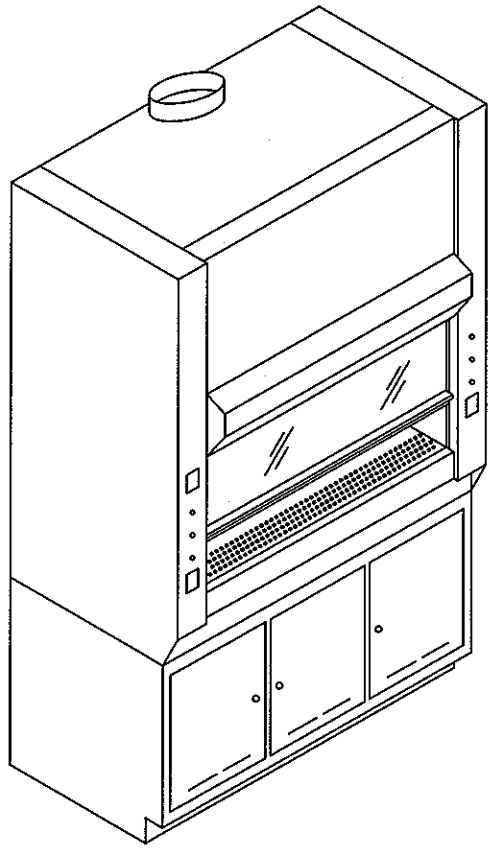
OPERATION AND MAINTENANCE MANUAL

PLASTIC LAMINAR FLOW FUME HOOD

PART # - ID-CB-72-LFH
SERIAL # - ID-334
JOB # - 9498
CUSTOMER - GIBSON
PROJECT - UNIVERSITY OF VERMONT



INLINE DESIGN CORP.

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

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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.

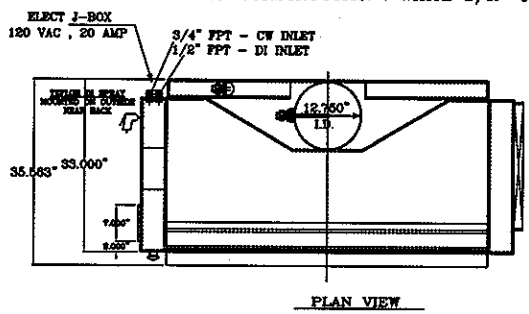
   To remove the motor, the impeller must first be removed. Disconnect electrical supply lines to the motor, noting the proper connections. Unbolt the motor from the vibration isolators and remove. Assembly is the same in the reverse order . Check to insure that the shaft and the impeller are not rubbing 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)

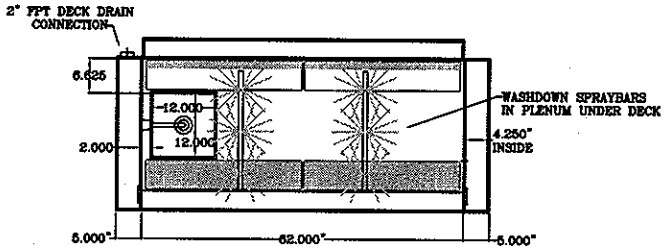
10. This hood is equipped with an optional manual plenum washdown system. There are two manifolds under the work deck, and two spray bars in the exhaust plenum. They should be inspected on a regular basis to insure that clogging does not occur and that they are operating properly. They are all connected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

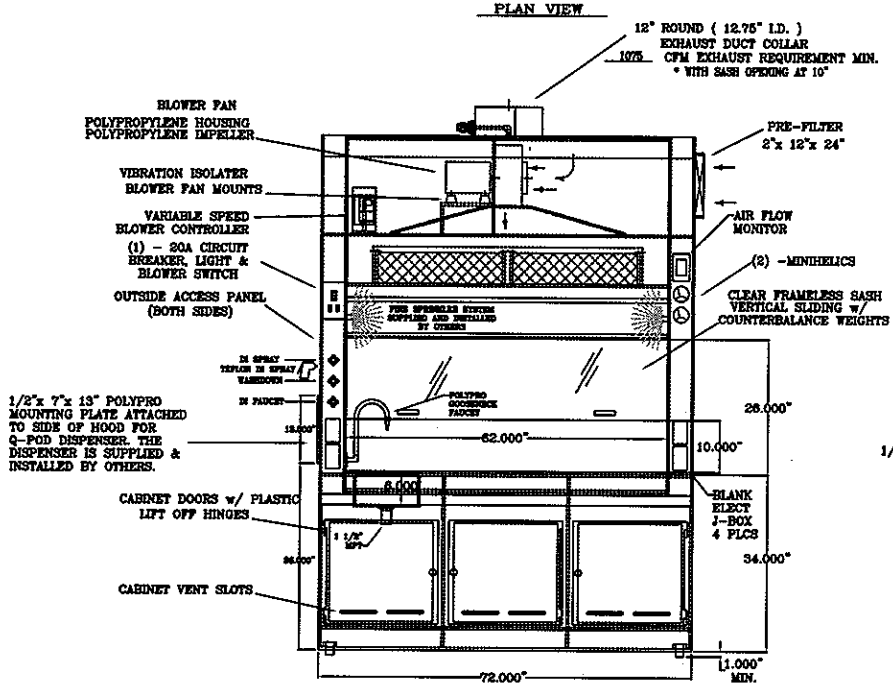
GENERAL ARRANGEMENT

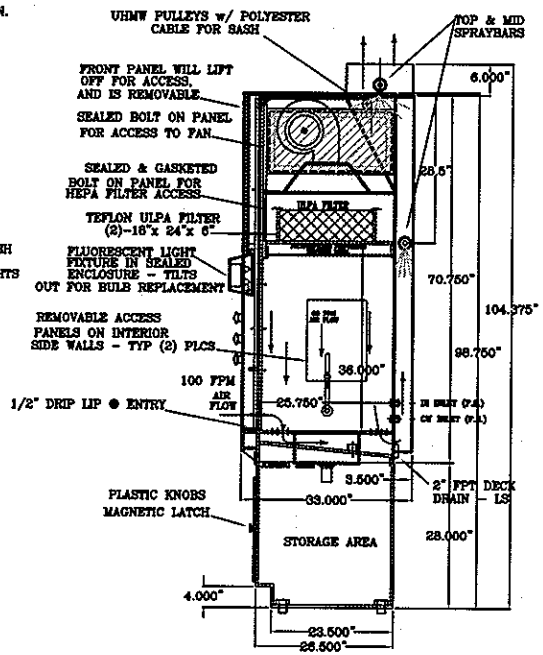


PLAN VIEW



DECK LAYOUT





PROJECT : UNIVERSITY OF VERMONT
HOOD # : VLF-FH-5
ELEVATION : LOW LEVEL ACID HOOD

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

ADD ON OPTIONS :
1 - 12" x 12" x 6" 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, 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 -

THE INFORMATION ON THIS DRAWING IS PROPRIETARY, AND IS NOT TO BE DUPLICATED OR DIVULGED WITHOUT THE WRITTEN CONSENT OF TPI / INLINE DESIGN
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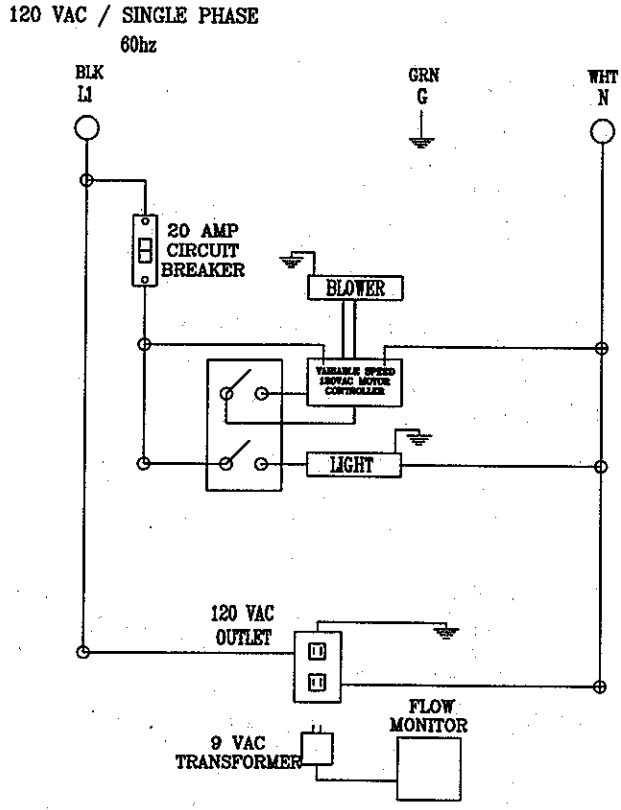
D	MISC REVISIONS AS PER CLIENT LIST	GJ	2-5-08
C	MISC REVISIONS AS PER CLIENT LIST	GJ	1-30-08
B	MISC REVISIONS AS PER CLIENT LIST	GJ	1-25-08
A	CHANGED MATERIAL OF CONSTRUCTION	GJ	1-15-08
	CHANGED PIPING MATERIAL FOR GAS SERVICE		

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

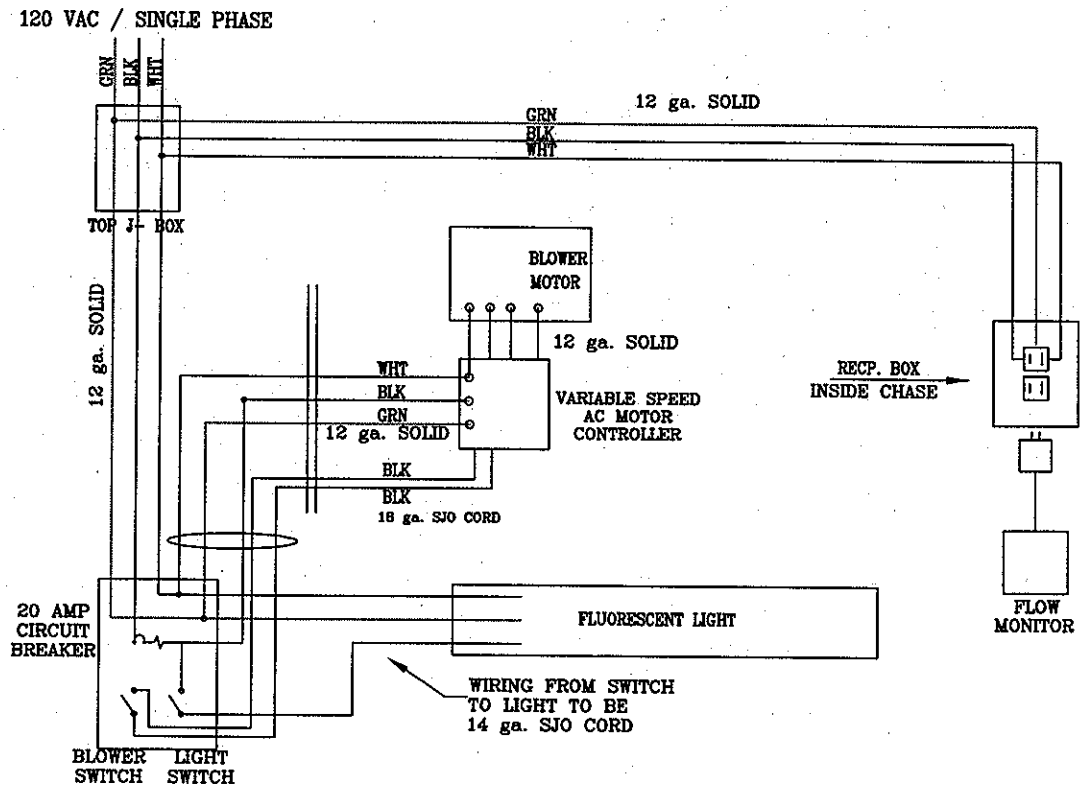
GIBSON ASSOCIATES

6' POLYPROPYLENE LAMINAR FLOW FUME HOOD

DRAWN BY	GJ	SCALE 1/12	DATE 11-17-07
APVD		DWG #	LC-380-01-FH5

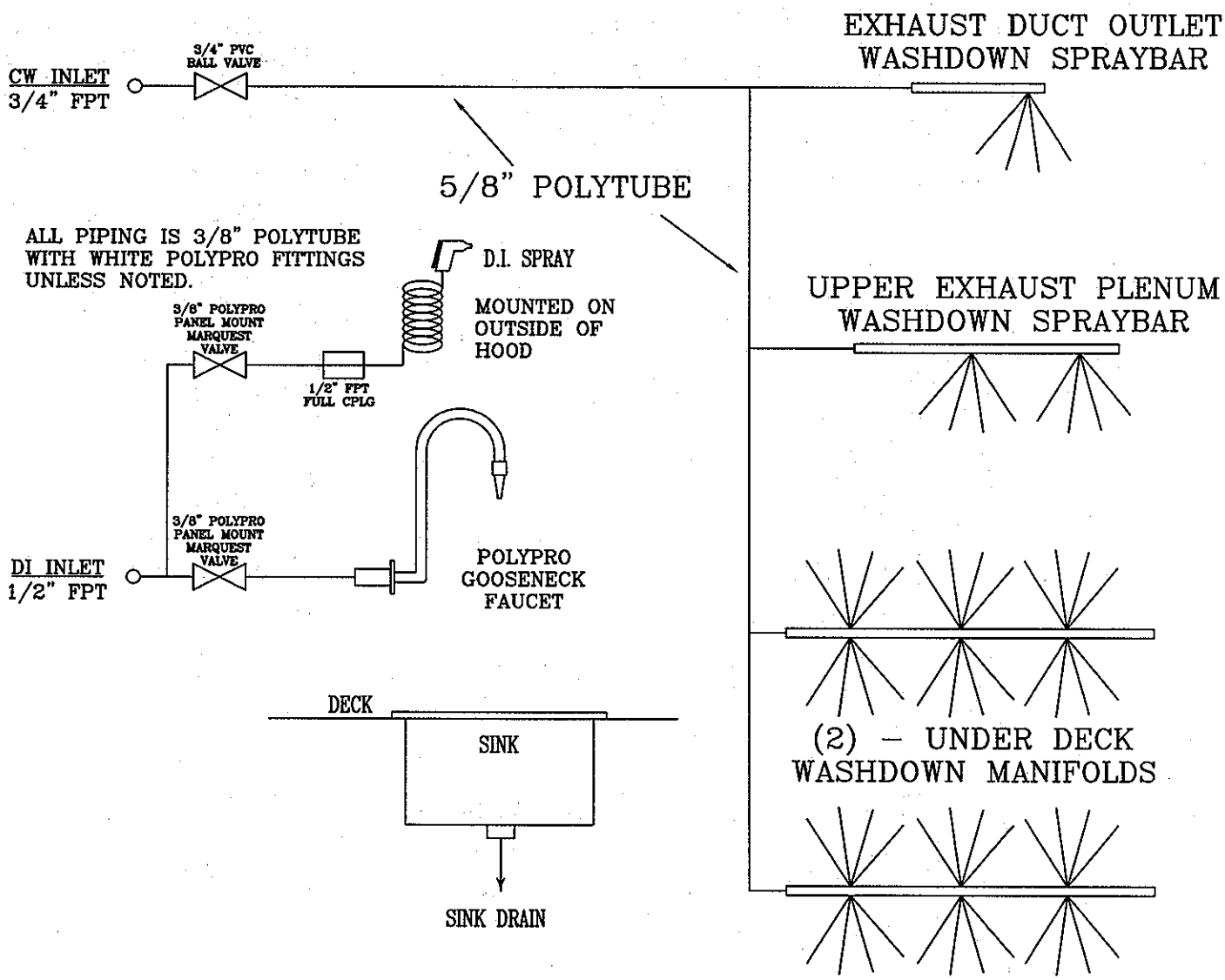


VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING DIAGRAM



VERTICAL LAMINAR FLOW CLEAN BENCH - WIRING COLOR CODE

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



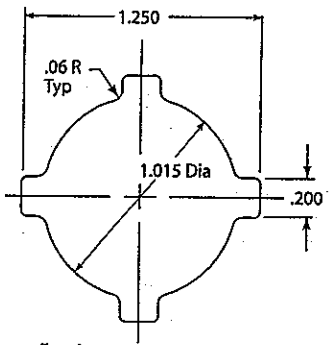
ELF - FH1, FH4 & FH5 - PIPING DIAGRAM

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.

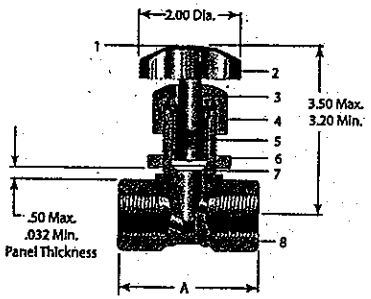
Panel thickness of .032" to .50" is the accepted range.



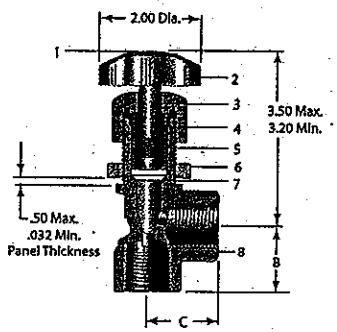
Dimensions/Inches

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.

MARQUEST SCIENTIFIC
Fluid Handling Products

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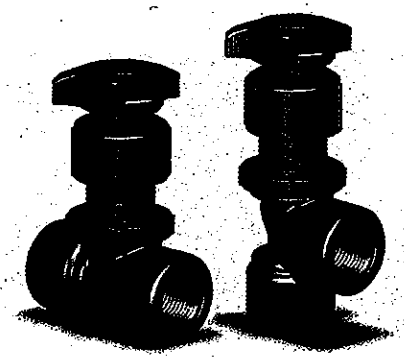
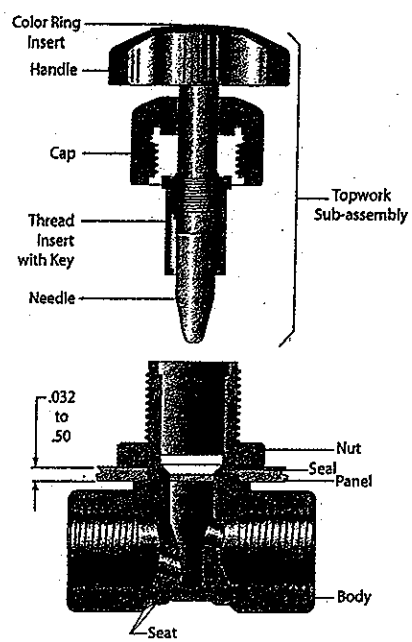


Throttle Master™ NEEDLE VALVES

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 other piping components.

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.

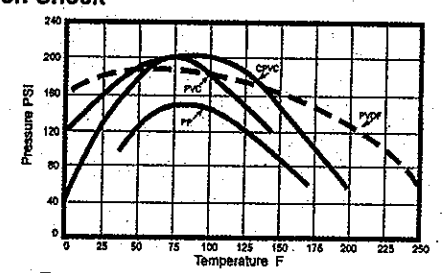
This stability, low friction, and high sealing effectiveness, provides an almost unlimited life potential in this component - the small wear can be taken up by simple tightening of the cap.

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.

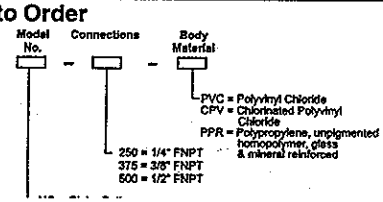
Pressure/Temperature Range Non-Shock

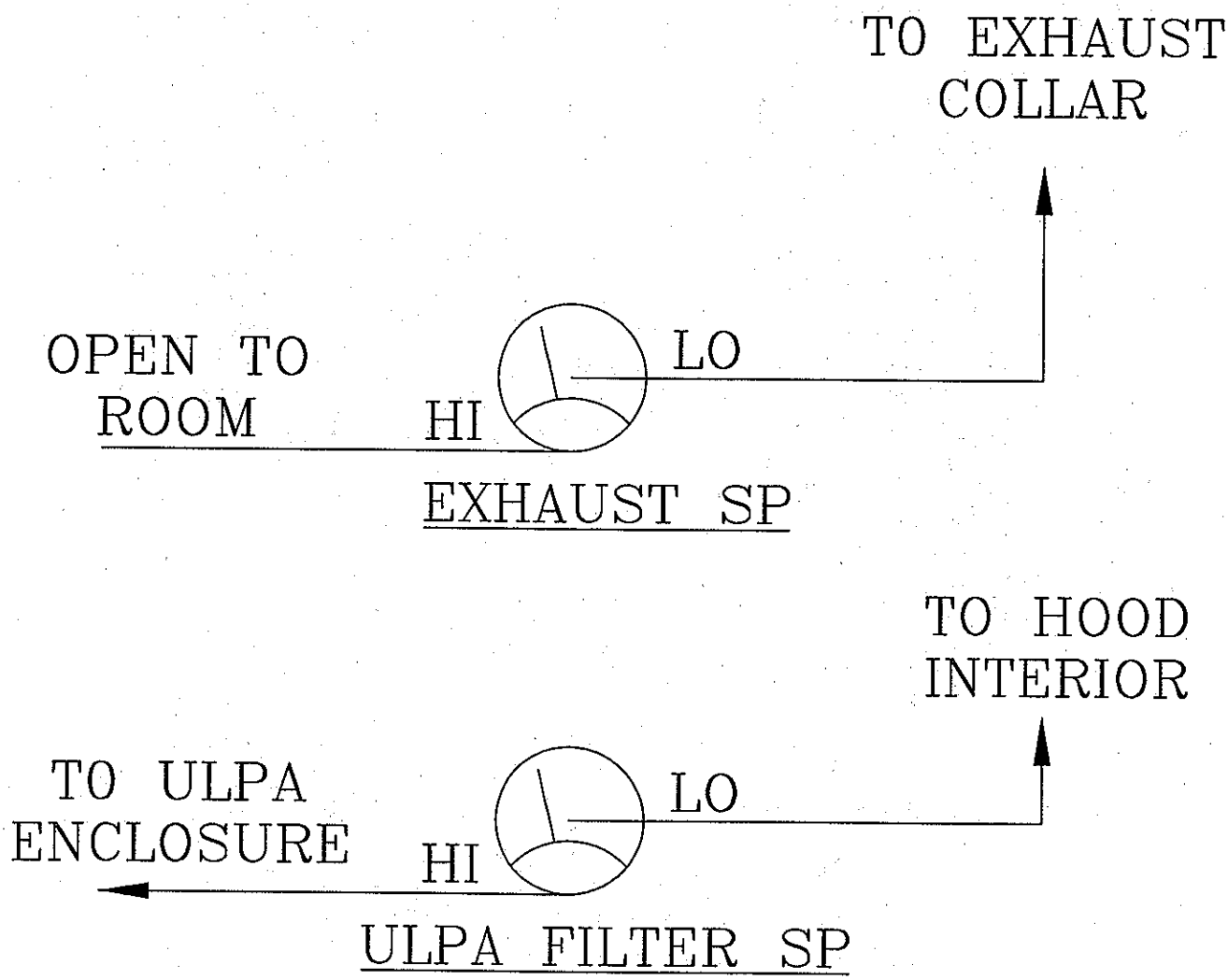


Flow Data

	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





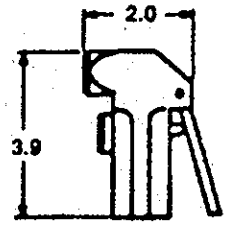
MINI HELICS

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

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

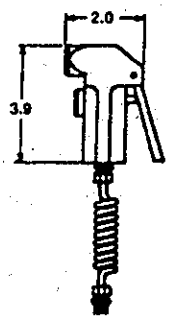
Part No.	Description
SG-103	Standard spray gun with 1/2" FNPT inlet thread.
SG-102	Spray gun with 3/8" FNPT inlet thread.
SG-101	Spray gun with 1/4" FNPT inlet thread.
SG-100	Spray Gun with 29/32"-16 inlet thread.*

* 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.

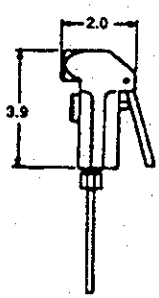


SG-100, SG-101, SG-102, SG-103

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	–



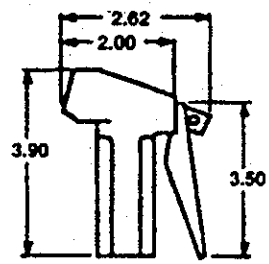
SG-206



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

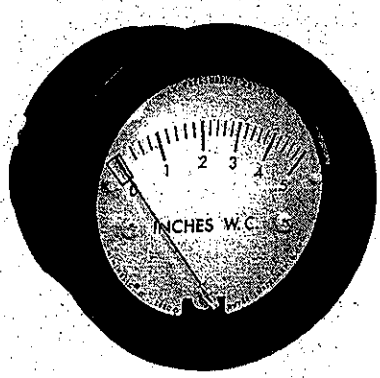
Assemblies Part No.	Gun	Hose Assy.
RC-104	RC-103	RC-1
RC-105	RC-103	RC-3
RC-106	RC-103	RC-5

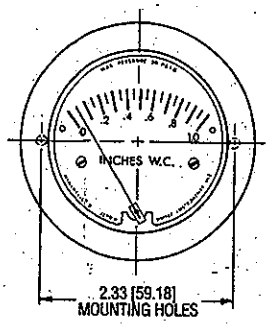
RC-104

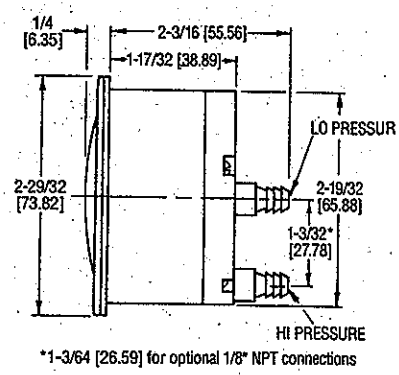
RC-106

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) x 2- 7/16" (61.93 mm).
Weight: 6 oz. [170 gr].
Rated Total Pressure: 50 psig (3.445 bar) surge; 30 psig (2.067 bar) continuous to either pressure connection.
Ambient Temperature Range: 20°F to 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, polycarbonate 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) panel 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.
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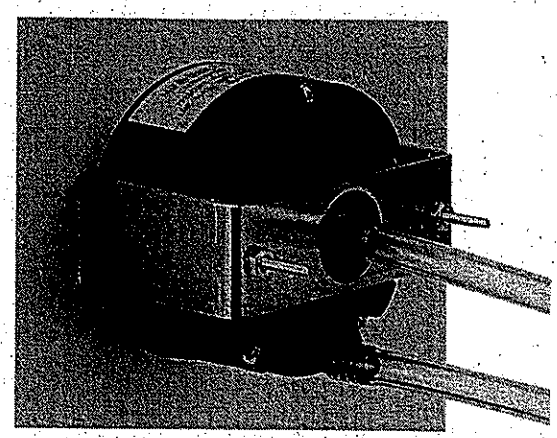

PANEL MOUNTED INSTALLATION

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.

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P.O. BOX 373 • MICHIGAN CITY, IN 46361, U.S.A.
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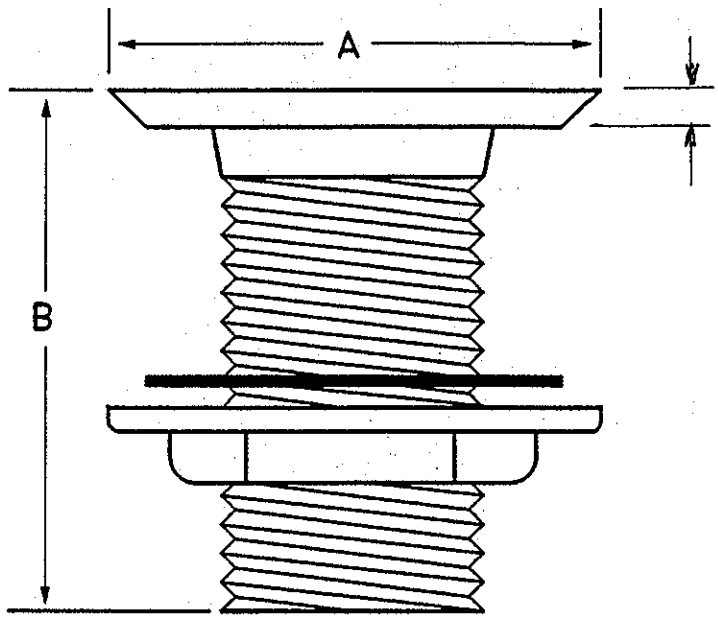
SCIENTIFIC PLASTICS COMPANY, Inc.

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	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 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

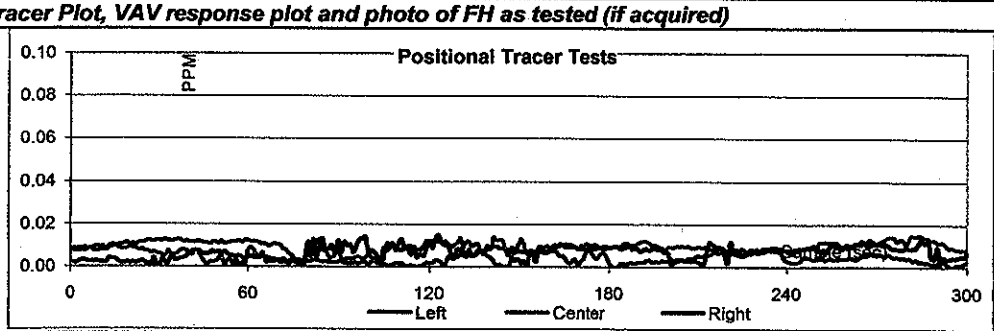
	20 second averages, fpm								Max	Avg.
Vertical	6	5	8	8	5	3			8	6
Horizontal	7	10	4	3	6	9			10	7

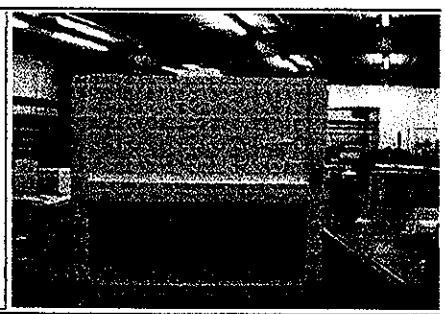
6) Tracer Gas Tests (5m. runs, 3xSE rep./center position)

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	1400	Ane	1372	Ane	NA	DMM	1461	IR	402	Factor	15.3

vvvv

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

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

X3

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 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:

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

Signature:
Test By: Mike Tester

Initials MAT 29 mar08

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

Airborne Nonviable Particle Count Test

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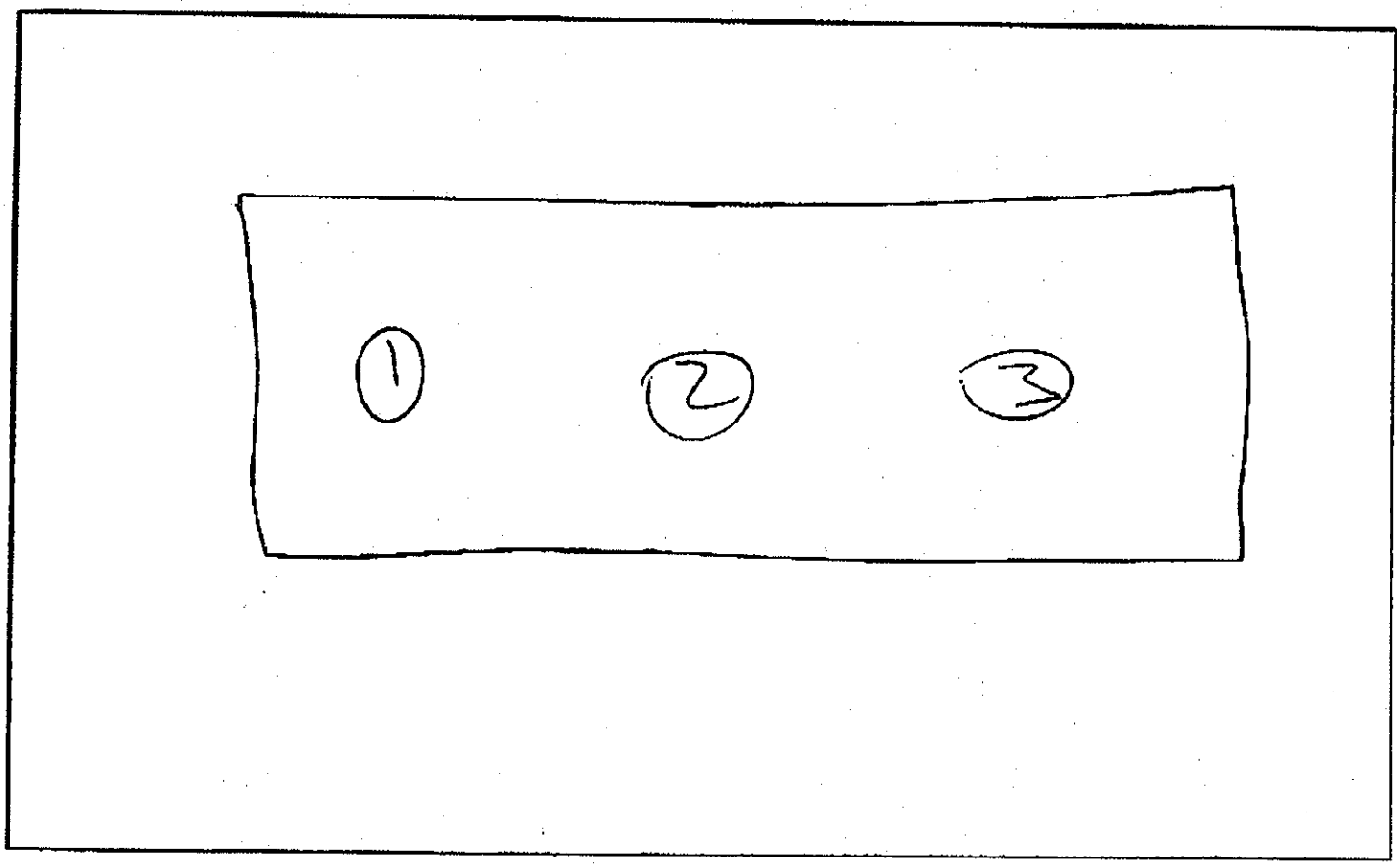
Diagram:



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

Signature:
Test By: Mike Tester

Initials Mar 29mar08
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:	***855160996***
Camfil Farr Sales Order Number:	***817190***
Camfil Farr Serial Number:	***B544678-002***
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***

H. Esen

Halime Esen
Quality Assurance Department

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

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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:	***B544679-003***
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

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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#: 334 .
Hood Size/Style: 6'-m ELF 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: RM_____ .

Manufacturers Product Warranty Polypropylene Hoods and Casework

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 period of Twenty Four months after date of delivery, that all products shall be free 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 the 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 PARAGRAPH 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 PURPOSE THE PURCHASER EXPRESSLY AGREES THAT TFI/INLINE DESIGN 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 for 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.