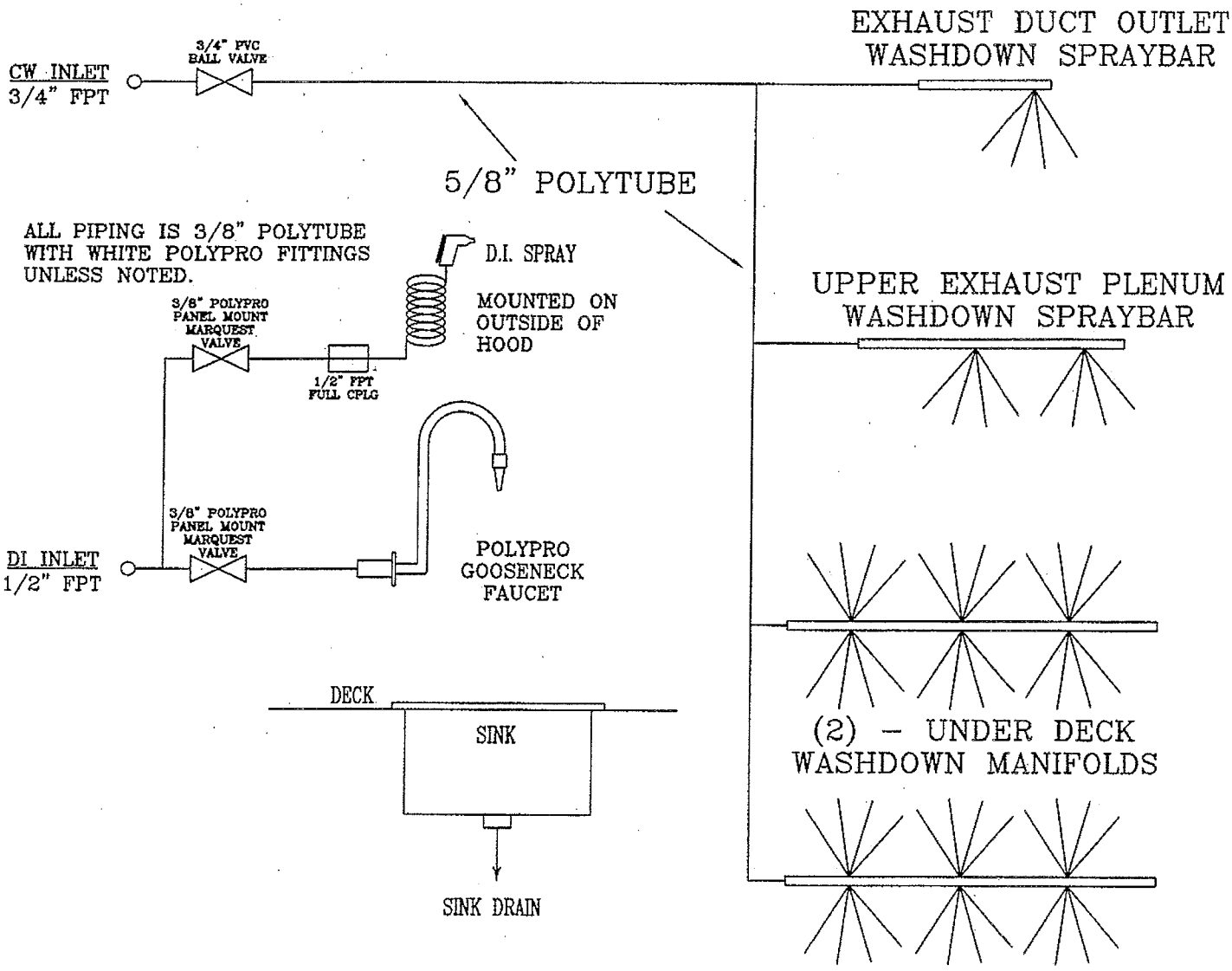


VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING DIAGRAM



VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING COLOR CODE

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT



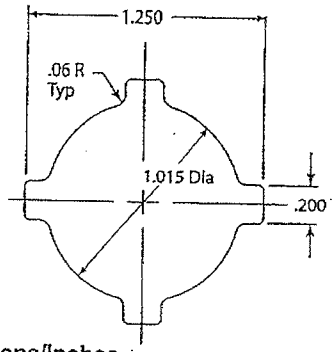
ELF - FH1, FH4 & FH5 - PIPING DIAGRAM

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT

Mounting Template

The template provided, outlines the hole and orientation slots for the panel or bracket, where required. The orientation slots may be cut in multiple positions to allow versatility in mounting the valve to accommodate the piping alignment requirements.

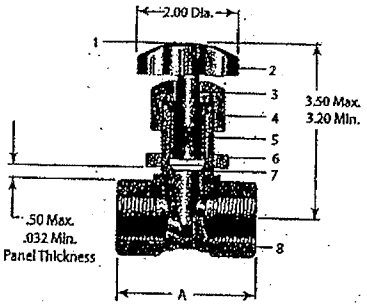
Panel thickness of .032" to .50" is the accepted range.



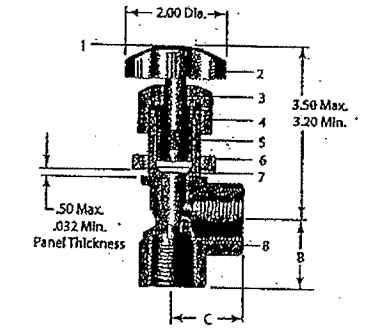
Dimensions/Inches

Size	A	B	C
1/4"	2.31	1.16	1.17
3/8"	2.39	1.19	1.21
1/2"	2.65	1.31	1.32

Globe Configuration



Angle Configuration



Parts List

Item	Description
1	Colored Ring Insert
2	Handle
3	Needle
4	Cap
5	Threaded Ring Insert
6	Panel Nut
7	PTFE Seal
8	Body

Special connections available on request.

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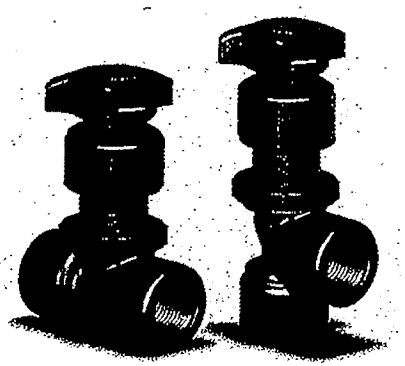
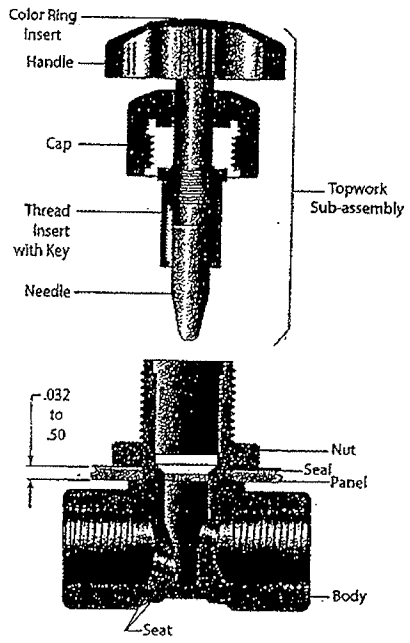


Throttle Master™ NEEDLE VALVES

Installation procedure and parts list



Please...read these instructions...

Marquest needle valves may be used in a wide range of services where the materials of construction are suitable in the chemical, thermal, and general environment limits of the installation.

Specific applications should be evaluated on the basis of pressure, temperature (see temperature chart and data sheet for particular materials) and the joining system.

MOUNTING VALVES

To relieve strain on the system and its components, the Marquest valve can be mounted on a panel or bracket in the following manner: After providing the proper hole to the "template dimensions," it is necessary to remove the top work subassembly and panel nut from the body. It is not required or recommended to disassemble the top work sub-assembly for this purpose. The body is then inserted into the hole, the panel nut secured, and the top work sub-assembly replaced.

CAUTION: Care should be taken to back off or position the needle sufficiently so that it will not engage the seat while tightening the "cap" on reassembly. *See position of "Threaded Insert with key" on adjacent drawing. Note space between threaded insert and cap.

CONNECTIONS

The 1/4", 3/8" and 1/2" ports are standard pipe threads (NPT) and may be adapted to tube fittings, socket adapters or

PTFE tape is recommended as a thread sealant. Pipe dope should not be used unless specifically recommended for plastic pipe by the manufacturer.

A firm, hand tight torque is normally sufficient for small plastic pipe threads; over tightening may deform threads and cause leaking.

STEM SEAL

The single seal in the Marquest Needle Valve is precision machined of virgin PTFE and is virtually immune to chemical attack and it will NOT contaminate sensitive media.

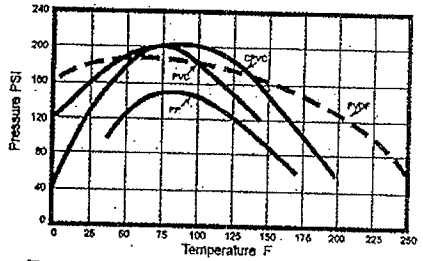
This stability, low friction, and high sealing effectiveness, provides an almost unlimited life potential in this component - the small wear can be taken up by simple tightening of the cap.

CHEMICAL RESISTANCE DATA

Chemical resistance data is not provided by MARQUEST due to the complex potential of combinations, concentrations, temperature and degree of safety factors required.

A specific inquiry to MARQUEST providing complete service data and service requirements will provide you with an opinion as to suitability.

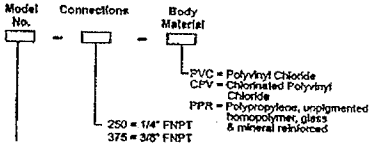
Pressure/Temperature Range Non-Shock

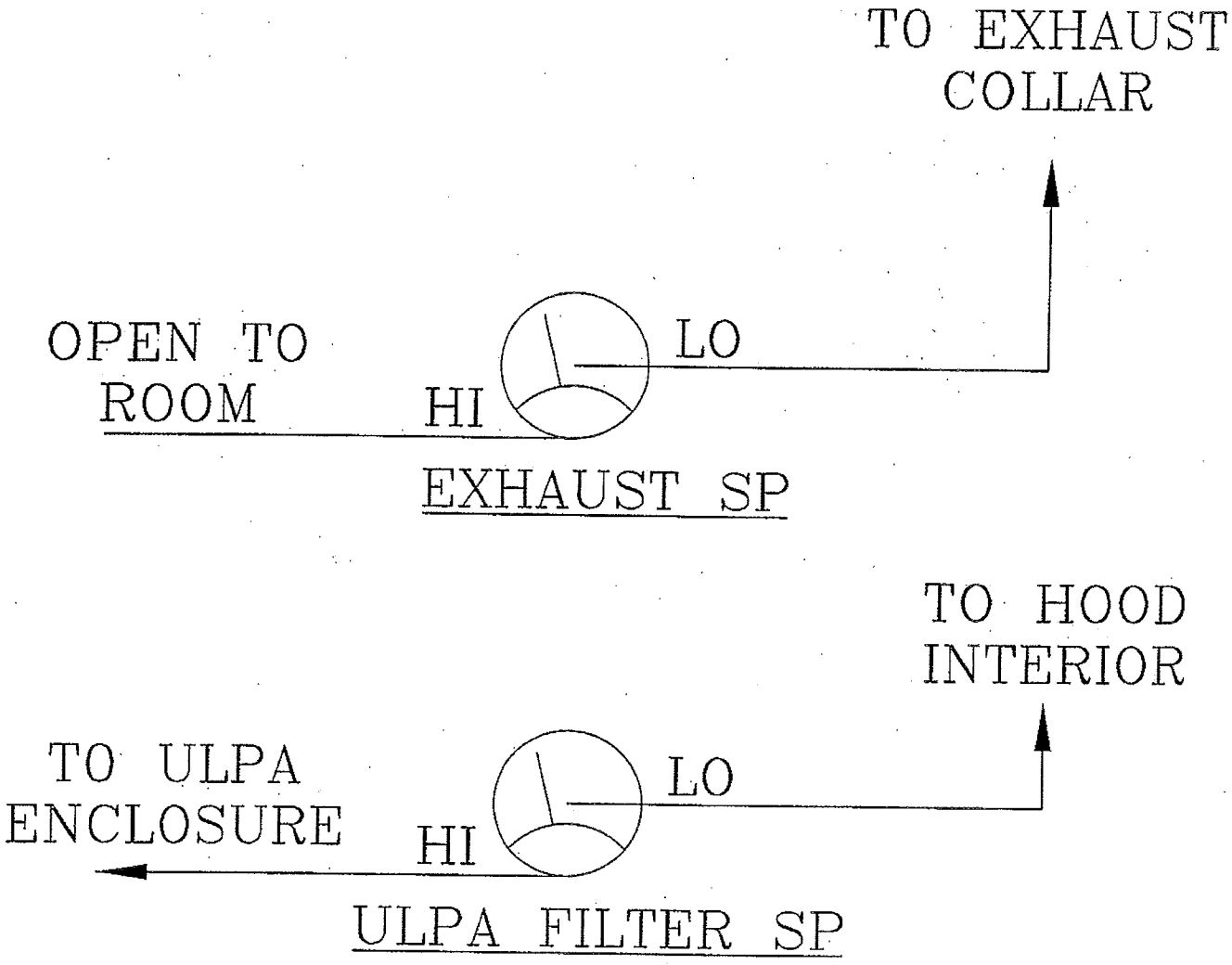


Flow Data

	1/4" & 3/8"		1/2"	
	Globe Pattern	Angle Pattern	Globe Pattern	Angel Patern
Orifices				
Inlet	0.187"	0.250"	0.218"	0.250"
Outlet	0.187"	0.187"	0.218	0.218"
C_V	0.310	0.426	0.620	0.780

How to Order





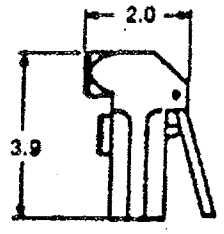
MINI HELICS

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT

DI SPRAY/RINSING GUNS
(Max. operating pressure 75 psi)

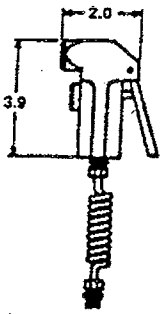
Part No.	Description
SG-103	Standard spray gun with 1/2" FNPT inlet thread.
SG-102	Spray gun with 3/8" FNPT inlet thread.
SG-101	Spray gun with 1/4" FNPT inlet thread.
SG-100	Spray Gun with 29/32"-16 inlet thread.*

* NOTE: This style gun has a shallow thread engagement zone, and is highly susceptible to thread stripping as opposed to the FNPT models, in the event overtightening occurs.

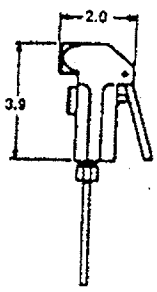


SG-100, SG-101, SG-102, SG-103

Assemblies Part No.	Gun	Hose	Intercon. Fitting	Source Fitting
SG-207	SG-103	504	MC-F-68-HA	MC-F-68-HA
SG-206	SG-103	502	J68	J68
SG-204	SG-103	101	J108	J108
SG-203	SG-103	101	J108	–
SG-202	SG-103	100	J88	J88
SG-201	SG-103	300	MC-F-88-HA	MC-F-88-HA
SG-200	SG-100	100	SW-10	–



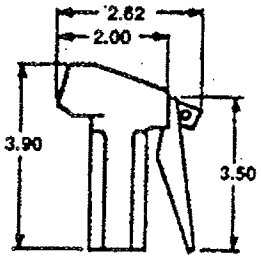
SG-206



SG-204

RECIRCULATING SPRAY GUNS
(Max. operating pressure 75 psi)

Part No.	Description
RC-103	Recirculating spray gun with 1/2" FNPT inlet thread (gun only).



RC-103

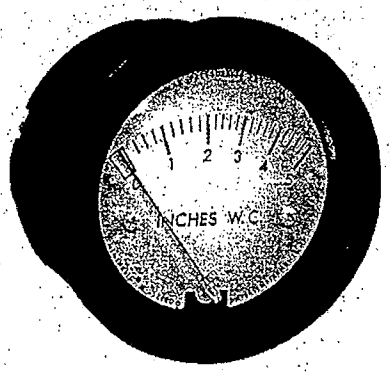
Assemblies Part No.	Gun	Hose Assy.
RC-104	RC-103	RC-1
RC-105	RC-103	RC-3
RC-106	RC-103	RC-5

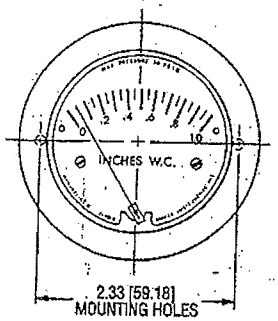
RC-104

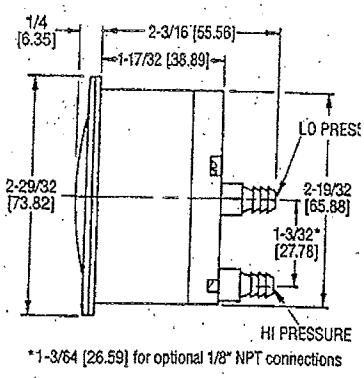
RC-106

Series 2-5000 Minihelic II® Differential Pressure Gage

Specifications: Installation & Operating Instructions







Dimensions, Series 2-5000 Minihelic II® Gage.

Series 2-5000 Minihelic II® Differential Pressure Gages have clean design, small size, low cost and sufficient accuracy for all but the most demanding applications. With housing molded from mineral- and glass-filled nylon and a lens molded from polycarbonate, this gage will withstand rough use and exposure, as well as high total pressure up to 30 psig [2.067 bar]. Over-pressure is accommodated by a blow-out membrane molded in conjunction with the diaphragm.

INSTALLATION

1. Select a location free from excessive vibration and where ambient temperature will be between 20°F to 120°F (-6.7°C to 49°C). Sensing lines may be any length necessary without affecting accuracy. However, long runs of tubing will dampen readings slightly and cause a minor increase in response time. If pulsing pressure or vibration cause excessive pointer oscillation, please contact factory for ways to provide additional damping.

2. This gage is calibrated and zeroed in the vertical position at the factory. If the gage is used in any other position, it must be re-zeroed each time the position is changed. Gages with ranges under 5 inches w.c.(1.24 kPa), or the equivalent, should be used only in the vertical position unless special calibration was specified when ordering.

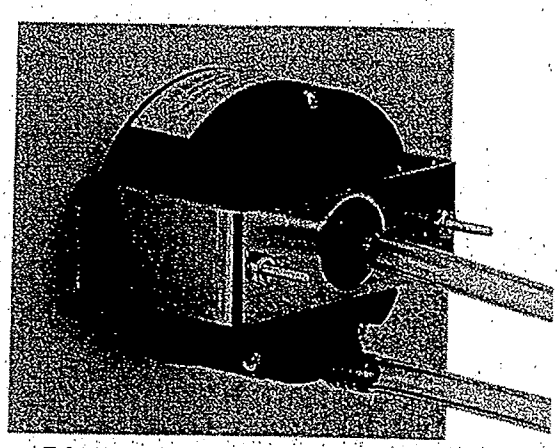
PHYSICAL DATA

Dimensions: 2-29/32" (73.82 mm) 2- 7/16" (61.93 mm).
Weight: 6 oz. [170 gr].
Rated Total Pressure: 50 psig (3.445 ba surge; 30 psig (2.067 bar) continuous t either pressure connection.
Ambient Temperature Range: 20°F t 120°F (- 6.7°C to 49°C).
Accuracy: ± 5% of full scale at 70°F (21.1°C).
Connections: standard, barbed for 3/16 I.D. tubing; optional,1/8" NPT(M).
Housing: glass-filled nylon, polycarbonat lens.
Finish: black.
Standard Accessories: (2) 4-40 x 1-5/8 mounting studs, (2) 4-40 hex nuts (1) .050" hex allen wrench, (1) pane mounting bracket.

CAUTION:

Use only with air or compatible non-corrosive gases.

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, IN 46361 U.S.A.
Phone: 219/879-8000 www.dwyer-inst.c
Fax: 219/872-9057
e-mail: info@dwyer-inst.com
Lit-By-Fax: 888/891-4963



PANEL MOUNTED INSTALLATION

3. To surface-mount the gage, drill two 5/32" [3.97 mm] holes on a horizontal line, 2-1/3" [59.26 mm] apart for mounting screws. Next, drill two 7/16" [11.11 mm] holes 1-1/32" [26.19 mm] apart on a vertical line for pressure connections. Install mounting studs in back of the gage, insert through holes in the panel, and secure with hex nuts provided. Be careful not to block the slotted hole near the right-hand mounting hole. This provides a path for pressure relief in the event of over-pressurization.

4. To panel-mount gage, cut a 2-5/8" diameter hole. Install the mounting studs in the back of gage, position gage in the panel, and place bracket over the studs. Thread hex nuts over studs and tighten.

5. After installation, the gage may need to be zeroed before placing in operation. If re-zeroing is required, firmly hold the case of gage with one hand and unscrew the front cover with the palm of the other hand in a counterclockwise direction. If difficult to loosen, place a small sheet of rubber between the cover and the palm of the hand. Zero-adjust screw is located behind the scale at the pair marked "zero." Use the hex allen wrench supplied and adjust until pointer is on zero. This must be done with both pressure connections vented to atmosphere and the gage oriented in the final mounting position. Replace cover.

6. To measure positive pressure, connect tubing to port marked "HI" and vent "LO" port to atmosphere. For negative pressure (vacuum), connect to port marked "LO" and vent "HI" port to atmosphere. For differential pressure, connect higher pressure to port marked "HI" and lower to "LO" port. If gage is supplied with 1/8" NPT connections, be careful not to over-tighten fittings to avoid damage to the gage.

CALIBRATION CHECK

Select a second gage or manometer of known accuracy and in an appropriate range. Use short lengths of rubber or vinyl tubing to connect the high-pressure side of the Minihelic gage and the test gage to two legs of a tee. Very slowly, apply pressure through the third leg. Allow enough time for pressure to equalize throughout the system and for fluid to drain. If a manometer is being used. Compare readings. If the gage being tested exceeds rated accuracy, it should be returned to the factory for recalibration.

MAINTENANCE

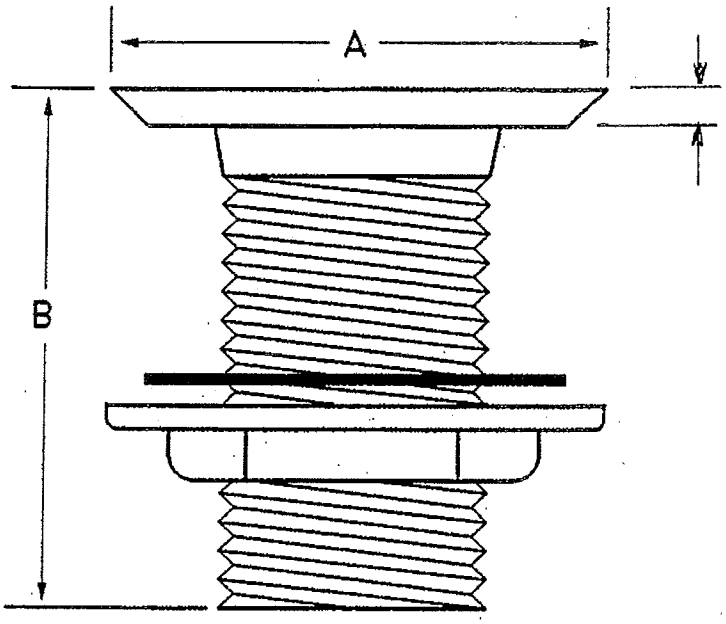
No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally, disconnect pressure lines to vent both sides of the gage to atmosphere and re-zero per paragraph 5.

 Printed in U.S.A. 4/01 FR# 14-440434-00 Rev. 1

DWYER INSTRUMENTS, INC
P.O. BOX 373 • MICHIGAN CITY, IN 46361 U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057
e-mail: info@dwyer-inst.com
Lit-By Fax: 888/891-4963

SCIENTIFIC PLASTICS COMPANY, Inc.

TAILPIECE



SINK TAILPIECE ASSEMBLY

Here is a sturdy tailpiece which has an integral recessed strainer for clog-free drainage flow and easy cleaning. 1-1/2" NPSL thread, choice of of color in large size. Plug, backnut and gasket.

SYMBOL	SIZE	A	B	COLOR
W38920-151	1-1/2" NPSL	2-7/8"	1-3/4"	WHITE
W38920-152	1-1/2" NPSL	3-3/8"	1-3/4"	WHITE
W31551-152	1-1/2" NPSL	3-3/8"	3-3/4"	WHITE
→ W38953-152	1-1/2" NPSL	3-3/8"	3-3/4"	BLACK
W38953-200	2" NPSL	3-3/8"	3-3/4"	BLACK

8-95

P.O. Box 642 • Waukesha, Wisconsin USA 53187-0642 • Phone 414-548-1120 • Fax 414-548-1134

AIR TEST REPORTS

ASHRAE 110-1995 Fume Hood Performance Test Report

Technical Safety Services, Inc.
1(800)877-7742 www.techsafety.com

1) General Test Information

Client	TFI Inline	FH ID	331	Test #	auto
Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

2) Criteria (applied to design-height readings)

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

3) Airflow Visualization Tests (Small Volume = TiCl4, Large' = PEG)

Result = Pass

Small-Volume Resul	Pass	Comment	N/A
Large-Volume Resul	Pass	Comment	N/A

4) Face Velocity Tests

Result = Pass

Design Sash Velocity Profile, fpm					50% Design Sash VP (VAV Only), fpm				25% Design Sash VP (VAV Only), fpm			
102	100	106	107	105								
101	106	104	102	110								
Ht. 10in	Avg. 104		Min. 100		Ht. 5in	Avg.		Min.	Ht. 3in	Avg.		Min.
Wd. 50in	RSD. 3%		Max. 110		Wd. 50in	RSD.		Max.	Wd. 50in	RSD.		Max.

5) Cross-current Velocity Tests (60" high, ~12" spacing,18" in front of FH with sashes closed)

Result = FIO

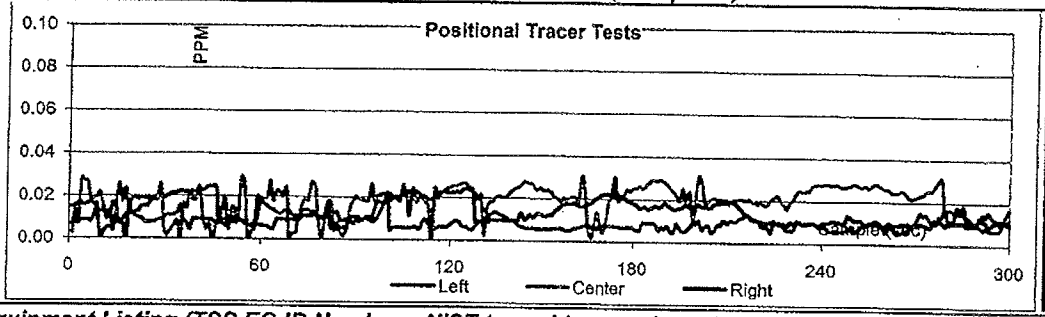
	20 second averages, fpm								Max	Avg.
Vertical	4	2	6	2	8				8	4
Horizontal	11	4	4	7	6				11	6

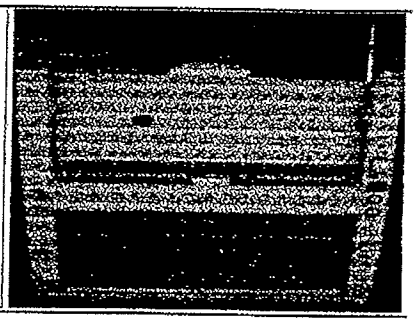
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

Rating: 4.0 AI 0.02 SME 0.03 Pass

Position	Left	Center	Right
Rating	0.01 ppm	0.02 ppm	0.01 ppm
Sash Effect	Trial #1 0.03 ppm	Trial #2 0.03 ppm	Trial #3 0.01 ppm
Perimeter-scan	0.01 ppm		
Comments	None		

7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)





8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)

Flowmeter	1400	Ane	1372	Ane	NA	DMM	1461	IR	402	Factor	16.5

9) Comments: *This FH passes the test criteria.*

10) Tested by: *Mike Tester* **Date:** *3/27/2008*

11) Reviewed by: *Martin Burke* **Date:** *3/31/2008*

Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT832911155
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 331

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 8.33 ft^2; 0.77 m^2

	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
Loc.	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0		0	0	0		0	30.40	14.00
2.)	0	0		0	0	0		0	30.00	14.60
3.)	0	0		0	0	0		0	29.80	14.60

Mean of Averages:	0	Mean of Averages:	0
Standard Deviation:	0	Standard Deviation:	0
Standard Error:	0	Standard Error:	0
95% UCL Factor:	2.9	95% UCL Factor:	2.9
95% UCL Result:	0	95% UCL Result:	0
Class Limit, PPCF:	100	Class Limit, PPCF:	0.7
Convert to PPCM:	0	Convert to PPCM:	0
Class Limit, PPCM:	3,520	Class Limit, PPCM:	29
Class Limit Test:	**Pass**	**Class Limit Test:**	**FIO**
Sample Volume Test:	**Pass**	**Sample Volume Test:**	**FIO**
Class Limit Location:	**Pass**	**Class Limit Location:**	**FIO**

Avg. %rH	Avg. Temp.
30.1	14.4

Testing is performed in accordance with ISO 14644-2:2000:

Pass

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar 08
eData Ver.: 1.3.0.3 29 mar 08

TSS
Technical Safety Services, Inc.

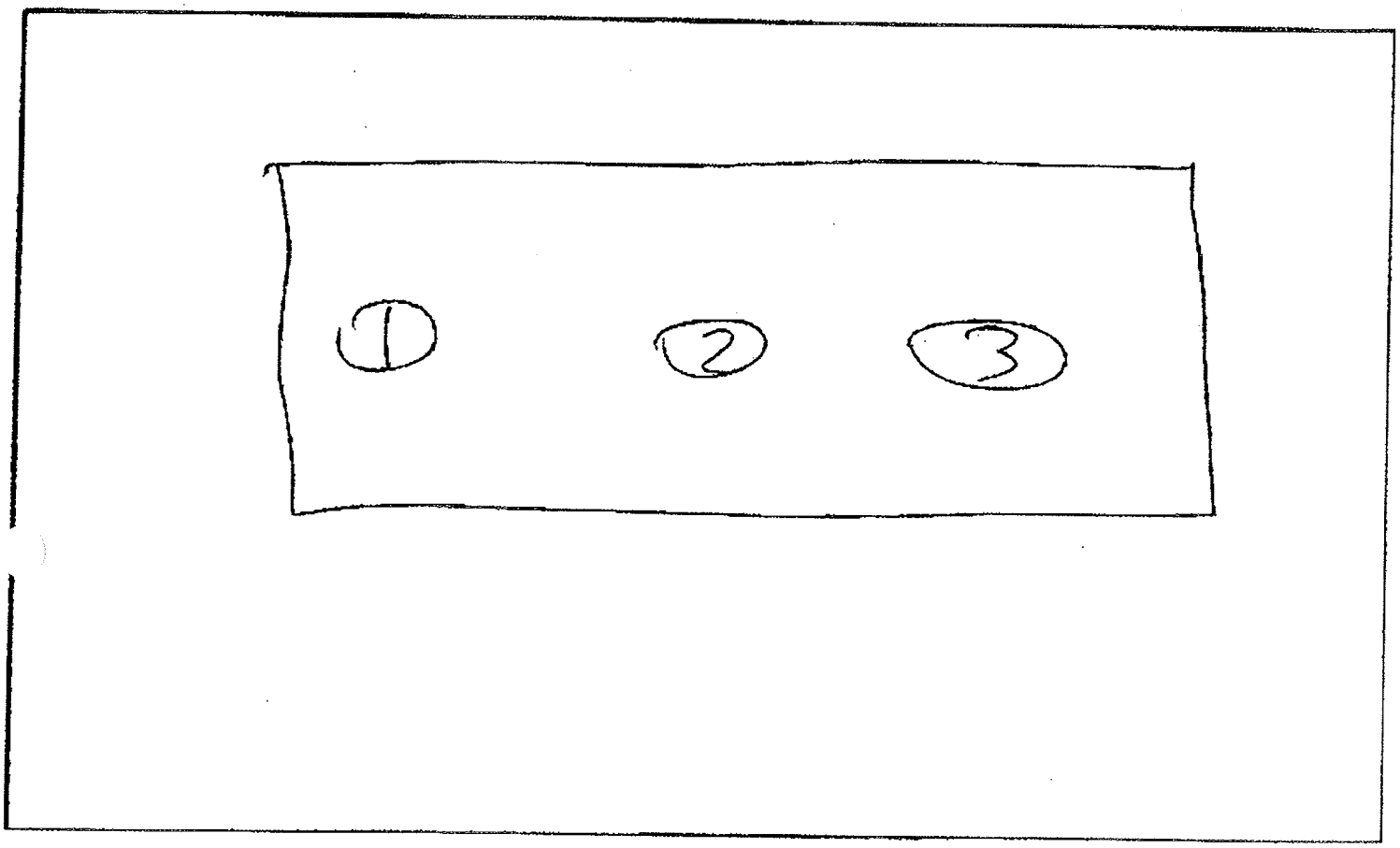
Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT832911155
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 331

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 8.33 ft^2; 0.77 m^2

Diagram:



Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar-08
eData Ver.: 1.3.0.3

Camfil Farr Inc.
One North Corporate Drive – Riverdale, N.J. 07457 U.SA.
Phone: (973) 616 – 7300
Fax: (973) 616 - 7771

CERTIFICATE OF COMPLIANCE

This certificate of compliance, for the article(s) delivered, has been manufactured, inspected and found to be in compliance with specifications, drawings, approved samples and/or other requirements stated in your purchase order.

The filter meets the given efficiency and pressure drop and it is conformance with **IEST-RP-CC034.2** for scanning leak thresholds specification.

A PSL challenge was utilized during testing and a record of testing is affixed to frame of filter ("Scanned" label)

Camfil Farr Part Number:	***855160997***
Camfil Farr Sales Order Number:	***817190***
Camfil Farr Serial Number:	***B544679-008***
Customer Name:	***Air Filter Solutions, Inc.***
Customer Purchase Order Number:	***2555***
Efficiency:	***99.99995% @ MPPS***
Resistance @ rated flow (in. w.g.):	***0.48 inches***
Date of Certification:	***March 24, 2008***

H. Esen

Halime Esen
Quality Assurance Department

TFI Inline Design Inc.

FUME HOOD FINALIZATION *and* INSPECTION LIST

JOB NAME: University of Vermont Job#: 9498 Date: 04/03/2008 Hood S/N#: 331 .
Hood Size/Style: 5' ELF-m Std Polypropylene Power: 120vac Amps: 30 .

- [X]
- [X] Test light(s)
- [X] Test electrical outlets
- [X] Check rotation of blower wheel
- [X] Test water valves and plumbing for leaks
- [X] Check continuity with tester
- [X] Test washdown drain for leaks (if applicable)
- [X] Test sump for leaks (laminar flow only)
- [X] Test sink(s) for leaks
- [Y] [ ] Test air flow by qualified inspector?
- [X] Check that air flow monitor plug is in (when applicable)

- [X] Vacuum access panel and deck area
- [X] Clean hood with glass cleaner (inside & out)
- [X] Clean backside of front removable panel

- [X] Label access panels at top w/magic marker (left/right)
- [X] Label HEPA & blower access panels with stickers
- [X] Put labels on valves, outlets, light/fan switches, etc...
- [X] Label top elec. boxes 120 or 240 with magic marker
- [X] Put final packaging labels on front removable panel:
  1. "Remove packaging around weight & check pulley string before use"
  2. "Replace s/s shipping bolts with plastic bolts"

- [X] Replace plastic screws with steel (CT - 4 on sash track, 4-6 on baffles)
  (LAM - 4 on sash track only)
- [X] Plastic screws for access panels (8)
- [X] Wire tie turn buckles
- [X] Support sash for shippint with 1-1/2 x 3-1/2" Plate
- [X] Block in weight with 2 x 2 x 15" = 1 each (more if needed)
- [X] Put access panels/manuels behind weight for shipment (when possible)
- [X] Support CT Weight with 2x4's

TFI Inline Design Inc.

- [X] Package hood/cabinet front trim peace & joint plates - (Laminar)
- [X] Package cup sink and hardware
- [0] Package top shroud enclosure (if used)
- [X] Package all hardware - (plastic & s/s bolts, knobs, etc.)
- [0] Package loose tubing or piping on top back light area for shipment - (CT
- [X] Manuel Booklet - put in box on top of hood or in right access panel area

* May be required to put box in another location depending upon hood requirements

---

- [X] Packaging/Finalization Inspection Completed - Initials: RS_____ .

Manufacturers Product Warranty Polypropylene Hoods and Casewor

Unless otherwise specified in contract documents, TFI/Inline Design Corporation's products are backed by the following warranty. For the benefit of the original user, TFI/Inline Design Corp. warrants for the perio of Twenty Four months after date of delivery, that all products shall be fre from defects in material and workmanship. For any product found to be defective, TFI/ Inline Design Corp. will repair or replace it, or refund to th purchaser its purchase price, whichever remedy TFI/Inline Design Corp. shall select in its sole discretion. All products not manufactured by TFI/Inline Design Corp., but used in its products carry the original manufacturer's warranty copies of which are available upon request.

THE WARRANTY CONTAINED IN THE PRECEEDING PARAGRAPI IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE ABOVE PARAGRAPH AND TFI/INLINE DESIGN CORP. HEREBY DISCLAIMS ANY AND ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOS THE PURCHASER EXPRESSLY AGREES THAT TFI/INLINE DESIGI CORP. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES IN ANY CLAIM, SUIT OR PROCEEDINS, INCLUDING BUT NOT LIMITED TO CLAIMS FOR OTHER LABOR OR REPAIRS, LOSS OF PROFITS, OR OTHER EXPENSES INCIDENTAL TO REPLACEMENT OF PRODUCTS.

TFI/Inline Design Corp., shall have no responsibility under this warranty f damages caused during shipping, by improper use or installation of the product, by the purchaser's attempts to use the product beyond its capacity or for products modified, or repaired by any person or entity other than TFI/Inline Design Corp., (unless such repair was authorized in writing by TFI Inline Design Corp.), or for products which have been subjected to misuse, abuse, neglect, vandalism, or accident.

ASHRAE 110-1995 Fume Hood Performance Test Report

Technical Safety Services, Inc.
1(800)877-7742 www.techsafety.com

1) General Test Information

Client	TFI Inline	FH ID	332	Test #	auto
Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

2) Criteria (applied to design-height readings)

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

3) Airflow Visualization Tests (Small Volume = TiCl4, Large' = PEG)

Result = Pass

Small-Volume Result	Pass	Comment	N/A
Large-Volume Result	Pass	Comment	N/A

4) Face Velocity Tests

Result = Pass

Design Sash Velocity Profile, fpm								50% Design Sash VP (VAV Only), fpm								25% Design Sash VP (VAV Only), fpm							
103	106	104	103	107	105																		
110	111	107	109	105	112																		
Ht.	10in	Avg.	107		Min.	103		Ht.	5in	Avg.		Min.				Ht.	3in	Avg.		Min.			
Wd.	62in	RSD.	3%		Max.	112		Wd.	62in	RSD.		Max.				Wd.	62in	RSD.		Max.			

5) Cross-current Velocity Tests (60" high, ~12" spacing,18" in front of FH with sashes closed)

Result = FIO

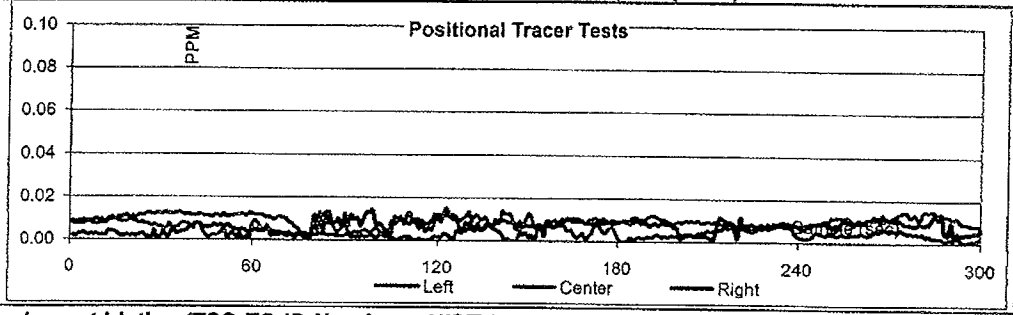
	20 second averages, fpm								Max	Avg.
Vertical	6	5	8	8	5	3			8	6
Horizontal	7	10	4	3	6	9			10	7

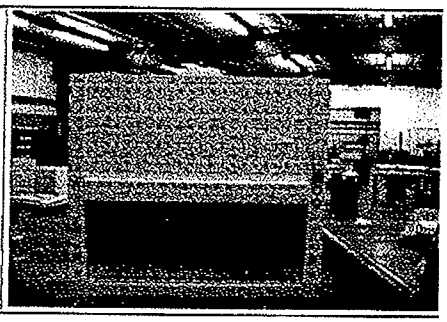
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

Rating: 4.0 AI 0.01 SME 0.01 Pass

Position	Left	Center	Right
Rating	0.01 ppm	0.01 ppm	0.01 ppm
Sash Effect	Trial #1 0.01 ppm	Trial #2 0.01 ppm	Trial #3 0.00 ppm
Perimeter-scan	0.03 ppm		
Comments			

7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)





8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)

Flowmeter	1400	Ane	1372	Ane	NA	DMM	1461	IR	402	Factor	15.3

9) Comments: *This FH passes the test criteria.*

10) Tested by: Mike Tester

Date: 3/27/2008

X3

Reviewed by: Martin Burke

Date: 3/31/2008

TSS Instrument Safety Services, Inc.

Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 332

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
Loc.	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0		0	0	0		0	25.40	19.70
2.)	0	0		0	0	0		0	25.80	19.30
3.)	0	0		0	0	0		0	26.00	19.70

Mean of Averages:	0	Mean of Averages:	0	Avg. %rH	Avg. Temp.
Standard Deviation:	0	Standard Deviation:	0	25.7	19.6
Standard Error:	0	Standard Error:	0		
95% UCL Factor:	2.9	95% UCL Factor:	2.9		
95% UCL Result:	0	95% UCL Result:	0		
Class Limit, PPCF:	100	Class Limit, PPCF:	0.7		
Convert to PPCM:	0	Convert to PPCM:	0		
Class Limit, PPCM:	3,520	Class Limit, PPCM:	29		
Class Limit Test:	**Pass**	**Class Limit Test:**	**FIO**		
Sample Volume Test:	**Pass**	**Sample Volume Test:**	**FIO**		
Class Limit Location:	**Pass**	**Class Limit Location:**	**FIO**		

Testing is performed in accordance with ISO 14644-2:2000:

Pass

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar 08
eData Ver.: 1.3.0.3

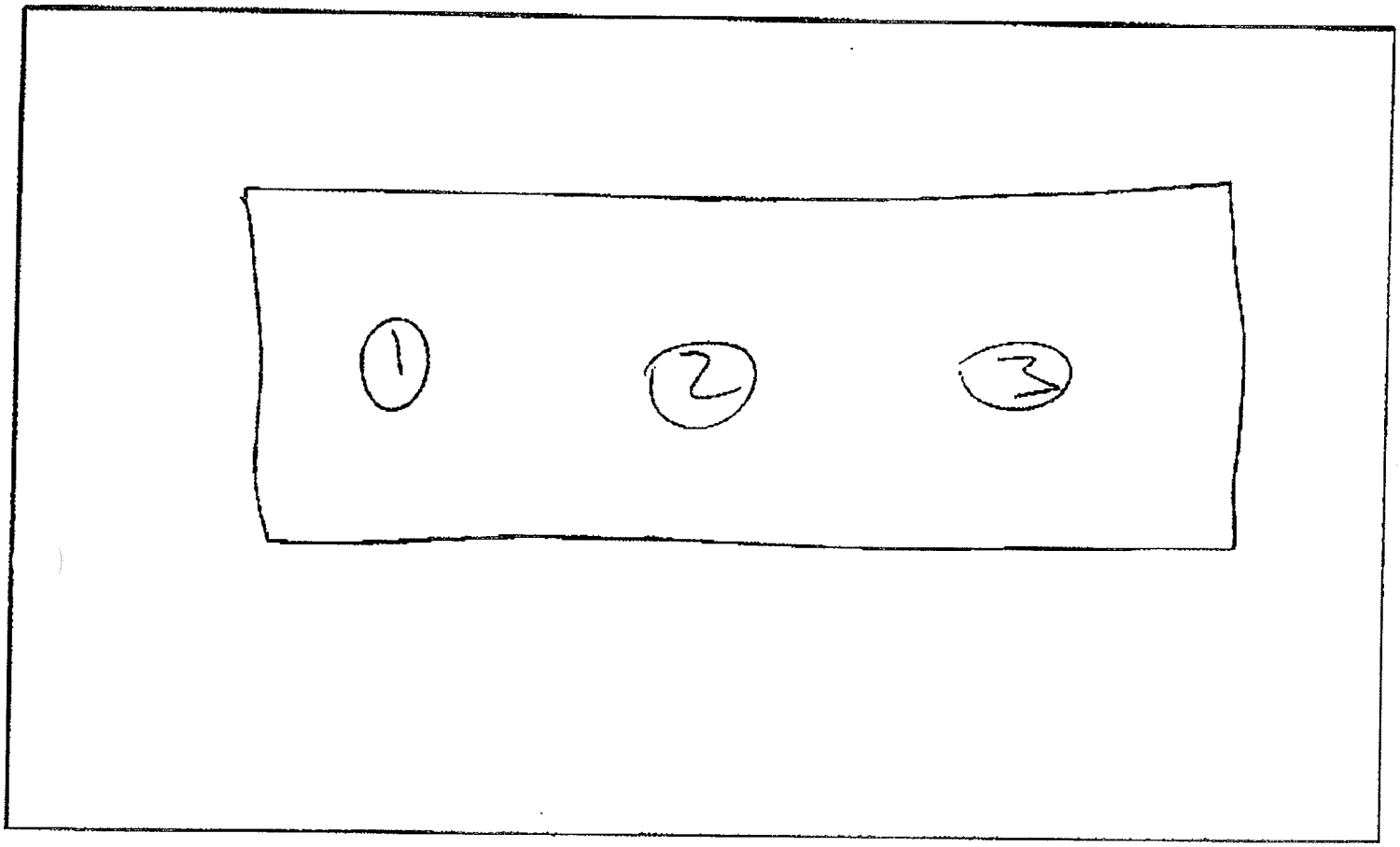
Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 332

Test Specification: ISO 14644
Locations: 3
Sample Vol.: 1.0 ft^3/28.3 L
Area Status: At Rest/Static
Class: ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

Diagram:



ate: 03/29/2008
etest Date: 03/29/2009
ast TSS Test Date:

Signature:
Test By: Mike Tester

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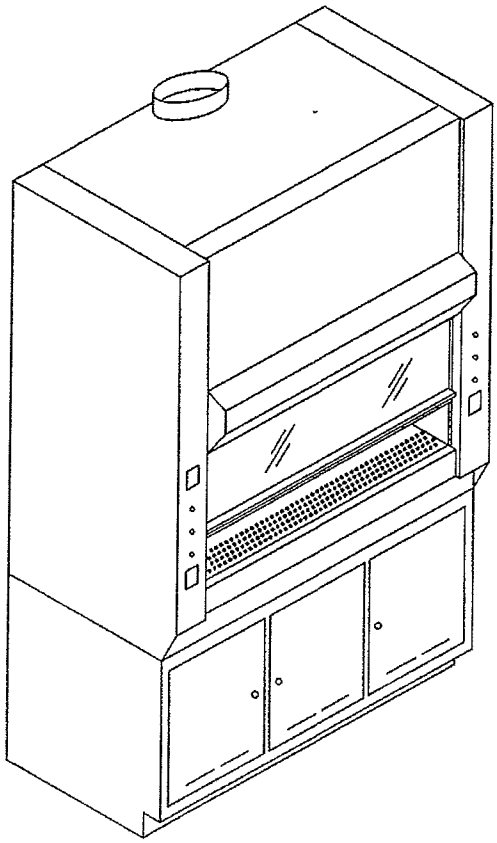
eData Ver.: 1.3.0.3

OPERATION AND MAINTENANCE MANUAL

PLASTIC LAMINAR FLOW FUME HOOD

PART # - ID-CB-72-LFH
SERIAL # - ID-335
JOB # - 9498
CUSTOMER - GIBSON
PROJECT - UNIVERSITY OF VERMONT



INLINE DESIGN CORP.

MANUFACTURED BY INLINE DESIGN
5658 E. 58TH
COMMERCE CITY, COLORADO 80022

* A PRODUCT OF TFI / INLINE DESIGN

PLASTIC LAMINAR FLOW FUME HOOD

manufactured by

TFI / INLINE DESIGN

TABLE OF CONTENTS

STANDARD FEATURES

- Solid thermoplastic construction, with base cabinet for storage. The standard material for construction is white s/r polypropylene, however other materials such as PVC, FR polypropylene, PVDF and Halar are available.
- Metal components (such as lights, motor, and counterbalance weights) are completely encapsulated with plastic or encased in gasket tight enclosures.
- The sash is clear plastic with a vertical counterbalance system.
- The front panel is designed to lift off for access to the filters , blower and pulley system. Filters and blower are located behind gasket tight panels.
- (4) - PVC junction boxes are installed on the front of the hood for electrical receptacles.
- Access panels are installed on both and interior and exterior walls.
- The work surface is integrally welded to the interior walls. A sloped sump under the deck will contain any spills and rout them to the drain. The deck perforations also serve as a fume exhaust path, and should never be blocked off . A ½" high drip lip across the front prevents spills from escaping from the work area.
- A dual bulb fluorescent light fixture is located in a sealed chamber with a gasket tight lid. The sealed light panel is clear plastic. The enclosure will tilt down for easy access to change light bulbs.
- (2) minihelic pressure gauges to determine the static pressure drop across the ULPA filters, and SP of the exhaust system.
- On/off switches for the lights and blower, pre-wired to a junction box located on the top back of the hood.
- Main 16a breaker switch mounted in the control panel.
- A variable speed blower controller (located behind the front panel in the upper left corner), controls the airflow thru the hepa filters.
- Refer to general arrangement drawings for additional details and fixture locations.

OPTIONAL FEATURES

- Air flow monitoring system
- 120VAC OR 240 VAC receptacles and/or switches
- Electrical hook up of options (complies to NEC code. Some state and local codes may vary).
- Gas, vacuum, or water fixtures.
- Mounting and supply lines to fixtures
- Cup sinks or utility sinks.

INSTALLATION

1. Choose a location for the hood that will not be subject to constant foot traffic or heavy air currents.
2. Place the hood on a flat level surface.
3. Attach an exhaust duct with adequate CFM requirements to the exhaust outlet. If corrosive chemicals are to be used in the hood, a fume scrubber in the exhaust system is recommended.
4. Have a licensed electrician and plumber hook up all required receptacles and fixtures.
5. After the exhaust system is operating, and the internal blower is on, have a ventilation technician adjust and balance the air flow through the hood to the required specifications.
6. Remove the packing around the counterweight (reattach weight if required) and check the sash cables to insure they are routed correctly and operating smoothly. The sash should glide up and down through the track with fingertip ease.
7. A clearance of 24"min. on the right side the hood is required for access to the pre-filter(s).
8. Remove the packing from the light fixture enclosure. See Maintenance section for removal details.
9. The hood and base cabinet are shipped in two separate sections and will require assembly at the time of installation. The hood section will need to be raised above and be positioned on top of the base cabinet. The hood section is fairly heavy (400 to 650 lbs. Depending on length) and should only be lifted by the base. A sissorlift or hoist is recommended for this procedure. Set the base cabinet in it's final location, and level it by adjusting the leveling legs. It is important to make these adjustments before adding the extra weight of the hood section. The cabinet can then be moved for assembly (if needed) and then slid back into location.

INSTALLATION

(continued)

To set the hood, place spacer bars on top of the base cabinet from front to back (2 x 4's work well) in (2) places aprox. 6" in from each end. Position the hood on top of the spacers. Lift one end of the hood and remove the spacers on that side. and gently lower the hood in place. The guides on the base cabinet will position the hood. Use the same procedure on the other side. Once the hood is set, secure it to the base cabinet by bolting on the attachment plate(s) provided. This is done from inside the cabinet on the mid panel(s). Then, bolt on the front trim panel over the front seam. Protective masking is generally left on the surfaces to prevent scratches during manufacturing and shipping. Peel off all masking as a last step before positioning hood in it's final location.

10. The overall width of the hood is 35 5/8", and is designed to go through a 36" X 80" opening (unassembled). If necessary, the light fixture assembly can be tilted down to make the overall width 34". To accomplish this, do the following steps:
    - Remove the top front panel by lifting off, using the hand holes on top.
    - Remove the bolted on sash stop(s) located on top of the sash track.
    - Remove the bolted on handles on the sash.
    - Lift sash to it's highest position.
    - Remove the top (2) 5/16" bolts that secure the light bracket and swing the light outward and down.

    Repeat steps in reverse order to reassemble. Be careful not to over tighten plastic bolts as they can break. A snug fit is generally sufficient.

INSTALLATION
(continued)

11. If the hood is equipped with the optional air flow monitor, field calibration will be required. Details of this procedure are listed in the manufactures' installation and maintenance instructions. The model used is "TEL" model 1000 fume hood monitor.

12. For reasons due to shipping and handling, stainless steel screws have been used to secure the sash track and plenum baffles. After the hood is in place, these can be replaced with the included polypropylene screws. To avoid breakage, Take care not to over tighten the screws.

OPERATION

1. Insure that the exhaust system is operating at all times when the hood is in use.
2. Do not block off exhaust slots or in deck with equipment or containers.
3. Keep the sash opening at 10" during chemical operations. This will insure optimum exhaust performance.
4. Keep hot plates and heating elements from direct contact with work surface, side walls and clear sash panel. Damage could occur if surfaces get too hot. Insulation and air flow under and around elements are recommended.
5. The use of an air flow monitor to insure proper air flow is desirable. If not, check air flow on a regular basis. 100 fpm face velocity is considered standard for most fume hood operations, however some procedures may vary.
6. The fume hood is not designed to protect personnel from explosions or violent chemical reactions. Take appropriate safety precautions when doing procedures that are associated with these risks.
7. Do not use Perchloric acid in a hood that is not designed for Perchloric acid use only . Only trained personnel that are experienced in the use and system maintenance of Perchloric acid operations should be considered for these procedures. A risk of explosion exists in an improperly maintained system.

MAINTENANCE

1. Insure that a consistent air flow is maintained through the hood. A surface mounted monitor or a hand held meter will accomplish this. If airflow drop is noticed, troubleshoot the entire exhaust system to determine the cause.
2. A routine schedule of cleaning of the hood interior and exterior is suggested to keep the hood in top shape and appearance. The use of abrasive cleaners should be avoided, to prevent scratches from forming. Do not use acetone on polycarbonate sash or light panel, as fogging may occur.
3. Inspect sash cables and pulleys for wear or adjustments on a monthly basis. Replace sash cables immediately if any wear or fraying is noticed.
4. Disconnect electrical power and turn off pressure lines prior to maintenance work in the respective areas.
5. Replace fluorescent lamp bulbs :
   To access the fixture lift up on the front panel. This will disengage the top of the panel from the dowel pins on top of the hood and the lower retainer at the bottom. Hand holes are located on the top of the panel to assist in removal. On longer hoods it may require more than one person to lower the panel. Unscrew the 5/16" bolts from the top front of the light enclosure brackets. Swing the enclosure out and down to expose the clear panel. Unscrew the plastic bolts and remove panel. Change bulbs as needed. Reassemble in the reverse order, taking care not to overtighten the plastic screws.
6. Replace ULPA filters :
   Remove the front panel. Remove the plastic bolts on the lower panel labeled ULPA filters.The ULPA filters are held in place

MAINTENANCE
(continued)

and compressed with polypropylene brackets, held down with ½" fiberglass bolts. Remove the perforated diffuser plate under the Ulpa filters. The plate is held in place by (2) – ¼" slots that run the length of the hood interior, and plastic bolts. Remove the plastic bolts. Pull down on the middle of the perforated plate until it can be wedged out of place. The next step may require (2) people, one to loosen the bolts, and one to position the brackets. Remove the bolts and brackets, then slide the ULPA filters out through the front. Insure that the sealing surface around the perimeter is clean and smooth It is recommended to apply a thin layer of silicone release agent around the sealing surface to insure ease of filter removal at the next changing. Replace the filters in the reverse order. Do not over tighten the plastic bolts. A snug fit will compress the gasket for a sufficient air seal. Take extra precaution when handling ULPA filters, as they are fragile. Even a pinhole leak will reduce the efficiency of the filter.

7. Replacing the pre-filters :
   The pre-filter(s) is located on the side of the hood. Tools are not required to exchange the filters. First, turn off the blower to prevent accidental injury or damage. Rotate the (4) hold down tabs that hold the filter in place. Remove old filter and replace with a new one, close the tabs and the procedure is complete.

8. Replacing the cupsink (where applicable) :
   Disconnect the 1 ½" PVC drain line by loosening the two unions. Two polypropylene bars with fiberglass bolts hold the sink in place. Remove these and the sink will drop out. Apply gasket seal to the top of the new sink and position in place. Replace bars and bolts. Center the sink and tighten the bolts. Replace drain line.

MAINTENANCE
(continued)

9. Servicing the blower fan
   The fan that supplies the incoming air is located in the top of the cabinet between the pre filter(s) and the hepa filter(s). Insure that the fan is turned off and electrical power is disconnected before performing any service work. Remove the top (2) access panels to expose the motor and impeller. The fan housing is an integral part of the hood, and cannot be removed. To remove the impeller, first unbolt the inlet cone and remove. Loosen the set screw on the hub of the impeller. The impeller should then slide of the shaft. In some cases a gear puller may be required to remove the impeller. Inspect, clean, or replace the impeller wheel as necessary. Assembly is the same in the reverse order.

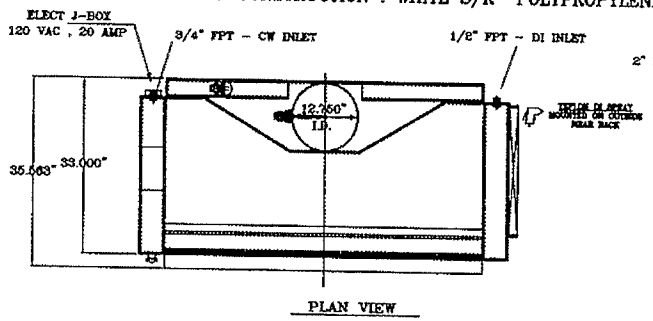
   To remove the motor, the impeller must first be removed. Disconnect electrical supply lines to the motor, noting the proper connections. Unbolt the motor from the vibration isolators and remove. Assembly is the same in the reverse order . Check to insure that the shaft and the impeller are not rubbing on the blower housing. The space between the impeller and the inlet cone should be 1/8". The direction of fan should be clockwise when viewing into the inlet of the blower. Replace access panels being careful not to over tighten the plastic bolts. Reconnect electrical supply and test the blower for air flow, vibration and noise.

MAINTENANCE
(continued)

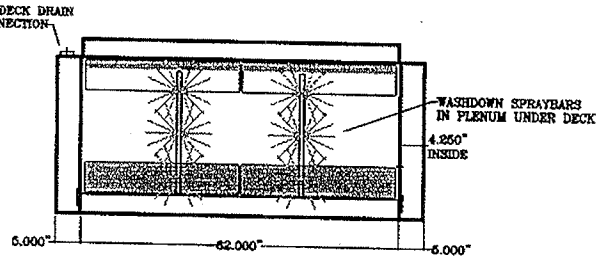
10. This hood is equipped with an optional manual plenum washdown system. There are two manifolds under the work deck, and two spray bars in the exhaust plenum. They should be inspected on a regular basis to insure that clogging does not occur and that they are operating properly. They are all connected with union connections for easy removal. To access the manifolds under the deck, remove the perforated deck panels.

GENERAL ARRANGEMENT

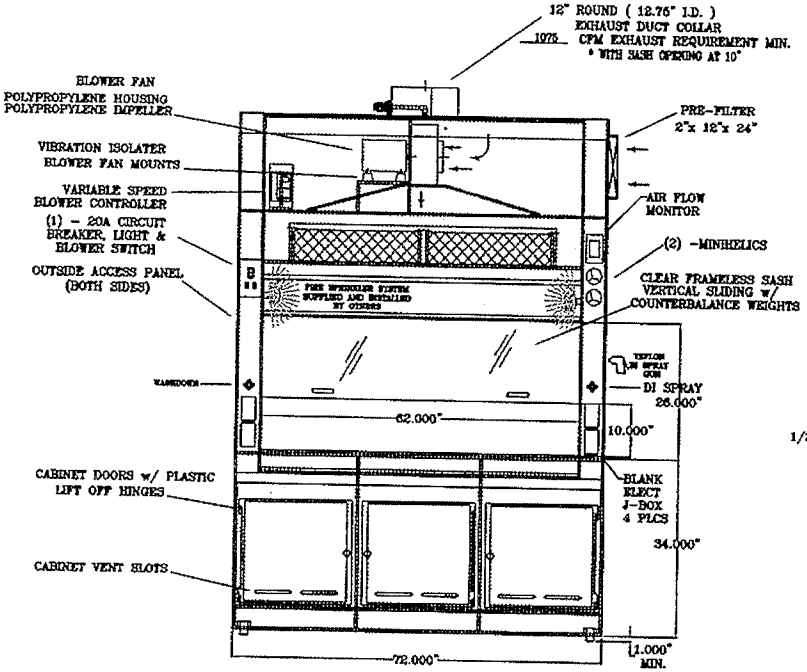
MAIN MATERIAL OF CONSTRUCTION : WHITE S/R POLYPROPYLENE.

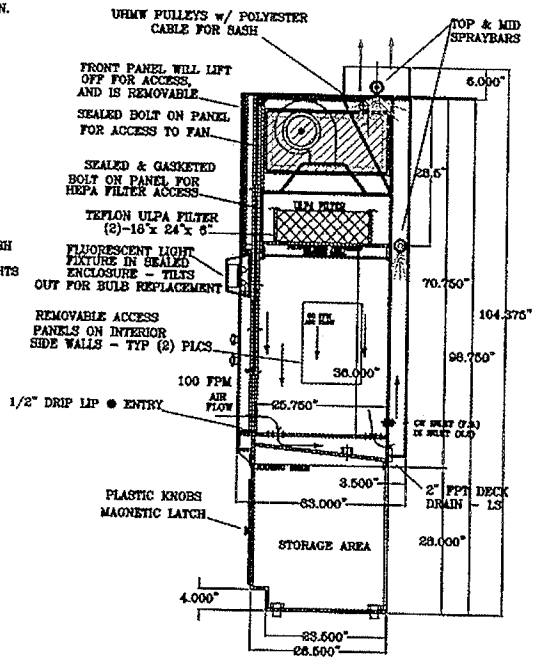


PLAN VIEW



DECK LAYOUT





PROJECT : UNIVERSITY OF VERMONT
HOOD # : VLF-FH-2
ELEVATION : PRODUCTION ACID HOOD

EXHAUST CFM REQUIREMENTS - 1075 CFM MIN
FACE VELOCITY (average) - 100 FPM
DOWNFLOW VELOCITY (average) - 60 FPM

ADD ON OPTIONS :
1 - TEL 1000 AIR FLOW MONITOR
1 - TEFLON DI SPRAY GUN w/ COILED HOSE, REMOTE POLYPRO MARQUEST VALVE, PRE PLUMBED
1 - WASHDOWN SYSTEM w/ REMOTE VALVE(S).
1 - RELOCATE PREFILTER FROM TOP TO RIGHT SIDE.
1 - 20A CIRCUIT BREAKER.
1 - ADD MINIHELIC FOR SP IN EXHAUST SYSTEM.
- ALL PREPLUMBING TO USE POLYTUBE AND POLYPROPYLENE FITTINGS UNLESS NOTED.

SPECIAL INSTRUCTIONS :

QUANTITY : (1)
MODEL # : ID-CB-72-LFH
PROJECT : UNIVERSITY OF VERMONT

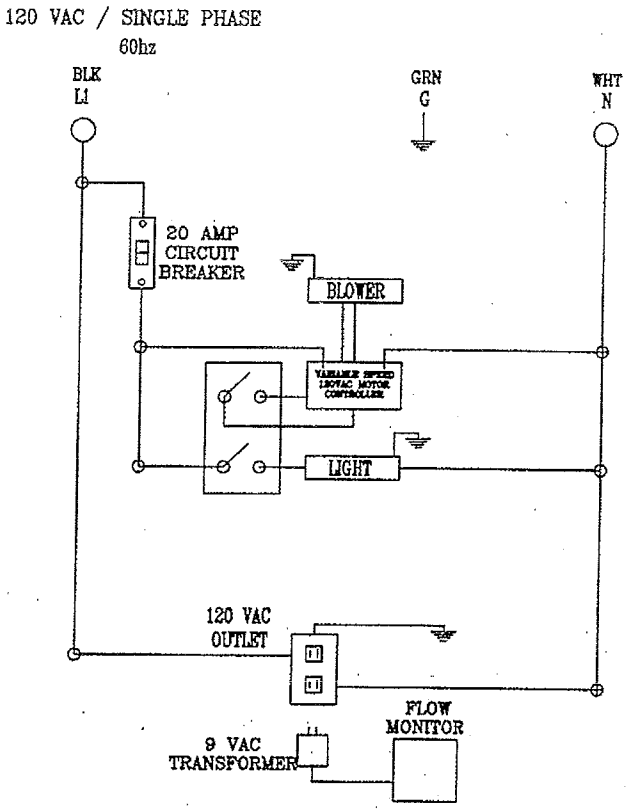
-DO NOT SCALE DRAWING -

D	MISC REVISIONS AS PER CLIENT LIST	GJ	2-5-08
C	MISC REVISIONS AS PER CLIENT LIST	GJ	1-30-08
B	MISC REVISIONS AS PER CLIENT LIST	GJ	1-25-08
A	CHANGED MATERIAL OF CONSTRUCTION	GJ	1-16-08
	CHANGED PIPING MATERIAL FOR GAS SERVICE		

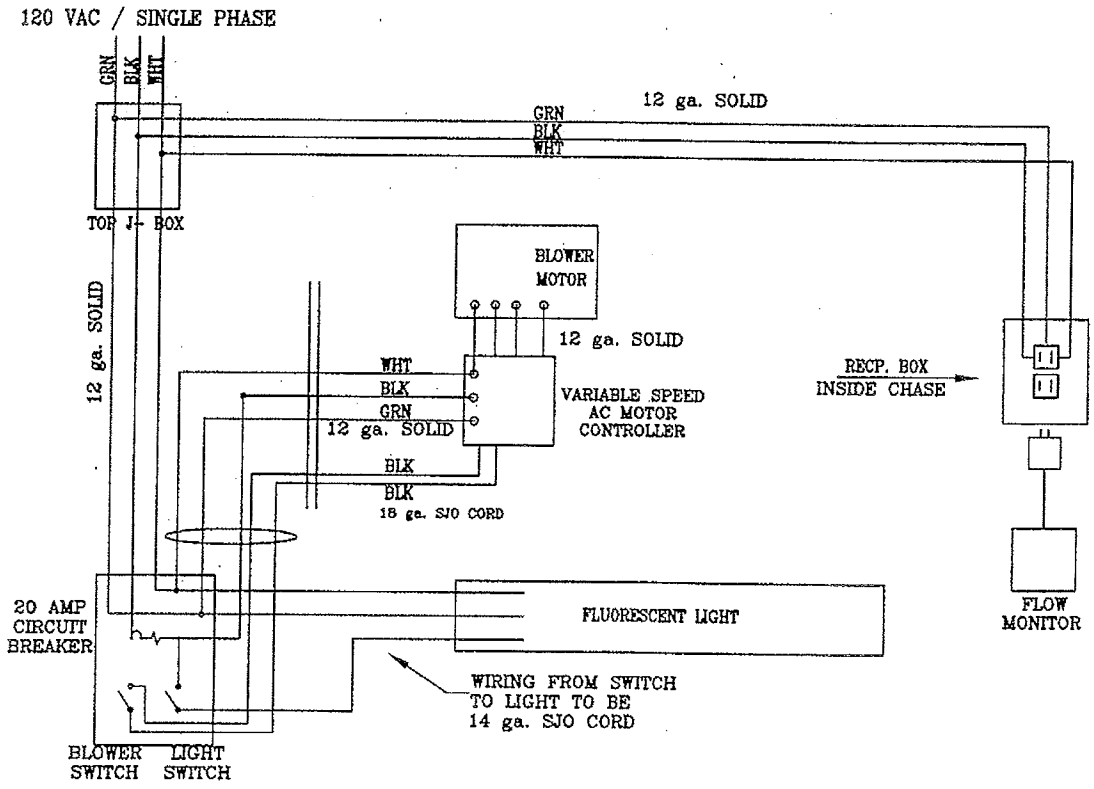
TFI INLINE DESIGN CORP.
5858 E. 58th COMMERCE CITY , COLORADO

GIBSON ASSOCIATES
6' POLYPROPYLENE LAMINAR FLOW FUME HOOD

DRAWN BY	GJ	SCALE 1/12	DATE 11-17-07
APP'D		JOB #	DRAWING # LC-380-01-FH2

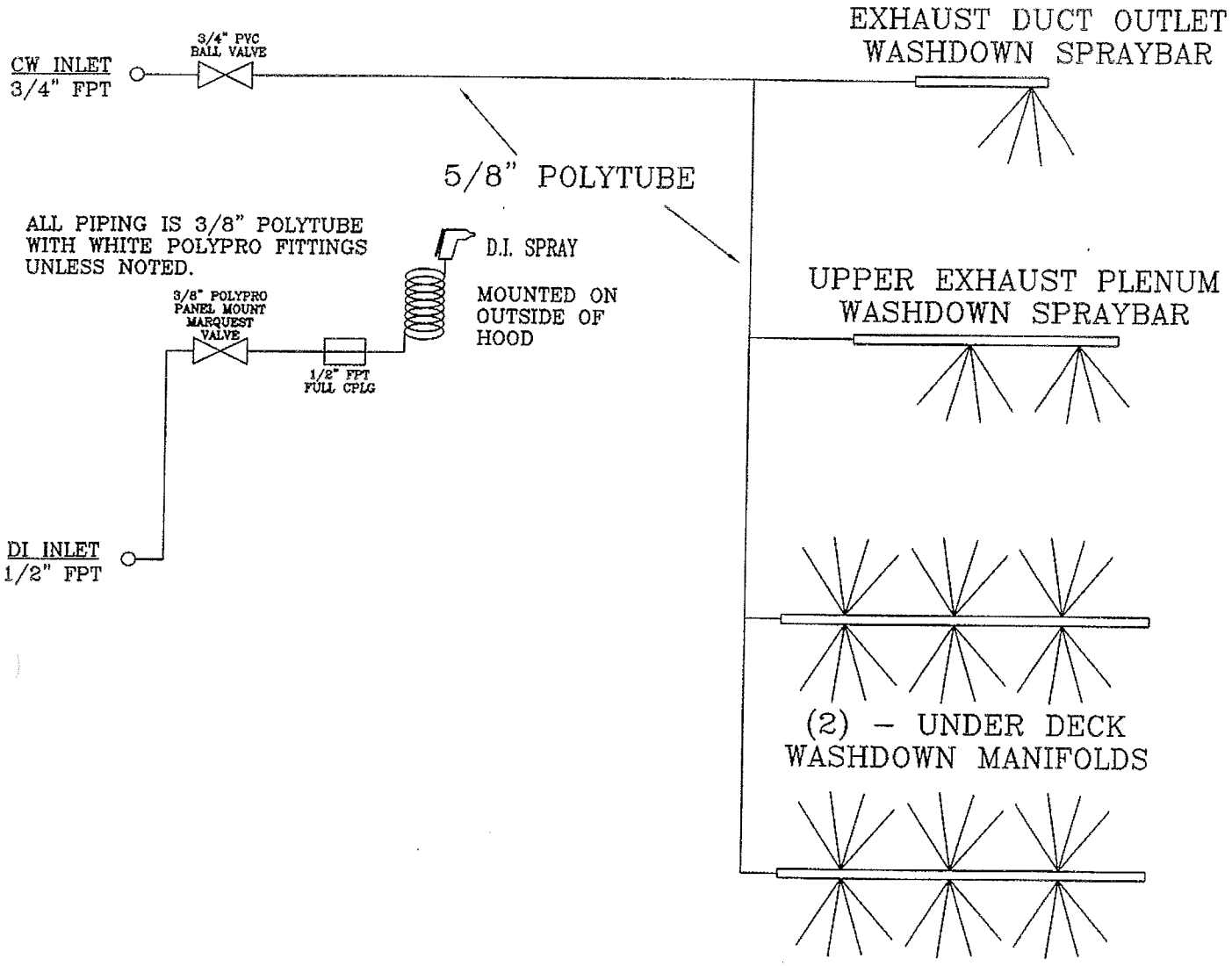


VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING DIAGRAM



VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING COLOR CODE

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT



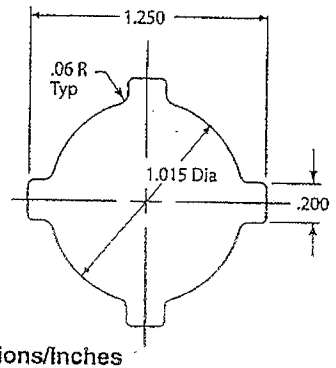
ELF - FH2 - PIPING DIAGRAM

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT

Mounting Template

The template provided, outlines the hole and orientation slots for the panel or bracket, where required. The orientation slots may be cut in multiple positions to allow versatility in mounting the valve to accommodate the piping alignment requirements.

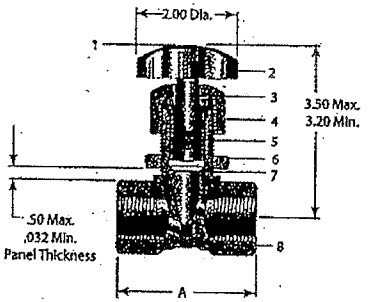
Panel thickness of .032" to .50" is the accepted range.



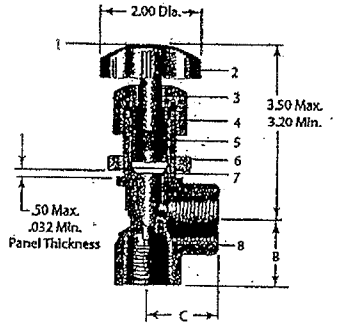
Dimensions/Inches

Size	A	B	C
1/4"	2.31	1.16	1.17
3/8"	2.39	1.19	1.21
1/2"	2.65	1.31	1.32

Globe Configuration



Angle Configuration



Parts List

Item	Description
1	Colored Ring Insert
2	Handle
3	Needle
4	Cap
5	Threaded Ring Insert
6	Panel Nut
7	PTFE Seal
8	Body

Special connections available on request.

MARQUEST SCIENTIFIC
Fluid Handling Products

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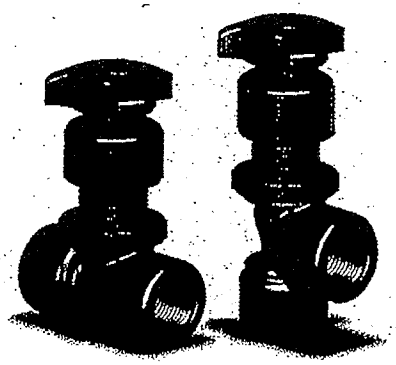
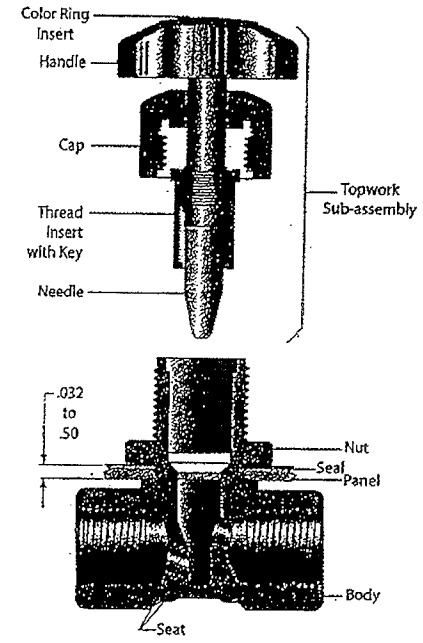


Throttle Master™ NEEDLE VALVES

Installation procedure and parts list



Please...read these instructions...

Marquest needle valves may be used in a wide range of services where the materials of construction are suitable in the chemical, thermal, and general environment limits of the installation.

Specific applications should be evaluated on the basis of pressure, temperature (see temperature chart and data sheet for particular materials) and the joining system.

MOUNTING VALVES

To relieve strain on the system and its components, the Marquest valve can be mounted on a panel or bracket in the following manner: After providing the proper hole to the "template dimensions," it is necessary to remove the top work subassembly and panel nut from the body. It is not required or recommended to disassemble the top work sub-assembly for this purpose. The body is then inserted into the hole, the panel nut secured, and the top work sub-assembly replaced.

CAUTION: Care should be taken to back off or position the needle sufficiently so that it will not engage the seat while tightening the "cap" on reassembly. *See position of "Threaded Insert with key" on adjacent drawing. Note space between threaded insert and cap.

CONNECTIONS

The 1/4", 3/8" and 1/2" ports are standard pipe threads (NPT) and may be adapted to tube fittings, socket adapters or PTFE tape is recommended as a thread sealant. Pipe dope should not be used unless specifically recommended for plastic pipe by the manufacturer.

A firm, hand tight torque is normally sufficient for small plastic pipe threads; over tightening may deform threads and cause leaking.

STEM SEAL

The single seal in the Marquest Needle Valve is precision machined of virgin PTFE and is virtually immune to chemical attack and it will NOT contaminate sensitive media.

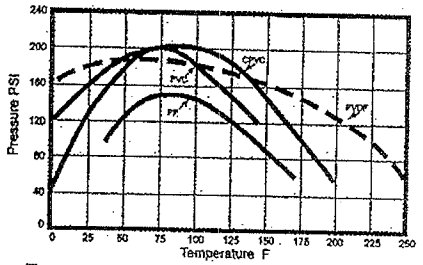
This stability, low friction, and high sealing effectiveness, provides an almost unlimited life potential in this component - the small wear can be taken up by simple tightening of the cap.

CHEMICAL RESISTANCE DATA

Chemical resistance data is not provided by MARQUEST due to the complex potential of combinations, concentrations, temperature and degree of safety factors required.

A specific inquiry to MARQUEST providing complete service data and service requirements will provide you with an opinion as to suitability.

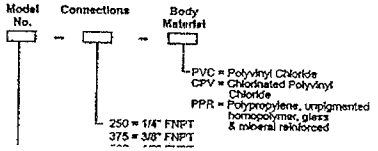
Pressure/Temperature Range Non-Shock

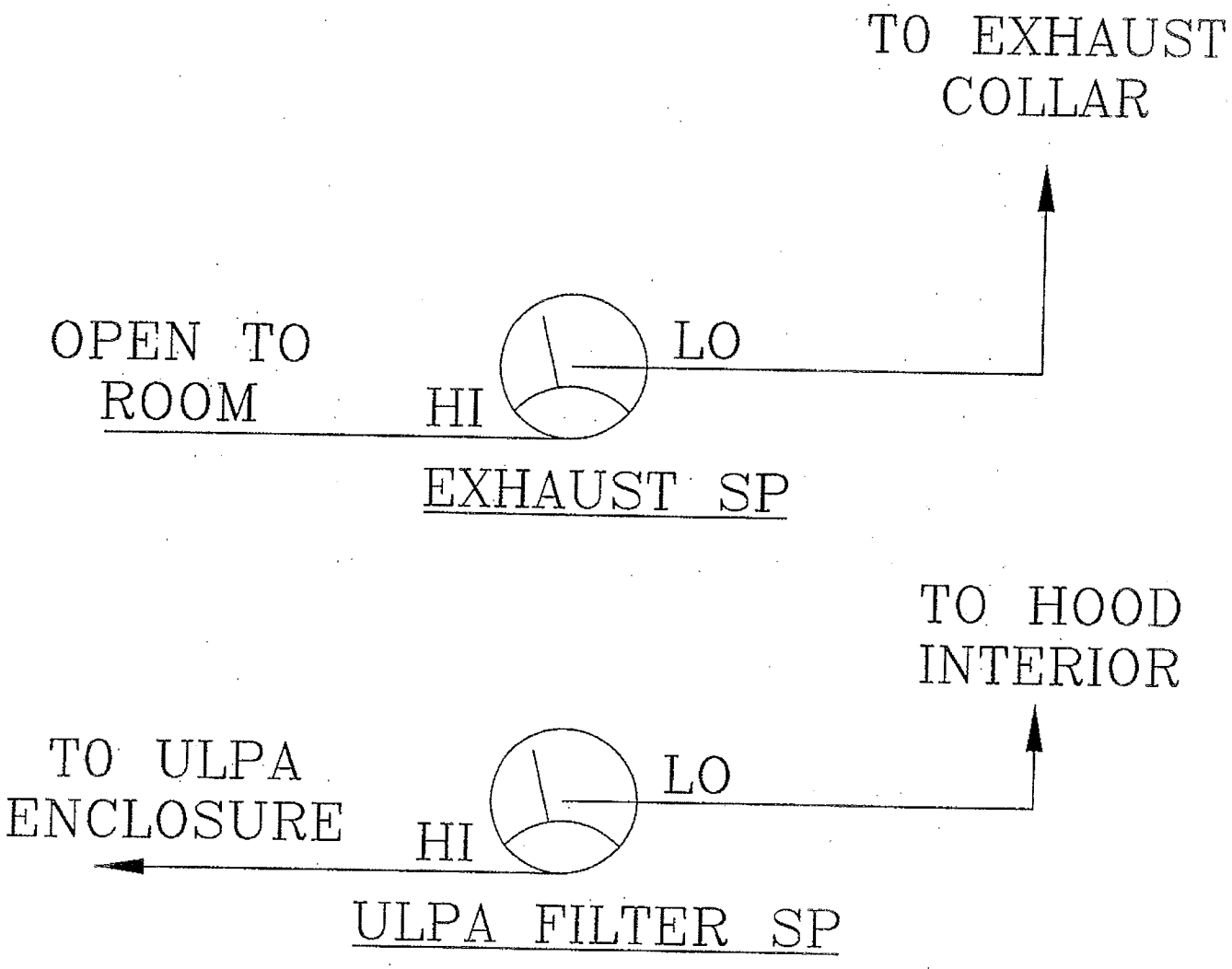


Flow Data

	1/4" & 3/8"		1/2"	
	Globe Pattern	Angle Pattern	Globe Pattern	Angel Patern
Orifices				
Inlet	0.187"	0.250"	0.218"	0.250"
Outlet	0.187"	0.187"	0.218	0.218"
C_V	0.310	0.426	0.620	0.780

How to Order





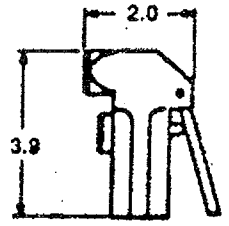
MINI HELICS

CUSTOMER : GIBSON
JOB # : 9498
PROJECT : UNIV OF VERMONT

DI SPRAY/RINSING GUNS
(Max. operating pressure 75 psi)

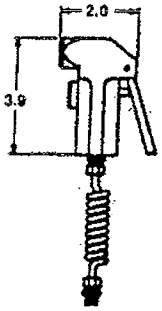
Part No.	Description
SG-103	Standard spray gun with 1/2" FNPT inlet thread.
SG-102	Spray gun with 3/8" FNPT inlet thread.
SG-101	Spray gun with 1/4" FNPT inlet thread.
SG-100	Spray Gun with 29/32"-16 inlet thread.*

* NOTE: This style gun has a shallow thread engagement zone, and is highly susceptible to thread stripping as opposed to the FNPT models, in the event overtightening occurs.

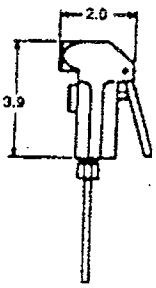


SG-100, SG-101, SG-102, SG-103

Assemblies Part No.	Gun	Hose	Intercon. Fitting	Source Fitting
SG-207	SG-103	504	MC-F-68-HA	MC-F-68-HA
SG-206	SG-103	502	J68	J68
SG-204	SG-103	101	J108	J108
SG-203	SG-103	101	J108	–
SG-202	SG-103	100	J88	J88
SG-201	SG-103	300	MC-F-88-HA	MC-F-88-HA
SG-200	SG-100	100	SW-10	–



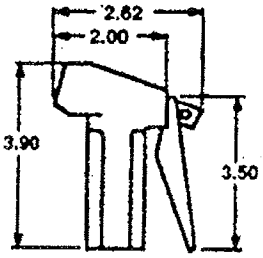
SG-206



SG-204

RECIRCULATING SPRAY GUNS
(Max. operating pressure 75 psi)

Part No.	Description
RC-103	Recirculating spray gun with 1/2" FNPT inlet thread (gun only).



RC-103

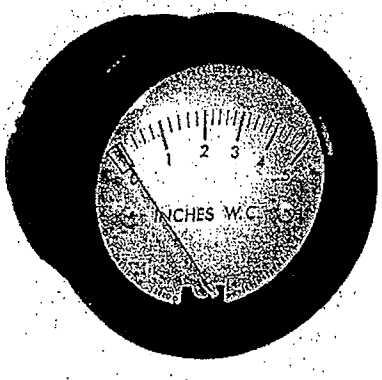
Assemblies Part No.	Gun	Hose Assy.
RC-104	RC-103	RC-1
RC-105	RC-103	RC-3
RC-106	RC-103	RC-5

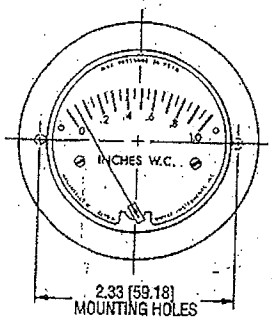
RC-104

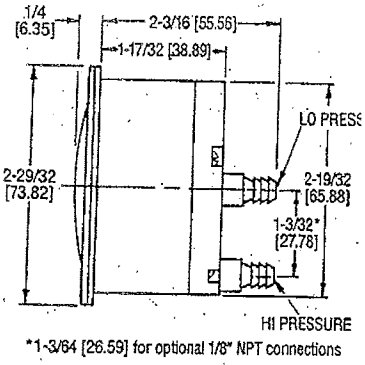
RC-106

Series 2-5000 Minihelic II® Differential Pressure Gage

Specifications: Installation & Operating Instructions







Dimensions, Series 2-5000 Minihelic II® Gage.

Series 2-5000 Minihelic II® Differential Pressure Gages have clean design, small size, low cost and sufficient accuracy for all but the most demanding applications. With housing molded from mineral- and glass-filled nylon and a lens molded from polycarbonate, this gage will withstand rough use and exposure, as well as high total pressure up to 30 psig [2.067 bar]. Over-pressure is accommodated by a blow-out membrane molded in conjunction with the diaphragm.

INSTALLATION

1. Select a location free from excessive vibration and where ambient temperature will be between 20°F to 120°F (-6.7°C to 49°C). Sensing lines may be any length necessary without affecting accuracy. However, long runs of tubing will dampen readings slightly and cause a minor increase in response time. If pulsing pressure or vibration cause excessive pointer oscillation, please contact factory for ways to provide additional damping.

2. This gage is calibrated and zeroed in the vertical position at the factory. If the gage is used in any other position, it must be re-zeroed each time the position is changed. Gages with ranges under 5 inches w.c.(1.24 kPa), or the equivalent, should be used only in the vertical position unless special calibration was specified when ordering.

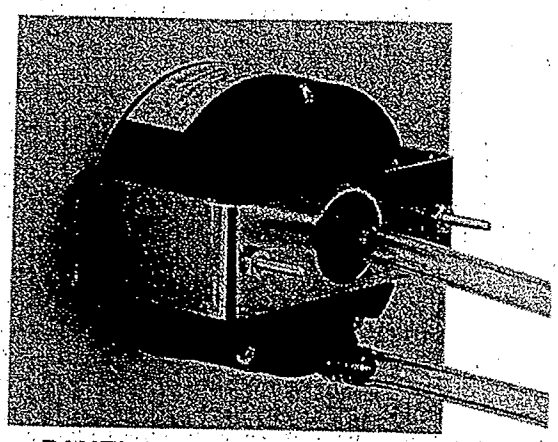
PHYSICAL DATA

Dimensions: 2-29/32" (73.82 mm) 2- 7/16" (61.93 mm).
Weight: 6 oz. [170 gr].
Rated Total Pressure: 50 psig (3.445 ba surge; 30 psig (2.067 bar) continuous t either pressure connection.
Ambient Temperature Range: 20°F t 120°F (- 6.7°C to 49°C).
Accuracy: ± 5% of full scale at 70°F (21.1°C).
Connections: standard, barbed for 3/16 I.D. tubing; optional, 1/8" NPT(M).
Housing: glass-filled nylon, polycarbonat lens.
Finish: black.
Standard Accessories: (2) 4-40 x 1-5/8 mounting studs, (2) 4-40 hex nuts (1) .050" hex allen wrench, (1) pane mounting bracket.

CAUTION:

Use only with air or compatible non-corrosive gases.

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, IN 46361, U.S.A.
Phone: 219/879-8000 www.dwyer-inst.c
Fax: 219/872-9057
e-mail: info@dwyer-inst.com
Lit-By Fax: 888/891-4963



PANEL MOUNTED INSTALLATION

3. To surface-mount the gage, drill two 5/32" [3.97 mm] holes on a horizontal line, 2-1/3" [59.26 mm] apart for mounting screws. Next, drill two 7/16" [11.11 mm] holes 1-1/32" [26.19 mm] apart on a vertical line for pressure connections. Install mounting studs in back of the gage, insert through holes in the panel, and secure with hex nuts provided. Be careful not to block the slotted hole near the right-hand mounting hole. This provides a path for pressure relief in the event of over-pressurization.

4. To panel-mount gage, cut a 2-5/8" diameter hole. Install the mounting studs in the back of gage, position gage in the panel, and place bracket over the studs. Thread hex nuts over studs and tighten.

5. After installation, the gage may need to be zeroed before placing in operation. If re-zeroing is required, firmly hold the case of gage with one hand and unscrew the front cover with the palm of the other hand in a counterclockwise direction. If difficult to loosen, place a small sheet of rubber between the cover and the palm of the hand. Zero-adjust screw is located behind the scale at the pair marked "zero." Use the hex allen wrench supplied and adjust until pointer is on zero. This must be done with both pressure connections vented to atmosphere and the gage oriented in the final mounting position. Replace cover.

6. To measure positive pressure, connect tubing to port marked "HI" and vent "LO" port to atmosphere. For negative pressure (vacuum), connect to port marked "LO" and vent "HI" port to atmosphere. For differential pressure, connect higher pressure to port marked "HI" and lower to "LO" port. If gage is supplied with 1/8" NPT connections, be careful not to over-tighten fittings to avoid damage to the gage.

CALIBRATION CHECK

Select a second gage or manometer of known accuracy and in an appropriate range. Use short lengths of rubber or vinyl tubing to connect the high-pressure side of the Minihelic gage and the test gage to two legs of a tee. Very slowly, apply pressure through the third leg. Allow enough time for pressure to equalize throughout the system and for fluid to drain. if a manometer is being used. Compare readings. If the gage being tested exceeds rated accuracy, it should be returned to the factory for recalibration.

MAINTENANCE

No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally, disconnect pressure lines to vent both sides of the gage to atmosphere and re-zero per paragraph 5.

 Printed in U.S.A. 4/01 FR# 14-440434-00 Rev. 1

DWYER INSTRUMENTS, INC.
P.O. BOX 373 · MICHIGAN CITY, IN 46361 U.S.A.
Phone: 219/879-8000 www.dwyer-inst.com
Fax: 219/872-9057
e-mail: info@dwyer-inst.com
Lit By Fax: 888/891-4963

AIR TEST REPORTS

ASHRAE 110-1995 Fume Hood Performance Test Report

Technical Safety Services, Inc.
1(800)877-7742 www.techsafety.com

1) General Test Information

Client	TFI Inline	FH ID	333	Test #	auto
Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

2) Criteria (applied to design-height readings)

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

3) Airflow Visualization Tests (Small Volume = TiCl4, Large = PEG)

Result = Pass

Small-Volume Resul	Pass	Comment	N/A
Large-Volume Resul	Pass	Comment	N/A

4) Face Velocity Tests

Result = Pass

Design Sash Velocity Profile, fpm								50% Design Sash VP (VAV Only), fpm								25% Design Sash VP (VAV Only), fpm							
103	106	104	103	107	105																		
110	111	107	109	105	112																		
Ht.	10in	Avg.	107		Min.	103		Ht.	5in	Avg.		Min.				Ht.	3in	Avg.		Min.			
Wd.	62in	RSD.	3%		Max.	112		Wd.	62in	RSD.		Max.				Wd.	62in	RSD.		Max.			

5) Cross-current Velocity Tests (60" high, ~12" spacing, 18" in front of FH with sashes closed)

Result = FIO

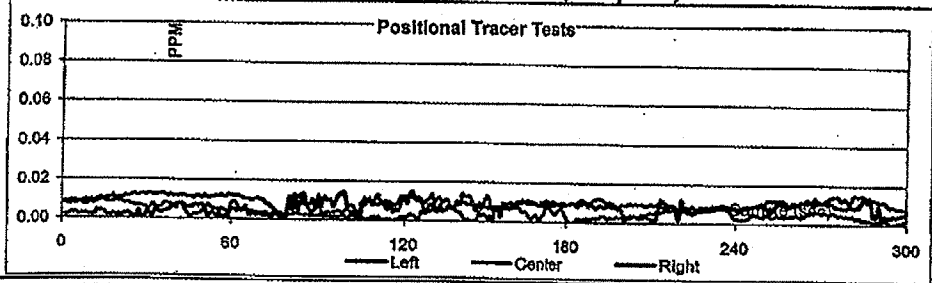
	20 second averages, fpm								Max	Avg.
Vertical	6	5	8	8	5	3			8	6
Horizontal	7	10	4	3	6	9			10	7

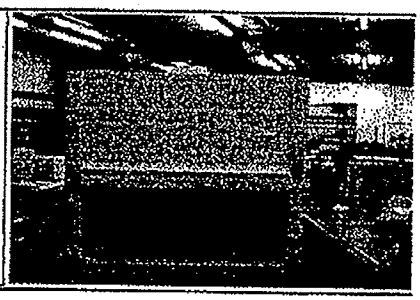
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

Rating: 4.0 AI 0.01 SME 0.01 Pass

Position	Left	Center	Right
Rating	0.01 ppm	0.01 ppm	0.01 ppm
Sash Effect	Trial #1 0.01 ppm	Trial #2 0.01 ppm	Trial #3 0.00 ppm
Perimeter-scan	0.03 ppm		
Comments			

7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)





8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)

Flowmeter	Ane	Ane	DMM	IR	Factor
1400	1372	NA	1461	402	15.3

9) Comments: This FH passes the test criteria.

10) Tested by: Mike Tester

X3

Date: 3/27/2008

11) Reviewed by: Martin Burke

Date: 3/31/2008

Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 335

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
Loc.	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0		0	0	0		0	25.40	19.70
2.)	0	0		0	0	0		0	25.80	19.30
3.)	0	0		0	0	0		0	26.00	19.70

Mean of Averages:	0	Mean of Averages:	0	Avg. %rH	Avg. Temp.
Standard Deviation:	0	Standard Deviation:	0	25.7	19.6
Standard Error:	0	Standard Error:	0		
95% UCL Factor:	2.9	95% UCL Factor:	2.9		
95% UCL Result:	0	95% UCL Result:	0		
Class Limit, PPCF:	100	Class Limit, PPCF:	0.7		
Convert to PPCM:	0	Convert to PPCM:	0		
Class Limit, PPCM:	3,520	Class Limit, PPCM:	29		
Class Limit Test:	**Pass**	**Class Limit Test:**	**FIO**		
Sample Volume Test:	**Pass**	**Sample Volume Test:**	**FIO**		
Class Limit Location:	**Pass**	**Class Limit Location:**	**FIO**		

Testing is performed in accordance with ISO 14644-2:2000:

Pass

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar 08

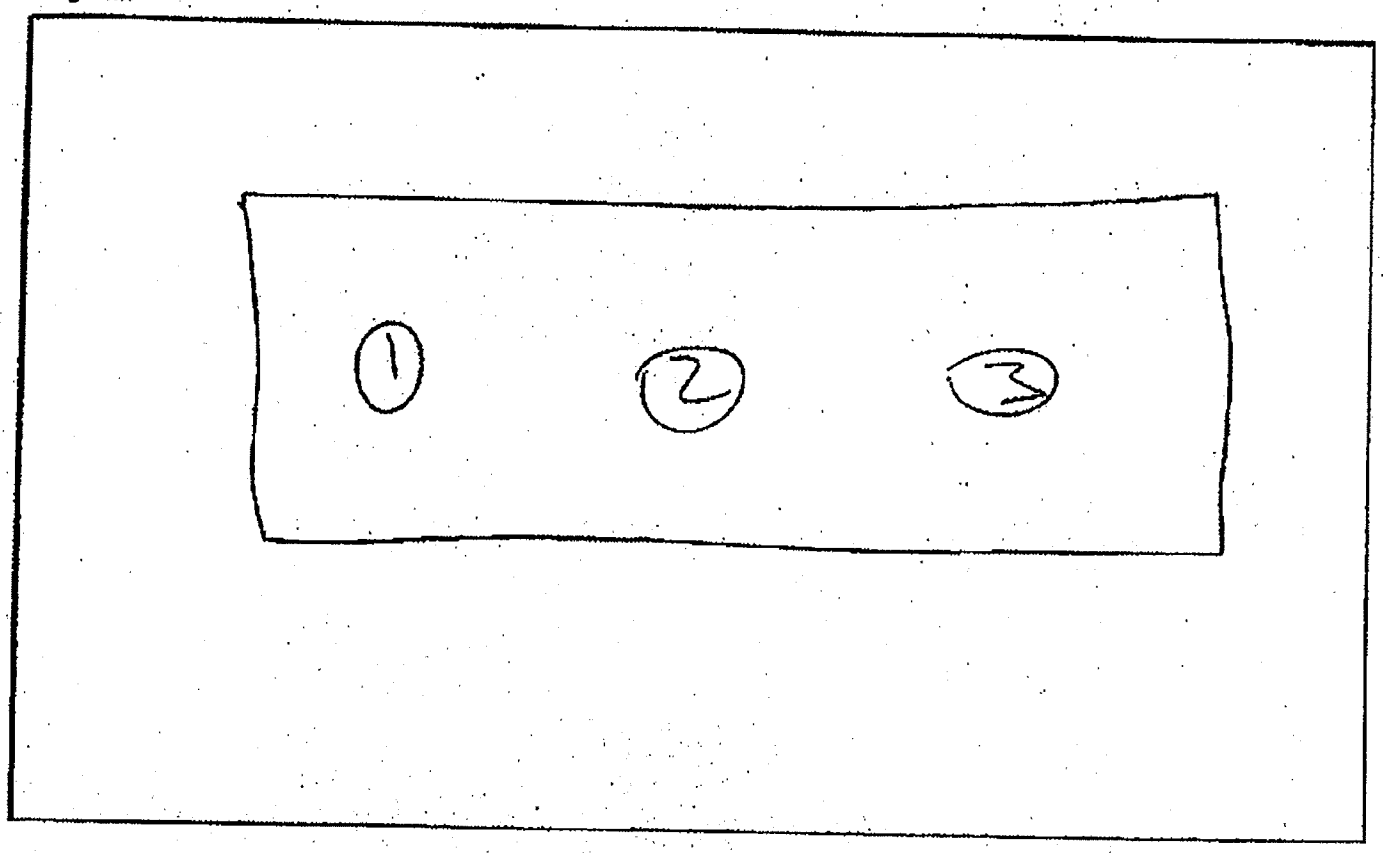
TSS Technical Safety Services, Inc.
Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 33835

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

Diagram:



Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature: _____
Test By: Mike Tester

Initials MAT 29mar08
eData Ver.: 1.3.0.3

ASHRAE 110-1995 Fume Hood Performance Test Report

Technical Safety Services, Inc.
1(800)877-7742 www.techsafety.com

1) General Test Information

Client	TFI Inline	FH ID	~~334~~ new	Test #	auto
Code	TFI02	TSS DBID		S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

2) Criteria (applied to design-height readings)

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

3) Airflow Visualization Tests (Small Volume = TiCl4, Large = PEG)

Result = Pass

Small-Volume Result	Pass	Comment	N/A
Large-Volume Result	Pass	Comment	N/A

4) Face Velocity Tests

Result = Pass

Design Sash Velocity Profile, fpm							50% Design Sash VP (VAV Only), fpm				25% Design Sash VP (VAV Only), fpm			
103	106	104	103	107	105									
110	111	107	109	105	112									
Ht. 10in		Avg.	107	Min.	103		Ht. 6in	Avg.		Min.	Ht. 3in	Avg.		Min.
Wd. 62in		RSD.	3%	Max.	112		Wd. 62in	RSD.		Max.	Wd. 62in	RSD.		Max.

5) Cross-current Velocity Tests (60" high, ~12" spacing, 18" in front of FH with sashes closed)

Result = FIO

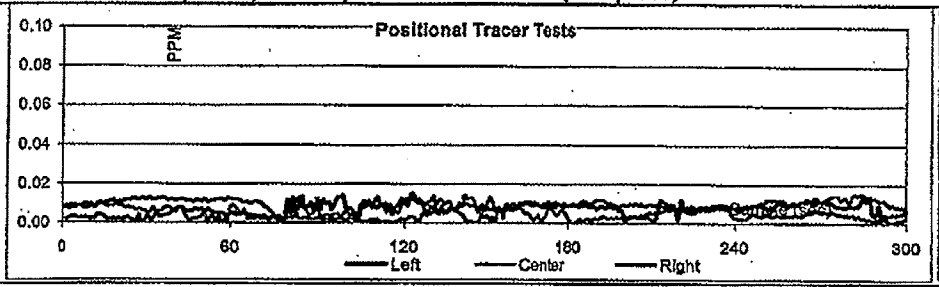
	20 second averages, fpm								Max	Avg.
Vertical	6	5	8	8	5	3			8	6
Horizontal	7	10	4	3	6	9			10	7

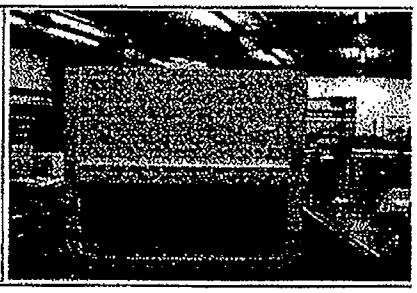
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

Rating: 4.0 AI 0.01 SME 0.01 Pass

Position	Left	Center	Right
Rating	0.01 ppm	0.01 ppm	0.01 ppm
Sash Effect	Trial #1 0.01 ppm	Trial #2 0.01 ppm	Trial #3 0.00 ppm
Perimeter-scan	0.03 ppm		
Comments			

7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)





8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)

Flowmeter	Ane	Ane	DMM	IR	Factor
1400	1372	NA	1461	402	15.3

9) Comments: This FH passes the test criteria.

10) Tested by: Mike Tester X3 Date: 3/27/2008

11) Reviewed by: Martin Burke Date: 3/31/2008

Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 334

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
Loc.	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp, C
1.)	0	0		0	0	0		0	25.40	19.70
2.)	0	0		0	0	0		0	25.80	19.30
3.)	0	0		0	0	0		0	26.00	19.70

Mean of Averages:	0	Mean of Averages:	0
Standard Deviation:	0	Standard Deviation:	0
Standard Error:	0	Standard Error:	0
95% UCL Factor:	2.9	95% UCL Factor:	2.9
95% UCL Result:	0	95% UCL Result:	0
Class Limit, PPCF:	100	Class Limit, PPCF:	0.7
Convert to PPCM:	0	Convert to PPCM:	0
Class Limit, PPCM:	3,520	Class Limit, PPCM:	29
Class Limit Test:	**Pass**	**Class Limit Test:**	**FIO**
Sample Volume Test:	**Pass**	**Sample Volume Test:**	**FIO**
Class Limit Location:	**Pass**	**Class Limit Location:**	**FIO**

Avg. %rH	Avg. Temp.
25.7	19.6

Testing is performed in accordance with ISO 14644-2:2000:
Pass

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar 08

eData Ver.: 1.3.0.3

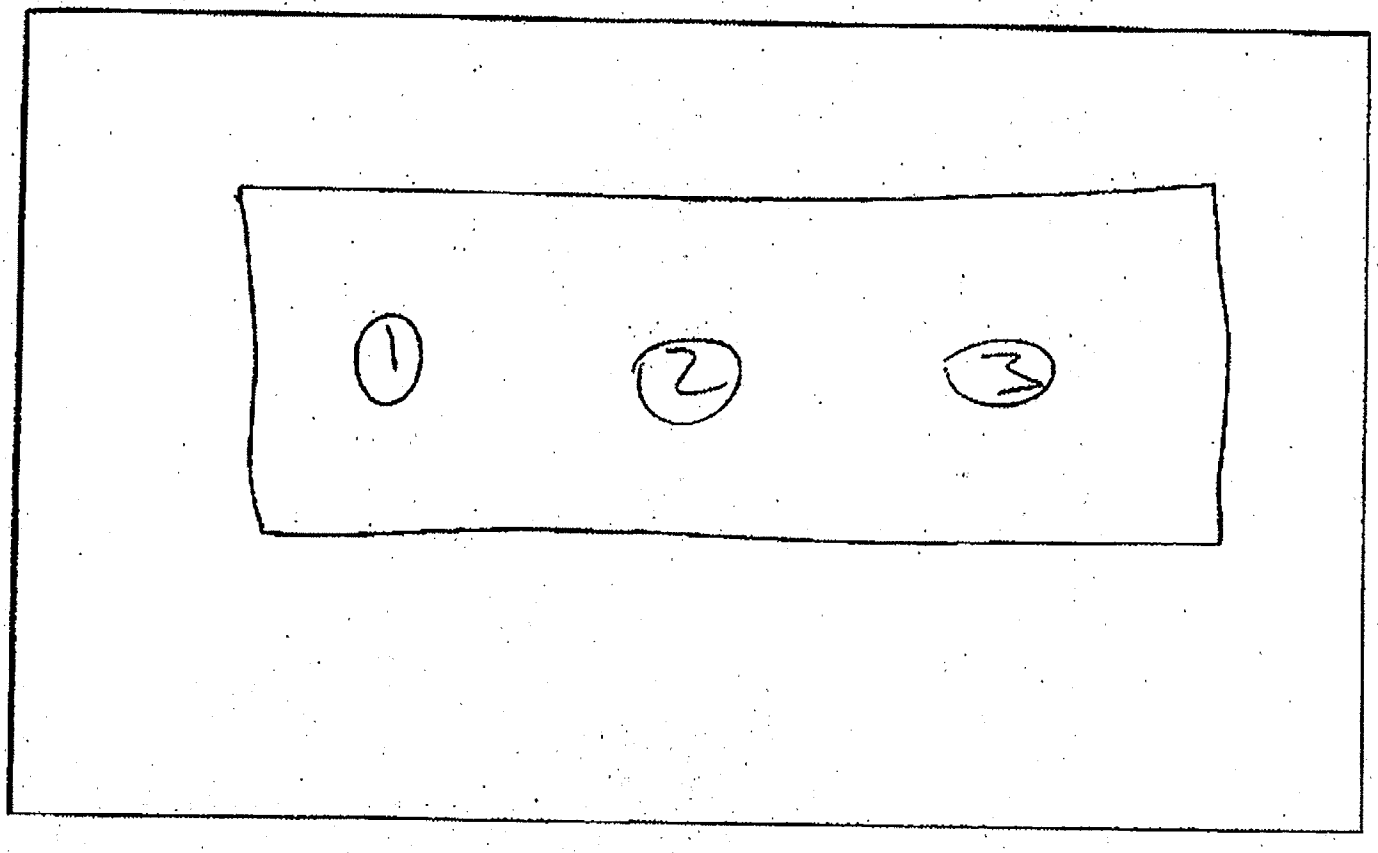
Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU334

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

Diagram:



Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials Mar 29 mar 08
eData Ver.: 1.3.0.3

ASHRAE 110-1995 Fume Hood Performance Test Report

Technical Safety Services, Inc.
1(800)877-7742 www.techsafety.com

1) General Test Information

Client	TFI Inline	FH ID	335	Test #	auto
Code	TFI02	TSS DBID	new	S.O.	CO-TFI080102D-01
Address	5658 E. 58th Ave	Building	5658	Test Date	3/27/2008
Address	Commerce City, CO	Room	Test Room	Retest	N/A
Address	80022	Make	TFI Inline		
Contact	Frank Conner	Model	Exhausted Laminar Flow		
Phone	303-288-6823	Type	CAV		
Email	fconner@tfiinlinedesign.net	Condition	AM		

2) Criteria (applied to design-height readings)

Minimum Point Velocity, fpm	70	Minimum Point Velocity, % of Average	NA
Minimum Average Velocity, fpm	100	Maximum Average Velocity, fpm	NA
Maximum Positional Rating, ppm	0.1	Maximum Average Cross draft, % of Average	NA

3) Airflow Visualization Tests (Small Volume = TiCl4, Large' = PEG)

Result = Pass

Small-Volume Resul	Pass.	Comment	N/A
Large-Volume Resul	Pass	Comment	N/A

4) Face Velocity Tests

Result = Pass

Design Sash Velocity Profile, fpm						50% Design Sash VP (VAV Only), fpm						25% Design Sash VP (VAV Only), fpm					
103	106	104	103	107	105												
110	111	107	109	105	112												
Ht. 10in		Avg.	107		Min. 103	Ht. 5in		Avg.			Min.	Ht. 3in		Avg.			Min.
Wd. 62in		RSD.	3%		Max. 112	Wd. 62in		RSD.			Max.	Wd. 62in		RSD.			Max.

5) Cross-current Velocity Tests (60" high, ~12" spacing, 18" in front of FH with sashes closed)

Result = FIO

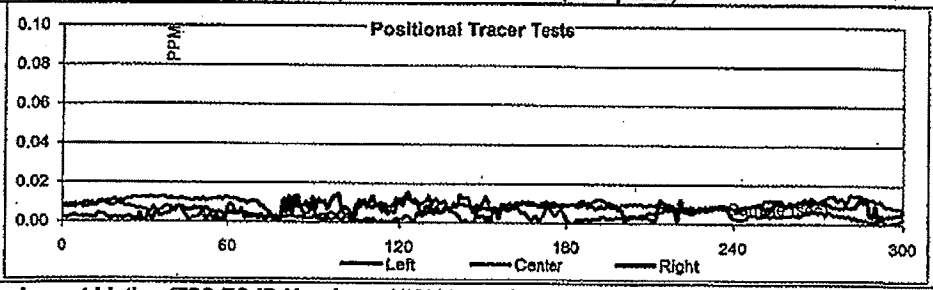
	20 second averages, fpm								Max	Avg.
Vertical	6	5	8	8	5	3			8	6
Horizontal	7	10	4	3	6	9			10	7

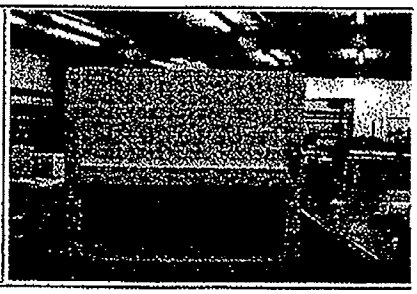
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

Rating: 4.0 AI 0.01 SME 0.01 Pass

Position	Left	Center	Right
Rating	0.01 ppm	0.01 ppm	0.01 ppm
Sash Effect	Trial #1 0.01 ppm	Trial #2 0.01 ppm	Trial #3 0.00 ppm
Perimeter-scan	0.03 ppm		
Comments			

7) Tracer Plot, VAV response plot and photo of FH as tested (if acquired)





8) Equipment Listing (TSS EQ ID Numbers, NIST-traceable records on file)

Flowmeter	Ane	Ane	DMM	IR	VVV Factor
1400	1372	NA	1461	402	15.3

9) Comments: *This FH passes the test criteria.*

10) Tested by: *Mike Tester* X3 **Date:** *3/27/2008*

11) Reviewed by: *Martin Burke* **Date:** *3/31/2008*

Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 333

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

	PPCF >= 0.50 um				PPCF >= 5.00 um				Environmental	
Loc.	Count 1	Count 2	Count 3	Average	Count 1	Count 2	Count 3	Average	% rH	Temp. C
1.)	0	0		0	0	0		0	25.40	19.70
2.)	0	0		0	0	0		0	25.80	19.30
3.)	0	0		0	0	0		0	26.00	19.70

Mean of Averages:	0	Mean of Averages:	0
Standard Deviation:	0	Standard Deviation:	0
Standard Error:	0	Standard Error:	0
95% UCL Factor:	2.9	95% UCL Factor:	2.9
95% UCL Result:	0	95% UCL Result:	0
Class Limit, PPCF:	100	Class Limit, PPCF:	0.7
Convert to PPCM:	0	Convert to PPCM:	0
Class Limit, PPCM:	3,520	Class Limit, PPCM:	29

Avg. %rH	Avg. Temp.
25.7	19.6

Class Limit Test: Pass
Sample Volume Test: Pass
Class Limit Location: Pass

Class Limit Test: FIO
Sample Volume Test: FIO
Class Limit Location: FIO

Testing is performed in accordance with ISO 14644-2:2000:

Pass

The following NIST-traceable equipment were used to perform this test:

Equipment ID	Equipment Type	Serial Number	Calibration Date
000816	Particle Counter	011348	August 2008

Comments:

Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials MAT 29 mar 08

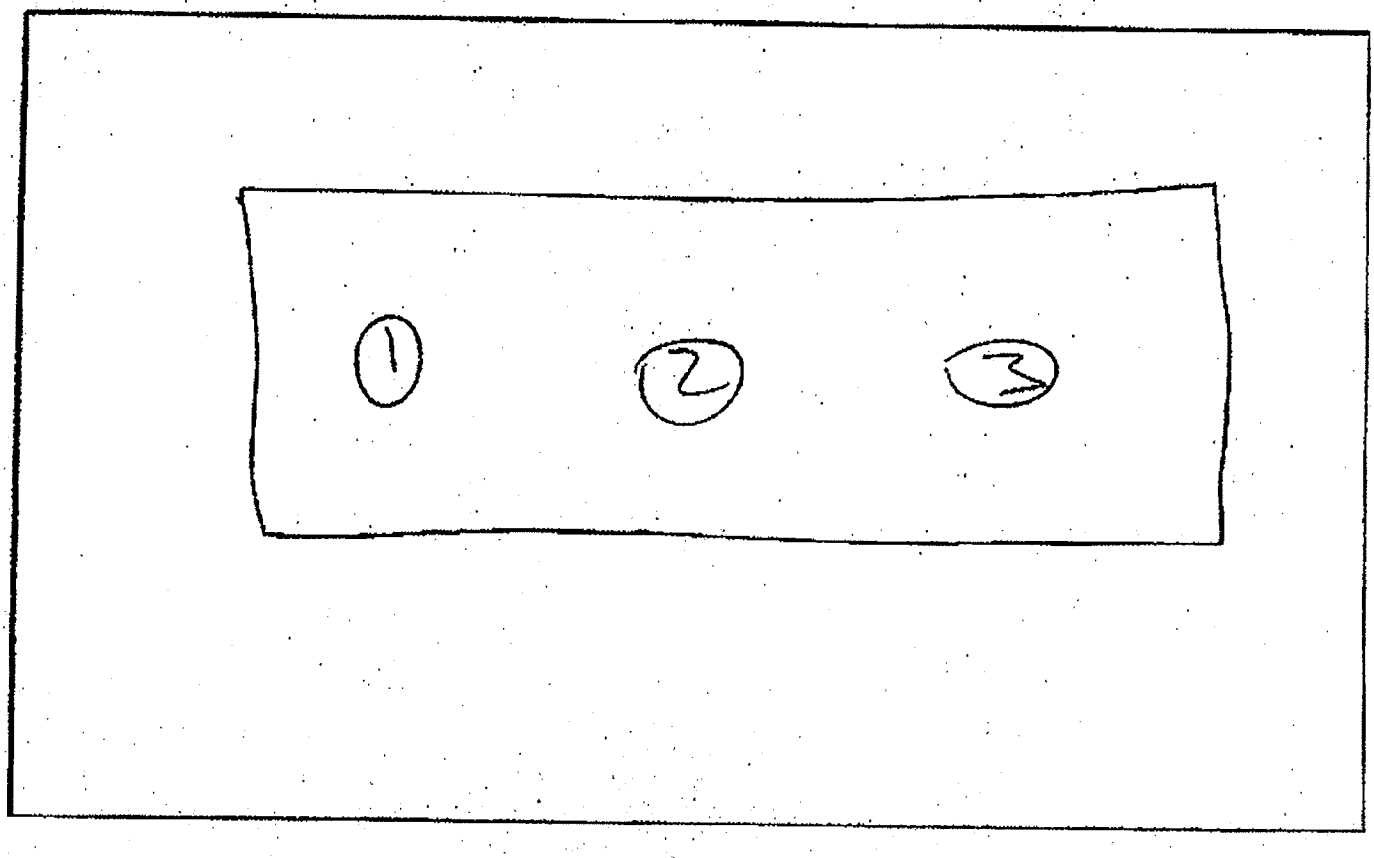
Colorado
6732 W Coal Mine Ave., Unit 408
Littleton CO, 80123
Phone: (720)981-4965
Fax: (720)981-4988

Airborne Nonviable Particle Count Test

Service Order: CO-TFI20080102D-01
Cert. No.: MAT8329111757
Facility: TFI02 - TFI Inline Design Corp.
Clean Zone ID: Exhausted LFU 333

Test Specification: ISO 14644
Locations: 3 **Sample Vol.:** 1.0 ft^3/28.3 L
Area Status: At Rest/Static **Class:** ISO5/100
Zone Area: 11.19 ft^2; 1.04 m^2

Diagram:



Test Date: 03/29/2008
Retest Date: 03/29/2009
Last TSS Test Date:

Signature:
Test By: Mike Tester

Initials Mar 29 2008
eData Ver.: 1.3.0.3

Camfil Farr Inc.
One North Corporate Drive – Riverdale, N.J. 07457 U.SA.
Phone: (973) 616 – 7300
Fax: (973) 616 - 7771

CERTIFICATE OF COMPLIANCE

This certificate of compliance, for the article(s) delivered, has been manufactured, inspected and found to be in compliance with specifications, drawings, approved samples and/or other requirements stated in your purchase order.

The filter meets the given efficiency and pressure drop and it is conformance with **IEST-RP-CC034.2** for scanning leak thresholds specification.

A PSL challenge was utilized during testing and a record of testing is affixed to frame of filter ("Scanned" label)

Camfil Farr Part Number:	***855160997***
Camfil Farr Sales Order Number:	***817190***
Camfil Farr Serial Number:	***B544679-001***
Customer Name:	***Air Filter Solutions, Inc.***
Customer Purchase Order Number:	***2555***
Efficiency:	***99.99995% @ MPPS***
Resistance @ rated flow (in. w.g.):	***0.48 inches***
Date of Certification:	***March 24, 2008***

Halime Esen
Quality Assurance Department

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A PSL challenge was utilized during testing and a record of testing is affixed to frame of filter ("Scanned" label)

Camfil Farr Part Number:	***855160997***
Camfil Farr Sales Order Number:	***817190***
Camfil Farr Serial Number:	***B544679-002***
Customer Name:	***Air Filter Solutions, Inc.***
Customer Purchase Order Number:	***2555***
Efficiency:	***99.99995% @ MPPS***
Resistance @ rated flow (in. w.g.):	***0.48 inches***
Date of Certification:	***March 24, 2008***

Halime Esen
Quality Assurance Department

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TFI Inline Design Inc.

FUME HOOD FINALIZATION *and* INSPECTION LIST

JOB NAME: University of Vermont Job#: 9498 Date: 04/03/2008 Hood S/N#: 335

Hood Size/Style: 6'-m ELF Std Polypropylene Power: 120vac Amps: 30

- [X] Test light(s)
- [X] Test electrical outlets
- [X] Check rotation of blower wheel
- [X] Test water valves and plumbing for leaks
- [X] Check continuity with tester
- [X] Test washdown drain for leaks (if applicable)
- [X] Test sump for leaks (laminar flow only)
- [X] Test sink(s) for leaks
- [Y] Test air flow by qualified inspector?
- [X] Check that air flow monitor plug is in (when applicable)

- [X] Vacuum access panel and deck area
- [X] Clean hood with glass cleaner (inside & out)
- [X] Clean backside of front removable panel

- [X] Label access panels at top w/magic marker (left/right)
- [X] Label HEPA & blower access panels with stickers
- [X] Put labels on valves, outlets, light/fan switches, etc...
- [X] Label top elec. boxes 120 or 240 with magic marker
- [X] Put final packaging labels on front removable panel:
  1. "Remove packaging around weight & check pulley string before use"
  2. "Replace s/s shipping bolts with plastic bolts"

- [X] Replace plastic screws with steel (CT - 4 on sash track, 4-6 on baffles)
  (LAM - 4 on sash track only)
- [X] Plastic screws for access panels (8)
- [X] Wire tie turn buckles
- [X] Support sash for shippint with 1-1/2 x 3-1/2" Plate
- [X] Block in weight with 2 x 2 x 15" = 1 each (more if needed)
- [X] Put access panels/manuels behind weight for shipment (when possible)
- [X] Support CT Weight with 2x4's

TFI Inline Design Inc.

- [X] Package hood/cabinet front trim peace & joint plates - (Laminar)
- [X] Package cup sink and hardware
- [0] Package top shroud enclosure (if used)
- [X] Package all hardware - (plastic & s/s bolts, knobs, etc.)
- [0] Package loose tubing or piping on top back light area for shipment - (CT
- [X] Manuel Booklet - put in box on top of hood or in right access panel area

* May be required to put box in another location depending upon hood requirements

---

- [X] Packaging/Finalization Inspection Completed - Initials: RM_____ .

Manufacturers Product Warranty Polypropylene Hoods and Casewor

Unless otherwise specified in contract documents, TFI/Inline Design Corporation's products are backed by the following warranty. For the benefit of the original user, TFI/Inline Design Corp. warrants for the perio of Twenty Four months after date of delivery, that all products shall be fre from defects in material and workmanship. For any product found to be defective, TFI/ Inline Design Corp. will repair or replace it, or refund to th purchaser its purchase price, whichever remedy TFI/Inline Design Corp. shall select in its sole discretion. All products not manufactured by TFI/Inline Design Corp., but used in its products carry the original manufacturer's warranty copies of which are available upon request.

THE WARRANTY CONTAINED IN THE PRECEEDING PARAGRAPI IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE ABOVE PARAGRAPH AND TFI/INLINE DESIGN CORP. HEREBY DISCLAIMS ANY AND ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOS THE PURCHASER EXPRESSLY AGREES THAT TFI/INLINE DESIGI CORP. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES IN ANY CLAIM, SUIT OR PROCEEDINS, INCLUDING BUT NOT LIMITED TO CLAIMS FOR OTHER LABOR OR REPAIRS, LOSS OF PROFITS, OR OTHER EXPENSES INCIDENTAL TO REPLACEMENT OF PRODUCTS.

TFI/Inline Design Corp., shall have no responsibility under this warranty f damages caused during shipping, by improper use or installation of the product, by the purchaser's attempts to use the product beyond its capacity or for products modified, or repaired by any person or entity other than TFI/Inline Design Corp., (unless such repair was authorized in writing by TFI Inline Design Corp.), or for products which have been subjected to misuse, abuse, neglect, vandalism, or accident.

Fisher Hamilton LLC
Manufacturer

Project Name
University of Vermont
Delahanty Hall

Product
Fisher Hamilton
Epoxyn Counters

Guarantee/Warranty

Gibson Associates, Inc. warrants, for a period of one (1) year from the date of substantial completion 5/05/08, that all products sold under the contract referenced above shall be free from defects in material and workmanship. Gibson Associates, Inc. makes no other warranty, expressed or implied, written or oral, including but not limited to those of merchantability or fitness for any particular purpose. Purchaser shall notify Gibson Associates, Inc. immediately of any defect and Gibson Associates, Inc. shall be given reasonable opportunity to inspect any product as to which notices are given of defect. No product shall be returned to Gibson Associates, Inc. without receipt by purchaser of written shipping instructions from Gibson Associates, Inc.

Purchaser exclusive remedy, and Fisher Hamilton sole liability shall be, at Gibson Associates, Inc. sole option, repair or replacement of the non-conforming product or its parts, or refund of the purchase price. Gibson Associates, Inc. shall not be liable for any incidental or consequential damage, losses or expenses whether incurred in connection with injury to persons or property. Gibson Associates, Inc. assumes no liability for, and does not authorize, any person or entity to assume liability under this warranty for any damage to its products which is in whole or in part a result of accident, alteration, abuse, negligence or damages as a result of connection to non Fisher Hamilton LLC parts or products. Further, Gibson Associates, Inc. assumes no liability under this warranty for any damages incurred to its products as a result of service work and/or installation which is not performed by a factory trained, certified installation or service firm.

Name – Edward Gibson Title: President

4/28/08
Date

Elaine Pagliazzo
Elaine Pagliazzo -- Notary Public

11-15-13
My Commission Expires

LABORATORY CASEWORK PROVIDED BY

GIBSON ASSOCIATES, INC.

325 BOSTON POST ROAD
SUDBURY, MA 01776

(TEL) 978-443-8160
(FAX) 978-443-0928

LABORATORY CASEWORK MANUFACTURED BY

FISHER HAMILTON SCIENTIFIC

TWO RIVERS, WI 54241

CASEWORK SHOP DRAWINGS FOR

UVM

DELEHANTY HALL

BURLINGTON, VT

CASEWORK CONSTRUCTION:

WOOD "REGENCY" CASEWORK – STANDARD CONSTRUCTION

-FRONT STYLE: LIPPED OVERLAY "LEGACY"
-VENEER TYPE: PLAIN-SLICED RED OAK, A-GRADE SELECT
-GRAIN DIRECTION: COMBINATION
-CABINET CORE: VENEER CORE PLYWOOD
-EDGEBANDING: WOOD EDGEBAND ON WOOD FACE
-CABINET TOP FRAME: FRONT HORIZONTAL AND REAR VERTICAL RAILS
-INTERMEDIATE FRONT RAILS: WITH
-INTERMEDIATE REAR RAILS: WITH
-SECURITY PANELS: WITHOUT SECURITY PANEL
-REMOVABLE BACK PANEL – BASE CABINET ONLY: ONE PIECE BEHIND CUPBOARD AND 36" TO 48" WIDE DRAWER UNITS. OPEN BEHIND DRAWERS ON LESS THAN 36" WIDE UNITS.
-FIXED BACK AT TALL CASE/WALL CASE/UPPER CASE ONLY (SOLID DOORS ONLY): TEMPERED HARDBOARD
-DRAWER CONSTRUCTION – DRAWER HEIGHT: STANDARD HEIGHT
-DRAWER CONSTRUCTION – DRAWER JOINERY: MULTIPLE DOVETAIL, 5MM WHITE PVC CLAD MDF, NO DIVIDER GROOVES
-DRAWER SUSPENSION: 3/4 EXTENSION – ROLLER 100LB. DYNAMIC – SELF-CLOSING – EPOXY COATED
-SHELF MATERIAL: WOOD
-BASE CABINET SHELF DEPTH: FULL DEPTH 17.75" SHELF
-SHELF THICKNESS: 3/4" THICK, 55LB. RATING: 12"-30" WIDTHS – AND – 1" THICK, 100LB. RATING: 36"-48" WIDTHS
-SHELF CLIPS: PLATED PIN & SOCKET STANDARD DEFAULT
-PULL DIRECTION: CONFIGURATION 1 (HORIZONTAL ON DRAWERS, VERTICAL DOORS)
-PULL TYPE: ALUMINUM WIRE
-CABINET HINGES: 5-KNUCKLE – STAINLESS STEEL
-BASE- PLYWOOD (BASE UNITS ONLY): INTEGRAL WITH END PANELS WITHOUT LEVELERS
-TOE KICK AT TALL CASES ONLY: FLUSH
-LOCK TYPE: NATIONAL MASTER 5-DISC (REMOVE -A-CORE)
-DOOR CATCHES: ROLLER CATCH (NO OPTIONS)
-LABEL HOLDERS: NONE
-GLASS TYPE: SAFETY GLASS – TEMPERED: 3MM ON FRAMED GLASS DOORS; 6MM ON UNFRAMED GLASS DOORS
-FINISH (WOOD DOOR & DRAWER FRONTS ONLY): SEFA 8
-SUSPENSION HARDWARE: HANGER AT MAX/LAB

COLOR SELECTIONS

MATERIAL	MANUFACTURER	SELECTION
WOOD CASEWORK	FISHER HAMILTON	T.B.D.
EPOXY RESIN TOPS		BLACK
EPOXY RESIN SINKS		BLACK
PLASTIC LAMINATE TOPS	--	T.B.D.
	--	
	--	
FIXTURES	WATERSAVER	MODEL #

GENERAL NOTES:

1. CASEWORK CONSTRUCTION – STANDARD FISHER HAMILTON CABINETRY
2. BASE MOLDING – BY OTHERS
3. COUNTERTOPS – 1" THICK EPOXY RESIN COUNTERTOPS WITH 4" HIGH CURBS WHERE INDICATED – 12" CURBS AT SINKS ALL EPOXY COUNTERTOPS TO HAVE MARINE EDGE EXCEPT WHERE NOTED
4. GIBSON REPRESENTATIVE TO FIELD VERIFY ALL BUILDING CONDITIONS PRIOR TO FABRICATION
5. KEYING REQUIREMENTS – NEEDED BEFORE PROJECT CAN BE ORDERED
6. ADDITIONAL PIPING, WIRING, CONDUIT, DRAIN LINES, TRAPS, AND FINAL CONNECTIONS BY OTHERS

-ADVISORY NOTE-

THE ABOVE FINISH SELECTIONS MUST BE MADE IN ORDER FOR CASEWORK/COUNTERTOPS TO BE RELEASED FOR MANUFACTURING. DUE TO MANUFACTURING SCHEDULING, CHANGES MADE AFTER CASEWORK/COUNTERTOPS HAVE BEEN RELEASED, MAY CAUSE DELAYS IN DELIVERY TIME AND/OR ADDITIONAL EXPENSE.

PROJECT INFORMATION

GIBSON PROJECT #: JB6228
FH OOR #:
SALES MANAGER: JIM BRODERICK
PROJECT MANAGER: FRANK NYKEIL
DRAWN BY: PAG

ARCHITECT

IDC ARCHITECTS
200 CORPORATE CENTER DRIVE
SUITE 200
PITTSBURGH, PA 15108

CONTRACTOR

ReARCH COMPANY
30 COMMUNITY DRIVE
SOUTH BURLINGTON, VT 05403

SHIP TO ADDRESS

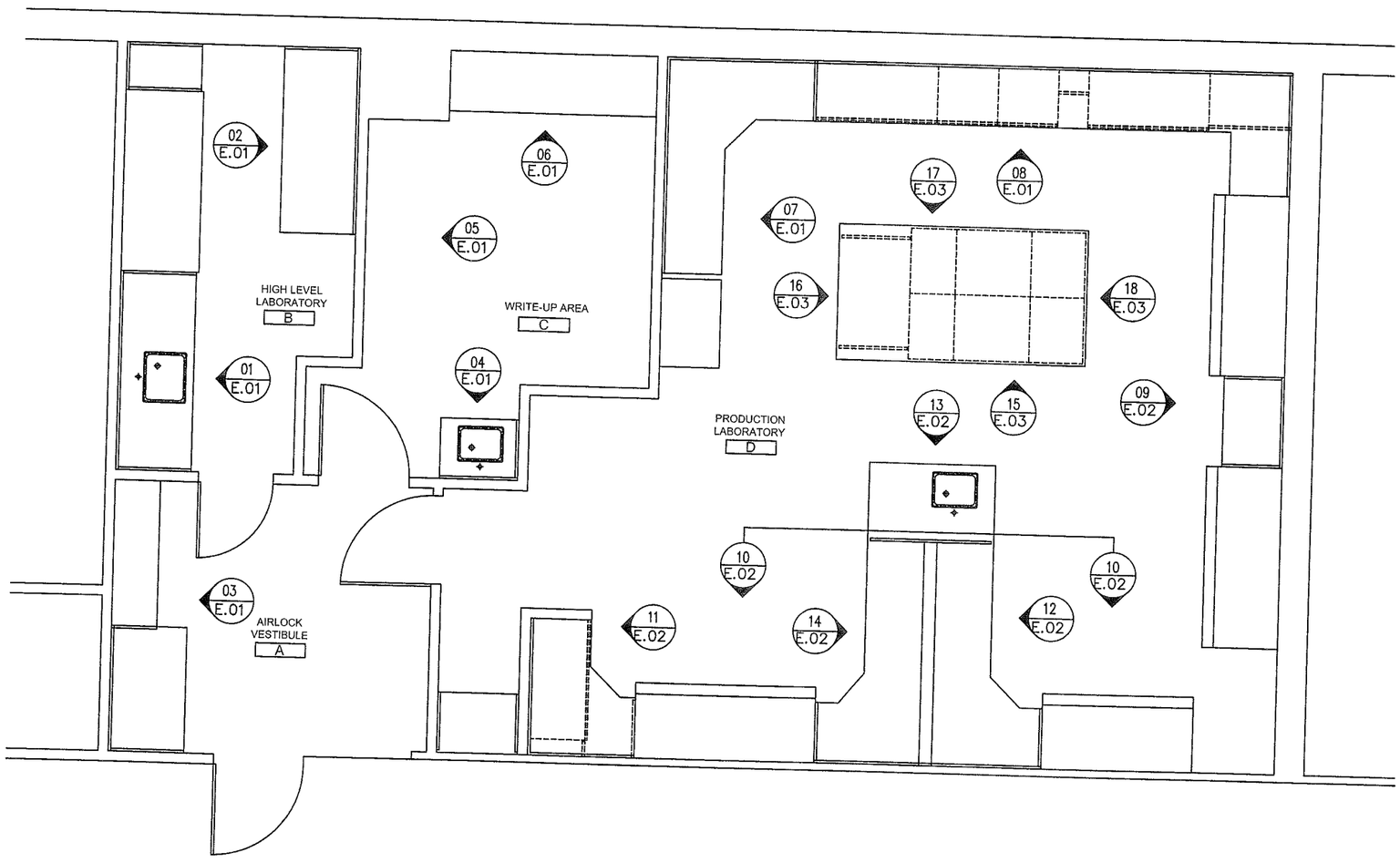
UNIVERSITY VERMONT
DELEHANTY HALL
180 COLCHESTER AVE.
BURLINGTON, VT 05405

ATTN: GIBSON FOREMAN

LIST OF DRAWINGS:

SHOP DRAWING SUBMITTAL:

01-25-08	APPROVAL SET
02-11-08	REVISED SET
3-06-08	CONSTRUCTION SET



Gibson
Associates, Inc.
Laboratory Furniture Solutions

325 BOSTON POST ROAD
SUDBURY, MA 01778

TELEPHONE: 978-443-8180
FAX (DESIGN): 978-443-0928
FAX (SALES): 978-443-7497

DRAWING ADVISORY:

THIS PRINT IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON THE EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY OR MANNER THAT MAY BE DETRIMENTAL TO THE INTERESTS OF GIBSON ASSOCIATES INC. AND/OR FISHER HAMILTON SCIENTIFIC INC.

ROUGHING-IN ADVISORY:

ROUGHING-IN DRAWINGS ARE OF AN ADVISORY NATURE ONLY, TO BE USED AS A GUIDE BY THE MECHANICAL CONTRACTOR TO EFFECT ROUGH-IN THAT WILL BE WITHIN SUCH PORTIONS OF THE CABINET AREA, TO ALLOW FOR ACCESS TO SHUT-OFFS, TRAPS, SERVICE LINES AND ELECTRICAL JUNCTION BOXES. NOTE, THESE ROUGH-IN DRAWINGS SHALL NOT BE CONSIDERED AS AN AUTHORITY TO MAKE ANY CHANGES IN MECHANICAL OR ELECTRICAL CONTRACTS OR SUB-CONTRACTS ALREADY HELD BY THOSE DOING WORK FOR THE OWNER AND FURTHERMORE, VARIANCES FROM THE ROUGHING-IN SHOWN MADE NECESSARY BY BEAMS OR OTHER BUILDING CONDITIONS SHALL IN NO WAY BE CONSIDERED A LIABILITY RESULTING FROM THE PREPARATION AND SUBMISSION OF THESE DRAWINGS.

GENERAL NOTES FOR FREE AREA ROUGHING-IN:

1. AREA SHOWN CROSS HATCHED WITHIN EACH ITEM IS FREE AREA. SLEEVES FOR SERVICES MUST BE LOCATED WITHIN THIS AREA SO AS TO NOT CONFLICT WITH LAB FURNITURE.
2. PLUMBER, ELECTRICIAN AND HVAC CONTRACTORS ARE TO CO-COORDINATE ARCHITECT'S SPECS AND MECHANICAL DRAWINGS WITH FISHER HAMILTON DRAWINGS FOR SERVICES REQUIRED WITHIN EACH ITEM AND LOCATION.
3. ROUGHING-IN LOCATIONS FOR ITEMS N.I.C. ARE NOT SHOWN ON THESE DRAWINGS.
4. ELEVATION I.D. SYMBOL MEN:

Elev. # / Sheet #

NOTES:

1. DIMENSION CHANGE TO UTILIZE STANDARD CASEWORK MODULARITY
2. SHELVING SUPPORT CHANGE TO BETTER THE STABILITY IN SHELVING OF THIS LENGTH, USING END BRACKETS AT THESE LENGTHS MAY CAUSE SAGGING OF SHELF.

FURNITURE FOR TECHNICAL ENVIRONMENTS MANUFACTURED BY
FISHER HAMILTON SCIENTIFIC
TWO RIVERS, WISCONSIN 54241

UVM

DELEHANTY HALL

BURLINGTON, VT

DRAWN BY: PAG	REVISED:
SCALE: 1/2" = 1'-0"	REVISED:
DATE: 1-25-06	REVISED:
REVISED: 2-11-06	REVISED:
REVISED: 3-06-06	REVISED:

- ○ PRELIMINARY DESIGN SET
- ◉ APPROVAL SET
- ○ CONSTRUCTION SET
- ○ FILE / RECORD SET

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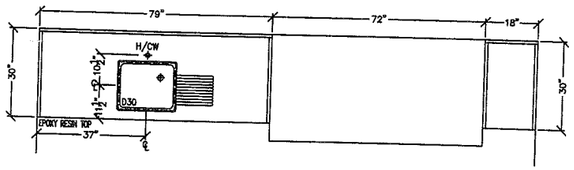
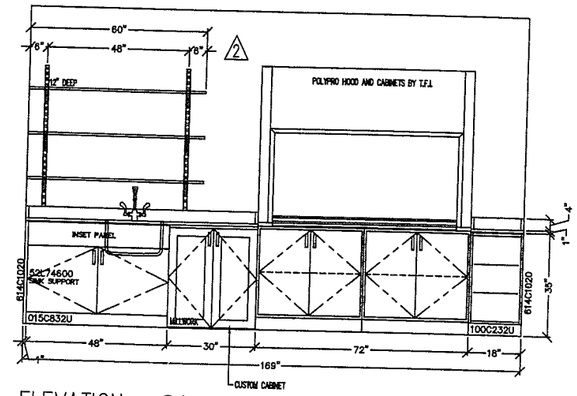
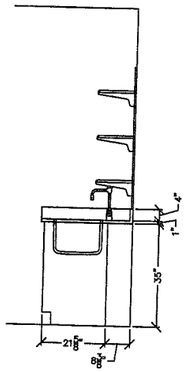
PROJECT NO.	DRAWING NO.
JB6228	FP.01







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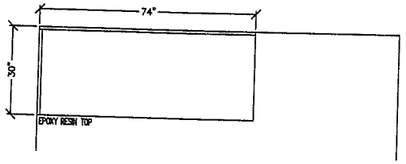

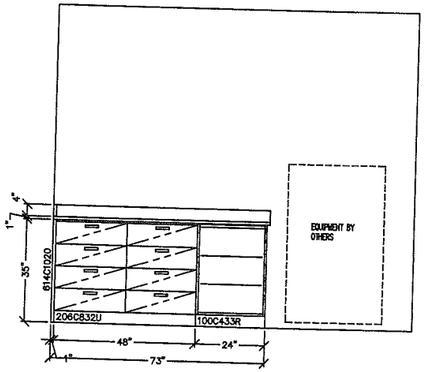

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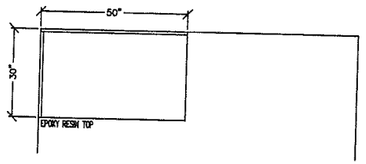

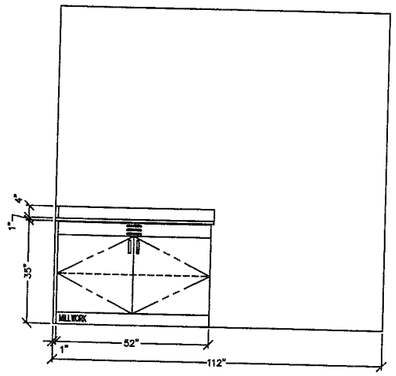

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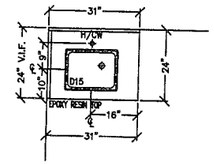

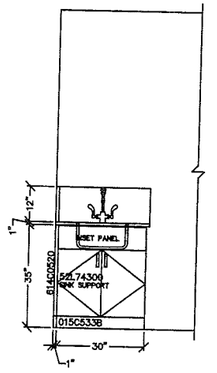

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ELEVATION NOT REQUIRED

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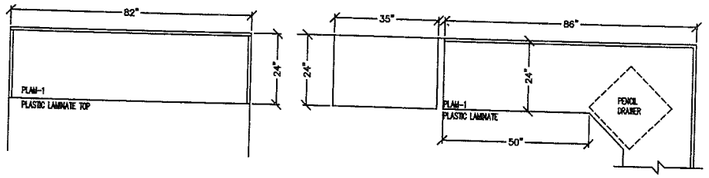

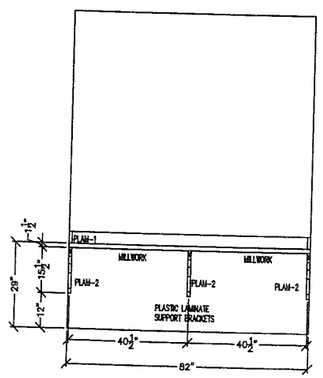

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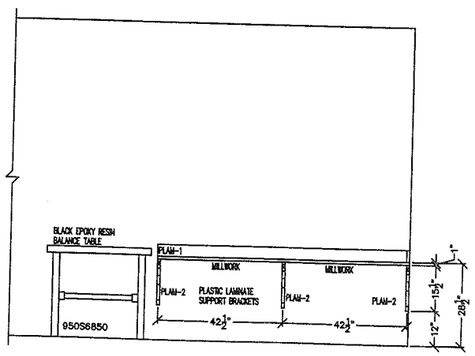

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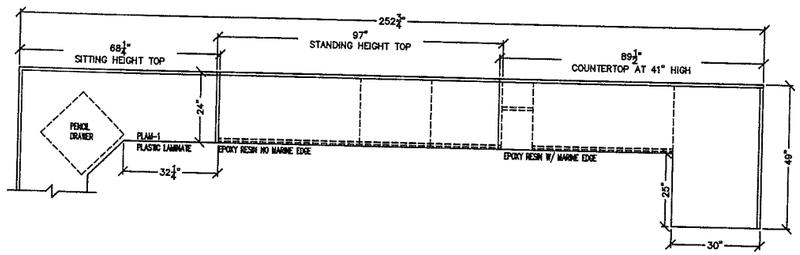

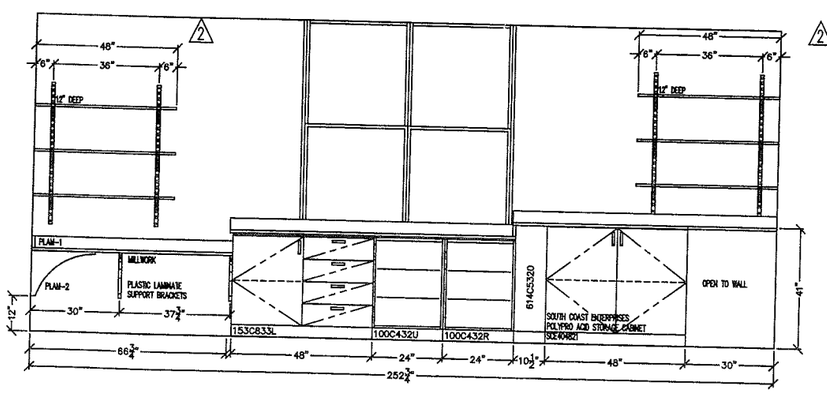

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UVM

DELEHANTY HALL

BURLINGTON, VT

DRAWN BY: PAG	REVISED:
SCALE: 1/2" = 1'-0"	REVISED:
DATE: 1-25-08	REVISED:
REVISED: 2-11-08	REVISED:
REVISED: 3-06-08	REVISED:

- ○ PRELIMINARY DESIGN SET
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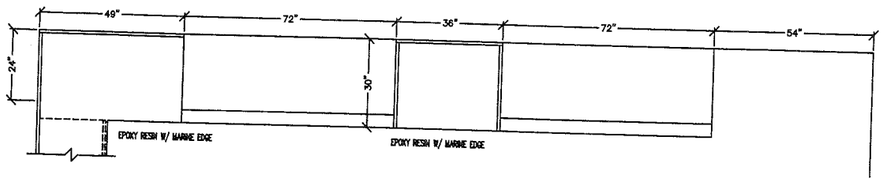
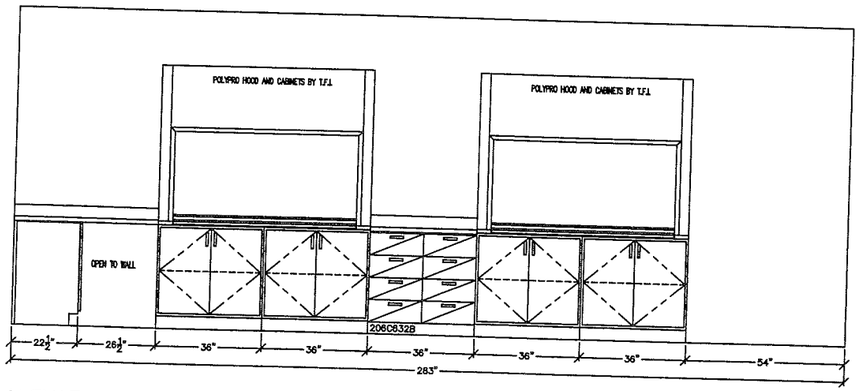
PROJECT NO. JB6228	DRAWING NO. E.01





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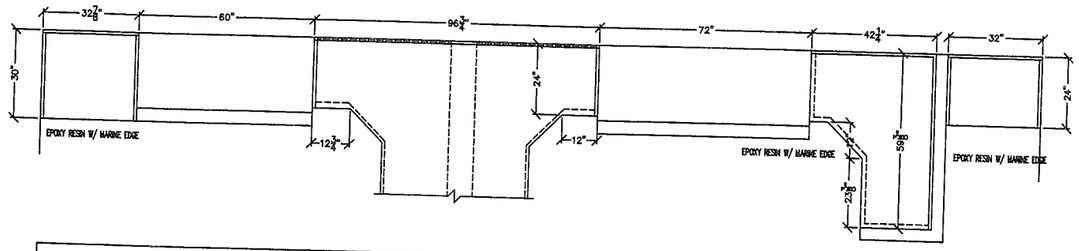

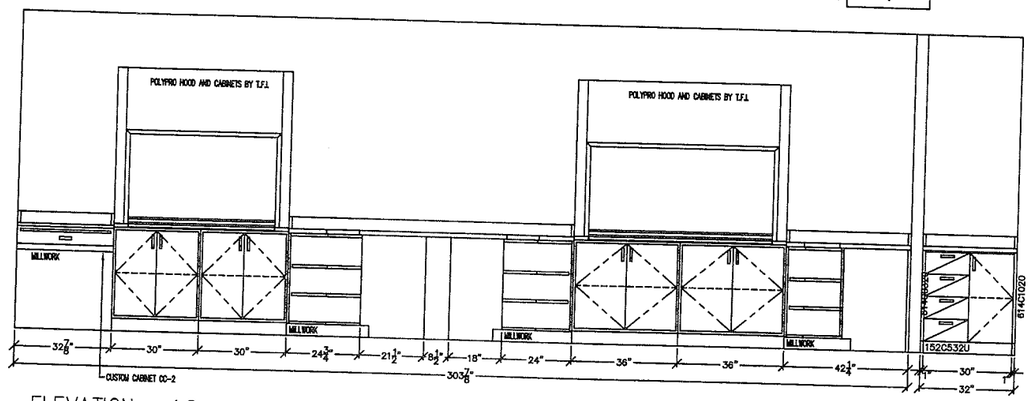

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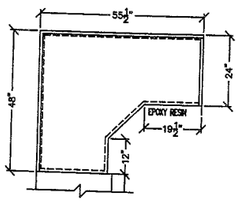

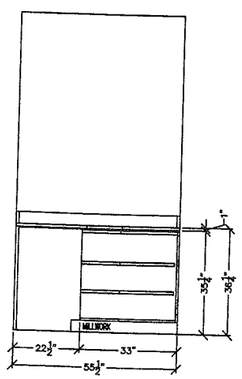

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Room: D Sec.: 01
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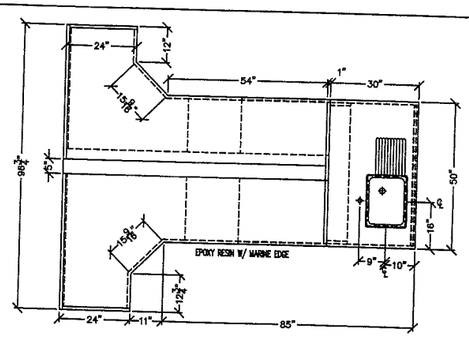

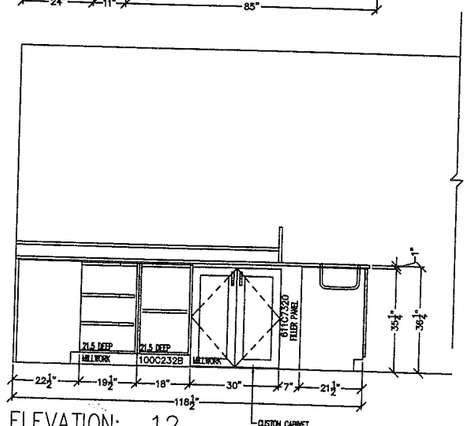

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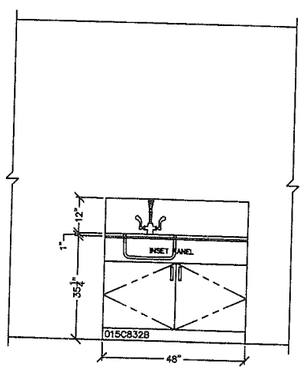

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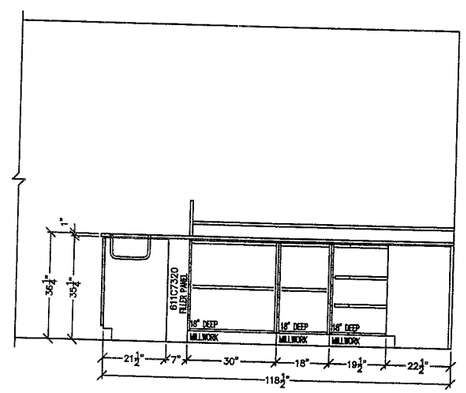

ELEVATION: 14
Room: D Sec.: 01
Qty.: 1 Arch. Ref.:

Gibson Associates, Inc.
Laboratory Furniture Solutions
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TELEPHONE: 978-443-8160
FAX (DESIGN): 978-443-0928
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3. ROUGHING-IN LOCATIONS FOR ITEMS N.I.C. ARE NOT SHOWN ON THESE DRAWINGS.
4. ELEVATION I.D. SYMBOL KEY:

Elev. #
Sheet #

NOTES:

1. DIMENSION CHANGE TO UTILIZE STANDARD CASEWORK MODULARITY
2. SHELVING SUPPORT CHANGE TO BETTER THE STABILITY IN SHELVING OF THIS LENGTH. USING END BRACKETS AT THESE LENGTHS MAY CAUSE SAGGING OF SHELF.

FURNITURE FOR TECHNICAL ENVIRONMENTS MANUFACTURED BY
FISHER HAMILTON SCIENTIFIC
TWO RIVERS, WISCONSIN 54241

UVM

DELEHANTY HALL

BURLINGTON, VT

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